

Descartes on Necessity and the Laws of Nature

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ABSTRACT: This paper is on Descartes's account of modality and, in particular, his account of the necessity of the laws of nature. He famously argues that the necessity of the "eternal truths" of logic and mathematics depends on God's will. Here I suggest he has the same view about the necessity of the laws of nature. Further, I argue, this is a plausible theory of laws. For philosophers often talk about something being nomologically or physically necessary because of the laws of nature, but this necessity is thought to be metaphysically contingent. However, they struggle to explain how the laws could be genuinely necessary while being metaphysically contingent. The chief advantage of Descartes's view, I argue, is that God's will can plausibly explain both the necessity of the laws (because God made them necessary) and the contingency of the laws (because God could have done otherwise). So, Descartes's theistic account of laws provides a plausible explanation, perhaps the best explanation, of the contingent-necessity of laws of nature.

1. Introduction

Many philosophers consider the laws of nature to be a kind of necessity (e.g., an unsuspending object *must* fall to the ground) while, at the same time, they grant that the laws could have been different than they are. So, the laws of nature are widely thought to be necessary, but only *contingently*-necessary. Recently, the most well-known proponent of this kind of view is David Armstrong (1983), but it remains controversial whether Armstrong can successfully explain both the apparent necessity and the apparent contingency of the laws of nature. Others have offered their own proposals, but there remains no consensus view about how to capture the contingent-necessity of laws. In this paper, I look back at Descartes, who played a singularly important role in developing the modern concept of a law of nature,¹ and argue that Descartes offers an interesting and plausible theory of modality that can explain the contingent-necessity of the laws of nature.

Descartes holds that God can *make* something necessary. He claims, for example, that God makes the so-called "eternal truths" of logic and mathematics necessarily true. That they depend on God's will leaves open the possibility that there could have been different eternal truths, yet the fact that God wills them to be necessary makes them necessary. What is interesting about Descartes's account of modality is that it is a contingent fact that the eternal truths are necessary; as Curley (1984, p. 581) says, for Descartes the eternal truths are necessary

¹ Descartes influenced the modern concept of laws of nature in several ways. He was the first to propose universal laws of motion, which were later revised by others, culminating in Newton's three laws of motion. And, most importantly for purposes of this paper, he systematically uses laws of nature to explain the outcome of particular events. This practice was widely adopted after Descartes. So, although the term "laws of nature" did get occasionally used before Descartes (even going back to antiquity), after Descartes the discussion of laws of nature took a central place in the development of science and philosophy of science. For an excellent review of these developments, see Henry 2008.

but they are not *necessarily*-necessary. I am inclined to reject this account of the modal status of logic and mathematics. However, when this theory of modality is applied to the laws of nature it provides an interesting and plausible account of the necessity of the laws of nature, or so I shall argue.

The suggestion from Descartes that I am defending is the claim that the necessity of the laws of nature depends on God's will. The chief advantage of this account of the laws of nature is that Descartes is able to provide an explanation for how it is that the laws of nature are both (naturally) necessary and yet could have been different (so, metaphysically contingent). I conclude, then, that Descartes's theistic account of laws provides one plausible explanation, perhaps even the best explanation, of the contingent-necessity of the laws of nature.

2. Descartes on the Eternal Truths

Descartes holds that God can, by an act of his will, *make* something necessary. The idea here is that God, as an omnipotent being, can will something to be necessary and consequently it *is* necessary. I of course do not know *how* God makes something necessary, just as I do not know how God could create the world *ex nihilo*; yet there is a conceptual connection between an omnipotent being willing that p and p being true. So, it is intuitively plausible to assert *that* an omnipotent God can make something necessary. But philosophers now (more clearly than Descartes) distinguish between several types of necessity: logical necessity, metaphysical necessity, natural necessity, and so forth. So, when Descartes claims that God can make some proposition p necessary, what kind of necessity does he have in mind?

Logical necessity is often defined in terms of a logical contradiction. A contradiction is logically impossible, whatever is *not* contradictory is logically possible, and the *negation* of a contradiction is logically necessary. Descartes sometimes talks of possibility and necessity in this way. For example, he says, "I have never judged that something could not be made by [God] except on the grounds that there would be a contradiction" (*Meditations*, AT 7/CSM 2: 71/50) and, elsewhere, that God's *non*-existence is contradictory and hence necessarily false (*Meditations*, AT 7/CSM 2: 66-67/46).² Yet Descartes distinguishes what seems possible to us from what is possible for God:

I do not think we should ever say of anything that it cannot be brought about by God. For since every basis of truth and goodness depends on his omnipotence, I would not dare to say that God cannot make a mountain without a valley, or that one and two should not be three. I merely say that he has given me such a mind that I cannot conceive a mountain without a valley, or an aggregate of one and two which is not three, and that such things involve a contradiction in my conception. (*Correspondence*, AT 5/CSMK 3: 223-224/358-359)

Descartes judges contradictions to be impossible (though not impossible for God), and thus sometimes uses contradictions to make judgments about modality. Following now-standard terminology, I will refer to a contradiction as logically impossible, the negation of a

² All citations of Descartes's writings include a reference to the Latin edition edited by Adams and Tannery (AT) *Oeuvres de Descartes* and the corresponding English translation in *The Philosophical Writings of Descartes* by Cottingham, Stoothoff, and Murdoch (CSM), and volume 3 with Kenny (CSMK). Each reference first includes the volume in AT and CSM followed by the page numbers in each.

contradiction as logically necessary, and a statement that is not logically contradictory as logically possible.

Metaphysical possibility refers to any way the world could be. Contemporary philosophers often use “possible worlds” to describe ways the world could be; so, in terms of the standard possible world semantics, it is metaphysically possible for a proposition p to be true if, and only if, there is a possible world in which p is true (i.e., that is a way the world could be). Divine omnipotence is thus best described in possible world semantics as holding the following. First, if God could make p true (or false), then it is metaphysically possible for God to make p true (or false). Second, since God’s making p true in a possible world entails that there is at least one possible world in which p is true, if God could make p true (or false), then it is metaphysically possible for p to be true (or false). Although Descartes did not use these terms in this way, it will nonetheless be useful to describe what, according to Descartes, it is possible or impossible for God to do in terms of possible world semantics so that we can be clear about what it is, exactly, that he is claiming.

