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Reply to Goodman

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In 'Williamson on necessitism' (Goodman 2016), Jeremy Goodman makes a variety of probing objections to my arguments for necessitism in *Modal Logic as Metaphysics*. Had the book done justice to all the considerations he raises, it would have been much longer, something for which not all readers would have been wholeheartedly grateful. That is not remotely to imply that Goodman's considerations are irrelevant or unimportant. The dispute between necessitism and contingentism is genuinely caught up in an intricate nexus of complex philosophical and technical issues, all of which deserve to be untangled at length. As Goodman shows, many diverse but internally coherent theories give distinctive answers to the questions. In writing the book, I did not expect or even hope that it would be the last word on anything. My aim was to make some progress myself and to facilitate much more on the part of others. Goodman has contributed significantly to such progress through his explorations of the space of conceivable logico-metaphysical theories of modal reality.

1. First-order contingentism and higher-order contingentism

Section 1 of Goodman's paper criticizes my arguments in Section 6.2 of the book against combining ordinary first-order contingentism with higher-order necessitism. On the target view, it is contingent what objects there are, in other words $\neg\Box\forall x\ \Box\exists y\ x = y$, but necessary what properties there are, or more correctly $\Box\forall X\ \Box\exists Y\ X \approx Y$, where the variables '$X$' and '$Y$' take monadic predicate position and $\approx$ is the appropriate analogue of identity, and likewise for other higher types.

Goodman agrees with me that, given first-order contingentism, there is *some* defeasible presumption in favour of higher-order contingentism because uniform theories are *ceteris paribus* preferable to non-uniform ones. At least, he writes 'I don't want to claim that there is no theoretical pressure in this direction' (Section 1.1). In the reverse direction, I agree with Goodman that if one is going to be contingentist at some orders and necessitist at others, the best place

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to make the cut is between the first order and the rest, because in an inductively defined hierarchy it is not unusual for the case governed by the base clause to be special, by contrast with the cases governed by the inductive clauses. Goodman and I also agree that the issue between necessitism and contingentism at any order is a difficult theoretical one, not to be settled by pre-theoretical judgements. He does point out that first-order contingentism is far more often considered obvious than higher-order contingentism, in response to the claim that there is parity in motivation between the views. But that asymmetry is hardly surprising, given the unfamiliarity of higher-order quantification by contrast with first-order quantification. It does not show that the considerations moving people to first-order contingentism have no analogues for higher-order quantification; the analogues may just be psychologically harder to access.

One can get a feel for the oddness of the hybrid view by considering a theorist whose logic is first-order contingentist but higher-order necessitist, and whose metaphysics also permits first-order quantification over properties. The first-order ascription of contingent being to the property of being a tiger is consistent in the logic, while the corresponding second-order ascription of contingent being is not. That looks like an unwarranted asymmetry. A good example of a thoughtful contingentist who takes the case for contingentism about individuals to generalize to properties, relations and propositions is Stalnaker (2012).

Some contingentists are moved by the idea that necessitism makes the modal float free of the non-modal in some objectionable sense. I explore this idea in the book, finding the distinction between the modal and the non-modal obscure but conceding that there may be some sense in which necessitism implies that individuals can differ in qualitative modal respects without differing in qualitative non-modal respects, although I argue that such a failure of supervenience would not be objectionable (2013, 380–391). Goodman considers this issue in Section 1.2 of his paper. It is important for him because he thinks that 'the best theoretical argument against necessitism is that it makes the modal "float free" of the non-modal in some objectionable way'. Thus, if the floating free argument has force when formulated in first-order terms but not when formulated in higher-order terms, there is a crucial difference in motivation between first-order contingentism and higher-order contingentism, which would go some way towards motivating the combination of first-order contingentism with higher-order necessitism. As he points out, my discussion of the supervenience issues is formulated only in terms of properties of (and relations between) individuals. However, that restriction was only for the sake of simplicity, since at that point in the book I was no longer considering the hybrid view. I see no special difficulty in formulating higher-order analogues of the floating free argument. Indeed, Goodman himself sketches how such an analogue might go, although he expresses uncertainty about its force. Just as (apparently) first-order necessitism makes the qualitative modal difference between Goodman and his computer float free of any qualitative non-modal differences between them

