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Counterfactual reasoning and knowledge of possibilities

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Abstract Williamson has argued against scepticism concerning our metaphysically modal knowledge, by arguing that standard patterns of suppositional reasoning to counterfactual conclusions provide reliable sources of correct ascriptions of possibility and necessity. The paper argues that, while Williamson's claims relating to necessity may well be right, he has not provided adequate reasons for thinking that the familiar modes of counterfactual reasoning to which he points generalise to provide a decent route to ascriptions of possibility. The paper also explores another path to ascriptions of possibility that may be extracted from Williamson's ideas, before briefly considering the general status of counterfactual reasoning in relation to our knowledge of possibilities.

Keywords Modal epistemology · Possibility · Counterfactuals · Suppositions · Knowledge · Williamson

1 Introduction

We know that it is not just true that $2 + 2 = 4$, but that it could not be false that $2 + 2 = 4$; and we know that, although there are currently over 7 billion people living on the surface of this planet, there could have been under 3 million. The proposition that $2 + 2 = 4$ is thus *metaphysically necessary*, while the proposition that there are under 3 million people living on the earth at the current time is *metaphysically possible*. How do we get our knowledge that certain propositions are not just actually true but necessary? And how do we get our knowledge that certain propositions which are actually false yet could have been true?

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In relatively recent work, Williamson has sought to shed light on our ascriptions of the metaphysical modalities.[1] He suggests that philosophical appeals to, say, intuition as a source of our beliefs about (metaphysical[2]) possibility and necessity arise from a failure to see the wider context within which our thoughts about the metaphysical modalities take place, and that they thereby make our claims to metaphysically modal knowledge seem needlessly shady. Rather, he argues, 'the ordinary cognitive capacity to handle counterfactual conditionals carries with it the cognitive capacity to handle metaphysical modality' (Williamson 2007b, 136).

The following two sections present Williamson's views in more detail. Section 2 presents some background materials relating to the epistemology of counterfactuals and their negations, while Sect. 3 explains how Williamson extends those materials to generate ideas relating to our ascriptions of the metaphysical modalities. Sections 4 and 5 argue against Williamson's claim to have drawn the sting from scepticism about our knowledge of what is metaphysically possible, by having shown that the reliability of certain forms of argument leading to ascriptions of possibility is a mere corollary of the reliability of a more general pattern of reasoning that we habitually employ in support of denials of counterfactual conditionals.

Section 6 then explores another potential route to ascriptions of possibility that is easily extracted from Williamson's ideas. Section 7 concludes: it suggests that, while counterfactual reasoning doubtless has crucial roles to play in extending our prior knowledge of possibilities, the amount of philosophical light that it can shed upon our knowledge of possibility in general is limited.

2 Williamson on counterfactual knowledge

Suppose that one wishes to assess whether, if A were to be the case, B would be too ('$A \mathrel{\Box\!\!\rightarrow} B$'). Williamson notes that one might 'schematise a typical overall process of evaluating a counterfactual conditional thus: one supposes the antecedent and develops the supposition… To a first approximation: one asserts the counterfactual conditional if and only if the development eventually leads one to add the consequent' (Williamson 2007b, 152–153).

But, as Williamson remarks, this schematisation oversimplifies things somewhat, because we often rehearse a variety of scenarios in which the antecedent of a given counterfactual conditional obtains. We may consider various different scenarios in which the antecedent holds good, yet which are all pretty close to actuality, checking to see whether the consequent continues to obtain under those slight variations in the initial conditions. 'Robustness in the result under such minor perturbations supports a higher degree of confidence' (Williamson 2007b, 153) in the truth of the relevant counterfactual conditional, by suggesting that the

[1] See, in particular, Williamson (2007b), chapter 5; see also his (2007a). It is clear that any proposition that is actually true is possible, so there are many ascriptions of possibility that are not remotely mysterious; the interesting cases feature propositions that are not believed actually to be true.

[2] I will simply talk of 'possibility' and 'necessity' from this point onwards.

consequent flows from the antecedent in a relatively wide range of possible circumstances.

Suppose that, after running through a range of iterations of the above process using the propositions *A* and *B*, we find that our developments of initial supposition *A* are not tending to yield *B*. We can hardly immediately conclude that it is false that, if *A* were to be the case, *B* would be too. Maybe we have not sufficiently explored the counterfactual consequences of *A*, for instance; or maybe we lack some item of relevant background knowledge that would lead us to see a connection between *A* and *B* (Williamson 2007b, 153). The process of exploring the counterfactual consequences of initial suppositions thus does not lead as straightforwardly to denials of counterfactual conditionals as it does to their assertions.

But, while we often cannot be *certain* that some version of the foregoing process would not eventually lead us from initial supposition *A* to proposition *B*, Williamson holds that the process nonetheless commonly does put us 'in a position to deny counterfactual conditionals' (Williamson 2007b, 155). He appeals to a nice analogy with the denials of existential claims: we may be in a position to deny that there are *F*s even though we are not *certain* that our search for *F*s has been exhaustive (Williamson 2007b, 154).

