Timothy Williamson, **Modal logic as metaphysics**. Oxford University Press, 2013, pp 464 + xvi. ISBN-13: 978-0199552078 (hardback) \$44.95, ISBN-13: 978-0198709435 (paperback) \$28.95, (Kindle).

This book is simultaneously: 1) an interesting and wide-ranging survey of recent writings on modal and philosophical logic and their somewhat less-recent progenitors, 2) an articulation and defense of a methodology for investigations into the metaphysics of necessity, possibility and contingency and, by implication, any other branch of metaphysics capable of comparable formalization and 3) an application of that methodology to defend a particular metaphysical thesis labeled "necessitism" against its contrary, "contingentism." That summary omits many original observations and longer ruminations on the nature of logic, analogies and disanalogies between temporal and modal notions, substitutional interpretation of quantifiers, the value of higher-order and plural quantification and their proper interpretations, "translation" between rival theories, the existence (or rather non-existence) of truth-makers, and many other matters. This review will concentrate on what purports to be the book's central, and what strikes this reviewer as its least convincing, theses-that the choice between necessitism and contingentism is a clear and central issue to which philosophers interested in ontology and necessity should redirect their attention and that appropriate reflection on modal logic provides convincing evidence for necessitism.

Necessitism is described as the thesis that "necessarily everything is necessarily something" (p2). This is a rather peculiar wording, which might seem to convey something trivial. He prefers it to something more substantive-sounding like, say, "It not possible that anything can have merely possible existence," because he mistrusts the term "existence," which has restricted uses that might exclude, for example, events because they *occur* rather than *exist*,

or numbers and sets, because they don't exist *concretely*. Williamson's concern is the unrestricted notion of existence, and so he deliberately avoids all locutions of the form *x exists* in favor of those of the form *x is something*. Of course the quantificational phrase "being something" has obvious restricted uses as well, but Williamson thinks the very obviousness of such uses makes the phrase less likely to cause confusion. One difficulty with this policy is that claims about whether an alleged particular is "something" seem at least as murky as those about whether it exists, so that the reader may find himself, as the reviewer did, translating such claims back into existence language. A reader may also get the uneasy feeling that, by insisting on taking the quantificational phrase in its "absolutely unrestricted" sense Williamson may be sneaking the rabbit he wishes to produce into his hat from the beginning. Of course standard systems of quantified modal logic with possibilist quantifiers verify **BF CBF** and **NNE**, but the contingentist who works with such a system presumably thinks that not all the values of its variables deserve the label of "being something."

An apparent virtue of Williamson's notion is its simple expression as a formula of modal logic.¹

(NNE) $\Box \forall x \Box \exists y x = y$,

(the 'E' presumably being a covert reference to the banished 'existence'). Prior discussions of modality and ontology have focused instead on the Barcan formula and its converse:

(BF) $\Diamond \exists v A \rightarrow \exists v \Diamond A$ (CBF) $\exists v \Diamond A \rightarrow \Diamond \exists v A$

¹Williamson's defense of **NNE** and the views explained below that ordinary objects have necessary existence but contingent concreteness and that simplicity is an important virtue in modal systems are all anticipated to some extent in [7].

As Williamson observes (p 44), in standard modal systems that reject these schemas (viz., extensions of **KB** closed under necessitation and based on an underlying free logic of quantification with identity), **BF**, **CBF** and **NNE** are all equivalent, so any of these could be used to demarcate the metaphysical thesis of interest to him. **NNE**, however, expresses the idea more directly and it has the additional advantage of being a single formula rather than a schema.

Just as Williamson asks us to redirect our attention from familiar modal formulas, he asks us to redirect our attention from a familiar modal debate, that between *actualism* and *possibilism*, about which, he says "there is a widespread feeling of dissatisfaction" (p22). The actualist maintains (and the possibilist denies) that everything is actual, so that possibility talk must ultimately rest on actually existing stuff. The dissatisfaction Williamson discerns stems from the idea that the parties to the debate employ divergent notions of actuality. Although, as Williamson says, necessitism and contingentism may "remind some readers of views associated with the terms 'possibilism' and 'actualism', respectively," it is not clear that a question about the possible existence of contingent individuals captures everything salvageable from the actualism/possibilism debate², or that the notion of necessitism is as simple and immune to problems of equivocation as Williamson's book might suggest.