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(there are none) in counterfactual circumstances where neither is concrete, so (apparently) higher-order necessitism makes the second-order qualitative modal difference between being Goodman and being his computer float free of any second-order qualitative non-modal difference between them (there are none) in the same counterfactual circumstances. Although the problem does not depend on an intensional view of the higher-orders such as I take in the book, it is exacerbated by that view, which makes the higher-orders modal in their very nature, and thereby undermines the requisite higher-order non-modal differences. Thus what Goodman regards as the best theoretical argument against first-order necessitism does have a natural and arguably at least equally forceful analogue against higher-order necessitism. Although he considers several further variations on these themes, nothing he says warrants his claim that 'the best arguments for contingentism do not correspond to parallel arguments for higher-order contingentism'. On the contrary, the parallelism stands up well, thereby removing a supposed motivation for the hybrid view.

In the book, I briefly discuss a form of anti-essentialism as a response to the floating free argument that some necessitists may wish to make (2013, 389). Goodman says that '[i]n chapter 8.2 Williamson expresses sympathy for' it, but I do not; I merely mention it as a theoretical option. He contends, plausibly, that it will not suffice to block the floating free argument once counterfactual conditionals are included in the domain of the modal. His point reinforces the case for parity between first-order necessitism and higher-order necessitism, since necessitist comprehension principles in higher-order logic rule out the relevant higher-order analogues of anti-essentialism. For instance, there is a property that necessarily everything has and a property that necessarily nothing has.[1]

The central arguments in the book for the parity of first-order and higher-order contingentism turn on the connection between an object and its haecceity, the property of being that object (which there necessarily is, given higher-order necessitism). If there is no such object, how can there be a property necessarily related to it? In Section 1.3 of his paper, Goodman makes much of a passage in which I ask rhetorically about my haecceity in circumstances where there is no such thing as me 'how can it lock onto me in my absence?' (2013, 269). He argues that the challenge fails to address higher-order necessitism, because my haecceity would have locked onto me in my absence on the relevant modal reading ($\Box\forall x\,(Xx \leftrightarrow x = \mathrm{TW})$) given first-order contingentism, whether or not there was such a property in those circumstances, and so irrespective of the difference between higher-order necessitism and higher-order contingentism. He writes:

> Maybe this is just a slip. After all, Williamson could instead have written 'How could *there have been* something that in my absence locked onto me?' But if it is a slip, it is a telling one, since the ease of making it suggests that we are mistaking a general puzzling feature of contingentism for a particular puzzling feature of the combination of contingentism and higher-order necessitism.

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There was no slip. My point was just that higher contingentism can mitigate the general puzzling feature of first-order contingentism by denying that there would have been such a property in the relevant circumstances, while higher-order necessitism cannot. Goodman is hardly in a position to repudiate such a move, since he treats an analogous move at first order as effective. For, given an apparent violation of the supervenience of the qualitative on the fundamental, when he and his computer differ in their absence with respect to the qualitative property of possibly being a person, despite supposedly not differing with respect to any fundamental property, he writes in Section 1.2:

> A contingentist can respond by claiming that in the relevant counterfactual circumstances there would have been no such thing as me and no such thing as my computer, thereby blocking the alleged counterexample to the supervenience thesis.

But in the relevant counterfactual circumstances Goodman and his (actual) computer would still have had the modal qualitative difference on the relevant modal reading ($\neg(\Diamond Px \leftrightarrow \Diamond Py)$) with no corresponding fundamental (or non-modal qualitative) difference, whether or not there would have been such things in those circumstances. Goodman's point is presumably that first-order contingentism can mitigate the general puzzling feature of that failure of supervenience by denying that there would have been such things in the relevant circumstances. Fair enough, but a structurally analogous point is being expressed in the passage of which he makes such heavy weather.