Some interpreters claim that, on Descartes’s view, modality simply does not apply to God (Bennett 1994; Kaufman 2002; Alanen 2008). This is because Descartes claims that modality depends on God’s will and so, prior to God’s deciding what is and is not possible, modality does not apply to God. I think this is a mistake. Descartes repeatedly makes counterfactual assertions about what God can and cannot do: for example, God cannot be a deceiver (Fourth Meditation) and God could have made the eternal truths false (see references below). The way to translate these claims into possible world semantics, so it seems to me, is to say (1) that there is no possible world in which God deceives us and (2) there is a possible world in which God made the eternal truths false. In what follows, then, I will proceed to interpret Descartes’s claims about what God can and cannot do in terms of metaphysical possibility.

Infamously, Descartes claims that the “eternal truths” of logic and mathematics depend on God’s will. To Mersenne, Descartes writes:

The mathematical truths which you call eternal have been laid down by God and depend on him entirely no less than the rest of his creatures. Indeed, to say that these truths are independent of God is to talk of him as if he were Jupiter or Saturn and to subject him to the Styx and the Fates... it is God who has laid down these laws in nature just as a king lays down laws in his kingdom. (*Correspondence*, AT 1/CSMK: 145/23)

Just as the physical world and all that is in it depends on God’s will, so also the eternal truths of logic and mathematics depend on God’s will. As this comparison suggests, Descartes seems to be thinking that God could have decided *not* to make the eternal truths true (just as God was free *not* to create the world). In a follow up letter to Mersenne, he writes:

You ask also what necessitated God to create these [eternal] truths; and I reply that he was free to make it *not true* that all the radii of the circle are equal – just as free as he was not to create the world. (*Correspondence*, AT 1/CSMK: 152/25, my emphasis)

According to Descartes, then, the eternal truths might not have been true. Indeed, Descartes seems to assert that God could have made the eternal truths false:

God cannot have been determined to make it true that contradictories cannot be true together, and therefore that *he could have done the opposite*. (*Correspondence*, AT 6/CSMK: 118/235, my emphasis)

It is an eternal truth (i.e., the law of non-contradiction) that contradictions must be false. Yet, Descartes asserts, God “*could have done the opposite*,” meaning that God could have made contradictions true. Hence, the eternal truths depend on the determination of God’s will.

Descartes thus holds the unusual position that it is metaphysically possible for logically necessary propositions to be false. Descartes recognizes that $2 + 3 \neq 5$ is a “manifest contradiction” (*Meditations*, AT 7/CSM 2: 36/25) and yet, as we have seen, he is willing to say that God could have made contradictions true. Similarly, $2 \times 4 \neq 8$ is no less obviously contradictory, and yet he says, “God could have brought it about from eternity that it was not true” (*Meditations*, AT 7/CSM 2: /297). Since God could have made contradictions such as these true, that is one way the world can be. Contradictions do not limit God’s power but only limits our understanding of his power (again, see *Correspondence*, AT 5/CSMK 3: 223-224/358-359). A useful way to describe Descartes’s view, then, is that he thinks the logically impossible is metaphysically possible.

Descartes thinks that God *creates* the essences of things, apparently including that of mathematics (again, see *Correspondence*, AT 1/CSMK: 151-152/25). As we have seen, Descartes thinks there could be two possible worlds, one in which God makes the nature of 2, and 3, and 5 so that $2 + 3 = 5$, and another one in which God makes the nature of 2, 3, and 5 so that $2 + 3 = 23$. One possible explanation, which is perhaps implied by Descartes’s comments that God creates the essences of things, is that God creates 2, 3, and 5 with *different natures* and the natures of these numbers then determine the different sums of $2 + 3$. Another explanation for the different sums is that God *changes the relations* between the very same numbers. I think the latter explanation should be given primacy. For Descartes wants to insist that God cannot have any limits, and so he is committed to the view that God *could* make 2 and 3, with the very same nature, equal to 5 in one world and 23 in another. The main motivation for the doctrine of the creation of the eternal truths, then, leads to the conclusion that God change the relations between the same objects. (Later, I will suggest this is what on Descartes’s view God does with the laws of nature.)

Descartes’s position goes against my intuitions of modality. It seems to me that $2 + 3 = 5$ is necessarily true and not even God could make it false. This is in line with the standard view of omnipotence (articulated by Aquinas and others), which is that God cannot do what is logically impossible. On the standard view, if p is logically impossible then p is metaphysically impossible and, conversely, if p is metaphysically possible then p is logically possible. However, Descartes’s view expands the domain of metaphysically possible worlds to include worlds in which logically necessary propositions are false. As an account of *logical* necessity, I think Descartes account of modality should be rejected. Nonetheless, my hope is that it will be useful to consider Descartes’s position concerning the necessity of the eternal truths as a way to think about *natural* necessity, which can more plausibly be thought to depend on God’s will. Let us, then, temporarily suspend our disbelief and go along with the fiction that the logically impossible is metaphysically possible.

Commentators have argued that, since the eternal truths depend on God’s will, the eternal truths are merely contingent. For example, Frankfurt (1977, p. 42) claims that on Descartes’s view “the eternal truths are inherently as contingent as any other proposition” and Plantinga (1980, p. 100) argues that “if [the eternal truths] could have been false, then they aren’t necessary”. I agree that, for Descartes, the eternal truths are metaphysically contingent.