Williamson writes as if the debate between necessitism and contingentism is an old one, and, once we understand the central issue, we can discern defenses of the two positions in much of the recent writing on modal metaphysics. But the arguments presented here are largely original to Williamson and very little of the literature Williamson ably elucidates explicitly defends the

²In particular, one might think that the actualist would favor one of the spare versions of necessitism described below while the possibilist would be more comfortable with the expansive version.

kind of necessitism that he favors. Perhaps the most obvious way of affirming **NNE** is to contemplate a *spare* ontology from which the contingent individuals are eliminated, leaving only necessary ones behind. Thus a super-Platonist might hold that only the Forms exist, while the shadows they cast in the everyday world are illusory, and a super-idealist might hold that only ideas in the mind of God are real, while the bundles of them that temporarily occupy the minds of men are not, and (sparest of all) an existence monist might hold that only the universe exists. Williamson, however, advocates an *expansive* ontology, according to which the ordinary individuals whom we know and love themselves have necessary existence (or rather, are necessarily something). Thus the death of Socrates does not mark his ceasing to exist, but merely his transition to a non-concrete (and non-human) form. If the familiar things that we thought of as contingent are necessary, then it is reasonable to think that those things we thought of as merely possible are also necessary. In the helpful, if merely metaphorical, idiom of possible worlds, if the individuals in this world exist in all worlds, then it is reasonable to think that the individuals in other worlds exist in all worlds, including this one. (That's why there is the outer box in NNE.) Thus Williamson's kind of necessitism requires, as he says, "a multiplication of entities" (p8). But this is not a decisive consideration against it: "Multiplying entities is sometimes a necessity for the sake of theoretical plausibility, because the alternative is a massive loss of simplicity, elegance and economy in principles" (p 9).

The idea that necessitism can be identified with acceptance of a particular modal formula must be taken with some care. One of the few figures Williamson explicitly identifies as a necessitist is David Lewis. But Lewis's counterpart theory does not validate **BF**, which he interprets as saying that if some world contains an individual that is A then the actual world contains an individual with a counterpart that is A. (This can be false if the possible individual

that is A is not the counterpart of any actual individual.) Counterpart theory does validate NNE, but that is because that formula is interpreted as saying that *if* a possible object has a counterpart then that counterpart is identical to something (namely itself), and not because all possible objects have counterparts in all worlds. Lewis himself seems to regard the validation of NNE as an unfortunate feature of his theory, to be accepted only because the consequences of alternative theories are even more unfortunate ([6] p 119). Williamson characterizes Lewis as a necessitist, not because Lewis believes that ordinary objects or their counterparts exist in all worlds, but because what Lewis really takes to "exist" in the unrestricted sense (and to so exist necessarily) are all the possible worlds and their world-bound contents. How is it that Lewis can side with the necessitists in thinking that every possible object exists necessarily and therefore exists simpliciter while rejecting BF? One explanation might be that Lewis takes counterpart theory as providing a semantics for the word *necessarily*. When we say Socrates might have been foolish, we are asserting the existence of a foolish Socrates-like individual at a location spatiotemporally isolated from us. The fact that there are other such places where no individual resembles Socrates, Lewis might say, does not mean that Socrates himself could fail to exist. The tension between interpreting Lewis as providing a semantical theory or a metaphysical one can perhaps be seen more clearly in his account of counterfactuals. When Lewis gives examples illustrating the vagueness and ambiguity of counterfactuals he seems to take the similarity relation as a relation that is determined by language users according to context, but when he uses counterfactuals to explain the notion of causation it is more natural to interpret him as taking similarity to be something independent of language and mind. Williamson tells us repeatedly that this book is not concerned with the way we speak or think, but about the way things are-he sees metaphysics as (non-empirical) science. If the modal logician sees her system merely as some

kind of idealization of reasoning in natural language then her acceptance or rejection of **NNE** might provide no evidence for her metaphysical views. Disentangling truths about language from truths about the world, however, may be difficult or impossible. If Lewis *is* a necessitist, then, as Williamson makes clear, he subscribes to an entirely different sort of theory than Williamson himself. For, on Lewis's account, the real Socrates, and presumably all his counterparts, are necessarily concrete and necessarily human.