In the book, I note that in some cases a contingentist can explain how actual materials uniquely characterize a merely possible object, and thereby make it plausible from a contingentist perspective to claim actual being for its haecceity, without reliance on higher-order necessitism. For instance, parts from which it could be made may have actual being. However, I argued that extending that strategy to a general case for higher-order necessitism from a first-order contingentist starting point would require highly implausible metaphysical assumptions (270–271). In Section 1.3.1 of his paper, Goodman suggests that I underestimated the range of metaphysical resources available to some first-order contingentists in pursuing such a strategy. He gives two ingenious examples, which I will discuss in turn.

Goodman's first example is of a first-order contingentist who endorses the principle of plenitude that 'any eligible "modal profile" is the modal profile of some possible material object'; Goodman provides a more precise unpacking of this idea. He continues:

> Given the not outlandish assumptions that, necessarily, (1) there is at least one material object, and (2) any two material objects that necessarily coincide (in the sense of sharing parts with the same things) are qualitatively discernible, the principle of plenitude allows us to argue that, necessarily, every material object necessarily has a haecceity, where we assume only that there is a property corresponding to any condition specified in terms of individuals there are and their qualitative properties and relations.

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He then sketches an extension of the strategy to non-material things. One general concern about this strategy is that its reliance on modal considerations to individuate coincident material objects may undermine what Goodman regards as the best motivation for first-order contingentism: the argument that first-order necessitism makes the modal float objectionably free of the non-modal. A more specific objection to the strategy is that the assumption that necessarily there is at least one material object is, contrary to Goodman, unreasonable. Why could there not have been mere empty space-time? Or, if empty space-time itself counts as a material object, why could there not have been no space-time at all? Both scenarios seem to be metaphysically possible.

Goodman's other example depends on the principle of conditional excluded middle (CEM), that for any antecedent *A* and consequent *C*, either *A* counterfactually implies *C* or *A* counterfactually implies ¬*C*, which is valid on Stalnaker's semantics for counterfactuals but not on Lewis's. On that assumption, 'we can argue that necessarily everything necessarily has a haecceity from the premise that, necessarily, any two contingent beings are possibly qualitatively discernible'. In recent years, support has grown for CEM as a thesis about counterfactual conditionals in natural language. Now one point on which both its proponents and its opponents agree is that its defence requires a story about tiebreaking. For there are surely cases where a possible world *w* is equally similar to two possible worlds w_a and w_b, by whatever standard of similarity is relevant to counterfactuals, so w_a and w_b are tied with respect to *w*. Let *A* be true in just the worlds w_a and w_b, and *C* be true in just w_a. Thus, if *A* counterfactually implies *C* in *w*, then the tie is broken in favour of w_a, while if *A* counterfactually implies ¬*C* in *w*, then the tie is broken in favour of w_b. Hence, if CEM holds in *w*, the tie is broken one way or the other. Some putative readings of the counterfactual break the tie in favour of w_a, other putative readings break it in favour of w_b. Normally, proponents of CEM take either a supervaluationist or an epistemicist view of tiebreaking. On the supervaluationist view, it is indeterminate which reading is correct, but determinate that exactly one reading is correct (in an appropriately minimalist sense of 'correct'). On the epistemicist view, it is unknowable which reading is correct, but knowable that exactly one reading is correct. Such tiebreaking is crucial to the supposed role of counterfactuals in capturing haecceities.

A toy model will clarify the position. Suppose that the world w_a contains only the material object *a*, while the world w_b contains only the material object *b*, where by normal standards *a* in w_a is qualitatively identical to *b* in w_b; the world *w* contains nothing. Suppose that the reading of the counterfactual conditional > breaks the tie in favour of w_a. Then, from the standpoint of any world, this predicate singles out *a*, in the sense of applying uniquely to *a*:

