

On Absolute Possibility

Is there a type of possibility, call it ‘absolute possibility’, such that every “genuine” type of possibility applies only to sentences that are absolutely possible?¹ And if so, does absolute possibility correspond to some known type of possibility (e.g., logical possibility, metaphysical possibility, etc...)? Equivalently, is there a type of necessity, call it ‘absolute necessity’ such that every “genuine” type of necessity applies to all the sentences that are absolutely necessary?² And if so, does absolute necessity correspond to some known type of necessity?

In addressing the questions above many have endorsed the position that metaphysical possibility is absolute possibility and, equivalently, that metaphysical necessity is absolute necessity. Let’s call this position, “**METAPHYSICALISM**”. There is a long and impressive list of philosophers who have endorsed **METAPHYSICALISM** including, but not limited to: David Chalmers, Cian Dorr, John Hawthorne, David Lewis, Gideon Rosen, Robert Stalnaker, Peter van Inwagen, Timothy Williamson, and Juhani Yli-Vakkuri.^{3,4} Let’s call those who endorse **METAPHYSICALISM**, “metaphysicalists”.

The popularity of **METAPHYSICALISM** is surprising given the widespread belief that there are various types of possibility, such as epistemic possibility and logical possibility, that apply to

¹ Unless otherwise noted I take the modality of a sentence to be derivative of the modality of the proposition it actually expresses regardless of the type of modality in question (e.g., the sentence, ‘All bachelors are unmarried’ is logically necessary because the proposition it expresses is true in all logically possible worlds; it does not matter that in some worlds the equivalent string of symbols might express a false proposition). I would prefer to talk about of the modality of propositions but much of this paper is in response to Dorr, Hawthorne, and Yli-Vakkuri (2021) who write about the modality of sentences.

² This question is equivalent to the first question given that each type of possibility and the corresponding type of necessity are logical duals of each other. The duality of possibility and necessity is so fundamental to the very notions of possibility and necessity, I will assume it for any type of possibility under discussion.

³ Chalmers (1996, pg. 35 and 38), Dorr et al. (2021), Lewis (1986), Rosen (2006), Stalnaker (2003 pg. 203), van Inwagen (1998 pg. 72), and Williamson (2016).

⁴ Additionally, Saul Kripke and Frank Jackson are often considered as metaphysicalists. For example, Clarke-Doane (2019) and Dorr et al. (2021) cite Kripke as a metaphysicalists (based on Kripke 1972/1980, pg. 19 and 99) and Stalnaker (2003 pg. 203) cites Frank Jackson as a metaphysicalists (but with no text cited). I am uncertain on the veracity of these attributions.

sentences that are not metaphysically possible (*cf.* Mallozzi, Vaidya, and Wallner 2021 and Robertson-Ishii and Atkins 2020). On the face of it **METAPHYSICALISM** is proven false by the obvious fact that both Goldbach’s Conjecture and its negation are epistemically possible (relative to, presumably, anyone) but only one of these is metaphysically possible.

This brings us to the critical issue of what it means for something to be a “genuine type of possibility”.⁵ Metaphysicalists don’t always agree or have much to say on this issue, which is unfortunate because this issue has the potential to make the whole debate about **METAPHYSICALISM** merely terminological. If “genuine type of possibility” is synonymous with “type of possibility that counts only a subset of the metaphysically possible sentences as possible” then **METAPHYSICALISM** is trivially true, and we ought all be metaphysicalists. But if epistemic possibility is a “genuine type of possibility” then **METAPHYSICALISM** is obviously false (given the example above). So, it is critical to the debate about **METAPHYSICALISM** and the nature of absolute possibility that we have a handle on what a genuine type of possibility is.

In their book, *The Bounds of Possibility*, Dorr, Hawthorne, and Yli-Vakkuri (2021⁶) tackle this problem.^{7,8} They believe that all genuine types of possibility obey certain inferential patterns. For example, all genuine types of possibility must apply to all sentences of the form ‘a = a’ (i.e., a sentence ascribing self-identity and nothing else). And if a sentence is necessary according to some genuine type of necessity, then that sentence must in fact be true. Dorr et al.

⁵ “Genuine” is meant to be a catch all for the qualifiers many metaphysicalists use when expressing the absoluteness of metaphysical possibility. For example, Williamson (2016, pg. 459) writes that metaphysical possibility is the “maximal objective modality” and Rosen (2002, pg. 16) writes that metaphysical possibility is most inclusive “real possibility”.

⁶ *The Bounds of Possibility* was published in November 2021, just a couple weeks before the finalization of this paper. The page numbers given in citations of Dorr et al. (2021) correspond to page numbers in a penultimate manuscript given to me that is available at request.

⁷ Dorr et al. (2021) don’t conclusively pick a way of demarcating what counts as a genuine type of necessity, but they give enough guidance on the issue that it isn’t hard to reason about the subject. They provide a significant amount of detail on this issue throughout sections §8.1, §8.2, and §8.4.

⁸ All references to works of “Dorr et al.” are to Dorr et al. (2021), and so “(2021)” may be omitted.

don't provide arguments in favor of their understanding of genuine types of possibility, but what is so interesting about this account of genuine types of possibility is that it ensures that the debate about **METAPHYSICALISM** is of theoretical importance.

Even if we restrict our attention to the types of possibility that obey the inferential patterns Dorr et al. mention, **METAPHYSICALISM** being true would still be theoretically important because, likely, metaphysically possible metaphysical possibility obeys all of the inferential patterns Dorr et al. mention (e.g., we can infer from a sentence's being metaphysically necessarily metaphysically necessary that the sentence is in fact true). And, if metaphysically possible metaphysical possibility is a genuine type of possibility, then if **METAPHYSICALISM** is true, then every instance of the characteristic S4 axiom-schema $[\Diamond P \rightarrow \Diamond P]$ is true (contra Chandler 1976 and Salmón 1986 and 1989). This is because **METAPHYSICALISM** is the claim that every other genuine type of possibility applies only to the sentences that are metaphysically possible. And so, if **METAPHYSICALISM** is true and metaphysically possible metaphysical possibility is a genuine type of possibility, then any sentence that is metaphysically possibly metaphysically possible is metaphysically possible. Thus, **METAPHYSICALISM**, even within the restricted domain of types of possibility that obey particular inferential patterns, has significant implications for modal logic.

The above paragraph shows that following Dorr et al.'s way of demarcating genuine types of possibilities results in the truth of **METAPHYSICALISM** being significant, but, as was mentioned before, ways of demarcating genuine types of possibility could also be such that **METAPHYSICALISM** would be obviously false. Dorr et al.'s demarcation of genuine types of possibility does well here too in that they think **METAPHYSICALISM** is true given this way of understanding genuine types of possibility. And so, they provide a defense for

METAPHYSICALISM and if their defense is successful, then there are significant ramifications for modal logic.