Given that the choice between necessitism and contingentism is a clear and central issue in the metaphysics of modality, how should it be decided? Williamson recommends a methodology similar to that employed in the natural sciences, which, following C.S. Peirce, he labels "abduction."

"Very general theories are formulated in a formal notation that facilitates complex rigorous deductions of their consequences. The theories are judged partly on their strength, simplicity and elegance, partly on the fit between their consequences and what is independently known" (p 423).

Applied to the case at hand, this means determining whether the simplest and most elegant modal logic (construed as a theory of the world rather than a theory about thought or language) that fits with what is independently known includes **NNE** as a theorem: hence *Modal Logic as Metaphysics*. A more apt title might be *Metaphysics as Modal Logic*. Williamson's quarrel is not with modal logic pursued for other purposes, but with the metaphysics of necessity and existence pursued by other methods.

Given this general outlook, one might expect Williamson to defend **S5** as the appropriate sentential logic for metaphysical necessity. It is, after all, a simple and strong system, widely accepted by "acknowledged experts," and its acceptance has failed to "generate a proliferation of anomalies, spreading outwards from the initial error" (p 426). Instead, however, Williamson gives a careful and detailed account of what it is for a propositional modal logic to be correct for

metaphysical necessity and a cautious partial answer to the question of what logic satisfies the condition.³⁴ Since this account reveals many aspects of Williamson's general outlook that feature in his later defense of **NNE**, it is worth reviewing.

One would normally say that a theory is correct if it is true on its *intended* model. Modal logics, however, aim at general truths about necessity and possibility rather than particular ones. Formulas contain sentence letters not intended to represent any particular propositions, and so there can be no particular model that is intended for such formulas. Williamson suggests that we look instead at that their (propositionally) universal generalizations. A formula of propositional modal logic is *metaphysically universal* if the result of replacing its sentence letters by propositional variables and then applying universal quantifiers is true on the intended interpretation (which takes \land , \lor and \neg to express the appropriate truth functions and \Box to express metaphysical necessity). The set **MU** of all metaphysically universal formulas constitutes the correct logic for metaphysical necessity. Williamson provides arguments that **MU** is a consistent extension of K, that it is closed under substitution and modus ponens and that it is Halldén complete (i.e., it contains a disjunction of formulas with no letters in common only if it contains one of the disjuncts). The fact that these are all properties of the logics determined by Kripkestyle model structures gives him confidence to construct a Kripke-style model structure, M^{\wedge} = $\langle W^{A}, R^{A}, w^{A} \rangle$, that he takes to be the intended mathematical model for **MU**. Start with an atomic boolean algebra of propositions (i.e., a boolean algebra in which each element q has an "atomic"

³ Similar accounts and (perhaps less cautious) answers are given in [5], and [2] (reported in [3]), and an analogous account for logical necessity is given in [1].

⁴ Williamson does apply the abductive method described more directly later in the book, where he argues that the simplest and most elegant higher order logics of necessity have as theorems certain comprehension principles from which **NNE** can be derived.

