

# Modal Rationalism and Modal Monism

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**Abstract** Modal rationalism includes the thesis that ideal primary positive conceivability entails primary possibility. Modal monism is the thesis that the space of logically possible worlds is coextensive with the space of metaphysically possible worlds. In this paper I explore the relation between the two theses. My aim is to show that the former thesis implies the latter thesis, and that problems with the latter make the former implausible as a complete picture of the epistemology of modality. My argument explores the relation between logical modality and metaphysical modality.

## 1 Introduction

One of the most important debates in the history of philosophy has been over the relation between conceivability and modality. Philosophers have long been interested in how we come to know what is possible and necessary. Historically, both rationalists and empiricists have advocated or adopted some version of a link between conceivability and modality. Descartes and Hume, stand out as the key advocates for each camp, with their corresponding critics being Arnauld and Mill.

The debate on the relation between conceivability and modality was revitalized in contemporary philosophy by Stephen Yablo's (1993) "Is Conceivability a Guide to Possibility". And most recently an attempt at a connection between conceivability and modality has been worked out by David Chalmers (1996, 1999), and (2002). It is with a critical eye in the spirit of Arnauld that I want to turn toward this topic, and take up the thesis defended by Chalmers, known as *Modal Rationalism*.

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(MR) *Modal Rationalism*: primary positive ideal conceivability entails primary possibility.<sup>1</sup>

(MR) is an exciting thesis because it promises to provide us with an overall framework for doing metaphysics and philosophy of mind, in much the same manner that the proposals of Descartes and Hume did. It is a metaphysical thesis about the link between conceivability and modality. It is safe to say that since the introduction of the thesis a great deal of criticism has ensued.

Let me begin with a brief survey of the kinds of criticism currently in the literature. Most of the criticisms of (MR) focus either on issues in the philosophy of language, philosophy of mind, or epistemology.

Regarding the philosophy of language, one central concern has been with (MR)'s employment of a certain form of Neo-Fregean descriptivism; which contemporary direct reference theorists find objectionable. Soames (2005) provides a good example of this kind of criticism. Regarding the philosophy of mind, the concern has been with the use of (MR) against materialism about the mind. The key use of (MR) has been as a premise in a Cartesian style argument against physicalism, and in favor of property dualism. Many critics find the conclusion of the argument reason to reject (MR) itself, or to seek a distinct theory of the epistemology of modality. Hill (2006) serves as a good example of this. Regarding epistemology, the concern has been with (MR)'s employment of the notion of *ideal rational reflection*, and the standard worries about whether one can always tell from the inside whether what they take to be conceivable actually reflects a genuine possibility. Both Brueckner (2001) and Worley (2003) provide excellent discussions of these points.

It is my contention that there is a stalemate over the plausibility of (MR) because of the stalemate over clashing intuitions in the philosophy of language, philosophy of mind, and epistemology. There are those that accept the framework and use it, and there are those that do not accept the framework. As a consequence of this stalemate, it would be profitable if the debate over (MR) could be revitalized by looking for important considerations that may help determine its plausibility and overall acceptability as a thesis about the epistemology of modality. Indeed it would be good if considerations from outside the philosophy of language, philosophy of mind, and epistemology could be brought to bear on (MR).

My critical project here is precisely to do that. I will be exploring considerations from metaphysics and logic that shed light on the overall plausibility of (MR). In particular, I will be investigating a distinct thesis known as *Modal Monism* and its relation to (MR).

(MM) *Modal Monism*: the set of logically possible worlds is identical to the set of metaphysically possible worlds.

(MM) is a metaphysical thesis about the nature of metaphysical modality and logical modality. It maintains that although metaphysical modality is notionally

<sup>1</sup> Strictly speaking the thesis is called weak modal rationalism or (CP+). It is important that the reader keep this mind, as the distinction will become central in later sections.

distinct from logical modality, the two modalities are nevertheless extensionally equivalent. (MM) is a reductive thesis about metaphysical modality. The basic argument I will be exploring is the following:

1. (MR)  $\rightarrow$  (MM).
2.  $\neg$ (MM).
3.  $\neg$ (MR).

As a point of entry into the argument above I want to begin by discussing how (MR)'s development in reaction to the standard worry about a priori conceivability to possibility theses leads to the truth of (1). From there I will proceed to an extended consideration and defense of (2).

## 2 (MR $\rightarrow$ MM)

Where 'C(P)' stands for 'it is conceivable that P', and ' $\Diamond$ P' stands for 'it is possible that P'. The fundamental contemporary challenge facing any a priori conceivability thesis of the form  $C(P) \rightarrow \Diamond P$  comes from the existence of Kripkean a posteriori metaphysical necessities (KAPs, hereafter). If there are propositions that are necessary and yet only knowable a posteriori, one could in some sense conceive P a priori, and yet not be guaranteed that P is possible because the proposition that shows P is impossible is only knowable a posteriori.

For example, if 'water = H<sub>2</sub>O' is necessary and a posteriori, then a subject could not a priori infer from a scenario in which water is present, but H<sub>2</sub>O is not present, that it is possible for water to exist without H<sub>2</sub>O. (KAPs) pose a fundamental problem for a priori conceivability to modality theses.

In addition, the problem posed by (KAPs) is not a problem concerning computing ability, a Laplacian demon with infinite computing abilities that can reach ideal rational reflection on P could not infer from a scenario in which water but not H<sub>2</sub>O is present, that it is possible for the one to exist without the other. Both infinite computing abilities and ideal reasoning at an a priori level are simply irrelevant to the problem posed by the a posteriori facts involved in (KAPs). It is the a posteriori aspect of (KAPs) that pose a problem for a priori conceivability theses, and not cognitive limitations on a priori reasoning.

In the face of this challenge, (MR) is a very interesting thesis, since it attempts to provide an a priori link between conceivability and possibility that overcomes the worries posed by (KAPs). (MR) is constructed out of three different distinctions: primary vs. secondary conceivability/possibility, positive vs. negative conceivability, and prima facie vs. idea rational reflection. Given that my interest here is over metaphysical and logical issues that could be brought to bear on (MR), I will only be focusing on the first distinction.

The distinction between primary and secondary conceivability/possibility is grounded in a larger semantical theory that is independent of (MR). The theory is called *Epistemic Two-Dimensional Semantics* (E2-D, hereafter). The most detailed elaboration of it can be found in Chalmers (2004).

(E2-d) countenances the existence of two intensions associated with every statement  $S$ . The primary intension of  $S$  corresponds to the evaluation of  $S$  with respect to a centered world considered as actual; what the truth-value of  $S$  is, if  $w$  turns out to be the actual world. The secondary intension of  $S$  corresponds to the evaluation of  $S$  with respect to a world considered counterfactually, what the truth-value of  $S$  is at a world  $w^*$  given that another world  $w$  is taken as the actual world. For example, contrary to Kripke, on (E2-d) the statement ‘Hesperus  $\neq$  Phosphorus’ is true at T-earth when the statement is considered as a hypothesis about how the actual world might be. According to (E2-d), if Mars satisfies the a priori sense of ‘Hesperus’, ‘the morning star’, and Venus satisfies the a priori sense of ‘Phosphorus’, ‘the evening star’, then when T-earth is taken to be the actual world, the statement is true. Chalmers sees the (E2-d) analysis of (KAPs) as doing justice to the intuition that there is some sense in which things *could have turned out otherwise*; even though given a certain state of affairs things *could not have been otherwise*.