Dorr et al.’s defense of **METAPHYSICALISM** is ambitious and interesting but I’ll argue that it doesn’t work, even if we grant them that all genuine types of possibility obey the inferential rules Dorr et al. mention. In §1, I’ll explain how Dorr et al. use the fact that all genuine types of possibility obey certain inferential patterns to defend **METAPHYSICALISM**. As will become apparent in explaining Dorr et al.’s defense of **METAPHYSICALISM**, these inferential patterns support **METAPHYSICALISM** only if countless highly implausible identifications are true. In §2, I will argue against these identifications.

§1 The defense for **METAPHYSICALISM**

In §8.1 of *The Bounds of Possibility*, Dorr et al. argue that some proclaimed or apparent counterexamples to **METAPHYSICALISM** must in fact be necessary according to any genuine type of necessity. The apparent counterexamples they consider are four sentences that are classically considered metaphysically necessary but yet are, or are like, sentences that either Salmón (1989) or Clarke-Doane (2019) have argued are not necessary according to all genuine types of necessity. The sentences Dorr et al. consider are:

- (1) Hesperus is Phosphorus.
- (2) Every golden thing is made of atoms containing 79 protons.
- (3) Biden is not a doll.⁹
- (4) Lectern *L* is not made of ice.

If any of (1) – (4) were not necessary according to some genuine type or types of necessity but were metaphysically necessary, then **METAPHYSICALISM** would be false. This is because if any

⁹ Dorr et al. use the sentence “Nixon is not an inanimate object”. I use “Biden is not a doll” because there are unrelated difficulties when talking about the truth of sentences about states of affairs with people who have passed away. Additionally, some might even think that since Nixon is not currently animate, “Nixon is not an inanimate object” is actually false (and so, certainly not absolutely necessarily true). “Biden is not a doll” avoids these difficulties while still being the type of example Dorr et al. want.

of (1) – (4) were not necessary according to some genuine type or types of necessity but were metaphysically necessary, then it would be the case that metaphysical necessity is not absolute necessity.

Dorr et al. (pg. 219) summarize the general reasoning of their opponent who claims that (1) is not absolutely necessary with the following schematic argument; sub any candidate type of necessity (e.g., logical necessity, epistemic necessity, etc...) for ‘O’ in the following:

(P1) O is a genuine type of necessity

(P2) O does not apply to (1)

(C) Therefore, there is a type of necessity that does not apply to (1)

But Dorrr et al. argue that there are no sound instances of this argument schema (pg. 219 – 223). This is because of two important ways genuine types of necessity must be “logically well-behaved”.

First, all genuine types of necessity apply to all sentences ascribing self-identity and nothing else. Formally, this requirement is $\forall X(\text{Necessity}(X)^{10} \rightarrow \forall yX(y = y))$ (Dorr et al. pg. 220). If a type of necessity does meet this requirement, let us say that it “validates the necessity of self-identity”. Given that genuine types of necessity must validate the necessity of self-identity, if (P1) is true then O applies to the sentence:

(5) Hesperus is Hesperus

Second, if the axiom-schema $\text{LL}_{\text{sub}} [a = b \rightarrow P[a/v] \rightarrow P[b/v]]$ has false instances when “P” represents a sentence where the operator representing a candidate type of necessity takes the widest scope, then that candidate type of necessity is not a genuine type of necessity (assuming that nothing other than the candidate type of necessity could be

¹⁰ “Necessity(X)” means that X is a genuine type of necessity.

functioning as a syntactic operator). LL_{sub} is roughly tantamount to the idea that you can substitute co-referential rigid designators¹¹ without harm to truth value. And Dorr et al.'s position here is roughly tantamount to the idea that you can substitute co-referential rigid designators that occur in the context of a genuine type of necessity without harming the truth value of the sentence (so long as there are no syntactic operators at play)¹². If a type of necessity does allow this substitution, let us say it "validates LL_{sub} ".

Given that all genuine types of necessity validate LL_{sub} , if X is a genuine type of necessity, then every instance of $[(a = b) \rightarrow (X(a = a) \rightarrow X(a = b))]$ must be true. Given that all genuine types of necessity validate the necessity of self-identity, if X is a genuine type of necessity, every instance of $[X(a=a)]$ must be true. Putting the two together, if X is a genuine type of necessity, then it must be that every instance of $[a = b \rightarrow X(a = b)]$ is true.

This is all they need to show that (1) cannot be a counterexample to **METAPHYSICALISM**. From the fact $[a = b \rightarrow X(a = b)]$ has only true instances, when X represents a genuine type of necessity, it follows that if (1), then (1) is necessary, using any genuine sense of "necessity"; assuming, as both Dorr et al. and I will, 'Hesperus' and 'Phosphorus' are rigid designators. And

¹¹ Without the stipulation that the terms "a" and "b" in LL_{sub} are rigid designators, Dorr et al.'s position would be very implausible. Since, if "a" and "b" didn't have to be rigid designators then the following sentence would be a false instance of LL_{sub} where an operator representing a genuine type of necessity takes the widest scope (and there are no quotational contexts):

If Ben Franklin is the inventor of bifocals, then if it is metaphysically necessary that Ben Franklin is Ben Franklin then it is metaphysically necessary that Ben Franklin is the inventor of bifocals.

But if LL_{sub} only allows the substitution of rigid designators, then the above sentence is not an instance of LL_{sub} .

¹² It could be that some candidate types of necessity are syntactic operators. In fact, this could be what prevents those candidate types of necessity from being genuine types of necessity (since LL_{sub} does not hold in quotational contexts). This is exactly why Dorr et al. think that Clarke-Doane's (2019) "logical necessity" is not a genuine type of necessity (Dorr et al. pgs. 216-221).

since, (1) is indeed true, all genuine types of necessity apply to (1). And so, going back to the schematic argument, either (P1) or (P2) must be false no matter what we sub for 'O'.¹³

We can also see that if Dorr et al.'s argument works, it does even more than they say. Dorr et al.'s argument doesn't just undermine their opponents' argument that there is a genuine type of necessity that applies to (1). If they are right, their argument shows that all genuine types of necessity apply to (1). And, assuming, as I will throughout, that there is such a thing as absolute necessity,¹⁴ their argument, if it works, shows that (1) is absolutely necessary.