However, as Curley (1984, pp. 576-578) points out, taking the eternal truths to be *merely* contingent conflicts with how Descartes describes the modal status of the eternal truths. Descartes claims that there are some “things which God could have made possible, but which he has nevertheless wished to make *impossible*”, and that “God has willed that some truths should be *necessary*” (*Correspondence*, AT 6/CSMK: 118/235, my emphasis). For example:

...it is because [God] willed that the three angles of a triangle should *necessarily* equal two right angles that this is true and *cannot be otherwise*, and so on in other cases. (*Meditations*, AT 7/CSM 2: 432/291, my emphasis).

Descartes claims that the eternal truths are necessary, even though God could have made them false. Dan Kaufman rightly observes that “the controversy surrounding” whether Descartes takes the eternal truths to be necessary “arises not because of a lack of textual support, but because Descartes’s acceptance of [the view that they depend on God’s will] is so uncontroversial” and seems to imply that there are no necessary truths (Kaufman 2002, p. 25). So, there is plenty of textual evidence that Descartes claims the eternal truths are necessary; the problem is understanding *how* the eternal truths are necessary even though they could have been false.

Frankfurt takes Descartes’s position to be incoherent. For, it is usually thought, if p is metaphysically possible this “entails that [p] is logically possible. Descartes’s statement that God could have made contradictions true seems to entail, accordingly, the *logical* possibility of the *logically* impossible” (Frankfurt 1977, p. 43, my emphasis). According to Frankfurt’s interpretation, the proposition “ $p \ \& \ \sim p$ ” is logically possible (because it is metaphysically possible for God to make it true) and at the same time it is logically impossible (because it is logically contradictory). However, I take it, Descartes rejects the usual assumption that if p is metaphysically possible then p is logically possible. It is not as if, on Descartes’s view, God makes “ $p \ \& \ \sim p$ ” cease to be contradictory; rather, Descartes insists that God could make “ $p \ \& \ \sim p$ ” true *even though it is contradictory* (i.e., logically impossible). So, the possibility of the impossible, unlike in Frankfurt’s description, are really two different modalities: Descartes is committed to the *metaphysical* possibility of the *logically* impossible. While perhaps objectionable and certainly unusual, the position is not flatly contradictory in the way Frankfurt claims it to be.

In response to Frankfurt’s charge of inconsistency, Plantinga defends Descartes by arguing that, since God could make any proposition true, “*nothing is logically impossible*. He does not mean to claim that a contradiction, for example, is logically impossible but possible for God; he claims instead contradictions are, in fact, possibly true *because it is within God’s power to make them true*” (Plantinga 1980, p. 116, my emphasis). Plantinga is guilty of the same mistake as Frankfurt: he assumes that, for Descartes, metaphysical possibility entails logical possibility. Because of this, Plantinga interprets Descartes as holding that there are no necessary truths. However, as noted above, this conflicts with Descartes’s claims that God makes the eternal truths necessary.

I want to make sense of Descartes’s idea that the eternal truths are necessary even though God could have made them false. I have already acknowledged that, for Descartes, the eternal truths are metaphysically contingent (because God could have made them false). I have also suggested that the relevant modality is not logical necessity (because God does not make propositions contradictory or not; rather, God decides whether or not to make contradictions true). So, when Descartes claims that God makes the eternal truths necessary the relevant kind of modality is neither logical nor metaphysical necessity. This is good for Descartes, for

otherwise his position would be either incoherent or false (as Frankfurt and Plantinga, respectively, suggest). The trouble now, though, is to explain why the eternal truths should count as “necessary” even though they could have been false.

For Descartes, the eternal truths are necessary only in a subset of possible worlds (those possible worlds in which God makes them necessary). The proposition p is metaphysically necessary if, and only if, p is true in all possible worlds *whatsoever*. By contrast, p is contingently-necessary for us if, and only if, p is true in all the possible worlds “*accessible*” to the actual world. The idea here, familiar in contemporary modal logic, is that only some possible worlds are relevant to the modal status of certain propositions. Thus, on Descartes’s view, God could have made $2 \times 4 \neq 8$ true in some distant possible world, but for us that is not relevant to the modal status of the proposition $2 \times 4 = 8$ because God has made it so that, in all the relevant ways *this* world could be, $2 \times 4 = 8$ is always true; so, for us, $2 \times 4 = 8$ is (as a contingent fact) necessarily true.

As Curley points out (1984, pp. 589-590; cf. Kaufman 2002, p. 32), several formal systems in modal logic can give a coherent account of necessity that applies to only a subset of possible worlds. Modal logics have developed inference rules not only for claims such as necessarily p (or $\Box p$) but also for iterated modal claims such as *necessarily-necessarily* p (or $\Box\Box p$) and *possibly-necessarily* (or $\Diamond\Box p$). The systems of modal logic can be distinguished by which rules are included. In some, though not all, systems of modal logic (e.g., S5) $\Box p$ entails $\Box\Box p$. Descartes denies this: “even if God has willed some truths should be necessary [so, $\Box p$], this does not mean that he willed them necessarily [so, $\sim\Box\Box p$]; for it is one thing to will that they be necessary and quite another to will this necessarily, or be necessitated to will it” (*Correspondence*, AT 6/CSMK: 118/235). Since what is necessary depends on God’s will, and God can do otherwise, Descartes denies that $\Box p$ entails $\Box\Box p$. So, Descartes’s account of modality can be captured in systems of modal logic which do *not* take $\Box p$ to entail $\Box\Box p$ (e.g., S6, among others). According to Descartes, p is necessary and yet could have been false: so, it is true both that $\Box p$ and yet $\Diamond\sim\Box p$ (and hence $\Diamond\Diamond\sim p$). A consistent position can be developed, then, according to which the eternal truths are necessary for a subset of possible worlds even though there are other possible worlds in which they are false.

Iterated modalities provide a promising way to interpret Descartes’s view of modality. He insists that the eternal truths are necessary, and yet God could have made them false. He is thus committed to both $\Box p$ and $\Diamond\sim\Box p$. In terms of modal logic, $\Box p$ is true for us because p is true in all the possible worlds accessible to us; $\Diamond\sim\Box p$ (or $\Diamond\Diamond\sim p$) is true because in more distant possible worlds, those inaccessible to us, p is false. Descartes’s view can then be understood as follows: God is the one making p true or false in these possible worlds and, since God control the modal status of p , God also controls which worlds are accessible to us. That is just to say that God makes p necessary for us but he could have done otherwise.