Considering twin earth as a hypothesis about how the actual world really is, ‘water = XYZ’ is true, since on twin earth XYZ satisfies the descriptive sense associated with ‘water’ that is known by competent speakers; however, given that earth is the actual world, where water = H<sub>2</sub>O, it could not have been true that water = XYZ.<sup>2</sup>

The distinction between the two intensions allows for the formulation of two kinds of conceivability and possibility: primary versus secondary conceivability, and primary versus secondary possibility. Primary conceivability is conceivability that is done in terms of the primary intensions of the statements involved. To primarily conceive ( $P \wedge \neg Q$ ) is to conceive of a state of affairs in which the primary intension of  $P$  and  $\neg Q$  is verified. Primary possibility is possibility captured by evaluating the primary intension of a statement. In contrast, secondary conceivability is conceivability that is done in terms of the secondary intensions of the statements involved. To secondarily conceive that ( $P \wedge \neg Q$ ) is to conceive of a state of affairs in which the secondary intension of  $P$  and  $\neg Q$  is verified. Secondary possibility is possibility that is captured by evaluating the secondary intension of a statement. The a priori link between conceivability and possibility is forged through primary conceivability and primary possibility. If one is ideally reflecting on ‘water = XYZ’, and considering twin-earth as the actual world, then given that XYZ satisfies the descriptive sense associated with ‘water’, it is primary possible that water = XYZ. In general, the strategy for avoiding the threat posed by (KAPs) is to analyze them away in a manner that allows for primary conceivability to link up with the space of possibilities.

<sup>2</sup> Notice that Chalmers is attempting to do justice to an intuition that Kripke straightforwardly rejects as confused when discussing de re cases. Kripke claims that ‘if it couldn’t have been the case that  $P$ , then it could not have turned out that  $P$ ’. The only sense, in which the lecturn could have been made of ice, Kripke says, is that one could have been in a qualitatively indiscernible situation with respect to a lecturn made of ice. However, the table would be a different table. There is no sense in which, with respect to the actual lecturn made of wood that it could have turned out to have been made of ice.

The important consequence of the (E2-d) analysis is that it captures (KAPs) as having a certain form. (KAPs) are all statements with a contingent primary intension, and a necessary secondary intension. ‘Water = H<sub>2</sub>O’ has a contingent primary intension, since if we consider T-earth as the actual world, then ‘water = XYZ’ is true; but it has a necessary secondary intension, since given that earth is the actual world it couldn’t have been (i.e. counterfactually the case) that water = XYZ. Having resolved the fundamental challenge posed by (KAPs) through the use of (E2-d), Chalmers is in a position to consider what *new* kinds of counterexamples (MR) could face.

It is in exploring what new kinds of counterexamples (MR) could face that we encounter the potential problem of a posteriori *strong necessities* (SN, hereafter). A (SN) is a statement that has both a necessary primary and secondary intension, but can only be known a posteriori; in particular, it is a statement, “that is falsified by some positively conceivable situation considered as actual, but which is nonetheless true in all possible worlds considered as actual.”<sup>3</sup> If there are statements that have a necessary primary and secondary intension, one would not be guaranteed that conceiving along the primary intension would deliver a genuine possible world. As Chalmers points out what allows (MR) to avoid the problematic (KAPs) is the fact that they all have contingent primary intensions and only necessary secondary intensions on an (E2-d) analysis. Thus, if (SN)s exist, there would be a distinct problem for (MR) over and above (KAPs).

As a consequence of the potential problem posed by (SN)s, an argument against the existence of them is required to support the plausibility of (MR). Chalmers offers some very good reasons against them. Namely, that there are no clear examples of them, that the existence of (SN)s would be brute and inexplicable, and in general not analogous with (KAPs). These reasons I take to be plausible. Nevertheless, it is the underlying source of the very possibility of (SN)s that raises a live metaphysical issue. According to Chalmers, the real problem with (SN)s is that they rest on *Modal Dualism* (MD, hereafter).

(MD) *Modal Dualism*: the set of metaphysically possible worlds is a proper subset of the set of logically possible worlds.<sup>4</sup>

Given the potential problem between (SN)s and (MR), it is possible to argue that (MR) → (MM) in the following manner.

- |                 |   |
|-----------------|---|
| 1. (MD) → (SN)  | Modal Dualism opens up Strong Necessities   |
| 2. (SN) → ¬(MR) | Strong Necessities refute Modal Rationalism |
| 3. (MR) → ¬(MD) | by HS & CP on (1) and (2)                   |
| 4. ¬(MD) → (MM) | Exclusivity of Relations                    |
| 5. (MR) → (MM)  | by HS on (3) and (4)                        |

<sup>3</sup> Chalmers (2002) p. 189.

<sup>4</sup> Chalmers (2002) Sect. 12.

The two key premises in the argument above are (2) and (4). Let me begin with some comments on (2). Chalmers (2005) maintains that

“...the relationship between (CP+) and the thesis that there are no strong necessities is not as clear. Certainly any counterexample to (CP+) will yield a strong necessity, but the reverse is not obviously the case.”

Where (CP+) is the claim that primary positive ideal conceivability entails primary possibility, the point being made in relation to (SN)s trades on the difference between:

- (i)  $\neg(\text{CP+}) \rightarrow (\text{SN})$  *a counterexample that renders (CP+) false is a strong necessity.*
- (ii)  $(\text{SN}) \rightarrow \neg(\text{CP+})$  *strong necessities falsify (CP+).*

The claim is that while (i) is true, (ii) may be false. The argument above at (2) uses (ii), since in the context of the argument (MR) = (CP+). As a consequence, one could argue that (MR) does not imply (MM), since (ii) is plausibly false.

While it is true that (ii) is plausibly false, one thing stands in favor of pursuing the argument as presented. Although (MR) is discussed here as simply (CP+), in actuality (MR) is a biconditional of which one part is (CP+). *Pure Modal Rationalism*, as it is called, is the thesis that S is ideal positive primary conceivable iff S is ideal negative primary conceivable iff S is primary possible. And (ii) is required for the truth of pure modal rationalism.<sup>5</sup>

What about premise (4). According to the way I have defined (MD) and (MM) as metaphysical theses about the relation between two notionally distinct modalities, the falsity of (MD) only leaves open (MM). That is either the two notions are extensionally equivalent or they are not. By extensional equivalence I mean that a world *w* is metaphysically possible if and only if *w* is logically possible. To be a modal monist is to embrace the idea that there are no worlds that are both logically possible and metaphysically impossible.

As a way of supporting my rendering of (MM) and (MD), and as a pathway back into the main argument against (MR) that I am developing, consider Chalmers' remarks against the existence of (SN)s. These remarks suggest that the conception of modality at play is one that eliminates the notion of metaphysical modality as originally conceived by Kripke.