This far, I agree with Dorr et al. As long as we require that all genuine types of necessity validate LL_{sub} and the necessity of self-identity, (1) is not a counterexample to **METAPHYSICALISM**. Additionally, since it is plausible that metaphysically possibly

¹³ Readers not interested in the specifics of exactly what Dorr et al. say may skip this note without harm. Surprisingly, Dorr et al. actually say more at this point but what they add faces some issues and seems unnecessary; at the very least, it is certainly unnecessary for purposes of this paper. They do argue that there is no genuine type of necessity that applies to (5) but doesn't apply to (1) because of LL_{sub} and that all genuine types of possibility apply to (5) and so there is no genuine type of necessity that fails to apply to (1). But from here they go an odd route, they argue that if X is a genuine type of necessity that fails to apply to (1), then expanding logic to include 'X' invalidates existential generalization because, as discussed above, they can derive that there is no genuine type of necessity that fails to apply to (1). It may be easier to understand with an example, let's suppose that epistemic necessity is a genuine type of necessity and that it applies to (5) but not to (1). Well, then, Dorr et al. say it must be the case that adding an "epistemic necessity" operator to our logic would invalidate existential generalization because we can derive that there is no genuine type of necessity that applies to (5) but not to (1). And, Dorr et al. continue, without existential generalization being valid an opponent cannot infer that there is a genuine type of necessity that fails to apply to (1) from the fact that epistemic necessity is a genuine type of necessity that fails to apply to (1). And so, they conclude, either one of (P1) or (P2) is false or the argument is invalid (because, as discussed above, existential generalization would become invalid). But there are several problems with this line of reasoning. First, quite obviously the opponent would give up that all genuine types of necessity validate LL_{sub} before they give up existential generalization. Second, more than just existential generalization would need to be invalid for it to be consistent that both there is no genuine type of necessity that fails to apply to (1) and that epistemic necessity is a genuine type of necessity that fails to apply to (1) (for example, from the fact that there is no genuine type of necessity that fails to apply to (1) then via quantifier negation and universal instantiation we can infer that it is not the case that epistemic necessity fails to apply to (1)). Third, these remarks are unnecessary, if one can really derive that there is no genuine type of necessity that fails to apply to (1), then one should just conclude that either epistemic necessity is not a genuine type of necessity or that it applies to (1). Pg. 224 is very revealing in this regard because they drop many of these moves and simply argue that all genuine types of necessity apply to (2).

¹⁴ This assumption is plausible and agreed to by both Dorr et al. and I. It allows me to infer from the fact that all genuine types of necessity apply to P that P is absolutely necessary, and it allows me to infer from the fact that there are at least one genuine type of possibility applies to P that P is absolutely possible.

metaphysical possibility validates LL_{sub} and the necessity of self-identity, **METAPHYSICALISM** being true even in the restricted domain of types of possibility that validate LL_{sub} and the necessity of self-identity would still have consequences for the debate on whether or not the S4 axiom has counter-examples (see pg. 2). Given this, while we could push against Dorr et al.'s restrictions on genuine types of possibility, it is worth seeing if **METAPHYSICALISM** holds in this domain of discourse regardless of whether or not it is a restricted domain.

Next Dorr et al. turn to (2). Here again they argue that there is no genuine type of possibility that fails to apply to (2). And so, assuming there is such a thing as absolute necessity, (2) is absolutely necessary. There are two important parts to their argument here.

First, they endorse:

(6) To be golden is to be made of atoms containing 79 protons¹⁵

They claim (6) is plausible and take discovering identity statements like (6) to be one of the central goals of science (pg. 223 – 224). They add that something has gone “terribly wrong” if we start denying identities such as the one ascribed in (6) based simply on arguments about *a priori* knowledge and the like (pg. 224).

The other key part of their argument for the absolute necessity of (2) is Dorr et al.'s (pg. 224) idea that LL_{sub} also licenses the substitution of predicates if the predicates rigidly predicate the same property (e.g., “if *being a bachelor* is the same property as *being an unmarried man*, then if John is a bachelor, then John is an unmarried man” is an instance of LL_{sub}). We can unify the claim that LL_{sub} allows predicate substitutions with the intuitive understanding of LL_{sub} as a rule that allows us to substitute co-referential rigid designators by thinking of some predicates of

¹⁵ While there are ways of reading (6) such that (6) is not an identity claim, Dorr et al. are explicit that the reading of (6) they are interested in is one where (6) is an identity claim between the properties *being golden* and *being made of atoms containing 79 protons* (Dorr et al. pgs. 223-224).

sentences as rigidly designating a particular property. The syntax of formal higher-order languages more clearly lines up with the idea that LL_{sub} allows certain predicate substitutions than does the syntax of natural languages (e.g., contrast “ $F = G \rightarrow (Fx \rightarrow Gx)$ ” with “If *being divisible by 2* is *being even*, then if 5 is divisible by 2 then 5 is even”) but the idea that LL_{sub} allows certain predicate substitutions is understandable even when using natural languages.

With (6) and the idea that LL_{sub} allows us to substitute certain predicates the argument goes as follows (*cf.* pg. 224)¹⁶:

- | | | |
|------|---|---------------------------------------|
| i. | (6) | [assumption] |
| ii. | It is absolutely necessary that every golden thing is golden | [see footnote ¹⁷] |
| iii. | <u>If (6), then if (ii), then it is absolutely necessary that (6)</u> | <u>[LL_{sub}]</u> |
| iv. | Therefore, it is absolutely necessary that (6) | |

It is noteworthy that (6) is quite controversial¹⁸ and yet (6) is a crucial part of Dorr et al.’s defense of the absolute necessity of (2).

As for the absolute necessity of (3) and (4), Dorr et al. have little to say. What they do say here is that it is “completely unpromising” (pg. 225) to think that (1) and (2) are absolutely necessary but that (3) and (4) are not. And that “if we can make peace with the initial oddity” that (1) and (2) are absolutely necessary, then it is “totally unobvious” whether (3) and (4) are absolutely necessary (pg. 225).

This is both under argued and highly implausible. I will argue that, while (1) may be absolutely necessary, according to the way Dorr et al. demarcate what counts as a genuine type of possibility, no similar defense of the absolute necessity of (3) or (4) can be given. As for (2), I

¹⁶ They conclude that there is no genuine type of necessity that fails to apply to (6) but as long as we think that there is such a thing as absolute necessity (as both Dorr et al. and I do), we can conclude that (6) is absolutely necessary.

¹⁷ Dorr et al. require that all genuine types of necessity apply to all closed theorems of a basic higher order logic such as their H_{KA} . There are issues with H_{KA} but this is irrelevant because “Every golden thing is golden”, formally $(\forall x)(Gx \rightarrow Gx)$, certainly will be a theorem even in a uncontroversial higher order logic.