While Descartes asserts that the eternal truths depend on God’s will, it remains controversial *what* truths depend on God’s will. One plausible interpretation is that Descartes thinks God controls the truth value of *any proposition whatsoever* (Frankfurt 1977, p. 42; Plantinga 1980, p. 112; Kaufman 2002, p. 33). Descartes’s comments do sometimes suggest this is his view. For example, he claims that “the power of God cannot have any limits” (*Correspondence*, AT 6/CSMK: 118/235) and, again, he asserts that he could have made the eternal truths false (*Correspondence*, AT 1/CSMK: 152/25; AT 6/CSMK: 118/235). However, as Plantinga points out, the unrestricted scope of divine power would entail that there are no necessary truths

about God's nature. For, on this view, God could make any proposition about his nature false, and hence no properties are essential to God (Plantinga 1980, p. 126).

My view is that, on Descartes's view, modal claims *about God's nature* (and those alone) are metaphysically necessary; and so, God can make any proposition true or false *except* for propositions about God's nature. A careful examination of the text supports the view that Descartes intends to *exclude* claims about God's nature from those eternal truths that God could have made false. For example, he claims that "the essence of *created things*?" depends on God's will (*Correspondence*, AT 1/CSMK: 152/25, my emphasis) and says (as an objection to his view) there cannot be "anything immutable and eternal *apart from God*" (*Meditations*, AT 7/CSM 2: 380/261, my emphasis). Both these claims exclude God's nature from the scope of things which depend on God's will. Further, I take it that God's existence and veracity are not contingent facts, otherwise this would spell disaster for the rest of Descartes's philosophical program (for then we could not know that God exists and is no deceiver, etc.). So, on my interpretation, facts about God's nature are metaphysically necessary (because they are true in every possible world), whereas all other eternal truths are contingently-necessary (because, as a contingent fact, God chose to make them necessary).

If there are metaphysically necessary truths about God's nature, as I have suggested, then this implies some limitation on God's power. God's essential attributes are usually said to include existence, omnipotence, omniscience, and being perfectly good which, for Descartes, notably includes not being a deceiver. But if these essential attributes really are metaphysically necessary, then it is not within God's power to make it so that he does not exist, or is weak, or is ignorant, or is a deceiver. Descartes, I think, would not find these limitations unacceptable (contra Plantinga 1980, p. 126). These limitations are unobjectionable because they are *internal* to God's nature. By contrast, Descartes objects to any *external* limitations to God's power. For example, when first introducing his view of the eternal truths, he objects that if the "mathematical truths which you call eternal" did not depend on God's will, then God would be like Jupiter or Saturn who are "subject to...the Styx and the Fates" (*Correspondence*, AT 1/CSMK: 145/23). The concern here is that the eternal truths, if they were independent of God's will, would be an *external* constraint on God's power. It is in this same context that he says "the power of God cannot have any limits" (*Correspondence*, AT 6/CSMK: 118/235), which I interpret as a denial that the eternal truths, as external constraints, can limit God's will. But that God cannot be a deceiver (and the like) is not an objectionable limitation of divine omnipotence precisely because the limitation is due to God's own nature, rather than something external to God imposing the limitation.

In an interesting twist, Descartes appeals to divine immutability (i.e., God's nature) as grounds for the necessity of the eternal truths. In a letter to Mersenne, Descartes expresses the worry that if the eternal truths depend on God then these "necessary" truths might not remain true. He imagines an objector saying, "if God had established these truths, he could change them as a king changes his laws." The suggestion here is that if it were entirely up to God whether a proposition such as " $2 + 3 = 5$ " is true then, even if the proposition is in fact true, God could at any moment make the proposition false, and hence " $2 + 3 = 5$ " would not really be necessary (this is a variation of the contingency objection pressed by Frankfurt and Plantinga). Descartes replies, "Yes he can [make eternal truths false], *if* his will can change." The hypothetical objector insists that logical and mathematical truths are "eternal and unchangeable". Descartes replies, "I make the same judgment about God" (*Correspondence*, AT 1/CSMK: 145-146/23, my emphasis). Since the eternal truths depend on God's will, *if* his will can change then the eternal truths can change. But the antecedent of this conditional is impossible: God's will is immutable, and so once God makes p an eternal truth, p must remain

true. As Descartes tells Burman about God's ability to make eternal truths false, "God could not *now* do this" (*Correspondence*, p. 343, my emphasis).³ So, Descartes's solution to the potential problem that God could at any moment change the "necessity" of the eternal truths is that *God's will cannot change* and thus once God wills the eternal truths to be necessary they must remain necessary.⁴ The unobjectionable limitation of God's nature, then, helps ensure the stability of the eternal truths.

My interpretation of the eternal truths is importantly different from the other main alternatives, and this difference allows Descartes to provide a plausible account of contingent-necessity. Plantinga presents the interpretive options as either (a) God can control the truth value of *any proposition whatsoever*, which implies God would have no nature, or (b) God's control is limited to modal truths. But I have argued for another alternative: (c) God can control the truth value of any proposition *except those about God's nature*. One advantage of this interpretation is that, unlike on Plantinga's interpretation, God's existence and nature are metaphysically necessary. Another advantage, as we just saw, is that Descartes can appeal to God's nature (specifically, divine immutability) as a way to secure the necessity of the eternal truths. For if God had no nature (and so his immutability was mutable), then God could change his mind at any moment and make the eternal truths false, undermining the "necessity" of the eternal truths. However, since God does have a nature (and so his immutable will is immutable), once God has decided to make the eternal truths necessary, they will forever remain necessary.