$$\lambda x(\neg\exists y\ y = y > (\exists y\ y = y > \exists y\ y = x))$$

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For the outer antecedent ($\neg\exists y\, y = y$) takes the evaluation from any world to w, from which the inner antecedent ($\exists y\, y = y$) takes it to w_a by hypothesis. On the other hand, if the reading of $>$ breaks the tie in favour of w_b, then that predicate singles out b. Under these conditions, for the reading of $>$ to break the tie between w_a and w_b just is in effect for it to single out one of a and b. Clearly, CEM by itself does nothing to explain how the tie is broken; it merely implies that somehow or other it is broken. Since a and b are not in w, the mystery of how w can contain a haecceity of a or of b has merely been transferred to the mystery of how w can contain a reading of $>$ that singles out one of a and b. In such cases, CEM may provide evidence for higher-order necessitism, but not in any way that provides a plausible metaphysical story to make sense of its combination with first-order contingentism, which is the challenge issued in the book.

Clearly, there is much more to be explored in combinations of first-order contingentism with higher-order necessitism. By comparison with the versions I consider in the book, Goodman's speculative hypotheses (which he is in any case disinclined to endorse) are more elaborate, but not thereby more plausible.

2. Capturing distinctions

Section 2 of Goodman's paper criticizes the central argument of chapter 7 of my book. Section 3 sketches what he describes as 'a good (though not decisive) argument for necessitism in the vicinity, which draws on a similar combination of observations about the intelligibility of superficially "necessitist" discourse and formal results about the undefinability of various classes of variable-domain Kripke-models'. Peter Fritz and he have developed the alternative argument in detail elsewhere (Fritz and Goodman, Forthcoming). The issues are complicated; some are explained below. My general view is that although the differences between the two arguments are not trivial, Goodman has exaggerated their significance.

An entry point is my summary of the argument in chapter 7 (2013, 364):

> In short, the necessitist can draw more distinctions than the contingentist can. Every distinction the contingentist can draw can be drawn in neutral terms, so the necessitist can draw it too. The converse fails. The necessitist can draw distinctions the contingentist cannot, because they cannot be drawn in neutral terms. That would not matter if those extra distinctions were bogus. But the contingentist cannot plausibly dismiss them like that, because they are too intimately related to distinctions the latter is committed to regarding as genuine. Thus necessitism provides a clearer view than contingentism of modal reality.

Having quoted this summary, Goodman comments in Section 3:

> This passage is hard to square with Williamson's official dialectical setup, because that setup is concerned with literal unhedged discourse in a common formal language, and anything the necessitist can say in that language the contingentist can say too. The passage seems more in keeping with the way of framing the argument for necessitism that I have been recommending […]

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The alleged discrepancy with my official dialectical set-up comes about because I hold, as does Goodman, that the necessitist and the contingentist share a common language: what words literally mean in the necessitist's mouth is just what they literally mean in the contingentist's mouth. Thus, if what distinctions one can draw depends only on the literal meanings of one's words, the distinctions the necessitist can draw are just the distinctions the contingentist can draw. However, that is not how I used talk of drawing distinctions in the book. I wrote of theorists sometimes seeing their rivals 'as tracking genuine distinctions which they misdescribe through relying on false theoretical assumptions' (Williamson 2013, 312). In that sense, someone who takes 'Thor' to name a flesh and blood Viking god may use the sentences 'Thor is angry' and 'Thor is not angry' literally and unhedged, yet thereby draw or track, but misdescribe, the genuine distinction between situations where thunder is on the way and situations where thunder is not on the way (2013, 309). What distinctions one is drawing depends not only on one's *language*, taken literally and unhedged, but on one's *theory*. If one's theory entails that (in all relevant situations) Thor is angry if and only if thunder is on the way, one can use 'Thor' sentences literally and thereby draw the distinction about thunder. If one's theory has no such entailment, one cannot.

Goodman sketches his preferred form of argument thus:

> [C]ertain ways of speaking that have a necessitist flavor seem to correspond to sensible ideas; yet these ideas are such that, if contingentism is true, then they are not expressible in the relevant formal languages (because we can prove that associated classes of models are not definable in those languages); so we should reject contingentism.