¹⁸ *cf.* Robertson-Ishii 2018 for a related discussion on kinds. Her points apply *mutatis mundais* to (6).

don't believe (2) is absolutely necessary because I take (6) to be false, but I admit the case for the absolute necessity of (2) is much better and so my remarks on this are limited. But before I argue against Dorr et al.'s defense of the absolute necessity of (3) and (4), it is worth trying to develop more of an argument from Dorr et al.'s cursory remarks. It is especially worthwhile to develop their argument here since there are other parts of their book that shed light on what they are thinking, and it turns out that we can build a rather robust defense of **METAPHYSICALISM** by stitching together what they say across several chapters of their book.

So, why would it be completely unpromising to accept the absolute necessity of (1) and (2) but reject the absolute necessity of (3) and (4)? Dorr et al. must think that the absolute necessity of (3) and (4) can be defended in a similar way to how the absolute necessity of (1) and (2) was defended (i.e., by appealing to particular identities and then using the requirement that all genuine types of necessity validate LL_{sub}). They must think this or else accepting the absolute necessity of (1) and (2) gives no reason for one to think that (3) and (4) are absolutely necessary, and so their claim that we should treat these cases similarly is entirely unmotivated.

This fits nicely with what they say in Chapter 7. In Chapter 7, they endorse a view about the world where, “non-fundamental objects — not only areas and molecules and fists and beards, but tables, pyramids, and so on— are linked to more fundamental objects by a rich array of higher-order identities” (Dorr et al., 2021, pg. 197). While they don't flush out all the details, they do suggest a way in which “non-fundamental objects” could be “linked to more fundamental objects by a rich array of higher order identities”. On pg. 198, they consider the claim:

- (7) To be identical to Woody is to be the first table-shaped object to be originally composed of at least k of atoms a_1, \dots, a_n .

While they think (7) is too simple and thus, prone to counterexamples (pg. 198), they find it initially appealing. It's revealing that they're both tempted by (7) and that their issue with it is not that the property *being identical to Woody* is identical to some complex property. The only issue they find with (7) is that this particular identification is too prone to counterexamples (i.e., objects that have one of the properties but not the other). They seem to like the idea of identifying *being identical to Woody* with some complex property, and, as we will see, this makes sense because it provides a way to defend **METAPHYSICALISM**.

They tell the reader that just because “in the case of objects like tables it is a lot harder [as compared to the case of objects such as regions, molecules, fists, and beards] to actually write down defensible candidates to be the higher-order identities” this is not indicative of a “deep metaphysical contrast” (pg. 198). They favor a view where non-fundamental objects are “nothing over and above” the fundamental microphysical ones (pg. 197). And they write that “higher-order identities of the sort we have been considering provide a relatively clear and satisfying way to make sense of such “nothing over and above” claims” (pg. 197).

This provides insight into how Dorr et al. could construct a defense of the absolute necessity of (3) in a way similar to how they defended the absolute necessity of (1) and (2). If higher order identity claims such as:

- a. To be identical to Biden is to be a human and ...
- b. To be a human is to be a biological organism and
- c. To be an inanimate object is to be not a biological organism and ...
- d. To be a doll is to be an inanimate object and ...

are all true, and the relevant terms all rigidly designate, then Dorr et al could again appeal to LL_{sub} to do the brunt of the theoretical work in showing that (3) is absolutely necessary.

Of course, Biden's not being a doll isn't supposed to be a special or unusual case for Dorr et al. but instead just an example of a metaphysical necessity. Given that this isn't a special case, we can generalize, first to account for other metaphysical necessities involving Biden and then to account for objects other than Biden, the result is a robust defense of **METAPHYSICALISM**.

Let F be the conjunction of all the properties that Biden actually metaphysically must have (perhaps, excluding those properties Biden trivially has such as *being such that $2+2 = 4$* and *being such that it is either raining or not raining*). So, assuming that *being human* and *being the child of Catherine and Joseph Biden Senior* are properties Biden actually metaphysically must have,¹⁹ F will be something like *being human and the child of Catherine and Joseph Biden Senior and...* With this setup we can generalize the suggested Dorr et al.'s reasoning for the absolute necessity of (3) and take inspiration from what they say throughout pgs. 189 – 212, by taking them to think that F is identical to *being identical to Biden*. Given that 'F' and '*being identical to Biden*' are rigid designators²⁰ and that all genuine types of necessity validate LL_{sub}:

(8) If $F = \textit{being identical to Biden}$, then if it is absolutely necessary that Biden is identical to Biden, then it is absolutely necessary that Biden is F

Since it is absolutely necessary that Biden is identical to Biden:

(9) If $F = \textit{being identical to Biden}$, then it is absolutely necessary that Biden is F.

And so, Dorr et al. would infer that it is absolutely necessary that Biden is F; since on this suggested path they take it *being identical to Biden* is F. Notice also that F is such that, for any property P that Biden metaphysically necessarily has (in the actual world), we can infer that Biden will have P because F is the conjunction of all the properties Biden metaphysically

¹⁹ For arguments that Biden metaphysically must have both of these are properties, see Kripke (1972/1980 pgs. 46-47 and 110-115).

²⁰ One might think that "F" is a hidden definite description because its reference was fixed by saying "let F be the conjunction ...". But this isn't so. See Kripke 1972/1980 fn. 33 on determining the reference of a name by description.

necessarily has. Formally, this follows from the lambda conversion rules. While these rules are dubious in some cases,²¹ they don't seem to be problematic here. And so, given the assumption that it is absolutely necessary that Biden is F, for any property P that Biden metaphysically necessarily has (in the actual world) we can infer that it is absolutely necessary that Biden has P. It is not much of a stretch to think that the preceding point, if true, would secure the absolute necessity of the metaphysically necessary sentences that have Biden and only Biden as the subject.

Given that Biden is not some special object, we could follow similar reasoning to argue for the absolute necessity of the metaphysically necessary sentences about any object. And so, if *being identical to Biden* is the same property as F, then Dorr et al. have a powerful argument for **METAPHYSICALISM**.

The argument is complex and there may be multiple places to push on it but, ultimately, the most significant problem with this argument is the claim that F is identical to *being identical to Biden*.

§2 Responding to the defense of METAPHYSICALISM

§2.1 The different properties and relations of F and *being identical to Biden*

The most straightforward reason to reject the identification between F and *being identical to Biden*, is that F and *being identical to Biden* have different second-order properties (i.e., different properties of properties). F is a massively complex property whereas *being identical to Biden* is remarkably less complex. F is such that it is composed of the properties such as *being human* and *being the child of Catherine Biden and Joseph Biden Senior*, but *being identical to Biden* is not such that it is composed of the properties *being human* and *being the child of*

²¹ See Robertson-Ishii and Salmón (2020) on the Russell-Myhill Paradox (Russell 1903: Appendix B; Myhill 1958)

Catherine Biden and Joseph Biden Senior. Thus, given that different second-order properties apply to *being identical to Biden* and F, they are not the same.

