



ORIGINAL ARTICLE

## God, the laws of nature, and occasionalism

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### Abstract

Occasionalism is often seen as a peculiarity of early modern philosophy. The idea that God is the sole source of efficient causation in the world strikes many as at best implausible. It was, however, a natural inference based on the seventeenth-century view that the laws of nature are simply God's decrees. The question here is whether such a view and its more recent descendants entail occasionalism. I argue that they do not, but showing why involves a new take on what exactly the laws of nature do.

**Keywords:** laws of nature; occasionalism; decretalism; nomological realism

Philosophy majors are often amused by their first encounter with occasionalism. Of course it is possible that, instead of my hand lifting a coffee mug, God is moving both my hand and the mug. But why would anyone think so? As we will see, it was not such an odd idea given other seventeenth-century innovations. Today matters are different. Most theists would prefer to distance themselves from this quirk of early modern philosophy.

Most, but not all. Many Muslim scholars embrace occasionalism. Some analytic philosophers, like Alvin Plantinga, do so as well. For both Plantinga and the early moderns, occasionalism is closely tied to an understanding of the laws of nature in which the laws are simply divine decrees. The question here is whether such a view entails occasionalism. I argue that it does not. Making this case, however, requires a relatively recent take on what the laws of nature do – one that, so far as I know, has not yet made its way out of the philosophy of science literature.

To begin, let's first say more about the doctrine in question. A 'full-blown occasionalist', says Sukjae Lee, subscribes to two theses: '(1) the positive thesis that God is the only genuine cause; (2) the negative thesis that no creaturely cause is a genuine cause but at most an occasional cause' (Lee 2020). On the negative side, it seems as if a vast number of causal interactions occur in nature every second. My fingers press the keys on my keyboard, a car's wheels propel it down the road, etc. The occasionalist instead believes that there are no natural causes. No substance has the power to bring about change.<sup>1</sup> The positive thesis says that God fills this causal gap. Strictly speaking, the torque produced by the wheels of the car does not propel it forward, God does. The same goes for lifting the coffee mug and all other causal interactions in nature.

To understand the rise of occasionalist thought, we need to consider how the early moderns thought about the laws of nature. We will then discuss where that view fits within contemporary work on laws. Finally, we will see whether that account or something like it inevitably leads to occasionalism. In the end, I will argue that those who believe that it does rely on a hidden premise, one that several philosophers of physics now reject.

## History

While the focus here will be on early modern natural philosophy, occasionalism arose far earlier in Muslim thought. The Ash'arite school went beyond 'full-blown occasionalism' in its rejection of Aristotelianism. God, they taught, does not merely step in to provide a causal link between events. Substances do not persist through time with God injecting efficient causes to bring about change. Instead, physical reality is continually recreated from moment to moment (Al-Ġazzālī 2017, 42).<sup>2</sup> God is the sole source of causation in that God remakes the whole of nature each successive instant (Salim and Malik 2022, 250). Any perceived continuity through time is because God wills events to appear that way.

Seventeenth-century philosophers in the West began at the same starting point: by rejecting Aristotelian-Thomism. Each substance, according to Aquinas, is a union of essence and prime matter, the former providing a thing's capacities to act. Rocks fall on this view because that is part of what it is to be a rock. Its end or 'final cause' is to reach the centre of the Earth, and it will keep going until something gets in the way. Natural philosophers such as René Descartes, Pierre Gassendi, Isaac Newton, and Robert Boyle explicitly rejected these pieces of Aristotelian metaphysics and their neo-Platonic counterparts such as a world-soul (Henry 2009, 93). As Newton put it,

Such occult Qualities put a stop to the Improvement of natural Philosophy, and therefore of late Years have been rejected. To tell us that every Species of Things is endow'd with an occult specifick Quality by which it acts and produces manifest Effects, is to tell us nothing. . . (Newton 1952, 401)

This was not a gradual evolution away from Aristotelianism, like the emergence of French from Latin. The rejection of medieval metaphysics was intentional and revolutionary, with clear consequences for the rise of modern science.

Consider for example the Aristotelian distinction between natural and violent motion. Natural motion is what a substance does given its essence, such as a rock falling. I can push the same rock horizontally along a table, but that is contrary to its nature – violent motion. How do we know? Because the rock will continue to fall until impeded, but it will stop moving across the table as soon I take my hand away. Aristotelian-Thomists believed that only natural motion could provide knowledge about the essence of a substance. From this perspective, experiments involved putting objects in artificial situations, which could only produce violent motion. The medievals therefore had metaphysical reasons for not doing experiments. 'Experiment . . . opens up no new access to the facts, and may succeed only in suppressing them' (Waterlow 1982, 34). With the rejection of Aristotelian essences, the distinction between natural and violent motion no longer made sense, clearing the way for experimental science.

Much of the work previously thought to be done by essences was taken up by a novel concept: the laws of nature. Unlike today where the laws are thought of in purely naturalistic terms, the early moderns took them to be intrinsically related to theism. Consider mathematician Roger Cotes in his Preface to Newton's *Principia*:

Surely, this World – so beautifully diversified in all its forms and motions – could not have arisen except from the perfectly free will of God, who provides and governs all things. From this source, then, have all the laws that are called laws of nature come, in which many traces of the highest wisdom and counsel certainly appear, but no traces of necessity. Accordingly we should not seek these laws by using untrustworthy conjectures, but learn them by observing and experimenting. (Cotes 1962, xxxii)

Cotes describes God as freely deciding what the laws are to be. Nothing compelled God to choose one set of laws over another. That means no theological principles can allow us to infer what choices God made. Observations and experiments are the only way to know (Henry 2009).