The phrase 'necessitist flavor' alludes to the role of theory in determining what 'ideas' the 'ways of speaking' (non-literally) correspond to. Goodman elaborates slightly on this earlier in Section 3:

> contingentists themselves, as ordinary English speakers, feel the temptation to talk in superficially necessitist ways — to make such speeches as 'there are *n* possible knives that could be made from a given spare handle and *n* spare blades' and 'most possible people will never be born'. Of course, mindful of their contingentism, if pressed they will not accept these sentences (or at least their most syntactically faithful renderings in a formal language) as literally true […]

But what I find missing in both Goodman's present paper and his one with Fritz (Forthcoming) is any account of what *kind* of necessitist theory contingentists are tempted to superficially talk along with, and how it corresponds to the *kind* of model relevant to issues of definability and undefinability.

Let me be more specific. In Fritz and Goodman's detailed arguments, they study definability with respect to variable domain Kripke models in which contingentists' (first-order) quantifiers are modelled in their literal use by quantifiers over the world-dependent domains of individuals but in their 'superficially necessitist' non-literal use by distinct quantifiers over the world-independent

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union of all the world-dependent domains of individuals (Fritz and Goodman, Forthcoming). Although that is what one might have expected, it constitutes a specific theoretical choice. From a technical perspective, one can just as well model superficially necessitist non-literal uses of contingentists' (first-order) quantifiers by quantifiers over the world-independent *intersection* of all the world-dependent domains of individuals, or over the domain of individuals associated with the designated actual world of the model, held constant irrespective of the world of evaluation, or over a constant domain that is not required to have any particular relation to the world-dependent domains of individuals. All of those theoretical choices and many more model the 'superficially necessitist' use with a constant domain semantics that validates necessitism. However, they differ radically from each other over the definability of the 'necessitist' quantifiers in terms of the 'contingentist' ones: some make it trivial, some make it impossible. Which class of models is relevant depends on the specific nature of contingentists' 'superficially necessitist' non-literal use of their quantifiers, which in turn depends on what kind of necessitist theory contingentists are simulating. Each of those classes of models is a natural modelling choice for some imaginable and at least superficially necessitist way of speaking. Although Fritz and Goodman may in fact have made the most natural modelling choice for the kind of superficially necessitist way in which contingentists are actually most tempted to speak, they do very little to make the connection.

The gap in Fritz and Goodman's argument is not only at the level of model theory and logic. For suppose that contingentists' 'superficially necessitist' non-literal use of quantifiers involved all sorts of non-logical deviations from their literal use, for example, in what material objects there were supposed to be. Then their definability and undefinability results might again be beside the point.

My postulation in the book of a neutral zone between the necessitist and the contingentist was a way of controlling for such problems. Although Fritz and Goodman may seem to achieve greater generality by doing without one, what is really going on is a failure to articulate the conditions for the appropriateness of the modelling choice on which their argument depends. Their arguments look tidier than mine because they have swept more of the messy non-formal issues under the carpet.

Goodman is especially hostile to my setting up of the argument in terms of communication between a necessitist and a contingentist. He sees himself as posing a much more urgent challenge to contingentists by asking how they justify to themselves their habit of speaking in at least superficially necessitist terms. It becomes their problem when internalized to them. But this difference between his way of setting up the issues and mine may be more presentational than substantive. Many deep philosophical debates can be conducted either out loud between two single-minded opponents or silently in the divided mind of one philosopher. In epistemology, for instance, we need no real-life committed

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sceptic to debate with, because we can feel the pull of sceptical arguments within ourselves. Similarly, it makes little difference whether the 'superficially necessitist' speeches for which contingentists feel some sympathy are ones they are tempted to make themselves or ones they hear necessitists make. The challenge to explain the apparent value of such speeches is the same. It is not as though the implicit non-literal structure of such speeches becomes transparent to one as soon as they are made within the privacy of one's own head. Indeed, the apparatus of neutrality is a handy way of tracking what is *not* at stake when contingentists wrestle with their own inner temptations.