There are two foreseeable alternative objections to the above reasoning. On the first alternative, a metaphysicist could object that the idea that complex properties are partially composed of simple properties problematically reifies properties. There is no real metaphysical difference between “complex” and “simple” properties. On the second alternative, a metaphysicist could object that what Dorr et al. have shown is that, surprisingly, the property *being identical to Biden* is a very complex property that is partially composed of *being human* and other properties.

In response to the first objection, there are two things to say. First, to those who do endorse the view where complex properties are composed of other properties, this line of reasoning does prevent the identification of F and *being identical to Biden*. Second, even if complex properties aren’t literally composed of simpler properties, it may still be that the “complexity” of a property reflects a metaphysical difference, if so, the different levels of complexity of F and *being identical to Biden* still prevents the proposed identification. Ultimately, debating the nature of properties is outside of the scope of the current project and I’m content merely to argue that some plausible views about the nature of properties entail that F and *being identical to Biden* are not the same property.

In response to the second objection, Dorr et al. did not give reason to think that *being identical to Biden* is a very complex property involving *being human* and the like. Saying that since F is identical to *being identical to Biden*, *being identical to Biden* turns out to be a very complex property begs the question. Intuitively, *being identical to Biden* doesn’t involve properties such as *being human* and so metaphysicists owe us an explanation of why *being*

identical to Biden really does involve these properties. Or at least an explanation of why our intuition is inaccurate in this area.

What is more, there are other reasons to reject the identification between F and *being identical to Biden*. Notably, F and *being identical to Biden* enter into different relationships. Take Sarah who doesn't know that Biden is the child of Catherine Biden and Joseph Biden Senior. The property *being identical to Biden* is such that Sarah believes it to apply to Biden whereas it is not the case that F is such that Sarah believes it to apply to Biden. The previous sentence is true but would be, not only false but, contradictory if F and *being identical to Biden* were one property.

It is true that one might think that 'believes' creates a non-extensional context such that the following sentences do not contradict each other.

- (i) Sarah believes that Hesperus is identical to Hesperus
- (ii) It is not the case that Sarah believes that Hesperus is identical to Phosphorus.

I do think that (i) and (ii) are contradictory, but even those who disagree, should think that (iii) and (iv) contradict each other.

- (iii) Hesperus is such that Sarah, believes it to be identical to Hesperus
- (iv) It is not the case that Phosphorus is such that Sarah believes it to be identical to Hesperus.

One and the same thing cannot be such that someone believes it to be a certain way and yet it is not the case that it is such that the person believes it to be that way.²² Yet it is overwhelmingly plausible that there is someone, "Sarah", such that the property *being identical to Biden* is such that Sarah believes it to apply to Biden and that F is such that Sarah does not believe that it [this massively complex property which includes properties such as *being the child of Catherine*

²² The issue is not whether Sarah has contradictory beliefs (e.g., Sarah believes that it is raining and Sarah believes that it is not raining) but whether a particular object (Venus) has a particular property (being believed to be identical to Hesperus by Sarah) and also lacks that property, a situation that is contradictory.

Biden and Joseph Biden Senior] to apply to Biden.²³ And so, F and *being identical to Biden* are not the same property.

One might object that our intuitions can often be misleading when dealing with sentences structured in the way (iii) and (iv) are.²⁴ For example, let's say Sarah sees someone in the fog and thinks that the person in the fog is not her friend John even though the person in the fog is John (let 'thinks' take the wide scope). There is a temptation to *incorrectly* say that John is such that Sarah believes he is identical to John but that it is not the case that the person in the fog is such that Sarah believes he is identical to John. And so, the objector continues, while we might be tempted to say that *being identical to Biden* is such that Sarah believes it applies to Biden but that it is not the case that F is such that Sarah believes it applies to Biden, this intuition is misleading just like in the fog case.

It is true that we must be careful when talking about statements where 'believes' takes the narrow scope, but that doesn't mean we can't reason about such statements. The intuition that it is not the case that F is such that Sarah believes it applies to Biden, is powerful. And it would be an overreaction to dismiss this intuition just because an unversed person may have the misleading intuition that it is not the case that the person in the fog is such that Sarah believes he is identical to John.

§2.2 The consistency of Biden lacking F

Dorr et al. (pg. 216 - 219) consider "logical necessity" as a candidate type of necessity that might be logically well-behaved (and so fit their requirement for a type of possibility to be a genuine type of possibility) but yet might not apply to all metaphysically necessary sentences

²³ These belief constructions are de re with respect to '*being identical to Biden*' and 'F' (cf. Nelson 2019).

²⁴ I.e., the sentences structured in such a way that forces 'believes' to take, what Russell called, narrow scope.

(and so show **METAPHYSICALISM** to be false). But unfortunately, they use ‘logical necessity’ as Clarke-Doane (2019) did where a sentence is logically necessary if and only if it is a theorem of some system of logic. Dorr et al. point out that this candidate type of necessity is too sensitive to syntactic differences and so won’t validate LL_{sub} and so won’t be a genuine type of necessity. With this they sweep Salmón’s (1989) comments about logical necessity under the rug. But this is a mistake because Salmón (1989) did not use “logical necessity” as Clarke-Doane did. Salmón (1989 pg. 13) writes, “[a] proposition is logically necessary if its truth is required on logical grounds alone”, which shows that Salmón was clearly not thinking of logical necessity as a purely syntactic notion equivalent to consistent within a certain system. For this section, a sentence is logically possible if and only if the proposition it expresses is consistent²⁵.

Given that ‘is F’ and ‘is Biden’ are rigid designators and that they are co-referential, with respect to any situation they will designate the very same property.²⁶ And so, the sentence:

(8) Biden is Biden but is not F

is not only false but expresses an inconsistent proposition²⁷ (and so is logically impossible), on the supposition that ‘is Biden’ and ‘is F’ are co-referential and rigid. For in that case (8) effectively says that Biden has a particular property and also lacks that very same property. We could not consistently talk about Biden being Biden but not being F. How could we? They are,

²⁵ By “consistent” I do not mean consistent within a particular system of logic but instead something like such that its negation is not analytic. Similarly, we can think of this idea as consistent in light of whatever logic actually governs the correct inferential relations between propositions.

²⁶ One might be tempted to push here and say rigid designators only need to refer to the same thing in all metaphysically possible situations. I find this idea highly unintuitive but, regardless, it won’t work for Dorr et al. This is because they must have these terms referring to one and the same property in any situation which fits a genuine type of possibility. This is because if they didn’t, then LL_{sub} would have false instances and shouldn’t be a requirement of genuine types of possibility. And this would then undermine their whole argument. They need the substitutions to go through in order to show that, say, Biden has F on all absolutely possible worlds.