What I find interesting and potentially useful about his account of the eternal truths is that they are necessary in some sense (because God willed them to be necessary) but contingent in another sense (because God could have done otherwise). While few have been willing to accept this account of modality as an account of the eternal truths, I suggest that this view of modality provides a plausible explanation of the contingent-necessity of the laws of nature.

3. Descartes on the Laws of Nature

My main goal in this paper is to use Descartes's account of modality as a way to explain the contingent-necessity of the laws of nature. I happen to think that this is in fact the way Descartes thinks of laws and, in this section, I wish to make that interpretation plausible. So, I will briefly provide some support for the view that Descartes thinks of laws as contingently-necessary and consider one common objection to this interpretation. In the next section, I go on to defend the view I here attribute to Descartes.

Descartes draws an intriguing connection between the eternal truths and the laws of nature. It is while working on *The World*, in which he first articulates universal laws of motion and develops his conception of the laws of nature, that he writes a letter to Mersenne saying that the "eternal [truths] have been laid down by God and depend on him entirely" and "God

³ It is convenient to describe the stability of God's will as being stable over time, though perhaps that is not strictly speaking correct if Descartes takes God to be atemporal. However, there is nothing essentially temporal about the point Descartes is making here: if God atemporally decides to will that *p* be necessary then, since God's will cannot change, the result is that *p* will always be necessary. Yet, as can be seen in the quote above, Descartes himself sometimes makes the point in temporal terms (see also Curley 1984, p.578-588).

⁴ One objection to Descartes's appeal to immutability is that God could will that (i) the eternal truths be true from t_1 to t_2 and (ii) the eternal truths be false after t_2 . This would allow the truth value of the eternal truths to vary even though God's will does not change. I discuss this kind of objection to Descartes's account of the laws of nature in the next section, and what I say in response to the objection there applies here as well.

has laid down *these laws in nature*". He later adds, "I hope to put this in writing, within the next fortnight, in my treatise on physics [i.e., *The World*]" (*Correspondence*, AT 1/CSMK: 146/23, my emphasis). Apparently, then, the laws of nature articulated in *The World* are among the eternal truths that depend on God's will. If so then, as with logic and mathematics, Descartes views the laws of nature as contingently-necessary.

The eternal truths are contingently-necessary because they depend on God's will and yet God chose to make them necessary, and both of these seem to be true of the laws of nature. Descartes repeatedly asserts that God is like a king and the laws depend on his will (again *Correspondence*, AT 1/CSMK: 145/23; also *Meditations*, Replies, AT 7/CSM 2: /293-294). As for the necessity of these laws, he says the motion of an object "*cannot possibly ever cease*" and, although it "may indeed pass...into another" object the motion itself "*cannot entirely cease* to exist in the world" (*The World*, AT 11/CSM 1: 11/85, my emphasis). It is *necessary* that an object's motion be conserved, and he uses this to infer the first two laws of motion (Garber 1992, ch. 7). Combining the apparent necessity of these laws with the view that the laws depend on God's will, it appears that he takes the laws of nature to be contingently-necessary.

However, commentators frequently assert that, on Descartes's view, the laws of nature are deducible *a priori* from the nature of God,⁵ which would make the laws of nature metaphysically necessary rather than contingently-necessary. Descartes argues, for example, from divine immutability to the conclusion that the quantity of motion in the world must remain the same:

For we understand that God's perfection involves not only his *being* immutable in himself, but also his *operating* in a manner that is always utterly *constant and immutable*. (*Principles*, AT 8/CSM 1: 2.36, my emphasis)

And "from the mere fact that God is *immutable*" it follows that

acting always in the same way, he *always produces the same effect*. For, supposing that God placed a certain quantity of motion in all matter in general at the first instant he created it, we must either admit that he always preserves the same amount of motion in it, or not believe that he always acts in the same way. (*The World*, AT 11/CSM 1: 43/ 96, my emphasis; cf. *Principles*, AT 8/CSM 1: 2.36)

God's immutable nature entails that God's will does not change. Thus, Descartes infers, once God has created objects in motion we can be sure that the same quantity of motion will be preserved thereafter (i.e., the law of conservation). He gives a similar justification for the first two laws of motion (see *Principles* 2.39). These passages lead many commentators to conclude that Descartes deduces the laws of nature from divine immutability alone.

The above argument from divine immutability is not a very good one. First, the laws do not follow from divine immutability alone (Garber 1992, p. 204; Della Rocca 1999, p. 63; cf. Kaufman 2005, pp. 15-16). For example, according to the first law of motion an object in motion will remain in motion (unless acted on by another force). Suppose, then, at t_1 God creates one and only one object and sets it in motion. It does not follow from divine immutability that the object will be in motion at t_2 . For, we can imagine, at t_1 God wills that (i) the object be in motion until t_2 and also (ii) at t_2 the object stop. In that case, objects are in motion at t_1 , not at t_2 , yet God never changes his will. Thus, divine immutability alone does

⁵ For example, Curley 1984, p. 573; Broughton 1987, p. 205; Pavelich 1997, p. 532; Henry 2008, p. 74.

not justify an inference to the laws of motion; what the laws of motion are depends on what it is that God wills to be the case. Second, taking the laws of nature to follow from divine immutability alone conflicts with Descartes's account of the eternal truths (Nadler 1987, p. 186). For Descartes thinks the rules of logic depend on God's will and so whether or not the laws of nature logically follow from God's nature is, at best, a contingent-necessity that depends on God's will making it so. Both of these failures bring out the need for God's will to determine what the laws of nature are.