Williamson notes that we draw upon an impressive array of cognitive resources when evaluating counterfactual conditionals using the processes just described. So, one of the most striking aspects of our engagement with counterfactuals is the role that our imaginations play in relation to our evaluations of them. (If I want to figure out what would happen if someone were to drop a tennis ball from some window, for instance, I might rehearse visual mental imagery that shows the course, and then the aftermath, of a tennis ball's descent from the window[3].) But there are all sorts of other tools that we may use in the course of counterfactual thought: we may employ mathematical reasoning, for instance, or we may draw upon the fruits of scientific discoveries that other people have communicated to us.

The flexibility and power of the mental resources that we bring to bear upon counterfactual conditionals are unsurprising, given the importance of the latter to 'empirical thought in general'; our concern with counterfactuals is closely linked to our concern with causal connections, for instance, and to the scientific enterprise of uncovering natural laws (Williamson 2007b, 140–141). Indeed, the significant roles played by counterfactual conditionals and their negations in relation to numerous aspects of empirical thought mean that '[o]ur overall capacity for somewhat reliable thought about counterfactual possibilities is hardly surprising' (Williamson 2007b, 137); they mean, too, that it would be impossible to stop a generally sceptical attitude towards our supposed knowledge of counterfactual matters from metamorphosing into an unacceptably strong scepticism about many further aspects of empirical thought (Williamson 2007b, 141).

[3] Williamson—rightly, I think—resists the claim that these sorts of uses of visual mental imagery posit 'the presence of [an] observer [as] part of the content' of the relevant imaginative acts (2007b, p. 149); see Gregory (2010, 2013) for a detailed account of the nature of the contents of visual mental images which bears out this point.

In the light of all that, let's follow Williamson in assuming that 'we have non-trivial knowledge' of counterfactual conditionals and their negations (Williamson 2007b, 141). More specifically, let's assume that our armoury of familiar methods for teasing out the counterfactual consequences of initial suppositions is pretty reliable, and that it commonly leads us to know that substantive counterfactual conditionals are true. And let's also assume—most crucially, for what follows—that we are indeed often 'in a position to deny counterfactual conditionals', because we are often in a position to be confident that our own inability reliably to reach a counterfactual conditional's consequent, when exploring the counterfactual consequences of its antecedent, reflects the lack of a counterfactual connection between the two claims, rather than just shortcomings in our investigations.

3 Williamson on modal knowledge

The previous section did not touch directly upon our beliefs concerning whether propositions are possible or necessary. But Williamson argues that the points about counterfactual knowledge just rehearsed can swiftly be brought to bear upon the latter, once we invoke the following two principles:[4]

$$(A)\ \Box(A \rightarrow B) \rightarrow (A \Box\!\!\rightarrow B)$$

$$(B)\ (A \Box\!\!\rightarrow B) \rightarrow (\Diamond A \rightarrow \Diamond B)$$

For (A) and (B), in tandem with a few moves employing elementary modal and propositional logic, are known to generate a range of 'necessary and sufficient conditions for necessity and possibility in terms of the counterfactual conditional' (Williamson 2007b, 156).[5] More specifically, take some contradiction $\bot$.[6] Then, using (A) and (B), we get:

$$(\mathrm{Nec}_{\bot})\ \Box A \leftrightarrow (\neg A \Box\!\!\rightarrow \bot)$$

$$(\mathrm{Poss}_{\bot})\ \Diamond A \leftrightarrow \neg(A \Box\!\!\rightarrow \bot)$$

Moreover, the status of $\neg A$ as contradictory to A means that we have[7]:

[4] Lowe objects to Williamson's use of (A), as Lowe holds that '$A \Box\!\!\rightarrow B$' is equivalent to '$(\Box(A \rightarrow B)\&(\Diamond A \vee \Box B))$' (Lowe 2012, 9). While Lowe's alternative account of the counterfactual conditional avoids certain troublesome implications of the more standard approach employed by Williamson—such as the need to regard counterfactuals with impossible antecedents as vacuously true—it faces issues of its own: for any impossible proposition A, for instance, Lowe has to deny that $(A \Box\!\!\rightarrow A)$.

[5] See (Williamson 2007b, 156–159) for the reasoning needed to generate the equivalences.

[6] Precisely what it is for a proposition to be a 'contradiction'—whether '$0 = 1$' counts, for instance, or whether contradictions are merely substitution instances of logical falsehoods of the propositional calculus—does not really matter for what follows; the arguments below merely require that contradictions are impossible.

[7] The derivations of $(\mathrm{Nec}_{\neg A})$ and $(\mathrm{Poss}_{\neg A})$ employ the reflexivity of the counterfactual conditional along with a 'closure principle' formulated at (Williamson 2007b, 143–144).

$$(\mathrm{Nec}_{\neg A})\ \Box A \leftrightarrow (\neg A \Box\!\!\rightarrow A)$$

$$(\mathrm{Poss}_{\neg A})\ \Diamond A \leftrightarrow \neg(A \Box\!\!\rightarrow \neg A)$$

Finally, the use of propositional quantification gives the following principles, which do not play a major role in Williamson's discussion, but to the second of which I will return in this paper's penultimate section:

$$(\mathrm{Nec}_{\forall})\ \Box A \leftrightarrow \forall p(p \Box\!\!\rightarrow A)$$

$$(\mathrm{Poss}_{\exists})\ \Diamond A \leftrightarrow \exists p \neg(p \Box\!\!\rightarrow \neg A)$$

Given the first four of the above equivalences, it seems that we may use the processes of counterfactual thought considered in the previous section to arrive at ascriptions of the metaphysical modalities that tend to be correct.