²⁷ One might think that we need an account of semantic content before we can say whether or not (8) is consistent or inconsistent. However, I take it that the reasoning here, inspired by Kripke (1972/1980 pg. 3), shows that as long as ‘*being identical to Biden*’ and ‘F’ are co-referential rigid designators then (8) is inconsistent.

by hypothesis, one and the same property! If ‘is F’ always refers to one and the same property as ‘is Biden’, as Dorr et al. would need according to the generalization of their view, then in any situation where an object is identical to Biden, that object is F because these aren’t two separate properties. There is not a logically possible situation in which Biden is Biden but Biden is not F, on the supposition that ‘is Biden’ and ‘is F’ are co-referential and rigid, for that situation would involve Biden having and not having the very same property. However, as I will argue, we can describe a consistent state of affairs in which an object is Biden, but that object lacks F. The intuitiveness of the consistency of this situation counts against the idea that *being identical to Biden* is the same property as F.²⁸

Additionally, the fact that the conditional (“if ‘is Biden’ and ‘is F’ are co-referential and rigid, then (8) is not logically possible”) is true suggests that logical possibility, in the sense Salmón (1989) and I use, meets Dorr et al.’s requirements to be a genuine type of possibility. Likely, given Dorr et al.’s method of discounting the genuineness of a type of possibility on the basis of its logical behavior, Dorr et al. would think that metaphysical possibility and logical possibility, as Salmón and I use it, are co-extensive but I will argue that they are not co-extensive. Much of the argument stands without the points made in this paragraph but additional significance of these points will be drawn out at the end of this section.

Imagine a situation in which Biden exists but lacks one of his metaphysically necessary properties, say *being human*. In that situation Biden is Biden but lacks F.²⁹ Now, the question is; is this situation consistent? For starters, let’s try to imagine situations that really are

²⁸ This reasoning also shows that any situation in which Hesperus isn’t Phosphorus is not a consistent situation. I take that to be correct and what Kripke (1972/1980 pg. 3) shows. I take it to be a mistake to disagree with this line of reasoning but even if one did, likely what they are disagreeing with is either the validity of LL_{sub} or the fact ‘Hesperus’ and ‘Phosphorus’ are rigid designators. But even this untenable path isn’t open to Dorr et al. because of the reasons discussed in the footnote 26.

²⁹ F involves a conjunction of all of Biden’s metaphysically necessary properties and so if Biden lacks one metaphysically necessary property Biden lacks F.

contradictory such as a situation in which Biden is blue and not blue or a situation in which Biden isn't Biden or in which Biden is a married bachelor. Upon reflecting on these various contradictory situations, we see that they are importantly different than one where Biden isn't a human.

One notable difference is that while one can easily imagine Biden being turned into a llama it seems impossible to imagine Biden being a married bachelor. Fittingly, it is often thought that we are incapable of imagining a contradictory situation and so the fact that we can imagine a situation in which Biden is not human counts for the consistency of the situation. The fact that we can imagine this situation is evidenced by the many stories that depict a human becoming non-human such as *Beauty and the Beast*, *The Emperor's New Groove*, *The Princess and The Frog*, *Spirited Away*, etc.

While the events in these stories are surely impossible in the metaphysical sense, they don't seem to be impossible in the logical sense. The fact that we can imagine Circe turning Odysseus's companions into pigs but can't imagine her turning Odysseus into a married bachelor is evidence, even if refutable, that the latter is contradictory whereas the former is not. Even more so than these points about imagination, it is simply intuitive that Circe turning Odysseus's companions into pigs is, while metaphysically impossible, not inconsistent. For all its metaphysical impossibility, nothing about the situation seems contradictory.

It is true that in these stories the characters are at one time human and at another time non-human whereas just imagining Biden being something other than human usually doesn't involve imagining Biden changing from a human into a non-human. But, just as an absolutely possible world where I go from being not a dentist to being a dentist falsifies the absolute necessity of me being not a dentist, a logically possible situation in which Biden changes from a

human into a doll, say, also falsifies the idea that we cannot have a logically possible situation in which Biden isn't human. So, while there are certainly arguments to be made that there is a consistent situation where Biden is a doll (or a pig or a llama) for all of Biden's existence, we could simply appeal to the consistent situation where Biden is turned into a doll (or a pig or a llama). If there is a consistent situation in which Biden loses the property of being human, then there is a consistent situation in which Biden isn't human.

Admittedly, there is something deeply impossible about Biden, or Kayshon in "Star Trek: Lower Decks", turning into a doll.³⁰ But what matters is whether or not the situation is consistent. What we have seen is that metaphysical impossibility applies to some consistent situations. After all, it does not seem to be inconsistent that a particular table originated from entirely different matter or that I had different parents or that I am turned into a dog, but all of these situations are often taken to be metaphysically impossible. The problem with Dorr et al.'s argument is that it collapses the distinction between the metaphysically impossible and the logically impossible.³¹ The lack of distinction between the metaphysically impossible and the logically impossible allows them to rule out types of possibility that apply to metaphysically impossible situations on the basis of logical behavior, but it comes at the cost of truth.

Of course, if 'is Biden' and 'is F' really do always refer to the same property, then the situation in which Biden is Biden but is not F is, surprisingly, inconsistent. But saying the situation is inconsistent *because* F is identical to *being identical to Biden* begs the question. Intuitively, the situation does *not* involve a contradiction and that is a problem with the

³⁰ In this T.V. series a character, Keyshon, is turned into a doll.

³¹ The distinction is collapsed because for every object, according to this account, the property of being identical to that object is one and the same as a complex property which includes all of the properties the object metaphysically must have. Given that it is inconsistent for an object to not be identical to itself, it is inconsistent for that object to lack the complex property in question. But the object will lack the complex property if it lacks even one of the properties that make up that complex property. And so, on this account, it would be inconsistent for an object to lack any property it metaphysically must have.

identification of F and *being identical to Biden*. We should remain neutral on the question of whether or not F is *being identical to Biden* when examining whether or not the situation in which Biden is Biden but lacks F is an inconsistent situation. Then we can weigh our reasons for thinking that *being Biden* is F against our intuition that the situation is inconsistent. And, as was seen in §1, Dorr et al. give very little reason to accept such an identification.

One might object that we cannot describe a situation in which Biden is a doll because the object in that situation wouldn't be Biden. What would make that doll Biden as opposed to something else? Clearly, the objector continues, there are reasons to think that the doll isn't Biden since it is nothing like Biden.