Goodman sometimes writes as though my argument assumed a demand on any theorist to find neutral equivalents for any of their opponents' utterances, but I agree with Goodman that such a demand would be quite unreasonable; I did not make it. The passage quoted above from p. 364 signals a tight restriction on the demand when I say 'the contingentist cannot plausibly dismiss [the necessitist's distinctions] like that, because they are too intimately related to distinctions the [contingentist] is committed to regarding as genuine'. Of course, the argument will not worry fanatical contingentists who feel no compunction in dismissing the necessitist's distinctions, but then Fritz and Goodman's argument will not worry fanatical contingentists who feel no temptation to speak in superficially necessitist ways. Perhaps such contingentists *ought* to be worried, but if so the reason has to do with the intimate relations between the distinctions they accept and those they reject. Given the restricted nature of my argument, it is unclear what problem Goodman's case in Section 2.3 of the slightly diverging necessitists Kit and Kit* and the slightly diverging contingentists Bob and Bob* pose for it.

Similar comments apply to Goodman's example of a necessitist's talk about his favourite set, with putative reference to a set that is not even possible by the contingentist's lights. Such talk goes beyond the dialectical set-up of the book, on the plausible assumption that it involves an ordinary atomic expression ('favourite') whose extension goes beyond the neutral zone. The contingentist is under no obligation to find a neutral equivalent for such talk in the necessitist's theory. For similar reasons, in Fritz and Goodman's framework, the contingentist is under no obligation to paraphrase such talk in terms that are not 'superficially necessitist'. In these respects, my argument and his are far more similar in dialectical situation than he suggests.

Goodman also has the more general concern that chapter 7's dialectical framing of the issues perversely makes the assessment of each side depend on what the *other* side says, through the challenge to find neutral equivalents within the other side's theory. But my argument aims in the first instance to compare against each other a pair of theories, one necessitist and one contingentist, but in all other respects as like each other as can be. Across such comparisons, neither side varies independently of the other. Thus, neither side drops out as somehow irrelevant to its own assessment. Of course, there are many versions

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of necessitism, and many versions of contingentism. Moreover, the best version of necessitism and the best version of contingentism may not form a neatly contrasted pair: the auxiliary assumptions most suited to necessitism may differ from the auxiliary assumptions most suited to contingentism. In the end, more holistic comparisons will be needed. Goodman's explorations of the space of contingentist options contribute to that task. But we cannot do everything at once. The more limited and schematic comparisons I undertook make a better starting point.

One schematic aspect of my treatment is the use of the predicate 'chunky' to demarcate the neutral ground. In order to achieve greater generality, I explicitly refrained from choosing between various readings, such as 'not contingently non-concrete', 'grounded in the concrete' and others (2013, 314). Of course, a problem then arises in comparing a version of necessitism that requires one reading of 'chunky' with a version of contingentism that requires a different reading, not to mention versions of necessitism and contingentism that cannot be formulated in terms of a 'chunky' predicate at all. One might be tempted to think that the predicate is more trouble than it is worth. Fritz and Goodman do without it. However, as I have already noted, that is because they prefer not to address the messy theoretical variations behind their summary references to 'paraphrase' and 'implicitly necessitist ways' of talking.

Goodman raises a number of other points in Sections 2 and 3 of his paper. Several concern combinations of first-order contingentism with higher-order necessitism, which I have said something about in Section 1 of this response. I will take up just two more of his points from that part of his paper.

The first point arises in Section 2.3, where Goodman lays down another challenge to my use of neutrality. He notes that my results establish that there is a sentence *A* of the relevant language not equivalent given CSN (the relevant necessitist theory) to any neutral sentence. He then writes:

> But this is not yet to establish that there is no sentence equivalent to *A* given CSN that is intuitively not at issue in Kit [the necessitist] and Bob [the contingentist]'s metaphysical dispute. That would require an argument that all such intuitively not-at-issue sentences are neutral in the technical sense.