part, i.e., an element p such that $p \le q$ and $r \le p$ only if r=0 or r=p) and a unary non-Boolean operator L for necessity. Take W^{\wedge} to be the algebra's atoms, R^{\wedge} to be the relation that holds between w and w' iff, for all propositions p, w \leq Lp implies w' \leq p, and take w[^] to be the set of all true propositions. He then offers a short informal proof that this construction does the job-the formulas valid in M[^] are just those that are metaphysically universal. Knowing that **MU** is determined by its intended model structure, however, does not reveal the identity of the logic. The relation of the model structure is defined in terms of the necessity operator on propositions, and we do not know, for example, whether that relation is transitive or Euclidean unless we already know whether that operator satisfies the axioms 4 ($\Box A \rightarrow \Box \Box A$) or 5 ($\Diamond A \rightarrow \Box \Diamond A$). This is only to be expected. Just as the intended interpretation of \wedge is conjunction (rather than, say, binary multiplication), the intended interpretation of \Box is necessity (rather than quantification). Furthermore, we do not know whether metaphysical universality is closed under necessitation. In fact, if we extend the idea to predicate logic with identity, it is plausible to think that $\exists x \exists y (x \neq y)$ is metaphysically universal but $\Box \exists x \exists y (x \neq y)$ is not. It is plausible that the necessity operator satisfies T ($\Box A \rightarrow A$) and the necessitation of all tautologies. Since S5 can be axiomatized by adding 4 and 5 to this basis, the fact that MU is determined by its intended model structure does ensure that *if* it satisfies the **4** and **5** axioms it contains **S5**. Furthermore, a well known theorem of S.J. Scroggs says that the only extensions of S5 are those that validate formulas Alt, requiring there to be at most n worlds. But it is plausible that possibly there are exactly I donkeys is true for every I, and this would mean that no Alt_n is metaphysically universal. Hence, *if* the correct propositional logic for necessity satisfies 4 and 5 it is exactly S5.

At least two features of this account bear closer scrutiny. First, the distinction between

properties of necessity plausible enough to endorse (presumably the "known facts") and those to be determined by theoretical considerations (presumably simplicity and elegance) is not clear. A central thesis is that Socrates' existence is contingent (or, in Williamson's preferred locution, Socrates might not be something) is not to be considered a known fact. But here we are to understand that it's possible that there are exactly googolplex plus one donkeys is. That is odd. Similarly, we are told that axioms 4 and 5 are controversial, but we are to understand that it is obvious that the axiom Triv (A \neg DA, Williamson's "collapse of possibility and necessity" –p 425 and elsewhere), is not metaphysically universal. Yet Triv is an expression of determinism, a position that is surely held widely enough to be considered controversial. A thinker who wished to determine the truth about determinism by Williamson's abductive method would be hardpressed to find a stronger, simpler, or more elegant logic than Triv (= KT+Triv). To be fair, the determinist does owe us an explanation of counterfactual conditionals, causation, and dispositional notions like solubility and flammability. This consideration, however, raises other difficult issues, including the one mentioned above about how semantic issues can be distinguished from metaphysical ones and the issue of the scope of the theory to which the abductive method applies. Williamson does persuasively advocate and illustrate the thesis that many of issues about metaphysical necessity surface only in settings more general than first order modal logic. But the general settings that concern him are obtained by adding \Box to systems with higher order or plural quantification, λ -abstraction operators, or the \in of set theoretic membership, which do not help in this case.

A second feature worth our attention surfaces in the argument that **MU** may not be closed under necessitation. Williamson argues repeatedly that the task of demarcating logic from other areas of inquiry is probably hopeless and is, in any case, irrelevant to his concerns. But if we take logical truths to be those true in virtue of the meanings of logical expressions and we take *necessarily* to be such an expression, then there it *is* very plausible that the correct logic of necessity is closed under necessitation. The oddness of Williamson's position is apparent in his alleged counterexample. $\exists x \exists y x \neq y$ is normally considered a truth about the world and *not* a truth of logic. Does Williamson want to change that perception? If so, he will presumably need to add to his logic theorems \mathbf{E}_n for each n expressing the existence of at least n objects (as he acknowledges on pages 143-144). The result will be a first order logic that is not finitely axiomatizable. Perhaps worse, a physicalist might believe that a finite, but unknown, number of these sentences should be theorems of logic. If Williamson or the physicalist wants to then apply their logic to see what follows from the assumption that the universe contains some smaller number of objects, they will find (if their logic is classical) that everything follows. This is surely not what we want from logic. In the same way, the modal logician may want to see what follows from the assumption that there are contingently existing objects as well as the assumption that there are not.⁵

Suppose we acquiesce to Williamson's general pluralism about logic-different logics