[Strong necessities] require two modal primitives: there is a space of logically possible worlds, and then (as a further primitive fact) a smaller space of these picked out as “metaphysically possible”. The primitives need not be cast in these terms, but we know that two primitives will be needed, as we need one to account for the rational modalities, and we need another in turn to account for the “metaphysical”.

Once we get this far, it is clear that something has gone wrong. There is no reason to believe in any more than one modal primitive, and there is no reason to postulate a second “metaphysical” primitive at all. The second primitive is

<sup>5</sup> I thank David Chalmers for bringing this point to my attention.

an *invention*; nothing in our conceptual system requires it. In particular, we need it to account for none of our existing modal notions. So it is a primitive that answers to no-one and does no work.

It seems to me that we do not even have a distinct *concept* of metaphysical necessity to which the second primitive can answer. The momentary impression of such a concept may be a residue from initial impressions of the Kripkean distinction between epistemic and metaphysical modality. But once we recognize that this distinction can be explained with one modal primitive, and that there are constitutive ties between the Kripkean modalities, the grounds for this impression disappears. The only concept of a “metaphysical possible world” that we have is that of a logically possible world. If someone thinks they have a distinct concept here, there is no reason to believe that anything answers to it.<sup>6</sup>

Thus, in addition, to the formal argument I have given in favor of the claim that  $(MR) \rightarrow (MM)$ , the passage above supports the claim that  $(MD)$  does pose a problem for  $(MR)$ . That is  $(MD)$ , as a metaphysical thesis concerning the relation between logical and metaphysical modality, if true, would threaten the possibility of  $(SN)$ s, and thus threaten  $(MR)$  itself. So, we might legitimately ask are there any metaphysical reasons in favor of  $(MD)$ . Is there a distinct concept of a metaphysically possible world over and above that of a logically possible world?

### 3 $\neg(MM)$

*Prima facie*, there appears to be two reasons standing against  $(MM)$  and in favor of  $(MD)$ . These reasons are dialectically ineffective in the current debate given  $(E2-d)$ , but they are worth noting as a prelude to the argument and considerations I will discuss.

First, paradigmatic metaphysical principles and truths such as the essentiality of origin, essentiality of fundamental kind, and the impossibility of simultaneous overlapping opposing colors (i.e. the impossibility of simultaneous red–green coloring all over) do not appear to be logically necessary. These examples do not appear to be logical necessities in either of the standard senses in which statements are held to be logically necessary; that is either in the sense of being pure logical necessities, or derivable from logical truths via substitution of synonymous terms. These metaphysical principles are not like paradigmatic cases of pure logical necessities, such as  $(P \rightarrow P)$ , or derived logical necessities, such ‘All bachelors are unmarried males’.

Pure logical necessities arguably have features such as neutrality, formality, and generality. Pure logical necessities and truths apply to everything. Surely, under some wider, and plausibly non-standard, notion of logical necessity the metaphysical principles above are logical necessities, but a substantial reason would be needed for treating them as such. Why, for example, treat the essentiality of origin as a logical necessity?

The metaphysical principles above are not neutral, formal, or general. Though it makes sense to talk of Nixon having an origin and debate whether his origin is

<sup>6</sup> Chalmers (1999) pp. 473–496.

essential, it makes no sense to talk of 2 having an origin and debate whether its origin is essential. The essentiality of origin is kind specific. While logical truths apply to everything, some metaphysical principles only apply to certain kinds of things, and apply to things in a way that is sensitive to the fundamental kind of thing the entity in question is (a point I will be developing in more detail).

In addition, the metaphysical principles above are not derivable from pure logical necessities by substitution of synonymous terms. Perhaps the best example of this is the metaphysical impossibility of simultaneous overlapping opposing colors. The metaphysical impossibility is an impossibility explained not by the meanings of the terms involved, but by the nature of the things themselves. This leads us into the second problem.

(MM) is counterintuitive because identifying metaphysical modality with logical modality in all cases leads to the view that the *sources* of the modality are the same. However, this does not appear to be the case. It is logically necessary that 'If Nixon is tall, then Nixon is tall', and logically possible that 'Nixon is an alligator'. The former is the case because it is an instance of a pure logical truth. The latter is the case because its negation is consistent with the axioms of propositional logic. By contrast, though, given the fundamental kind of thing Nixon is (i.e. a human) it seems impossible that he *might have been* an alligator. This impossibility seems to be best captured by a source that resides in the kind of thing Nixon is, and not from anything concerning logic.

So, given that (MR)  $\rightarrow$  (MM), it appears that there are some straightforward questions about the metaphysics of modality that need to be answered. At first glance (MM) appears to be a revision of our pre-theoretic understanding of modality, which appears to respect a plurality of kinds of modality, each of which captures a different way in which things can be necessary and possible.

As a consequence of these two points, the burden would seem to be on the proponent of (MM) to defend the position that the two modalities are in fact extensionally equivalent, and only notionally distinct. A proponent of (MD) correctly captures the differences in the sources of necessity by maintaining that the metaphysical realm is a subset of the logical realm. For example, a modal dualist who accepts the essentiality of origin would maintain that there are logically possible worlds in which one is born substantially earlier than they were actually born, but that there are no metaphysically possible worlds in which one is born substantially earlier than they were actually born.

Even though I believe these considerations speak heavily against (MM), I grant that they may be dialectically ineffective at the current stage of debate. The real issue appears to be whether the epistemic benefits gained by adopting (MR) outweigh the metaphysical costs incurred. Is (MD) dispensable? What do we gain and lose by adopting (MR)?

As a consequence of the possible ineffectiveness of the considerations given so far, I want to argue for the separation of metaphysical modality from logical modality by way of a different strategy; one that employs considerations from the literature on impossible worlds, and the logic of metaphysical modality. The considerations I will raise have been debated in the philosophy of modal logic, however their significance has yet to be considered in the debate on (MR). These

considerations provide an evaluator of (MR) with a wider net for evaluating it as a thesis in the epistemology of modality.

#### 4 The Separation of Metaphysical from Logical Modality

The basic argument I will defend against (MM) is the following.

- (1) Logical modality is characterized minimally by  $S_4 \Box p \rightarrow \Box \Box p$ , and maximally by  $S_5 \Diamond p \rightarrow \Box \Diamond p$ .<sup>7</sup>
- (2) Logical modality is co-extensive with metaphysical modality; so that  $p$  is logically necessary iff  $p$  is metaphysically necessary. *Assumption for Reductio*
- (3) If a modality  $M$  has as a characteristic axiom  $A$ , and  $M$  is co-extensive with  $M^*$ , then  $M^*$  has  $A$  as a characteristic axiom.
- (4) So, metaphysical modality is characterized minimally by  $S_4$  and maximally by  $S_5$ .
- (5)  $S_5$  entails  $S_4$ .
- (6)  $S_4$  is inconsistent with our intuitions about the *de re* modal properties of certain kinds of objects.
- (7) So, neither  $S_4$  nor  $S_5$  are characteristic of metaphysical modality.
- (8) So, logical modality is not co-extensive with metaphysical modality; that is, it is false that  $p$  is logically necessary iff  $p$  is metaphysically necessary.