A better version of the argument from divine immutability mirrors Descartes argument for the stability of the eternal truths. In that argument (discussed above), God wills that p be an eternal truth and, since God's will cannot change, it will therefore follow that p remains true forever. In this way, divine immutability ensures that p continues to have the status that God initially assigns to it. Now, what it is that God wills matters here. If at t_1 God wills only that p is true at t_1 , it will not follow that p is true at t_2 . But, as we have seen, when God wills that p be an eternal truth, God wills that p be a *necessary* truth. And if at t_1 God wills that p is necessary, it will follow that p is true at t_2 . Understood in this way, divine immutability can be used to justify the future truth of the eternal truth that p . Likewise, I suggest, Descartes's argument from immutability for the laws of nature should be understood in the same way. At t_1 God wills that it be a necessary law of nature that an object in motion will remain in motion, and it will therefore follow that an object's motion at t_1 will continue at t_2 . It is because God wills the laws to be necessary that divine immutability will ensure the future necessity of those laws. (Incidentally, this interpretation of the divine immutability argument further supports the view that Descartes sees the laws of nature as eternal truths.)

It might be objected that the laws of nature depend on God's will but God's will itself is metaphysically necessary, which would make the law of nature metaphysically necessary. For example, perhaps (following Leibniz) divine goodness entails that God must choose the *best* set of laws, or perhaps (following Malebranche) divine wisdom entails that God must choose the *simplest* set of laws. If so, then God's nature would determine God's will, so God's will could not be different than it is, and thus the laws would be metaphysically necessary.

However, Descartes insists that God is free to choose otherwise. He argues that it is "self-contradictory to suppose that the will of God was not indifferent from eternity with respect to everything" or that "God's idea of the good impelled him to choose one thing rather than another" (*Meditations*, AT 7/CSM 2: 431-432/291). It is fundamental to Descartes's concept of God that God is able to choose to do otherwise.

In defense of Descartes's view that God could have made the world with different laws, I will point out that we should not limit the power of God without having good reason for doing so. It is usually thought that God cannot do what is logically impossible. Since the logically impossible seems, so far as we can tell, to be inherently impossible, this is a reasonable limitation on God's power. But it is clearly objectionable to say that God cannot do something when there is *no apparent reason* for believing God cannot do so. Yet, as Hume persuasively argues, we do not perceive any *a priori* necessity in the laws of nature and we can imagine the world with different laws. This by itself provides *prima facie* evidence that the laws are contingent, rather than metaphysically necessary. And given the apparent contingency of the laws, there is no apparent reason to believe that God is incapable of creating a world with different laws of nature. Therefore, the view that the laws of nature are metaphysically necessary seems to place an unacceptable limitation on God's will.

I emphasize that, for Descartes, *everything* (other than God himself) depends on the will of God. *A fortiori*, the laws of nature depend on God's will. This is reason enough to doubt the view that, for Descartes, the laws are metaphysically necessary. Further, it is highly implausible

to believe that God can make, for example, $2 + 3 = 5$ false but he could not create an object that does not remain in motion. I agree with Kaufman (2002, p. 28) when he says, “I simply find it impossible to believe that Descartes thought that the natural laws have a greater degree of necessity than, say, the law of non-contradiction.” A much more plausible interpretation is that Descartes takes the eternal truths and the laws of nature to both be contingently-necessary.

We have seen three reasons to think that, for Descartes, the laws of nature are contingently-necessary. First, Descartes implies that the laws of nature are among the eternal truths. This would entail that, like the eternal truths, the laws of nature depend on God’s will and yet God makes them necessary. Second, Descartes uses the same kind of argument to justify the necessity of the eternal truths and the laws of nature. This suggests that he thinks they have the same modal status. Third, when talking about the laws of nature, he uses modal language, such as insisting that the motion of an object *must* be conserved. As I have argued, the conservation of motion would not be necessary unless God willed that it be necessary. So, there are good reasons to think that, according to Descartes, the laws of nature are contingently-necessary.

In my view, the most plausible interpretation of Descartes is that the laws of nature are contingently-necessary. At any rate, that is the view that I am interested in defending. I take this to be Descartes’s position, but even if it is not, it is at least a Cartesian position worth considering.

4. A Cartesian Account of Natural Necessity

The laws of nature explain why the world is the way it is. We notice, for example, that objects in motion remain in motion (unless acted upon by another force) and unsuspending objects fall to the ground. Why does this happen? The answer: these are laws of nature, and thus it is *necessary* that objects remain in motion, and *necessary* that they fall to the ground. In this way, the laws of nature are thought to “govern” the outcome of particular events. Nowadays, this kind of necessity gets referred to as “natural necessity” or “physical necessity” or the like, and natural necessity is often thought to be a kind of contingent-necessity. Descartes agrees that the laws of nature are contingently-necessary. But Descartes and (most) contemporary defenders of natural necessity disagree about the *grounds* of natural necessity. Descartes takes the grounds of natural necessity to be God, whereas most contemporary theories of natural necessity do not. In this final section, I defend Descartes’s view by arguing that God is an especially good candidate explanation for the grounds of the contingent-necessity of laws.

The view that there are necessary “laws” that “govern” nature has its origin (at least in large part) in an analogy to divine command theory: God “commands” material objects to behave in a certain way and those objects subsequently “obey” God’s command. God here is the lawmaker and his commands are the laws. While the analogy to divine command theory is historically important for the development of the concept of the laws of nature (Henry 2008, pp. 79, 88, 90), the analogy is also useful in clarifying the way in which God is thought to ground the laws of nature.

According to a divine command theory of morality, the rightness or wrongness of an action depends on God's commands.⁶ On this view, the ground of wrongness is God's command rather than anything intrinsic to the nature of the action. So, for example, if God did not exist, then torturing innocent people for fun would not be wrong. There is, on this view, nothing *inherently wrong* with torturing innocent people for fun; there is nothing about the *nature of the action* that would make it wrong. Instead, it is God's command that *imposes* wrongness on the action. Divine command theory takes the grounds of wrongness to be something *external* to the nature of the action (i.e., God's command), as opposed to grounding morality in something *internal* to the nature of the action that then makes the action wrong (e.g., the fact that it causes a person pain against her will, all for the amusement of another person, etc.).