So, for instance, 'by [(Nec$_{\perp}$)], we assert $\Box A$ when our counterfactual development of the supposition $\neg A$ robustly yields a contradiction; … [and by (Poss$_{\perp}$),] we assert $\Diamond A$ when our counterfactual development of the supposition A does not robustly yield a contradiction (and we do not attribute the failure to a defect in our search)' (Williamson 2007b, 163). But, given the virtues of the general processes of reasoning instanced in those cases, it may seem that we will then reliably end up with true ascriptions of necessity and of possibility. Likewise, by (Nec$_{\neg A}$), we may assert $\Box A$ 'when our counterfactual development of the supposition $\neg A$ robustly yields [A]'; and, by (Poss$_{\neg A}$), we may assert $\Diamond A$ 'when our counterfactual development of the supposition A does not robustly yield [$\neg A$] (and we do not attribute the failure to a defect in our search)'. Williamson accordingly concludes that '[g]eneral scepticism in the epistemology of metaphysical modality without general scepticism in the epistemology of counterfactuals'—what he rightly characterises as 'an extravagant scepticism' (Williamson 2007b, 178)—'is unmotivated' (Williamson 2007b, 164–165).

There are numerous questions that might be raised at this juncture. Are there reasons for rejecting the various equivalences involving the metaphysical modalities that were listed above?[8] Just how far are Williamson's ideas meant to track the methods that we actually use to arrive at ascriptions of the metaphysical modalities?[9] And, if they are hoped to provide a description of how we actually tend to reason, what sort of access are ordinary people meant to have to the equivalences that Williamson exploits?[10] But for our purposes those questions may be put aside.

[8] Lowe's rejection of (A) above—see fn. 4—leads him to reject each of the earlier equivalences, for instance.

[9] Jenkins (2008) suggests that Williamson overstates the extent to which we actually rely upon counterfactual reasoning in arriving at ascriptions of the metaphysical modalities; and Kroedel (2012) argues that empirical evidence conflicts with the claim that we generally form modal beliefs in the manner described by Williamson. Yli-Vakkuri (2013) notes that one of Williamson's main concerns is to address sceptical worries concerning our ability to acquire modal knowledge, however, and that his purported routes to modal knowledge may nonetheless be relevant to that aim.

[10] Williamson rightly rejects the idea that any of those various equivalences capture synonymy relationships, for instance (2007b, 160).

Let's allow that each of the earlier equivalences is correct. Recall, too, our previous assumption that the schematic processes of counterfactual reasoning described in the preceding section have the virtues which Williamson claims for them. Finally, I am happy to allow that we may reliably use ($\text{Nec}_{\perp}$) and ($\text{Nec}_{\neg A}$) to arrive at correct ascriptions of necessity. Against the backdrop of those various assumptions, though, just how confident should we be in basing ascriptions of *possibility* upon Williamsonian uses of ($\text{Poss}_{\perp}$) and ($\text{Poss}_{\neg A}$)?

4 Denying counterfactual conditionals

As we have seen, Williamson claims that 'our fallible imaginative evaluation of counterfactuals has a conceivability test for possibility… built in as [a] fallible special [case]': in line with ($\text{Poss}_{\perp}$), 'we assert $\diamond A$ when our counterfactual development of the supposition A does not robustly yield a contradiction (and we do not attribute the failure to a defect in our search)' (Williamson 2007b, 163). Given a proposition A which has passed that test—that is, given a proposition A for which an adequate range of developments of the supposition that A *has not* robustly yielded a contradiction—I shall say that A has passed the $\perp$-*search test*.

As also noted above, an analogous test for possibility may be based upon ($\text{Poss}_{\neg A}$): 'we assert $\diamond A$ when our counterfactual development of the supposition A does not robustly yield [$\neg A$] (and we do not attribute the failure to a defect in our search)'. A proposition which has passed that last test—that is, a proposition A for which an adequate range of developments of the supposition that A *has not* robustly yielded $\neg A$—has passed the $\neg A$-*search test*.

Here are some simple grounds on which someone might deny that we have reason to hold that a proposition's having passed one of those 'search tests' indicates its possibility. Suppose that proposition A has passed, say, the $\perp$-search test. That tells us that a satisfactory range of developments of the supposition that A has not robustly led us to a contradiction. But there might still be some contradiction $\perp$ such that $A \mathrel{\Box\!\!\rightarrow} \perp$ is *true*. For the truth of, say, $A \mathrel{\Box\!\!\rightarrow} (A \& \neg A)$ hardly itself requires that we will be able to employ our reasoning powers to reveal the counterfactual connection between A and $(A \& \neg A)$!