⁵ Williamson remarks in response to several rival ideas that "weakness" in a theory should never be considered a virtue. The suggestion here is that optimal theoretical division of labor may well recommend that power be withheld from one theory and allotted to another–in this case, a theorem should be withheld from logic in favor of metaphysics or physics. A second defense of weakness might be rooted in the conflict between the virtues of strength and simplicity noted by Williamson. A weak, simple, idealized theory might be preferred to one that deals with the phenomena to be explained in all their complexity. Williamson's favorable remarks about higher order logic suggests that, in the case at hand, he thinks the added power outweighs the loss of simplicity. But his general pluralism about logic leaves open the possibility that, in certain contexts, it is more appropriate employ the simpler classical first order logic rather than taking on the complexity of **MU**, just as, in other contexts, it is more appropriate to employ propositional logic rather than **FOL**. In any case, the argument here about division of labor among theories is independent of the argument about tradeoffs between simplicity and strength within a particular theory.

may be appropriate in different dialectical contexts-and to the idea that the boundary between the logical and non-logical is fuzzy. How then should we regard modal logic? Oddly, Williamson gives us no reason to suppose that necessity provides one of the special contexts in which ordinary principles of reasoning should be revised. The modal logic he favors is a conservative *extension* of classical logic. He explicitly rejects building it on free logic or any other logic weaker than classical and his addition of \Box leads to no new theorems in the \Box -free language. So the question of whether modal logic is a theory about metaphysical necessity or a general logic of modal reasoning depends on whether \Box is a logical particle. I have argued in [4] that \Box 's status as an operator rather than a predicate is not sufficient reason to classify it as logical. But even if we take modal systems as theories about general properties of necessity there is good reason to take their theorems to be analytic. At one time many thought that the characterization of necessary as true in every possible world was a definition. We now reject that idea because we realize that the notion of a *possible world* cannot be understood independently of necessity. It is not that the alleged definition is narrowly *circular* in the sense that *necessary A iff necessary A* or even necessary A iff possible A and not contingent A would be. It's more that it fails to meet the criterion that definitions should allow the term defined to be eliminated. Nevertheless, it is still reasonable to view the characterization as *analytic*, i.e., true in virtue of the meanings of necessary and possible. If so, then, as the completeness theorems reveal, all the theorems of K are analytic, and, if the notion of every possible world is "by definition" independent of world, then all the theorems of S5 are analytic. Thus, even if the standard modal systems are theories, it is plausible to take their theorems to be analytic, or at least theories about which truths are analytic. (The system *Triv*, on the other hand, cannot be reasonably regarded in this way. The question of whether there is only one possible world cannot be answered by merely

contemplating the meaning of *possible world*.)

Generalizing the account of correctness to first order modal logic and the formula NNE brings additional complications. In first order logic, the truth or falsity of a sentence in a model can, but need not, be defined in terms of the truth or falsity of an open formula in a model under an assignment. Open formulas, however useful as bits of formal machinery, are not naturally seen as corresponding to truth-bearing expressions of natural language. Nevertheless, Williamson opts to generalize the notion of metaphysical universality to include open formulas. A formula of quantified modal logic is metaphysically universal, if the result of replacing each of its predicate letters by distinct predicate variables and each of its individual constants by distinct individual variables and prefixing and closing under universal quantifiers is true on its interpretation. So whether the sentences Fc and $\forall xFx$ and the formula Fx are metaphysically universal depends on second order formulas that are identical up to relettering of bound variables. Furthermore, Williamson takes an open formula to be *valid* in Kripke-style variable-domain model structure, if it is true under any assignment of possible objects to its free variables. Not surprisingly, he then deduces that, if there is an intended (variable-domain) Kripke model structure Δ that determines quantified **MU** then that logic must include **BF**: $\forall x \exists y (x=y)$ is metaphysically universal, so $\exists y(x=y)$ is metaphysically universal, so it is valid in Δ . That means that every individual in any domain of Δ satisfies $\exists y(x=y)$. So, by the Kripke truth condition, every such individual is identical to some individual in the actual world of Δ . So the domain of the actual world contains all possible individuals and **BF** is valid in Δ and (since Δ determines quantified **MU**), **BF** is valid in quantified MU, as was claimed.