Descartes holds a similar kind of divine command theory concerning the eternal truths. Like with divine command theory, there is nothing about $2 + 3 = 5$ and the proposition "if p , then p " that, absent an act of God, would make them true. The view implies, in other words, that there is something *external* to the nature of math and logic that makes them true. While it is usually thought that the truth-maker of these propositions is *internal* to the nature of logic and mathematics, Descartes takes the truth-maker of the eternal truths to be God's will and so *external* to the nature of logic and mathematics.

Descartes's view that morality as well as logic and mathematics depends on God's will is a radical departure from the standard views of morality and necessity. Divine command theory is widely rejected because it makes morality contingent. It is usually assumed, instead, that the ground of morality is internal to the nature of actions themselves; we can therefore pick out right and wrong actions by attending to those features of the action that make it right or wrong. But if the ground of morality is internal to the actions themselves, then it follows that morality is metaphysically necessary. The same holds for the eternal truths. The statement "if p , then p " is a tautology and so, it is thought, it is true just by the internal features of the statement. On the standard view, then, the ground of morality and mathematics is internal to those subjects, whereas Descartes asserts that they depend on God's will.

The divine command theory analogy helps to illustrate the relationship between the nature of objects and the laws of nature. Suppose that there are two possible worlds with the same objects. If the ground of the laws of nature is intrinsic to the properties of those objects, then any possible world with those same objects would have the same laws of nature. Hence, the laws of nature would be metaphysically necessary.⁷ So, if there are two possible worlds with objects that have the same intrinsic properties and yet have different laws of nature, then the ground of the laws of nature must be external to the properties of those objects. Put differently, the properties of objects underdetermine what the laws of nature are. Something *external* to those objects, then, must ground the laws of nature. Just as divine command theory makes God's will an external ground of morality, Descartes thinks God's will is an external ground of the laws of nature. Further, like with divine command theory, this implies that the laws of nature are metaphysically contingent. So, if God, as a contingent act of his will, makes the laws necessary, then the laws would be contingently-necessary.

⁶ Descartes seems to accept this kind of view. He says, "it is impossible to imagine anything's being thought of in the divine intellect as good, or worthy of action or omission, prior to the decision of the divine will to make it so" (*Meditations* AT 7/CSM 2: 432/291).

⁷ I take this to be the standard Aristotelian-scholastic view as well as the view of Locke: the (real) essences of object determine what objects will do in various circumstances, or what the laws of nature are (see Rockwood 2018). The kind of view has been defended more recently by Ellis (2001) and, from a theistic perspective, by Adams (2018).

I do not need to insist that divine command theory is correct or that Descartes is right about the eternal truths in order to defend the Cartesian view of laws. Along with most other philosophers, I think there is an asymmetry between, on the one hand, the necessity of morality and the eternal truths and, on the other hand, the laws of nature. The main objection to divine command theory is that it makes morality contingent. Likewise, the main objection to Descartes's account of the eternal truths is that it makes what seem like necessary truths merely metaphysically contingent (Frankfurt 1977, p. 42; Plantinga 1980, pp. 127-140). By contrast, the view that the laws of nature are contingent is fairly common. Hume and others take the laws of nature to be entirely contingent, whereas Armstrong and others take the laws of nature to be contingently-necessary. Yet these philosophers take the eternal truths to be metaphysically necessary, implying that there is an asymmetry between the necessity of the eternal truths and the laws of nature.

We can see an asymmetry between the necessity of the eternal truths and the laws of nature by asking what would be the case if God did not exist. Descartes's view implies that if God did not exist then $2 + 3 = 5$ would not be true, which seems implausible. It seems to me that even if God did not exist, $2 + 3$ would still be equal to 5 and that "if p , then p " would still be true. If this is right, then that implies that, contrary to Descartes, the eternal truths do not depend on God's will. They are instead metaphysically necessary. But the same line of criticism is not nearly as compelling when the theory of modality is applied to the laws of nature. If God did not exist, would there be laws of nature? Would the orderliness we observe in nature be present? Descartes can reasonably answer "no" here. Arguably, if matter existed but God did not, the world would be chaotic rather than orderly. This is the kind of intuition driving intelligent design arguments: the order found in nature would not be present if it were not for the intelligent and intentional intervention of God. While that intuition is not universally held nor certainly correct, I do think that it is a plausible intuition that should be taken seriously. Descartes can reasonably hold, then, that the world would not have laws of nature without God. In this respect, the modal status of the laws of nature differs, in my view, from the necessity of the eternal truths. It seems to me that if God did not exist $2 + 3 = 5$ would nonetheless be necessarily true. I am much less confident that if God did not exist then objects would still gravitate. So, Descartes's thesis that the necessity of the laws of nature depends on God's will strikes me as much more plausible than his assertion that the eternal truths depend on God's will.

My point here is that applying Descartes's view of modality to the laws of nature does not require accepting his theory of modality of the eternal truths. If the eternal truths are metaphysically necessary, the laws of nature might nonetheless be contingently-necessary. If so, Descartes's account presents an interesting explanation for the ground of the contingent-necessity of those laws. Yet I do not need to insist that Descartes is wrong either. If (contrary to my intuitions about modality) Descartes is right about the necessity of the eternal truths, then the application of that view of modality to the laws of nature would be made all the easier: the account of the necessity of the eternal truths can simply be applied to the laws of nature.

Thus far in this section, I have argued that God's will can explain the contingency of the contingent-necessity of the laws of nature. The analogy to divine command theory shows, first, the contingency of the contingent-necessity must be grounded by something *external* to the nature of physical objects and, second, God's will could ground the contingency of the laws of nature. But whereas (in my view) the contingency of divine command theory of ethics is implausible, the contingency of Descartes's account of laws is plausible. Next, I will argue that God's will can ground the necessity of the laws of nature.