That response is simplistic, of course. Williamson is fully aware that there is a gap between our failure to uncover proposition B, in the course of adequately developing the supposition that A, and the falsity of the counterfactual conditional $A \mathrel{\Box\!\!\rightarrow} B$. Our failure robustly to arrive at B, in the course of satisfactorily developing the supposition that A, nonetheless surely does commonly line up with the falsity of $A \mathrel{\Box\!\!\rightarrow} B$; to claim otherwise is to invite corrosive sceptical worries about the grounds for many of our counterfactual beliefs. A mere confidence in our customary epistemic practices may thus seem to bear with it a commitment to the utility of the previous 'search tests' as guides to possibility.

That is too quick, however. The proposed uses of the search tests are indeed consonant with the manner in which we often reason to the falsity of counterfactual conditionals. But that does not in itself vindicate the envisaged uses of the tests. For it might be that, say, the counterfactual conditionals of the form $A \mathrel{\Box\!\!\rightarrow} \perp$ that we

are meant to deny, given propositions that have passed the $\perp$-search test, are relevantly different to the preponderance of those counterfactual conditionals that we are led to deny when we use analogous reasoning in other contexts. Are there any reasons for thinking that to be so?

That question is addressed in the next section. To lay the ground for that discussion, it will be worthwhile reflecting initially upon another one: why might our failure robustly to arrive at proposition B, in the course of satisfactorily developing the supposition that A, tend to indicate the falsity of $A \mathrel{\Box\!\!\rightarrow} B$? There are certain rather compelling thoughts that arise naturally in response to that question.

Suppose that you wish to assess whether, if the North Sea were suddenly to rise by 10 cm next year, the people of Rutland would swiftly demand secession from the United Kingdom. You would use certain parts of your explicit and implicit knowledge of the world in reasoning from your initial supposition: you would call upon, say, your awareness of the causal connections between slight rises in sea levels and the physical conditions prevailing in the East Midlands; of the political mood currently dominant among Rutland's populace; and of the potential interactions between the likely physical changes resulting from the North Sea's greater depth and the hopes and desires of Rutland's people.

Suppose that you use that rich array of known facts in repeatedly and diligently reasoning from the supposition that the North Sea will suddenly rise by 10 cm next year. But suppose, too, that your developments of the supposition do not robustly lead to the proposition that Rutland will quickly aim to leave the United Kingdom. Your investigations have hopefully taken into account the various factors that would be likely to connect Rutland's socio-political landscape with the hypothesised sudden rise in the North Sea's levels. But, if they have taken them all into account, the failure of your repeated attempts reliably to get from your initial supposition to revolutionary demands from Rutlanders may reasonably be taken to indicate the falsity of the counterfactual that you are considering.

More generally, we may follow Williamson in holding that our tendency to deny a counterfactual conditional $A \mathrel{\Box\!\!\rightarrow} B$, in the wake of our failure robustly to get to B after having adequately developed the supposition that A, will reliably but not infallibly lead us to true beliefs. For—and here we may appeal to a reasonable optimism about our epistemological circumstances that dogged sceptics will obviously spurn—our developments of initial suppositions, in the course of passages of counterfactual reasoning, tend to be shaped by our responsiveness to the myriad factors that would in fact interact with the truth of the relevant suppositions, to yield their characteristic counterfactual consequences.

Yet those heartening points themselves suggest that there will be limits to the circumstances in which we can trust the inferential tendency to which they relate. Suppose, for instance, that we are presented with a bunch of counterfactual conditionals whose truth-values are fixed in a manner that looks set to make irrelevant the sorts of factors which we are apt to exploit in assessing counterfactuals. Then the considerations that justify our confidence in the reliability of our *general* tendency to deny counterfactual conditionals, when we do not robustly get to their consequents in the course of an adequate range of suppositional developments of their antecedents, will not justify a parallel level of confidence

in the reliability of that inferential method in the *particular* case of those counterfactuals in the given bunch.

The next section brings those points to bear upon the standing of the earlier search tests as guides to possibility.

5 Counterfactual reasoning and possibility

Consider some proposition P: the proposition that more than 7 million people live in Sheffield, say. And consider some contradiction $\perp$: the proposition that ($0 = 0$ and $0 \neq 0$), for instance. As we have seen, each of the counterfactual conditionals $P \mathrel{\Box\!\!\rightarrow} \perp$ and $P \mathrel{\Box\!\!\rightarrow} \neg P$ holds just in case $\diamond P$ is false. A brief consideration of the reasoning that demonstrates those equivalences reveals that the truth-values of $P \mathrel{\Box\!\!\rightarrow} \perp$ and $P \mathrel{\Box\!\!\rightarrow} \neg P$ can very straightforwardly be traced back to the truth-value of $\diamond P$ plus, respectively, the status of $\perp$ as a contradiction and the status of $\neg P$ as contradictory to P.

Imagine that you were to run the $\perp$-search test on P. You start by supposing that more than 7 million people live in Sheffield. You carefully and sensibly explore the counterfactual consequences of that supposition: you think about what the presence of 7 million people in Sheffield would mean for the city's physical state and infrastructure; what the effects would be on Yorkshire more widely; and so on. Suppose that your investigations do not robustly carry you to a contradiction, leading you to conclude in particular that $\neg(P \mathrel{\Box\!\!\rightarrow} \perp)$. How approvingly should we regard the form of inference that you have employed?