But at bottom this objection just is the infamous “telescope view of possible worlds” that Kripke (1972/1980) discredited. “Possible worlds’ are *stipulated*, not *discovered* by powerful telescopes. There is no reason why we cannot *stipulate* that, in talking about what would have happened to Nixon in a certain counterfactual situation, we are talking about what would have happened to *him*” (Kripke 1972/1980 pg. 44). Metaphysicalists and their opponents should disagree about the consistency of this situation, not about whether or not the situation involves Biden. I can simply stipulate that I'm talking about Biden. Even if I say let's examine a situation in which Biden is not Biden, it is still the case that I am talking about Biden. It would be incorrect to say that the situation isn't as I described or that I've failed to describe a situation, instead my opponents should say that the situation I've described is contradictory. I am not incapable of describing a situation in which Biden is not human, but once a situation is described I do not get to stipulate certain facts about the situation (such as whether or not the situation is consistent). And it is these facts that either do or don't undermine Dorr et al.'s argument. Dorr et al.'s argument is fine, so long as the situation is inconsistent. But, as has been argued, the

situation in which Biden is a doll (or a pig or a llama), while metaphysically impossible is not logically impossible (i.e., it is not inconsistent).

To summarize, this section argues for a number of points. One, it was argued that if ‘is Biden’ and ‘is F’ are co-referential and rigid, then (8) is inconsistent (in the sense of expressing an inconsistent proposition, i.e., being logically impossible). Two, it was argued that (8) is consistent (i.e., logically possible). By modus tollens and the first two points, either ‘is Biden’ and ‘is F’ are not co-referential or they are not rigid. While more focus was given on the option that ‘is Biden’ and ‘is F’ are not co-referential, either option dismantles Dorr et al.’s ability to use LL_{sub} . Three, it was suggested that the conditional from point one, shows that logical possibility is a genuine type of possibility. But yet given that (8) is logically possible (see point 2) but not metaphysically possible (by construction of ‘is F’), then a challenge stands against **METAPHYSICALISM** and this challenge is by and large a vindication of Salmón (1989).

§2.3 Wide-Scope Propositional Attitude Reports Regarding F and *being identical to Biden*

If ‘F’ and ‘*being identical to Biden*’ are co-referential rigid designators, then LL_{sub} seems to allow one to substitute ‘is F’ for ‘is Biden’ in any non-quotational context without altering the truth value of the sentences. However, substitution of ‘is F’ for ‘is identical to Biden’ within the context of propositional attitude reports does seem to sometimes alter the truth value of sentences. For example, it seems that Sarah, from §2.1, believes that Biden is Biden but she doesn’t believe that Biden is F. But, assuming a smooth transition from talk about sentences to talk about propositions, LL_{sub} allows us to infer the implausible proposition that Sarah believes that Biden is F, from the fact that Sarah believes that Biden is Biden. If Sarah does believe that Biden is Biden but yet it is not the case that she believes that Biden is F, then there seems to be a

problem either with the unrestrictedness of LL_{sub} or the identification of F and *being identical to Biden*.³²

Additionally, LL_{sub} along with the co-referential rigidity of ‘is F’ and ‘is Biden’ seems to entail that if it is *a priori* that Biden is Biden, then it is *a priori* that Biden is F. But the antecedent seems undoubtedly true whereas the consequent seems obviously false. And so, once again either there is a problem with the unrestrictedness of LL_{sub} or with the identification between F and *being identical to Biden*.

Dorr et al. (pg. 219 – 226) anticipate problems like those mentioned above and they provide two types of responses, remaining neutral on which they prefer. They consider both the possibility that the unrestrictedness of LL_{sub} caused problems and also the possibility that, surprisingly, it is the case that Biden is Biden is *a priori* (or believed by Sarah) if and only if Biden is F is *a priori* (or believed by Sarah). First, they consider that perhaps LL_{sub} doesn’t soundly allow us to substitute terms within belief contexts and so we cannot infer that Sarah believes Biden is F from the fact that Sarah believes Biden is Biden. Alternatively, they consider that LL_{sub} does soundly allow us to infer that Sarah believes Biden is F (and that Biden is F is *a priori* knowable) from the fact that Sarah believes Biden is Biden (and that Biden is Biden is *a priori* knowable). They justify this by appealing to the fact that Salmón (1986), Soames (1987), and Braun (1988) among others argue that it is *a priori* knowable that Hesperus is Phosphorus and “if we could make our peace with the initially bizarre idea” that it is *a priori* knowable that

³² The problem could also be the rigidity of the terms in question, but this isn’t particularly plausible, nor would it help Dorr et al. They need it to be the case that ‘is Biden’ and ‘is F’ are both co-referential and rigid.

Hesperus is Phosphorus, then “it should at that point be totally unobvious whether we can also know *a priori* that Nixon is not an inanimate object” (pgs. 222 and 225).^{33, 34}

However, there are problems with both of the responses they consider. While claiming that LL_{sub} doesn't allow substitution in the contexts of beliefs is the better response of the two, the only explanation for failures of LL_{sub} they give involves quotational contexts (pg. 218 – 220). But Church (1950) conclusively argues against the idea that belief involves quotational contexts. Dorr et al. could give alternative reasons for why we can't substitute 'is F' for 'is Biden' in belief contexts but they would need to be very careful because their argument crucially relies on the ability to substitute 'is F' for 'is Biden' within the context of absolute necessity. They are in a difficult spot on this path of their response. They need to thread the needle in allowing the substitution of 'is F' for 'is Biden' in modal contexts but not in belief contexts but, also, they can't rely on the idea that 'believes' creates a quotational context because of Church's (1950) compelling argument.

Their alternative response is worse though. Just because “we could make peace with the initially bizarre idea” that some propositions (such as, that Hesperus is Phosphorus) are

³³ In this passage, they are actually talking about how if we can accept the initially bizarre idea that we can know *a priori* that every golden thing is made of atoms containing 79 protons then it should be totally unobvious whether we can also know *a priori* that Nixon is not an inanimate object. However, many, including myself, are not ready to make peace with the idea that we can know *a priori* that every golden thing is made of atoms containing 79 protons (see, Robertson-Ishii 2018). And in order to argue that it isn't absurd to think that we can know *a priori* that every golden thing is made of atoms containing 79 protons Dorr et al. appeal to the fact that many believe we can know *a priori* that Hesperus is Phosphorus (pg. 222). And so, it is not problematic to put their position in the way above. Their main point here is just that however we solve this issue in the Hesperus and Phosphorus case, where the identity is undeniable, gives us a way to solve the issue without rejecting the identity in other cases such as the *is identical to Biden* and F case.