Goodman then suggests that $\neg\exists x\, Dx$ ('There are no dragons') is a counterexample. He is right that it is intuitively not at issue, because Kit and Bob agree on it for reasons unconnected with modal metaphysics, and that it is not neutral in the technical sense, because it is not *logically* equivalent to a sentence appropriately restricted by the monadic predicate *C* ('… is chunky'). However, Goodman is assuming that to get from (1) to (3) I need the auxiliary premise (2) (where 'neutral' is understood in the technical sense and 'not-at-issue' is understood intuitively):

(1) No neutral sentence is equivalent given CSN to *A*.
(2) Every not-at-issue sentence is neutral.

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(3) No not-at-issue sentence is equivalent given CSN to *A*.

But Goodman's assumption that my argument requires (2) is false. I can get from (1) to (3) by the weaker auxiliary premise (2*):

(2*) Every not-at-issue sentence is equivalent given CSN to a neutral sentence.

For suppose that (1) and (2*) hold but (3) fails. Then some not-at-issue sentence *B* is equivalent given CSN to *A*. By (2*), *B* is equivalent given CSN to a neutral sentence *B**. But equivalence given CSN is symmetric and transitive, so *B** is equivalent given CSN to *A*. Since *B** is neutral, that contradicts (1). Thus (1) and (2*) suffice for (3). Moreover, although $\neg\exists x\, Dx$ is a counterexample to (2), it is not a counterexample to (2*), because $\neg\exists x\, Dx$ is equivalent given CSN to the neutral sentence $\neg\exists x\,(Cx \,\&\, Dx)$ ('There are no chunky dragons'). For CSN has the theorem $\forall x\,(Dx \rightarrow Cx)$ ('All dragons are chunky') if *D* is an ordinary atomic predicate, or even if it is replaced by a complex description of a dragon in partly positive terms. In line with its not-at-issue status, $\neg\exists x\, Dx$ is also equivalent to the neutral sentence $\neg\exists x\,(Cx \,\&\, Dx)$ given the relevant contingentist theory CSC, which also has the theorem $\forall x\,(Dx \rightarrow Cx)$. Goodman's sentence $\neg\exists x\, Dx$ presents no difficulty for my argument.

The other point arises at the end of Section 3 of Goodman's paper, where he discusses a technical contrast between my approach in chapter 7 and Fritz and Goodman's approach: I use plural quantifiers while they use generalized singular quantifiers. The connections they establish linking the necessitism–contingentism issue with the theory of generalized quantifiers are clearly illuminating. In particular, Goodman revisits my argument in Section 6.4 of the book that a second-order contingentist comprehension principle is too weak for the purposes of what I call 'second-order modal mathematics' because it does not permit the modalized version of the mathematical notion of a complete order to work as it should (2013, 285–288). He proposes that the example is best reinterpreted as another case of inexpressibility, like those in chapter 7 and in Fritz and Goodman's work: necessitist claims about modalized complete orders 'make perfect sense' but no formula within the envisaged contingentist framework can 'express the intended condition on models'. It is interesting that the example instantiates that phenomenon. But that is no reason to lose sight of the point I originally made with it. That point can be understood in terms of the unpacking of the implicitly modal content of ordinary scientific applications of non-modal mathematics to phase spaces, illustrated by the use of dynamical systems as models for a formal language with modal and temporal operators and quantification into sentence position (Williamson 2016a). The same method can easily be applied to phase spaces that permit other forms of quantification, such as quantification over individuals and their properties, as in the definition of a complete order. Ordinary non-modal mathematical reasoning implicitly relies on unrestricted quantification over all subsets of a given set domain, which turns

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out to validate unrestricted higher-order modal comprehension principles once the implicitly modal content of the applications to phase space is unpacked. Thus scientists' reliance on the free use of ordinary non-modal mathematical reasoning in applications to phase spaces implicitly relies on comprehension principles stronger than those higher-order contingentism permits. That is a point about deductive strength, not expressive power.

3. Intensionality

One controversial feature of the higher-order modal logic in the book is that it is intensional, rather than hyperintensional. It treats necessary coextensiveness as the analogue of identity for higher types. Goodman prefers a mildly hyperintensional higher-order modal logic, but his main concern in Section 4.1 of his paper is methodological. Why don't I treat intensionality as a contentious assumption in need of sustained theoretical defence?