The inference looks fine when viewed from sufficiently far away: we often deny counterfactual conditionals on the basis of broadly similar reasoning, as Williamson has noted. But the inference looks much less appealing when seen from closer to hand. In particular, it looks a little suspect once we take into account the nature of the counterfactual conditional involved in its conclusion.

For any A whatsoever, the truth-value of $\diamond A$, plus the status of various propositions as themselves contradictions or as contradictory to A, immediately settles the truth-value of each of the infinitely many counterfactual conditionals that has A as antecedent and either $\neg A$ or some contradiction as consequent: each of them is true just in case $\diamond A$ is false. Given an arbitrary such true conditional $A \mathrel{\Box\!\!\rightarrow} B$, then, it is very unclear why one would expect to be able robustly to reach B, upon initially supposing that A, when engaged in the sort of suppositional reasoning that we standardly employ when assessing counterfactual conditionals. For why shouldn't the truth-value of $A \mathrel{\Box\!\!\rightarrow} B$ *merely* reflect the truth-value of $\diamond A$ along with, say, B's standing as a contradiction, rather than any facts involving the sorts of connections to which we generally attend in counterfactual reasoning?

So, suppose that $P \mathrel{\Box\!\!\rightarrow} \perp$, because no more than 7 million people could live in Sheffield and because of the status of ($0 = 0$ and $0 \neq 0$) as a contradiction. Why would one expect that fact also to be reflected in one's ability robustly to reach ($0 = 0$ and $0 \neq 0$) on the basis of decent developments of the supposition that more than 7 million people live in Sheffield? After all, the sorts of considerations that we would actually be likely to call upon in developing that supposition, and which we

are generally rather skilled at employing, look unlikely to take us very naturally to conclusions relating to the identity of 0. (Our sensitivity to this sort of point is surely reflected in the rather unintuitive nature of the claim that, for every impossible A, $A \mathrel{\Box\!\!\rightarrow} \bot$.)

The previous remarks related to a specific contradiction, but it was an arbitrary one; they illustrate an entirely general point. The truth-values of most of the counterfactuals that we assess in everyday life, and which matter for practical purposes, are underwritten by various sorts of facts involving relationships to which we are thankfully sensitive when we develop suppositions. By contrast, it is very unclear why one would think that impossible propositions will be liable to generate contradictions along lines of influence that will be similarly accessible to us; certainly, Williamson has not provided any reasons for thinking that they will. If they are not prone to do so, though, the fact that a proposition passes the $\bot$-search test will not be a good sign of its possibility.

Now, the foregoing considerations evidently do not show that the $\bot$-search test is *not* a reliable test for possibility. It may be that, for instance, profound truths concerning the foundations of the metaphysical modalities mean that impossible propositions will indeed tend to yield contradictions that are accessible using tried and tested ordinary patterns of counterfactual reasoning. And, in that case, the fact that a proposition passes the $\bot$-search test will in fact be a reliable indicator of its possibility. Don't the previous considerations therefore merely indicate a small lacuna in Williamson's arguments, rather than a significant problem for them?

The situation is somewhat serious than that. Williamson has claimed to show why scepticism concerning the reliability of our ascriptions of the metaphysical modalities is untenable, at least for reasonable people like us: the space between our everyday practices of counterfactual reasoning and Williamson's methods for generating beliefs involving the metaphysical modalities is meant to be so small that the sceptic cannot hope to prise them apart. Yet the gap between them, at least in the case of ascriptions of metaphysical possibility, actually looks to be fairly substantial, for the following reasons.

We have seen that, if one wishes to assimilate the reliability of Williamson's process for arriving at ascriptions of metaphysical possibility to the reliability of a standard process for arriving at denials of counterfactual conditionals, one must appeal to a highly general thesis concerning impossibilities. But it is very hard to see how one could justify the latter thesis—the view that impossibilities will tend to generate contradictions by means of paths that our epistemic powers make available to us—without employing relatively recondite philosophical claims about the metaphysical modalities. In particular, some metaphysical-cum-epistemological story about the relationships between the grounds of modal truth and our epistemic capacities would seem to be required.

Yet such abstruse philosophical matters play no apparent part in convincing us of the reliability of our handling of counterfactual conditionals in quotidian contexts: Williamson himself cites rather plausible evolutionary considerations in that connection, for instance. Those who are inclined towards scepticism concerning our knowledge of the metaphysical modalities therefore look to be able to resist Williamson's attempted assimilation of ascriptions of metaphysical possibility to

everyday patterns of counterfactual reasoning. For they may insist—not unreasonably, and hardly extravagantly—that, although our ordinary uses of counterfactual reasoning work well, our philosophical reflections upon modal metaphysics and its connections to our epistemological powers are much less trustworthy.[11]

Similar points apply to the $\neg A$-search test. The truth-value of any counterfactual of the form $A \mathrel{\Box\!\!\rightarrow} \neg A$ is determined by the modal status of A and by the fact that $\neg A$ contradicts A. There are thus no evident reasons for thinking—and, again, Williamson has not provided any reasons for thinking—that there will standardly be some route, one that follows the sorts of paths which we skilfully traverse in the course of typical passages of counterfactual reasoning, from an impossible proposition to its own negation. If there is not generally any such route, however, the fact that a proposition passes the $\neg A$-search test will not be a good sign of its possibility.