The strategy offered above is to separate the two kinds of modality in virtue of the kind of logic each obeys. If there are good reasons for thinking that the logic of metaphysical modality is different from the logic of logical modality one can conclude that the two notions are not only notionally distinct, but also extensionally distinct. In the argument above the central premises that are in need of defense are (1) and (6). Logical modality is argued to be separate from metaphysical modality by the fact that the former has a logical structure somewhere between  $S_4$  and  $S_5$ , and the latter is claimed to have a logical structure that is weaker than  $S_4$ . For this argument to succeed reasons have to be given for maintaining that metaphysical modality is not characterized by  $S_4$ , but that logical modality is characterized at least by  $S_4$ .

Both the strategy for separating the two modalities, and the argument I will offer in favor of (6) are inspired by a counterexample to  $S_4$  defended and discussed by Nathan Salmon (1989). I will present the counterexample in much the same manner that Salmon presents it. However, my defense of it will go beyond the original discussion, in order to connect it directly to (MR). In particular, I will explore the plausibility of employing an (E2-d) interpretation of the counterexample to  $S_4$  as a defense against (6). The defense of premise (1) will come by way of considering the metaphysics of logic.

<sup>7</sup> I characterize logical modality as having minimally an  $S_4$  structure and maximally an  $S_5$  structure in order to allow for the fact that logical modality may best be characterized by some axiom of intermediate strength.

*The Example:* Suppose there is a tree  $T$  from which a portion of wood  $m$  is carved and completely used to make a table  $t$ . Given the essentiality of origin—the principle that the origin of  $x$  is a property  $x$  has in every possible world in which  $x$  exists—it follows that in every possible world in which  $t$  exists,  $t$  comes from  $m$ . So,  $t$  essentially originates from  $m$ . However, it seems to be the case that  $t$  would be the *very same* object that it actually is had  $t$  come from  $m^*$ , a portion of matter just slightly different than  $m$ . In particular, it seems as though there is a range of sub-portions of  $T$ ,  $m_1, \dots, m_n$ , such that for each  $m_i \in \{m_1, \dots, m_n\}$ ,  $t$  could have come from  $m_i$ .

Now, given that  $t$  actually originates from  $m$ , it is necessary that  $t$  originate from  $m$ , but given that it is possibly possible that  $t$  originate from  $m^*$ , it is not necessary that  $t$  essentially originate from  $m$ . So, it is true that  $t$  necessarily comes from  $m$ , but it is not necessarily necessary that  $t$  comes from  $m$ . More formally:

Let:

- (i)  $m$  be a portion of wood.
- (ii)  $t$  be a table carved wholly from  $m$  and contain no non- $m$  parts.

By the essentiality of origin it follows that  $t$  originates from  $m$  in every possible world in which  $t$  exists. So,  $\Box p$  is true, where  $p$  is the proposition that  $t$  originates from  $m$ . However,  $\neg\Box\Box p$  is true, since it is possibly possible that  $t$  come from  $m^*$ , matter which is just slightly different from  $m$ .

The example at first pass is a bit jarring. It appears hard to capture really what is being said. Nevertheless, by coming to consider some objections it will become clear what the example is aiming at, and how it is significant to the debate on (MM), and (MR).

## 5 Objections and Replies

**Objection 1:** *The example is inconsistent with the essentiality of origin.* The essentiality of origin states that the origin  $o$  of an object  $x$  is a property  $x$  has in every possible world in which  $x$  exists. The intuition supporting the counterexample to  $S_4$  claims that it is possible for an object  $x$  to have an origin  $o$ , and yet  $o$  not be an essential property of  $x$ .

**Reply 1:** The objection confuses what the example employs with what it denies. The example is a case in which it is an essential property of  $t$  that  $t$  originates from  $m$ ; but that it is not necessary that  $t$  essentially originates from  $m$ . That is the example purports to be a case in which one has a pair of intuitions. The first intuition is that the essentiality of origin holds. The second intuition is that the necessity of the essentiality of origin fails for a certain kind of object.

**Objection 2:** *Either the intuition that the essentiality of origin holds or the intuition that it is possibly possible that  $t$  comes from  $m^*$ , or both are not worth preserving.* One could respond to the argument above simply by denying either the intuition in favor of the essentiality of origin or the intuition against  $S_4$ . Although some of us share Salmon's intuition, many would deny it or think that given our

larger interests in modality we need to reject that intuition as a consequence of coming into reflective equilibrium about metaphysical modality.

Reply 2: While it is true that one can simply deny the intuition against the transitivity of metaphysical necessity for *de re* cases, such as t. Doing so is to take on a metaphysical burden that should be evaluated by considering the consequences of rejecting the intuition. I maintain that neither intuition can be abandoned. The main problem to be explored comes through recognizing that in maintaining the essentiality of origin while denying that it is possibly possible that t originate from m\* one is committed to maintaining that every bit of matter that was actually at the origin is relevant to individuating t from some other table t\*, and essential to t's identity. It is this claim that appears so hard to accept. Here is one strategy that could be used to defend this commitment.

One might try to prove the essentiality of origin and then derive from that proof the claim that every bit of matter is relevant for individuating one object from another. However, as pointed out by Salmon (1981), and recently discussed by Cameron (2005), Kripke's original footnote 56 argument fails as a strict proof of origin essentialism.<sup>8</sup> So, absent the explicit proof, the strategy is empty.

Going in the other direction, however, there are reasons for maintaining both intuitions, and for thinking that Kripke's actual reasoning is consistent with the counterexample offered by Salmon. If this is so, then we are in a position to hold that an adequate theory of modality must account for these intuitions. The first step in seeing how these intuitions are important comes from redirecting how we look at Kripke's reasoning at footnote 56. The reasoning should not be taken to be a proof of the essentiality of origin, but rather as the intuition that facts about origin are central for individuating objects across worlds. On this reading it can be argued that the reasoning is amenable to a scenario in which we consider a table that is created from matter just slightly different from one of the original tables. The reasoning Kripke offered is the following:

Let 'B' be a name (rigid designator) of a table, let 'A' name the piece of wood from which it actually came. Let 'C' name another piece of wood. Then suppose B were made from A, as in the actual world, but also another table D were simultaneously made from C. (We assume that there is no relation between A and C which makes the possibility of making a table from one dependent on making a table from the other.) Now in this situation  $B \neq D$ ; hence, even if D were made by itself, and no table were made from A, D would not be B.<sup>9</sup>

What is compelling in the reasoning above is not that B's origin A is essential to it, but that in a world in which nothing is created from A, the table D that is *qualitatively* similar to B is not *identical* to B because D's origin is C. There is just a strong intuition that the qualitatively similar D is not identical to B. This is forced out by the idea that when a *qualitatively* similar table is present in a world we can

<sup>8</sup> See Cameron (2005) for an excellent recent discussion of Kripke's original argument, Salmon's attempt at repairing it, and criticism of both.