Goodman is right that my attitude to the choice of a logic is not pragmatic. The choice raises serious questions of truth and falsity, just like theory choice in any other science. In particular, I do not regard intensionality as an artefact of a convenient restriction of the higher-order quantifiers. For example, the idea that the sentence A & (A ∨ B) expresses a different state of affairs from the sentence A, because they are about different subject matters, strikes me as an obviously wrong-headed projection of differences in modes of representation onto what is represented. However, that does not mean that I oppose the development of hyperintensional metaphysical theories, including hyperintensional higher-order modal logics with an objective reading of the modal operators. Rather, developing such theories is a good way to test the hypothesis of intensionality. In a more partisan spirit, I anticipate the pleasures of watching hyperintensional theories getting entangled in their own ramifications, or bogged down in their own muddy distinctions.

However, one could be much more sympathetic to hyperintensionality in metaphysics than I am and still think that, methodologically, intensionality is a better place to start. For we are in the early days of higher-order modal logic as a framework for metaphysics, and loading ourselves with the massive extra complexity of a hyperintensional theory may well drastically slow progress. Even if, strictly speaking, hyperintensional logics are more accurate than intensional logics, we may do better by working with a less accurate but tractable theory than with a more accurate but intractable one. That attitude corresponds to the spirit of model-building in science (compare Williamson 2016b). Some philosophers like to load all the complications they can think of into a theory from the start, but that attitude is not conducive to progress. It is often easier to get results within a simple framework and then adapt them to a more complex framework than it is to achieve the same result working from the start in the complex framework. The results of higher-order intensional logic will not all be wasted if we later move to higher-order hyperintensional logic.

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A second point is that we can simulate hyperintensionality within an intensional framework, just as we can simulate intensionality within the extensional framework of Kripke models. Carnap did the former with his definition of intensional isomorphism, which enabled him to define a hyperintensional criterion of linguistic synonymy within his intensional framework (1947, 56–64). For instance, the sentences A & (A ∨ B) and A are non-synonymous in the sense of not being intensionally isomorphic, because they differ in semantic structure, even though they have the same intension. Thus, we can still get the effect of hyperintensional distinctions even though they do not enter the theory at ground level.

A third point is that in constructing formal languages, we have some scope for making the symbols mean what we want them to mean. Thus, different theorists may use what looks like the same formula in different senses. Consequently, not every apparent disagreement is a real disagreement. Although that is not what is going on with the necessitism–contingentism dispute, which is deeply rooted in a shared natural language, it may be a live possibility with respect to some more artificial features of formal languages for higher-order modal logic. Goodman rightly points out that I deny that apparent disagreements over higher-order matters can be resolved by saying that the two sides are talking about different abstract objects, since I deny that higher-order quantification involves tacit quantification over objects of any kind, but it is not out of the question that some higher-order analogue of that picture fits some apparent disagreements. Such equivocation is not excluded from physics, so it can hardly be excluded from metaphysics, even on the uncompromisingly realist view of metaphysics to which I am sympathetic.

For all those reasons, I regard the intensional framework of the book as an appropriate starting point for the metaphysics of higher-order modal logic, on a metaphysical reading of the modal operators.

In the last section of his paper, Goodman gives his own preferred argument for necessitism, involving a characterization of the first-order universal quantifier in terms of not too hyperintensional, not specifically modal higher-order logic. There are many roads to the truth.

Note

1. Of course, the correct statement of the higher-order essentialist claims involves quantification into predicate position; for corresponding essentialist claims involving quantification into sentence position, see the discussion of the modal logic of dynamical systems in Williamson (2016a). Incidentally, for present purposes we must understand anti-essentialism as denying the relevant intensional claims that something *necessarily* has the given property, not just the stronger corresponding hyperintensional claims that it *essentially* has the property, since the latter denials without the former are too weak to engage the floating free argument, which targets modal differences.

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