While we may reasonably have a fair degree of confidence in the general reliability of the methods for reaching denials of counterfactual conditionals described by Williamson, then, we have not been provided with good reasons for placing a similar level of confidence in the reliability of the particular uses of those methods that Williamson proposes as ways of generating beliefs about possibility. In particular, the counterfactual conditionals involved in Williamson's uses of the methods have a very distinctive character, because their truth-values are entirely determined by the modal status of their antecedents and by the status of their consequents as either contradictions or contradictory to their antecedents. And their unusual nature undermines the thought that our general skill in distinguishing false counterfactual conditionals from true ones ensures that we will also be good at identifying false counterfactuals of the relevant types.

To conclude this section, it is worth emphasising that the previous argument should not be conflated with an argument to the effect that the contents of counterfactual conditionals of the forms $A \mathrel{\Box\!\!\rightarrow} \bot$ and $A \mathrel{\Box\!\!\rightarrow} \neg A$ are just plain odd, and that we therefore cannot be trusted to reason reliably with them. For that last style of argument is weak: we perhaps do not commonly make claims featuring unrestricted quantification, for instance, but our ability, in ordinary contexts, to reason well deductively using restricted quantification surely helps us also to reason well deductively, in less ordinary contexts, using unrestricted quantifiers.[12] The earlier arguments do not revolve around the mere oddity of the contents of any counterfactuals at all, however; rather, they focus upon the unusual way in which the truth-values of a broad family of counterfactuals are determined.

[11] Of course, if there is some way of demonstrating beyond all reasonable doubt that impossibilities will tend to generate contradictions that are accessible to us using ordinary forms of counterfactual reasoning, the sceptical tendency will be defeated—but who would bet on that?

[12] Many thanks to an anonymous referee for this journal for suggesting that I should mention this sort of case. Williamson (2007b, 171) briefly considers an objection to his account that cites the relatively unusual nature of counterfactual conditionals having the forms $A \mathrel{\Box\!\!\rightarrow} \bot$ and $A \mathrel{\Box\!\!\rightarrow} \neg A$; he writes that 'a general capacity to develop counterfactual suppositions must confer in particular the capacity to develop those which subsequently turn out to be inconsistent', which suggests that the relationship between our ordinary modes of counterfactual reasoning and his method for arriving at ascriptions of possibility lines up with the type of example provided in the text.

The issue for Williamson's approach then is that the reliability of our ordinary methods of counterfactual reasoning, which have developed in response to counterfactuals whose truth-values are settled in certain standard ways, may not extend to ensure our reliable treatment of those counterfactuals whose truth-values are fixed in this strikingly different manner.[13] The analogy with the passage from reasoning with restricted quantification to reasoning with unrestricted quantification thus breaks down at a crucial point. For the differences between the ways in which the truth-values of restricted and unrestricted readings of, say, 'some apple is tasty' are determined—in particular, the universality or otherwise of the domain relative to which the initial quantifier is to be interpreted—do not impinge upon the reliability of the modes of argumentation that we ordinarily use when we reason deductively using the existential quantifier.

6 Another way?

The last few sections have focused entirely upon potential uses for ($\text{Poss}_{\bot}$) and ($\text{Poss}_{\neg A}$). What about the remaining principle concerning possibility that was introduced earlier, namely ($\text{Poss}_{\exists}$) ('$\diamond A \leftrightarrow \exists p \neg (p \mathrel{\Box\!\!\rightarrow} \neg A)$')?[14]

It was granted above that the general form of reasoning to negated counterfactual conditionals emphasised by Williamson provides a decent way of arriving at denials of counterfactual conditionals. Yet, if one has a reliable method for forming beliefs of the form $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$, one can evidently also draw conclusions of the form $\exists p \neg (p \mathrel{\Box\!\!\rightarrow} \neg A)$ that will reliably be true. By ($\text{Poss}_{\exists}$), though, the contents of those last beliefs are equivalent to propositions of the form $\diamond A$. Someone who wishes to deny that ($\text{Poss}_{\exists}$) may be used in reliably arriving at correct ascriptions of possibility must therefore take issue with at least some of the aspects of Williamson's position that I have happily waved through. Can ($\text{Poss}_{\exists}$) thus be used to vindicate Williamson's claims for the special importance of counterfactual reasoning to the epistemology of metaphysical possibility?

In the right circumstances, some of the patterns of counterfactual thought described by Williamson evidently are capable of generating ascriptions of possibility that tend to be correct. We often form beliefs of the form $B \mathrel{\Box\!\!\rightarrow} A$ by

[13] Williamson (2007b, 171) suggests that, to the extent that our general capacity to develop counterfactual suppositions is 'not of uniform reliability', those variations depend primarily upon the nature of the antecedents of the relevant counterfactuals; we are perhaps poor at assessing counterfactuals featuring exotic antecedents of the sorts used in particularly wild philosophical thought-experiments, for instance. The arguments in the main text indicate another potential source of unreliability here, however; namely, appropriate differences in the ways that the truth-values of families of counterfactual conditionals are determined.