<sup>9</sup> See Kripke (1980), pp. 114–115.

look to its origin to determine whether it is identical to another table in another world. Given that B originates in A, D originates in C, and  $C \neq A$  in the actual world, it appears that  $B \neq D$  in some possible world.<sup>10</sup>

Now, consider the following scenario as a slight alteration on the original scenario. Let the actual world be as things are in Kripke's scenario. B is created from A, and D is created from C,  $A \neq C$ ,  $B \neq D$ , and the possibility of making B is not dependent on the possibility of making D. However, suppose in some possible world  $w$  a table E were carved from  $C^*$ , matter just slightly different than C, and nothing is carved from either A or C (given that the possibility of carving something from C depends on not carving something from  $C^*$ , nothing can be carved from C). Does  $E = D$ ,  $E = B$ , or neither?

Although E is qualitatively similar to both B and D of the actual world, we are more inclined to say that  $E = D$  than  $E = B$  in  $w$  because  $C^*$  shares a great deal of matter in common with C, and no matter in common with A. The question is whether the mere fact that E originates in slightly different matter than D is sufficient to show that  $E \neq D$ . I maintain that this position is not as attractive as maintaining that  $E = D$ ? My reasons for this stem from a conception of what kind of modality metaphysical modality is.

Metaphysical modality is a kind of modality that flows from the nature of the entities in question, and which is sensitive to the fundamental kind of thing the entity is. Given that there are fundamentally different kinds of entities, the essentiality of origin should be read as applying to an entity in virtue of the fundamental kind of thing the entity is. In slogan form, the essentiality of origin should be taken to have a *non-uniform application across different kinds* of entities. What we care about at the origin when individuating an object changes with the kind of object we are dealing with. If the object is abstract, for example, we do not care about its origin at all. If the object is concrete, then the degree and kind of vagueness that is tolerable at the origin will be determined by what kind of concrete thing the object is (i.e. artifact or biological kind). As a further consideration of this point consider Kripke's gamete example as opposed to the table example.

Could one maintain that although it is an essential property of Elizabeth that she originated from the gamete of her actual parents it is not necessarily essential that Elizabeth originated from the gamete of her actual parents? The answer here seems to be both yes and no. Of course not all of the matter that makes up the gamete is relevant. Slicing off a marginal bit of matter on the external edge of the gamete would surely not make a difference, and would be similar to the table case. But suppose we were to slice off the same marginal amount of material from a location that altered the actual DNA strand of the gamete resulting in a child born with Down syndrome. In that case, though the same marginal amount of material is sliced off, given its affect on the child resulting from the gamete, we would say that we had lost Elizabeth.

By contrast, if some amount of matter  $x$  located at region  $r$  of the actual origin of  $t$ ,  $m$ , is such that it is possibly possible that  $t$  originate from  $m^* = m - x$ , then  $x$  can

<sup>10</sup> For interesting work that answers this question in a way that I will not consider see Greg Restall and J.C. Beal's defense of Logical Pluralism.

be excised from any region  $r^*$  of  $m$  and it will still be possibly possible that  $t$  originate from  $m^*$ . Given that  $t$  is wholly carved from  $m$ , it would not matter where the amount of matter  $x$  is taken from because there are no relevant organizational features about the hunk of matter from which  $t$  is created that we care about. In the gamete case, however, if we change anything substantial to the DNA in virtue of deleting some marginal amount of matter, we lose Elizabeth.

Thus, the degree and kind of vagueness that is tolerable at the origin in the case of gametes is different than in the case of tables. A reason to think the application of the essentiality of origin should be different in these two cases is because what we care about with respect to origin in the case of biological kinds is different than what we care about in the case of artifacts. In both cases, for the purposes of individuation, we minimally care about the hunk of matter that constitutes the origin; but, in addition, given issues of vagueness, in some cases we may care about the organization of the matter as well.

Returning to our question, it is attractive to say that  $E = D$  in our altered scenario because given the kind of object we are talking about, not all of the matter at the origin is important. So, maintaining that  $E \neq D$  because there is just slightly different matter goes against the grain of what we care about in individuating the kind of entity we are dealing with. Moreover, maintaining the necessity of the essentiality of origin in a uniform manner across all cases amounts to a failure to pay respect to how the fundamental kind of thing an object is regulates its identity and individuation across possible worlds. The mistake made in maintaining a uniform application of the essentiality of origin across cases is on a par with the error made in the modal conception of essence discussed in Fine (1994).

On one reading of the modal conception of essence, an essence is a property an object has in every world in which it exists. A result of this conception of essence is that the property *being a member of the singleton Socrates* is an essence of Socrates because Socrates is a member of his singleton in every world in which he exists. Fine points out that intuitively this property has nothing to do with *the kind of thing* Socrates is, and as a result the modal conception of essence is not fine grained enough to capture what an essence is. Likewise, maintaining the necessity of the essentiality of origin in all cases is a consequence of not paying attention to the fundamental kind of thing an entity is. The error in both cases is that certain modal claims have to be endorsed as a consequence of the underlying framework, even though the claims in question are incoherent. Artifacts, such as tables and statues, have their origin essentially, but they are such that it is possibly possible that they come from slightly different matter because concerning these kinds of objects we do not care about all the matter. This intuition about artifacts is a data point an adequate theory of essence must capture, and which itself constrains epistemologies of essence.

**Objection 3:** *The counterexample commits one to the existence of impossible worlds. Impossible worlds are impossible, impossible things do not exist, so impossible worlds do not exist.* The counterexample to  $S_4$  commits one to an ontology that not only includes possible worlds, but impossible worlds as well. If one rejects the example on the grounds that it commits one to impossible worlds, which are incoherent, one can hold on to  $S_4$ .

Reply 3: On the one hand, the objection holds that there are no reasons for holding that there are impossible worlds in our ontology. And on the other hand, the objection misunderstands the sense in which a world is impossible. Concerning the first case, there is a classical kind of argument in favor of impossible worlds that should be addressed, and which has been offered by several philosophers of modality, Salmon (1984) is one example of this. The general argument is as follows:

1. If there are good reasons for admitting possible worlds into our ontology, then there are good reasons for admitting impossible worlds into our ontology.
2. There are good reasons for admitting possible worlds into our ontology.
3. So there are good reasons for admitting impossible worlds into our ontology.

The argument basically attempts to show that there is no way to be partial about admitting worlds into an ontological framework. For example, one might try to argue that we need possible worlds in our ontology because they are indispensable for making sense of reasoning about possibility and necessity. However, if one accepts this kind of reason there will be an equally good reason for accepting impossible worlds into our ontology. They are indispensable for making sense of our coming to discover that something is impossible. Think here of the set-theoretical paradoxes. Prior to their discovery many people reasoned with and about something that is impossible. To model their thoughts at the point of discovery we would need to use impossible worlds.

Nevertheless, even if one is skeptical about impossible worlds, one must be careful to understand the sense in which the counterexample to  $S_4$  requires a commitment to impossible worlds. In particular, the counterexample does not require a commitment to *absolutely* impossible worlds; that is worlds that are impossible and in no other sense possible. The worlds that are impossible are merely impossible *relative* to some other worlds taken as actual.