The goal here is to capture both the contingency and the necessity of the laws of nature. In order for this explanation of natural necessity to work, God must will that the laws of nature be *necessary*. Consider two similar but non-equivalent alternatives:

1. All *F* are *G*.
2. Necessarily, *F* are *G*.

The *necessity* claim entails the *generalization*, but not vice versa (Armstrong 1983, p. 71). So, if God were to will “all *F* are *G*” then it would follow that *F* are *G*, but it would *not* follow that *F* are *necessarily G*. God can make the laws contingently-necessary only if he wills that the laws be *necessary*. (In my view, this is the difference between Malebranche’s view and Descartes’s view on laws: Malebranche holds that God makes a law of nature by a general volition, or willing a generalization, whereas Descartes holds that God makes a law of nature by willing a necessity.)

The above point is missed by John Foster, a recent defender of a theistic account of laws. Foster argues that God’s willing a *generalization* makes that generalization *necessary*:

The basic idea is this. Where it is a law of nature that a certain regularity holds...I want to say that what creates this law is the fact that [God] causes (causally necessitates) things to be regular in that way. This would explain why a law qualifies...as a form of natural necessity. For *if the relevant regularity is causally necessitated*, then, in that sense, it *has* to obtain: things *have* to be regular (because they are *made* to be regular) in that way. (Foster 2001, p. 157, my emphasis)

Foster seems to be thinking that if God wills a generalization then, because God is omnipotent, it will necessarily follow that the generalization exists. This is right. But then Foster infers that the generalization itself would be necessary, and that does not follow. By way of analogy, the conclusion necessarily follows from a deductively valid argument, but that does not make the conclusion a necessary truth. Similarly, God’s willing *p* necessarily entails *p*, but that does not make *p* a necessary truth. So, God can will a generalization without making that generalization necessary. Again, then, in order for God to make the laws contingently necessary God must actually will that the laws be *necessary*.

Further, God’s will is capable of making the laws of nature (contingently) necessary. The point of section 1 is to show that we can make sense of Descartes’s assertion that God can make something necessary. There, I argued that God’s will makes *p* true in the subset of all *accessible* possible worlds, making *p* necessary for us. This is a consistent view. Moreover, it is plausible, at least when applied to the laws of nature. As an omnipotent being, if God wills that *p* then it (metaphysically) necessarily follows that *p* is true. Suppose then, as Descartes suggests, that God wills *p* and *p* = “the laws of nature are necessary”. It would follow that the laws are necessary. I do not, of course, know *how* God’s will could cause the laws to be necessary. But I do not know how God could cause miracles either and that is no objection to the view that God can cause miracles. Despite my ignorance about the mechanics of the divine omnipotence, it remains plausible *that* if God wills the laws to be necessary in a subset of accessible possible worlds then this would be so. God’s willing that the laws of nature be necessary can therefore explain the necessity of natural necessity. So, on the Cartesian view, it is relatively easy to see why the laws are contingently-necessary.

On alternative, non-theistic theories of laws it is much less obvious why the laws of nature would be contingently necessary. The best known non-theistic account of natural necessity is probably that of David Armstrong (1983), and so his view will make a useful comparison. Armstrong takes a law of nature to be a “natural necessity” relation between properties,

understood as universals, and this relation is said to be contingently-necessary. Speaking of the grounds of natural necessity, he says the following:

We are now saying that, for it to be a law that an *F* is a *G*, it must be *necessary* that an *F* is a *G*, in some sense of ‘necessary’. But what is the basis in reality, the truth-maker, the ontological ground, of such necessity? I suggest that it can only be found in *what it is to be an F* and *what it is to be a G*. (Armstrong 1983, p. 77)

Here Armstrong asserts that it is the nature of properties *F* and *G* that provide the ontological basis for the necessity relation that holds between them. Thus, he makes the ground of the necessity intrinsic to the nature of the properties. This is a problem. As I argued above, if the ground of the laws were internal to the nature of objects and their properties then the laws of nature would be metaphysically necessary. For this reason, Armstrong’s critics object that he fails to explain how the laws are contingently-necessary (e.g., Ellis 2001, p. 216; Foster 2001, pp. 155-156).

The point here is not just that Armstrong’s account fails to explain the contingent-necessity of laws (though I think that is true), but rather to clarify what is needed in an explanation of contingent-necessity. Armstrong’s account fails because the ground of natural necessity he appeals to are *internal* to the nature of the properties of objects, whereas a successful explanation must appeal to something *external* to the nature of objects and their properties. While it is outside the scope of this paper to embark on a review of the recent literature on laws, suffice it to say that there is no current consensus about what even *could* explain the contingent-necessity of the laws of nature. The point, again, is not that these recent theories are wrong about *what* grounds the necessity of the laws of nature (though I think they probably are), but rather that it is not clear whether the proposed grounds *can succeed* in explaining the contingent-necessity of laws.

The Cartesian account of natural necessity will be no less controversial, but one virtue of the position is that, if God did exist, God *can* explain the contingent-necessity of the laws. I have defended the thesis that God can, by a contingent act of his will, make something necessary. The result of such a willing would be a contingent-necessity. The view, I think, clearly has the explanatory power to adequately explain the contingent-necessity of laws. The controversial step, of course, is the assumption that God exists and so is in a position to play the explanatory role that Descartes assigns him.

Some have found the theological explanation of the necessity of laws so compelling that they use it as a step in an argument for God (Foster 2004; Swinburne 2010). More modestly, I suggest that for someone already inclined to believe God exists the Cartesian account of natural necessity is quite attractive. Indeed, without God, I have a hard time imagining what could explain the contingent-necessity of the laws. Perhaps, then, modern theorists should not be so eager to excise God’s role in a governing conception of the laws of nature. Indeed, for me, it is a data point on which a theory of laws ought to be assessed.⁸

⁸ Thanks to Eric Watkins, Kelly Trodgon, Samuel Rickless, Jay Burkette, Derek Harderlie, and anonymous reviewers for extensive and helpful comments on earlier drafts of this paper. I also thank the following individuals for their feedback on my earlier presentations on the same topic: Brandon Bowen, Cruz Davis, Robert Larmer, Ted Parent, Elliot Rossiter, Ignacio Silva, Lex Newman, Lydia Patton, and Eric Stencil.

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