[14] Kroedel (2012) suggests that ($\text{Poss}_{\exists}$) provides a better basis for ascriptions of possibility than ($\text{Poss}_{\bot}$) and ($\text{Poss}_{\neg A}$). His arguments depend upon following Lewis (1973) in treating $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$ as corresponding to the English locution 'A might be true if B were true', however; yet the mere claim that A might be true if B were true does not itself entail both the possibility of A and the possibility of B, as $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$ does. (If it were the case that $0 = 1$, for instance, then it might be the case that $0 = 1$.) More generally, Lewis's reading of $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$ only really has any plausibility when one restricts one's attention to negated counterfactuals whose antecedents are *possible*, as DeRose (1999, fn.3) also remarks.

investigating the counterfactual consequences of suppositions, for example, using the general processes of suppositional reasoning exploited by Williamson in relation to ($\text{Nec}_{\bot}$) and ($\text{Nec}_{\neg A}$). But suppose that the suppositions that kick off those processes of reasoning tend to be possible. Then, given also that the counterfactual conclusions $B \mathrel{\Box\!\!\rightarrow} A$ resulting from those passages of reasoning are generally true, it follows that subsequent beliefs to the effect that $\diamond A$ will tend to be correct. (Recall principle (B) above, which we may be rewritten as '$(B \mathrel{\Box\!\!\rightarrow} A) \rightarrow (\diamond B \rightarrow \diamond A)$'.)

Modes of counterfactual reasoning therefore certainly do have the potential, under the right conditions, of generating ascriptions of possibility that tend to be correct. And perhaps the process described at the start of this section, featuring ($\text{Poss}_{\exists}$), is one of those happy cases in which the appropriate conditions are actually in place. But that is not in itself a philosophically potent fact: the method of ascribing possibility to each proposition that is validly deducible from a proposition expressed within a book in Denmark will also reliably generate correct ascriptions of possibility, for instance, so long as most of those last propositions happen to be possible. Yet, even if that last condition holds, the 'Danish method' seems to be of minor importance to modal epistemology.

Williamson's proposed deployments of ($\text{Poss}_{\bot}$) and ($\text{Poss}_{\neg A}$) are much more interesting, however. For they are not meant simply to exploit the transmission of possibility from the propositions in one bunch to those in another. His arguments are instead intended to convince us that natural extensions of commonplace processes of counterfactual thought will supply a reliable basis for ascriptions of possibility, just because of the utility, within ordinary contexts, of the mundane methods in question. They accordingly hold out the promise of enabling us to see how we may reliably arrive at correct ascriptions of possibility, without our needing to assume—and any sensible sceptic would balk at this!—that the propositions used as input to the relevant processes of reasoning are themselves usually possible.

Let's return to the putatively reliable method described at the start of this section, for generating ascriptions of possibility by means of ($\text{Poss}_{\exists}$). That process goes via intermediate conclusions of the form $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$. Those intermediate conclusions result from episodes in which one fails robustly to reach $\neg A$ on the basis of adequate developments of an initial supposition that B: it is being assumed, crucially, that one's failure to reach $\neg A$ in those circumstances tends to indicate the falsity of the relevant counterfactual conditionals $(B \mathrel{\Box\!\!\rightarrow} \neg A)$. ($\text{Poss}_{\exists}$) is then to be applied, leading reliably to true conclusions of the form $\diamond A$.

But, merely by (A) above (which may be rewritten as '$\Box(B \rightarrow A) \rightarrow (B \mathrel{\Box\!\!\rightarrow} A)$') and by the logic of the material conditional, absolutely every counterfactual conditional with an impossible antecedent is true; for $\Box(B \rightarrow A)$ holds whenever B is impossible. Given some B which is impossible, it is hence unclear why one would think that the truth of a given counterfactual conditional $(B \mathrel{\Box\!\!\rightarrow} \neg A)$ would depend upon anything *more* than B's standing as an impossibility. In particular—to return to a familiar theme—it is unclear why one would think that, in this rather special sort of case, the truth of $(B \mathrel{\Box\!\!\rightarrow} \neg A)$ is likely to be reflected in the existence of some route, one that follows the sorts of paths that we are prone to trace in the course of episodes of counterfactual reasoning, from the supposition that B to the conclusion that $\neg A$.

Our justification for thinking that we are typically right to conclude that $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$, when we fail robustly to reach $\neg A$ in the light of an adequate range of developments of the initial supposition that B, thus depends upon our being entitled to assume that the relevant initial suppositions are generally *possible*. The ($\text{Poss}_{\exists}$)-employing method for reaching ascriptions of possibility suggested above, which proceeds via intermediate conclusions of the form $\neg(B \mathrel{\Box\!\!\rightarrow} \neg A)$, therefore cannot single-handedly realise Williamson's visions for the crucial role of counterfactual reasoning in modal epistemology. For, like the 'Danish method' described above, it is merely yet another example of a method for forming beliefs about possibility that may well be reliable, but in whose reliability we may reasonably believe only if we are already allowed to accept that the propositions which are fed into the relevant process are apt to be possible.