The actual world  $w$ , in which  $t$  originates from  $m$ , sets up a range of worlds that are possible relative to  $w$ , call that set  $W$ . Every world that is a member of  $W$  is such that  $t$  originates from  $m$ , since originating from  $m$  is an essential property of  $t$ . However, the world  $w^*$ , in which  $t$  originates from  $m^*$ , is not in the set  $W$ ; so,  $w^*$  is impossible from the perspective of  $w$ . Nevertheless,  $w^*$  is not absolutely impossible. It is possibly possible for  $t$  to originate from  $m^*$ , and  $w^*$  is the world in which  $t$  does originate from  $m^*$ ; consequently there is a set of worlds possible relative to  $w^*$ , call that set  $W^*$ . Every world that is a member of  $W^*$  is such that  $t$  originates from  $m^*$ , since from the perspective of  $w^*$  originating from  $m^*$  is an essential property of  $t$ . In addition,  $w$  is not a member of  $W^*$ , since in  $w$ ,  $t$  originates from  $m$ , something that is possibly possible for  $t$ , taking  $w^*$  as actual.

This analysis of the counterexample to  $S_4$  shows that the impossibility of a world is only relative. That a given world is impossible in the metaphysical sense is not an absolute property of the world, rather it is a property relative to other worlds. So, the objection to the counterexample from impossible worlds fails.

Objection 4: *Given that the counterexample shows that the impossibility is relative rather than absolute, it appears as if epistemic two-dimensional semantics can accommodate the counterexample.* The counterexample to  $S_4$  proceeds by showing that for some specific object, although its origin is necessary, it is not

necessary that it has its origin essentially. Since (E2-d) countenances the existence of two intensions associated with a statement, and is able to make sense of how 'water = H<sub>2</sub>O' is necessary in one sense and contingent in another sense, it may be able to handle the counterexample in a way that preserves **S<sub>4</sub>**.

For example, (E2-d) could handle the case in the following way. Given that *t* originates from *m* in the actual world, it is metaphysically necessary that *t* originates from *m*, and necessarily necessary that *t* originates from *m*. However, had another world *w\** (i.e. the world in which *t* originates from *m\**) turned out to be the actual world, then it would be necessary that *t* originates from *m\**, and it would have been necessary that *t* originates from *m\** necessarily.

The main move is to reinterpret the case to be about what we would say is necessary for *t* given a world *w\**, if asked: if *w\** turns out to be actual, would *w* be a world in which *t* is present? On this response **S<sub>4</sub>** is preserved and the intuition about the contingency of the essentiality of origin is reinterpreted to be about different epistemic hypotheses concerning which world is the actual world. If the actual world turns out to be the *w\** world, then a different origin is necessarily essential for *t*, then if the actual world turns out to be the one in which *t* originates from *m*. Thus, the case becomes about how what we would say is necessarily essential for *t* depends on which world we are considering as actual.

Reply 4: The response trades on two senses of modality: epistemic vs. metaphysical. As the example originally stands it purports to show that the origin of a specific artifact, although metaphysically necessary, is not metaphysically necessarily necessary. The response proposed changes the sense in which it is not necessarily necessary that *t* originate from *m* to the epistemic sense of possibility captured by the indicative conditionality test: if *w\** turns out to be the actual world, then *t* essentially originates from *m\**. However, in order for the two-dimensionalist to give an adequate treatment of the example it must preserve the idea that artifacts, such as tables, do not necessarily have their origin necessarily, under the metaphysical understanding of necessity. The point of the example is that **S<sub>4</sub>** is challenged for the metaphysical interpretation of '□' in virtue of the fact that for a specific kind of metaphysical category (i.e. artifacts) all of the matter at the actual origin though necessary is not metaphysically necessarily necessary.

Given that the intuition reflects the idea that we do not care about all the matter at the origin, reinterpreting the sense in which it is not necessarily necessary that *t* originate from *m* as being about what we would say if another epistemic scenario (i.e. the one in which *t* originates from *m\**) were actual, would not be accommodating the intuition, but rather rejecting the intuition outright. However, as I have argued the intuition should not be rejected because it reveals how the essentiality of origin itself is regulated by the fundamental kind of thing an entity is.

There is yet another way that a proponent of (E2-d) could respond. The proponent could argue that the essentiality of origin applies only to the secondary intension, and not to the primary intension, since the secondary intension is supposed to capture metaphysical necessity, while the primary intension is supposed to capture the a priori aspect of meaning. Given that the counterexample only relates to the secondary intension, and (MR) is a thesis about the primary intension, one

might wonder why an objection to the secondary intension carries over to the primary intension.

There are two responses to this version of the objection. First, it fails to note that the problem as developed here does not concern primary and secondary intensions per se, but rather the truth of (MM) considered independently from the semantics of modal statements. Second, the distinction between primary and secondary intensions is independent of (MR). (E2-d) does not imply (MR), but (MR) is directly formulated out of (E2-d). And strictly speaking there are good reasons for accepting a broadly (E2-d)-like picture, which does not employ (MM). I will develop this point in more detail in response to the following objection.

*Objection 5: The counterexample to  $S_4$  only works for de re cases, but not for de dicto cases. So, although (MM) may be false because of the counterexample, since (MR) is a thesis about de dicto modality, and not de re modality, it is only committed through (MM) to  $S_4$  for de dicto modality, and not for de re modality; So, the objection is irrelevant.* This objection grants that the counterexample to  $S_4$  is effective, but denies that (MR) is committed to  $S_4$  for de re modality. Thus, either the counterexample is irrelevant or a proof that (MR) entails  $S_4$  for de re modality is required.

Reply 5: There are a couple of different responses to this objection. Let me begin with a basic broad issue in the epistemology of modality.

The epistemology of modality is a comprehensive project attempting to give a systematic account of all of our modal knowledge. Thus, if (MR) is only a thesis about *de dicto* modality, it will either be silent over a large class of modal knowledge or it will implicitly be committed to some metaphysical thesis about *de re* modality.

In the case in which *de re* modality is taken to be important in the construction of an overall philosophy of modality, and (MR) is silent over knowledge of those claims, we are automatically entitled to search for a more comprehensive theory. In the case in which it is not silent over *de re* modality, its commitment to a certain metaphysical thesis about *de re* modality can be investigated as a reason in favor of it or against it. Although I will not offer an extended argument here, it may be the case that (MR)'s silence over cases of *de re* modality reveals an implicit commitment to a kind of skepticism about *de re* modality. One way to see this is to consider a direct argument from (MR)  $\rightarrow S_5$ .

Consider two frameworks relating meaning and modality: the (1-d) framework and the (E2-d) framework. On the (1-d) framework statements have one intension, and two spaces of possible worlds to evaluate them across, the metaphysically possible worlds and the logically possible worlds, with the former being a proper subset of the latter. On the (E2-d) framework there are two intensions and one space of worlds to evaluate the intensions across, the logically possible worlds. The point of the (E2-d) analysis is to trade out a 2-space-1-intension approach to modality and meaning, for a 1-space-2-intension approach. Rather than saying there is one intension that governs 'water = XYZ' and two kinds of worlds based on two distinct modal primitives, the logically possible worlds where the statement is true, and the metaphysically possible worlds where it is false, (E2-d) holds that there is just one space of worlds and two intensions. On the primary intension the statement

is true in some worlds (i.e. the XYZ worlds), and on the secondary intension the statement is false at some worlds (i.e. all the worlds where H<sub>2</sub>O is absent).