³⁴ Admittedly, Dorr et al. write about how it is unobvious whether or not we *a priori* know that Nixon is not an inanimate object (as opposed to it being unobvious whether or not we *a priori* know that Biden is F). But Nixon is just meant to be an arbitrary object and his not being an inanimate object is just meant to arbitrary example of a metaphysical necessity of his. And so, they want their points to apply just as well to it being *a priori* knowable that Biden has any of his metaphysically necessary properties (such as *being the child of Catherine and Joseph Biden Senior*). But this is all I need because my objection here is just that there are some metaphysically necessary properties, such as *being the child of Catherine and Joseph Biden Senior*, such that it is implausible to know *a priori* that Biden has those properties (e.g., knowing *a priori* that he is the child of Catherine and Joseph Biden Senior) even if it is *a priori* knowable that Hesperus is Phosphorus.

surprisingly *a priori* does not mean we should forgo the extremely strong intuition that the proposition expressed by “Biden is F” cannot be known *a priori*. To completely disregard intuition on this matter just because some propositions are surprisingly *a priori* is not warranted. If it is *a priori* knowable that Biden is F, then it is *a priori* knowable that Biden’s parents are Catherine and Joseph Biden because F is a complex property which includes the property *being the child of Catherine Biden and Joseph Biden Senior*. But if it is *a priori* knowable who people’s parents are, then I and so many others have little idea what concepts are being referred to by “*a priori* knowledge” and “*a posteriori* knowledge”. After all, the knowledge about who someone’s parents are can be an ostensive example of *a posteriori* knowledge; some learn the very concepts of *a posteriori* and *a priori* by looking at this example, among others. While it may be unintuitive to claim that it is *a priori* knowable that Hesperus is Phosphorus, it is contradictory to the very concept of *a priori* knowledge to claim that we can *a priori* know who anyone’s parents are. Thus, using the fact that some might be willing to bite the bullet on the Hesperus/Phosphorus case, is a poor justification for accepting that it is *a priori* knowable that Biden is F. At worst this justification makes the continuum fallacy, at best there is simply too little argument here to justify accepting such unintuitive points. Similar points can be made about belief, just because someone believes Biden is identical to Biden, that does not mean they believe that Biden is the child of Catherine and Joseph Biden.

§3 Conclusion

Dorr et al. (2021) is an ambitious and interesting work that spans many topics with great care. They attempt to show that all metaphysical necessities are guaranteed merely by logic and the way they go about this is clever and insightful. Their arguments attempt to show **METAPHYSICALISM** and that there can’t be any counterexamples to the S4 axiom. Additionally,

while it wasn't even one of Dorr et al.'s goals, they even explicitly avoid talking about essential properties, reconstructing their defense of **METAPHYSICALISM** reveals a relatively clear way of understanding the often confused and confusing notion that an essential property is a property that is required for that object to be that object (given that F will include all of Biden's non-trivial essential properties and that F is the property *being identical to Biden*). And so, we start to get a vast and interconnected world picture that addresses a great many modal topics.

But ultimately, for all the insightful moves made, their argument rests on implausible higher order identities. And Dorr et al. offer no explanation of securing the absolute necessity of various metaphysical necessities without utilizing these implausible identifications. As a case in point, once we rejected the identity between *being identical to Biden* and F, there was no reason to think that all metaphysical necessities involving Biden (such as (3)) are absolutely necessary.

Additionally, §2.2 shows that Salmón (1989) still stands as a powerful counter against **METAPHYSICALISM** as a whole. And so, there are challenges present in this paper to any metaphysicist.

References

- Braun, David. "Understanding Belief Reports." *Philosophical Review* 107, no. 4 (1998): 555–95.
- Chalmers, David J. *The Conscious Mind: In Search of a Fundamental Theory*. Vol. 4. Oxford University Press, 1996.
- Church, Alonzo. "On Carnap's Analysis of Statements of Assertion and Belief." *Analysis* 10, no. 5 (1950): 97–99.
- Clarke-Doane, Justin. "Metaphysical and Absolute Possibility." *Synthese* 198, no. Suppl 8 (2021 2019): 1861–72.
- Dorr, Cian, John Hawthorne, and Juhani Yli-Vakkuri. *The Bounds of Possibility: Puzzles of Modal Variation*. Oxford University Press, 2021.
- Kripke, Saul. *Naming and Necessity: Lectures Given to the Princeton University Philosophy Colloquium*. Vol. 217. Harvard University Press, 1972.
- Lewis, David. *On the Plurality of Worlds*. Wiley-Blackwell, 1986.
- Mallozzi, Antonella, Michael Wallner, and Anand Vaidya. "The Epistemology of Modality." In *The Stanford Encyclopedia of Philosophy*, 2021.

- Myhill, John. "Problems Arising in the Formalization of Intensional Logic." *Logique Et Analyse* 1, no. 1 (1958): 78–83.
- Nelson, Michael, "Propositional Attitude Reports: *The De Re/De Dicto Distinction*" *The Stanford Encyclopedia of Philosophy* (Spring 2019 Edition), Edward N. Zalta (ed.), URL = <<https://plato.stanford.edu/archives/spr2019/entries/prop-attitude-reports/dere.html>>.
- Robertson Ishii, Teresa. "A Puzzle about Kinds." *Philosophical Perspectives* 32, no. 1 (2018): 352–64.
- Robertson Ishii, Teresa, and Nathan Salmón. "Some Highs and Lows of Hylomorphism: On a Paradox about Property Abstraction." *Philosophical Studies* 177, no. 6 (2020): 1549–63.
- Robertson-Ishii, Teresa, and Philip Atkins. "Essential vs. Accidental Properties." In *Stanford Encyclopedia of Philosophy*, edited by Edward N. Zalta, 2020.
- Rosen, Gideon. "A Study in Modal Deviance." In *Conceivability and Possibility*, edited by John Hawthorne and Tamar Gendler, 283--307. Oxford University Press, 2002.
- Russell, Bertrand. "The Principles of Mathematics." *Revue de Métaphysique et de Morale* 11, no. 4 (1903): 11–12.
- Salmon, Nathan. "The Logic of What Might Have Been." *Philosophical Review* 98, no. 1 (1989): 3–34.
- Salmon, Nathan. *Frege's Puzzle*. Vol. 96. Ridgeview, 1986.
- Soames, Scott. "Direct Reference, Propositional Attitudes, and Semantic Content." *Philosophical Topics* 15, no. 1 (1987): 47–87.
- Stalnaker, Robert. "Conceptual Truth and Metaphysical Necessity." In *Ways a World Might Be: Metaphysical and Anti-Metaphysical Essays*, 201–15. Oxford: Oxford University Press, 2003.
- Van Inwagen, Peter. "Modal Epistemology." *Philosophical Studies* 92, no. 1 (1998): 67--84.
- Williamson, Timothy. "Modal Science." *Canadian Journal of Philosophy* 46, no. 4–5 (2016): 453–92.