7 Conclusion

Williamson aims to show how 'a plausible non-skeptical epistemology of metaphysical modality' may 'subsume our capacity to discriminate metaphysical possibilities from metaphysical impossibilities under more general cognitive capacities used in ordinary life' (Williamson 2007b, 136). To that end, he uses counterfactual conditionals to formulate a range of equivalences for ascriptions of the metaphysical modalities; and he argues that two of the equivalences—($\text{Poss}_{\bot}$) and ($\text{Poss}_{\neg A}$)—may be combined with a familiar process of counterfactual reasoning from suppositions to yield ascriptions of possibility that are reliably correct, going via negated counterfactual conditional conclusions of the forms $\neg(A \mathrel{\Box\!\!\rightarrow} \bot)$ and $\neg(A \mathrel{\Box\!\!\rightarrow} \neg A)$.

It was noted, however, that we have not been given reasons for thinking that the truth-values of the relevant counterfactual conditionals will typically depend upon any more than the modal status of A along with, respectively, the standing of $\bot$ as a contradiction and the status of $\neg A$ as contradictory to A. But there are therefore also no apparent reasons for thinking that our uses of the forms of counterfactual reasoning identified by Williamson will reliably lead us to correct denials of counterfactual conditionals of the relevant kinds, and thus to correct ascriptions of possibility. For the general reliability of our uses of those styles of reasoning reflects the sorts of counterfactual conditionals with which we have most to do in everyday life, whose truth-values derive from various types of facts that may well typically be irrelevant to the truth-values of the unusual counterfactual conditionals that Williamson deploys.

One might seek to close this gap in Williamson's arguments, by appealing to substantial metaphysical and epistemological theses about impossibility. But this strategy looks set to undermine one of the main dialectical advantages that Williamson claims for his ideas. For his arguments were meant to demonstrate that scepticism about our knowledge of metaphysical possibility naturally generalises to scepticism about our knowledge of everyday counterfactual matters. Yet, if Williamson's arguments need ultimately to appeal to contentious philosophical theses concerning modality, the way is surely open once again for sceptics to

endorse our everyday claims to counterfactual knowledge while spurning our claims to know much about what is metaphysically possible.

The previous section considered a potential way of using another equivalence stated by Williamson—namely, ($\text{Poss}_{\exists}$)—to generate ascriptions of possibility that are reliably correct. It was noted that, while the described method may well produce beliefs about possibility that tend to be right, our justification for holding that it does so depends upon our being entitled to assume the customary possibility of the propositions that serve as the starting-points of applications of the relevant process. The method may therefore be a handy way of reliably getting from possible truths to correct ascriptions of possibility—which is a good thing—but the method shares that feature with very many other potential ways of arriving at ascriptions of possibility that lack any special importance for modal epistemology.

It is worth emphasising that the preceding discussion has focused solely upon Williamson's claims about the potential utility of counterfactual reasoning in generating ascriptions of *possibility*; the view that one may demonstrate that A is necessary by showing that ($\neg A \mathrel{\Box\!\!\rightarrow} \bot$) holds, or that ($\neg A \mathrel{\Box\!\!\rightarrow} A$) does, seems to me to be right, and to fit nicely with ways in which we actually do reason. By contrast, I think that Williamson's claims concerning counterfactual reasoning and ascriptions of possibility fit less well with our actual practices: the earlier critical discussion of Williamson's approach thus is not meant to cast any sceptical aspersions upon our customary modes of reasoning.

We very often hold that it is possible that B, on the grounds that if A were the case then B would also be the case, where we already accept that A is possible. I think that there could be pink horses, for instance, because I can visualise scenes containing suitably coloured animals and because I take it that the sorts of situations that I can visualise are generally possible. But, although counterfactual reasoning is thus often used in passing from previously accepted ascriptions of possibility to new ones, it typically seems just to play a bridging role. It would be unusual, I think, to find someone who quite consciously sought to support an ascription of possibility by reasoning to the conclusion that, say, $\neg(A \mathrel{\Box\!\!\rightarrow} \neg A)$, rather than by seeking to describe a scenario that he or she judges to be possible and to be one in which A would obtain.

It has to be acknowledged, though, that aspects of Williamson's suppositional processes of reasoning to ascriptions of possibility are familiar. One might well mention one's inability to see how any contradictions would flow from A's truth, when contending that A is possible. But that does not necessarily indicate one's tacit employment of the patterns of reasoning that Williamson describes. We seem standardly to have a fairly liberal attitude towards possibility: we ascribe possibility to a proposition unless we can see compelling reasons for denying that it is possible. One might therefore mention A's apparent lack of contradictory consequences simply to raise the question why anyone would *deny* that A is possible, rather than as providing substantial support for the conclusion that $\neg(A \mathrel{\Box\!\!\rightarrow} \bot)$.

To conclude, while counterfactual reasoning surely has a significant role to play in generating knowledge of *necessity*, its role in relation to knowledge of *possibility* is less fundamental. We are able to use counterfactuals in passing from old ascriptions of possibility to new ones; and counterfactual conditionals may carry us

from there to potentially endless further beliefs about possibility. But, if we are to understand how the whole journey gets underway, we must use more than reflection upon counterfactual reasoning alone.

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