As a consequence, it looks as though (E2-d) trades metaphysical modal properties of objects, captured in the different spaces of possibility, into facts about meaning, captured by different intensions. So, it appears that (E2-d) implies a form of language dependence about modality. Modality is fundamentally a property of statements. And different kinds of modality are captured by different intensions and how they are evaluated. This would appear to conflict with the idea that there are cases of genuine *de re modality*, modality attaching directly to an object independent of description.

Given that the point of (E2-d) is to trade out one approach for another approach, we can ask: What kind of structure does the space of possible worlds over which the intensions are evaluated have to be like for (MR) to be true? By asking this question we open the path to a direct argument that (MR)  $\rightarrow$  S<sub>5</sub>. The argument is as follows.

If ideal primary positive conceivability is to link up with primary possibility in a way that gives us metaphysically robust conclusions, it has to be the case that the set of worlds is complete (i.e. contains all the worlds there are), with each world being genuinely possible, and where the *accessibility* relation is reflexive, symmetric, and transitive.

As a consequence of only having one set of worlds to evaluate across, if the space of worlds is incomplete, that is there are worlds outside of the space of worlds that we are evaluating the two intensions across, then we could only maintain that in the class of worlds under consideration the primary intension and secondary intension of a statement has a certain value. It would be left open, for example, whether according to another system of worlds the primary intension is empty.

If the worlds we are evaluating across are not genuinely possible worlds, then we lose the point of saying that there is a sense in which 'water = XYZ' is possibly true, and a sense in which it is necessarily false.

If the accessibility relation is non-transitive, then we really have something like a three-dimensional analysis. Given the worlds accessible from world *w*, S's primary intension is \_\_\_\_\_, and S's secondary intension is \_\_\_\_\_. And given the worlds accessible from *w\**, S's primary intension is \_\_\_\_\_, and S's secondary intension is \_\_\_\_\_. The problem with the three dimensional analysis is that it puts us in the same situation as the incomplete world scenario. So, it seems that trading the 2-space-1-intension approach for the 1-space-2-intension approach requires maintaining an S<sub>5</sub> structure for the single space of worlds, if we want to draw robust conclusions about modality from meaning.

Additionally, as I gestured in my response to objection 4, it is important to note that replacing the 2-space-1-intension approach for the 1-space-2-intension approach is not a core commitment of a general two-dimensional semantics. Some motivations for a broad two-dimensional semantics come from the fact that one dimension can be used to capture an aspect of meaning roughly similar to a Fregean *Sinn*. Some might find a two-dimensional semantics attractive because of its ability to recapture this aspect of meaning. However, countenancing two distinct intensions, one for the roughly Fregean aspect of meaning, and the other for the Kripkean aspect of meaning is independent of the claim that there is only one space

of worlds over which the intensions are evaluated. Both the number of intensions associated with a statement, and the number of spaces of worlds we can evaluate the intensions across is to be argued for in terms of overall desiderata. A broadly two-dimensional semantics is not incompatible with a plurality of spaces to evaluate the intensions over. It is only when a broadly two-dimensional semantics has to be strengthened to make the link between conceivability and possibility that it has to take on a strict 1-space-2-intension form with an underlying  $S_5$  structure.

*Objection 6: If the argument given so far succeeds, and conceivability is not a guide to possibility, then isn't the argument self-defeating.* The objection raises the point that the methodology of the argument presented here is in tension with the conclusion of the argument. The argument against (MR) itself is an a priori argument that involves intuitions and conceivability. If it is true that conceivability is not a guide to possibility, then the argument undermines itself. One explicit version of the problem is the following:

Any attempt to argue against a conceivability to possibility thesis of the form  $C(P) \rightarrow \Diamond P$ , by offering an a priori counterexample will involve conceiving of a situation in which 'C(P)' is true, yet ' $\Diamond P$ ' is false. So, if the counterexample is successful, then it undermines its own warrant. From this basic problem one might go so far as to say that it is impossible to give an a priori counterexample to a conceivability to possibility thesis.

*Reply 6:* One way to handle the problem raised is simply to distinguish, on the one hand between intuition and conceivability, and on the other hand between (MR) and what the counterexample is a counterexample to.

First, the argument offered against (MR) is an a priori argument that relies on certain intuitions about the modal properties of artifacts, and not explicitly on conceivability. So, the argument does not rely straightforwardly on conceivability, which is required for the argument to be strictly self-defeating.

Second, the argument is not one that attempts to give a counterexample directly to (MR). The counterexample is aimed at  $S_4$ , which is argued to be implied by (MR). So, again the argument is not straightforwardly self-defeating.

Yet, one might still worry what the warrant for the argument is, given the conclusion runs against a standard technique for doing metaphysics? What answer can be given to this kind of worry? The metaphysical answer that appears to be relevant comes from the nature of debates about matters a priori. In general, it must be possible for one to argue a priori about the merits of different a priori methodologies without falling into a self-defeating argument. That is in general it must be possible to show that one a priori methodology M fails because another a priori methodology M\* shows it to be the case. In fact this kind of reasoning could be used to show that intuition is more basic than conceivability.

## 6 Logical Modality

The objections and responses above suggest that transitivity is inappropriate for certain *de re* cases of the metaphysical interpretation of ' $\Box$ '. So, we have reason to

think that the logic of metaphysical modality is not  $S_4$ , which is the conclusion Salmon (1989) reaches. This brings us to the issue of whether logical modality minimally has an  $S_4$  structure.

Premise (1) of the separation argument asserts that logical modality is characterized minimally by  $S_4$  and maximally by  $S_5$ . The obvious way to avoid the conclusion of the argument against (MM) is to maintain that logical modality and metaphysical modality are co-extensive, but neither  $S_4$  nor any system that implies  $S_4$  is characteristic of logical or metaphysical modality.

$S_4$ :  $\Box p \rightarrow \Box \Box p$ , tells us that possibility deletion, and necessity iteration are truth preserving in all cases.  $S_5$ :  $\Diamond p \rightarrow \Box \Diamond p$ , tells us that the space of possible worlds has a certain structure: (i) every world is accessible to every other world, (ii) there are no other possible worlds outside the space of possible worlds, and (iii) there are no impossible worlds in the relative or absolute sense of impossibility. Why hold that logical modality is characterized minimally by  $S_4$ ?

Here I want to consider an argument that ties together how the metaphysics of logic relates to the epistemology of logic.

Consider the following as a strategy for rejecting  $S_5$  for logical modality. Given that  $S_5 \rightarrow S_4$ , show that some logical axiom is necessary, but it is not necessary that it is necessary; conclude that  $S_5$  does not characterize logical modality.

On this route what one would have to show is that some logical axiom, such as  $(P \rightarrow (Q \rightarrow P))$  is logically necessary; but that it is not logically necessary that  $(P \rightarrow (Q \rightarrow P))$  is logically necessary. *Prima Facie* there does not seem to be any reason to think that there are examples like this. Any reasons for holding that an axiom is logically necessary in the first place are going to transfer to the axiom's logical necessity itself being logically necessary. This holds even for principles of logic, such as bivalence. One might hold that bivalence is logically necessary, but that it is not necessarily necessary that there are only two truth-values. Yet, the question is what considerations could be used as evidence for the claim that although bivalence is logically necessary, it is not necessarily necessary. Whatever evidence there would be would seem to show that bivalence itself is not even logically necessary. We need an explanation from the metaphysics of logic to justify the epistemic point being made.