This little argument convinces Williamson that Kripke's variable-domain model theory actually "sits more comfortably with necessitism than it does with contingentism" (p 136). He

concedes that contingentists "might try tinkering with the model theory to avoid the result" (p 136), but maintains that the most obvious ways of doing so "introduce ad hoc complication," the need for which merely emphasizes the previous point. The remarks in the previous paragraph suggest that Williamson does *not* set things up in the way that the contingentist should find most natural.

It *is* true, and it has been recognized before, that there is something odd about models whose non-actual worlds have domains containing individuals that are beyond the range of quantifiers, which, in the actual worlds are supposed to range over all existing objects. As the authors of [7] put it, "the thesis of actualism fails for Kripke's metalanguage" ([7], p 439). The actualist, or the contingentist, cannot think that Kripke's variable-domain models represent the literal truth, and Williamson is surely right to emphasize that the logician whose metalanguage lacks modal constructions and who interprets the box as a domain-restricted quantifier is not exactly giving the box its intended interpretation. But in repeatedly suggesting that the variable-domain models are merely mathematical devices of purely instrumental value, like many-valued or algebraic interpretations that validate the theorems of a non-standard logic with no thought to the intended meanings of the connectives, he goes too far. It may be difficult to say exactly *why* the models are more than mathematical instruments for delimiting the theorems, but they surely are. They represent, at the least, *metaphors* for the way things are.

The reader should not take any of these remarks in the wrong way. To disparage *Modal Logic as Metaphysics* because one is unconvinced by the arguments for its central thesis would be like denigrating *Remembrance of Things Past* because one finds the plot dull. This is a remarkable book, and the thoughtfulness, erudition and technical skills of the author are in evidence throughout. Adept expositions of early and recent work in quantified modal logic are scattered throughout the first half of the book, including some work of Føllesdal, Stalnaker, Gallin and others that has been relatively neglected, and the discussion of which has certainly never been gathered together in one place and woven into a coherent narrative as it is here. The second half begins to free modal logic from the narrow first order setting that it has mostly occupied until now, and I suspect that this may be the most influential aspect of the book.

The book is not an easy read. This not because it is filled with especially difficult proofs. Most of the proofs, in fact, are confined to footnotes and short appendices after chapters 6 and 7, and can be skipped without much loss. Furthermore, the writing, at least at the level of sentences and paragraphs is admirably clear. The difficulty, I think, lies primarily in the difficulty of the ideas themselves and the number of them that are conveyed in a short space. Williamson frequently explores a variety of ways of solving a particular problem before presenting the solution that he favors himself, and he even more frequently explores various responses his opponents might make after presenting his own solution. All of this can sometimes weigh the reader down. But perseverance will be rewarded. *Modal Logic as Metaphysics* is a significant book that deserves careful attention. I am confident it will get it.⁶

⁶ This review has benefited from many conversations with Gabe Broughton.

References

[1] Burgess, John P. "Which modal logic is the right one?." *Notre Dame Journal of Formal Logic***40.1** (1999): 81-93.

[2] Fine, Kit and S. Kuhn, *Modal Logic*, manuscript (1983-2016)

[3] Kuhn, S. "Modal logic." Routledge Encyclopedia of Philosophy, London (1998).

[4] Kuhn, Steven T. "Logical expressions, constants, and operator logic." The Journal of

Philosophy 78.9 (1981): 487-499.

[5] Lemmon, Edward John, and G. P. Henderson. "Symposium: Is There Only One Correct System

of Modal Logic?." Proceedings of the Aristotelian Society, Supplementary Volumes 33 (1959):

23-56.

[6] Lewis, David K. "Counterpart theory and quantified modal logic." The Journal of Philosophy (1968): 113-126.

[7] Linsky, Bernard, and Edward N. Zalta. "In defense of the simplest quantified modal logic."

Philosophical perspectives 8 (1994): 431-458.

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