What makes a statement logically necessary? On one conception a logical necessity is simply a logical truth. A statement  $S$  is a logical truth just in case  $S$  is true under every interpretation of its non-logical constants. The connection between logical truth and logical necessity is constitutive. What makes a statement a logical truth is exactly what makes a statement a logical necessity. As a consequence, our reasons for holding that something is a logical necessity must derive from our reasons for holding that it is a logical truth. And our reasons for holding that something is a logical truth derives from our reasons for maintaining that certain terms are logical constants. Thus, logical necessity is tightly linked to the nature of logic itself.

In addition, on my view logic is connected to rationality in a way in which it captures something distinctive about how we *ought* to reason. If this view is correct, how could there be evidence for one system of logic  $L$  being correct; and thus  $L$ 's axioms being logical necessities encoding how we ought to reason, yet other

evidence that shows in some possibly possible world that we ought to reason in another manner?

First, one could argue that there is a possible world in which our mathematics is different, so that, from the point of view of that world, it is possible that our best choice of logical constants is different from what it actually is, given what our actual mathematics is. For example, if we were to adopt a stronger background set-theory, more notions could come out as logical.

Second, one could argue that there is a possible world in which our physics is different, so that, from the point of view of that world, it is possible that our best choice of logic to be used in our “physics + logic” is different from what it actually is, given what our actual physics is. For example, we could reject the law of excluded middle, in order to gain simplicity.

Although there are differences between the two considerations, it is important to note that both trade on an important and crucial point. The point concerns the relation between our best choice of logic for a given task and the truth of a logical system. It is true that there exists a plurality of formal logical systems and that in order to gain some benefit we may choose to use one system in one case and another system in another case. Nevertheless, this only shows that for practical purposes different logical systems have different costs and benefits. It does not show that logical necessities are not themselves necessary. The fact that we choose to use a logical system to solve one kind of problem does not show that another logical system is incorrect or that the logical necessities of that system are not themselves logically necessary.

In addition, it is important to note that some narrow logical necessities are not metaphysically necessary. Narrow logical necessities are necessities that simply derive from the logic of a set of concepts. For example, in the logic of indexicals, the statement ‘I am here now’ uttered by a speaker is logically true and knowable a priori, however, the proposition expressed is metaphysically contingent. So, we must be careful to distinguish between logical necessity determined by a logical system for a set of concepts, and logical necessity with respect to logic.

In addition, we can consider the objection from the case of mathematics in more detail. For this objection to hold it would also have to be the case that either mathematics is not metaphysically necessary or that the notion of ‘a possible world in which our mathematics is different’ amounts to a mere epistemic claim about what could turn out to be the correct mathematical system. Mathematical statements are metaphysically necessary. The only sense that can be made of ‘a possible world in which our mathematics is different’ amounts to an argument about what we could end up saying given a set of evidence about which of the variety of mathematical systems is the correct one.

Finally, there is yet another sense in which we could try to make sense of logic being otherwise, which should be presented, if only to be set aside. The sense in which we can talk of the possibility of reasoning otherwise is by looking at the invalid patterns of reasoning that are frequent in a given population, and the explanation for the frequency.

For example, suppose it is quite common for individuals to reason according to the fallacious pattern of inference  $P \rightarrow Q, Q/P$ ; and the explanation for this is that

people are simply not taught that this form of reasoning is invalid. There is a straightforward sense in which we could say: although this pattern of reasoning is invalid and common, *it could have been the case* that another invalid pattern of inference was common, for example  $P \rightarrow Q$ ,  $\neg P/Q$ . The sense in which we understand the contingency is one that is best explained by noting that people could have been taught the former form to be invalid, and failed to see the latter form as invalid. Nevertheless, the logical system  $L$  whose axioms and rules determine a set of invalid patterns of reasoning is such that if the axioms are necessary at all, they are necessarily necessary. The actual patterns of invalid reasoning that are frequent in a population are contingent. However, evidence for the contingency of the patterns of inference that are actually common is not evidence that a pattern of inference invalid in  $L$  is such that it is possibly possible for it to be valid.

Thus, although there may be reasons for rejecting that the logic of logical modality bears an  $S_5$  structure, reasons I have not discussed, it is nevertheless hard to see how one can maintain that it does not bear minimally an  $S_4$  structure without simply denying that logical truths are logically necessary. To hold that a certain statement is a logical truth is to hold that it is a logical necessity, which in turn means that it is essentially a logical necessity. The position I have endorsed so far is that while metaphysical modality is a relative kind of modality that is sensitive to kind-categories, logical modality is an absolute kind of modality that is not sensitive to kind-categories (other than the kind *logical*). Logical modality should be seen as having a logic at least as strong as  $S_4$  while metaphysical modality should be seen as having a logic weaker than  $S_4$ , as Salmon (1989) argues.

## 7 Conclusion

As a consequence of the considerations I have offered above (MM) appears to be a problem for (MR). Initially, I stated that the separation argument leads to the conclusion that (MR) is false by way of falsifying (MM); it is perhaps safer to state the force of my considerations in the following manner. There is a great deal of interest in a distinctive brand of modality, metaphysical modality, of which there are important *de re* cases. On the face of it (MR) does not give us a kind of conceivability that can pay respect to that kind of modality without simply abandoning it. The real package *Modal Rationalism* offers us as an epistemology of modality involves the collapse of the *prima facie* and plausible distinction between metaphysical and logical modality. Given the implausibility of (MM) as a thesis about metaphysical modality, (MR) is questionable as a thesis about the epistemology of metaphysical modality.

The key here is that the metaphysics of metaphysical modality is important to the epistemology of it. The debate between the modal monist and the modal dualist must be considered in the development of a comprehensive epistemology of metaphysical modality.

The nature of metaphysical modality plays a role in determining its appropriate epistemology. For example, if the set of metaphysically possible worlds is a proper

subset of the set of the logically possible worlds, as the modal dualist maintains, then one could construct a partial a priori epistemology of metaphysical modality.

Where ' $\diamond_L$ ' stands for logical possibility, and ' $\diamond_M$ ' stands for metaphysical possibility, a principle of such a system should be  $\neg\diamond_LP \rightarrow \neg\diamond_MP$ . The principle would allow for one to deduce the metaphysical impossibility of something from a priori evidence or knowledge of its logical impossibility. However, such a system should not endorse the principle that  $\diamond_LP \rightarrow \diamond_MP$ , which would allow for metaphysically robust conclusions to be drawn merely from evidence or knowledge of the logical possibility of something.

(MR) is a significant and important thesis in the epistemology of modality. And it is an advance over other attempts at a link between conceivability and possibility. Nevertheless, there are two substantial questions that need to be asked. Both questions take us back to Arnauld's criticism of Descartes. The First, What kind of modality does conceivability give us access to? Second, is the kind of modality that conceivability gives us access to the kind that allows for metaphysically robust conclusions about the nature of things?

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