What then are the laws of nature? What is their ontology? One of Newton's most prominent followers, Samuel Clarke, answers that question:

With regard to God . . . [there are] no powers of nature at all, that can do any thing of themselves, (as weights and springs work of themselves with regard to men); but the wisdom and foresight of God, consist . . . in contriving at once, what his power and government is continually putting in actual execution. (Leibniz and Clarke 1956, 23)

[What] men commonly call the course of nature . . . is nothing else but the will of God producing certain effects in a continued, constant, and uniform manner. (Clarke 1998, 149)

God did not create a power or entity that we call a law of nature. God instead wills 'the course of nature', and nature responds appropriately. Strictly speaking, the laws do not govern nature. God alone does that. This was a critical aspect of the rejection of Aristotelian and Platonic entities, as John Milton describes Descartes' thinking:

God governs the world, not by means of intermediaries of any kind, but directly, by regulating the motion of every single body, however tiny and unimportant. . . . Because God acts directly on matter everywhere, all the intermediaries proposed by the various schools of Greek philosophy and absorbed into the world-picture of the Middle Ages and Renaissance are to be discarded without exception. (Milton 1981, 193)

Cotton Mather, who was not only a Puritan clergyman but an experimentalist and Fellow of the Royal Society, would put it this way several decades later:

[There] is no such thing as an universal Soul, animating the vast system of the World, [as] according to Plato; nor any substantial Forms [as] according to Aristotle. . . . These unintelligent Beings are derogatory from the Wisdom and Power of the great God, who can easily govern the Machine He could create, by more direct Methods than employing such subservient divinities . . . (Mather 1721, 87–88)

God needs no help from created entities to govern.

We are now then a short step from occasionalism. If the laws rather than essences are responsible for change, and yet the laws are no more than patterns within God's will, then God is the sole efficient cause in the physical world. This seems to be Malebranche's inference:

All natural forces are therefore nothing but the will of God, which is always efficacious. God created the world because He willed it: 'Dixit, & facta sunt' (Ps. 32:9) and He moves all

things, and thus produces all the effects that we see happening . . . There are therefore no forces, powers, or true causes in the material world . . . (Malebranche 1997, 448–449)

Gravitational attraction often invited an occasionalist interpretation. Newton had famously offered no mechanism for how gravity worked in the General Scholium of the *Principia*. ‘*Hypotheses non fingo*,’ he wrote: ‘I feign no hypotheses.’ Without a mechanism and in light of a decretal view of laws, several natural philosophers attributed gravity to God’s immediate action. Consider Richard Bentley, a Fellow of the Royal Society: ‘all the powers of mechanism are entirely dependent on the Deity . . . Gravity, the great basis of all mechanism, is not itself mechanical, but the immediate *fiat* and finger of God, and the execution of divine law’ (Harrison 2013, 141). William Whiston likewise believed that gravity is God’s ‘general, immechanical, immediate power.’ (Whiston 1717, 111). Samuel Clarke agreed, and Newton at least sounded as if he did from time to time (Henry 2020).

In sum, the rise of occasionalism starts with the rejection of all intermediaries with roots in Greek philosophy between God and nature. Aristotelian essences were replaced by laws of nature, where the laws are those patterns and regularities that God has ordained. They have no ontology of their own. But given that *something* must be responsible for change, occasionalists believed God fills the causal gap as needed.<sup>3</sup>

The nature of the laws of nature continues to draw the interest of philosophers. Let’s next consider where the view of laws discussed in this section fits in the philosophical literature today. While some critical remarks will be offered along the way, the goal here is not a comprehensive critique but rather to find where in the current landscape the understanding of laws that led to occasionalism can be found.

## The Contemporary Landscape on Laws

There are three main approaches to the metaphysics of the laws of nature: dispositionalism, Humeanism, and nomological realism.

### Dispositionalism

Dispositionalists agree with occasionalists that something must account for both change and the uniformity of nature, but they do not believe that something is God or the laws of nature. They instead appeal to ‘causal powers’ or ‘capacities’ or the ‘dispositions’ of entities. Electrons, on their view, have several dispositions. They have the disposition to repel each other and another to attract protons. They also have the disposition to weakly attract all other bits of matter by way of gravitation. While we can write equations describing each of these interactions, they are not the effects of forces. Instead, the equations describe the regular behaviour brought about by various dispositions.

Aristotelian-Thomism is one type of dispositionalism. While there are neo-Aristotelians today who try to square it with modern science (Koons 2018; 2021), dispositionalism cannot be what the early moderns had in mind. They rejected such ‘occult qualities’, in Newton’s words, in favour of laws. The second family of views gives the notion of law a central role.

### Humeanism

Humean approaches are named after the philosopher David Hume. While Hume himself was more concerned with causation, his analysis gave rise to what is now called the *regularity theory* of laws. Consider two events: connecting a piece of metal to a source of electric current and the flow of electricity through that metal. Repeatedly seeing one event follow the other, we come to realize that metals conduct electricity. If there are no

exceptions, we can infer that ‘all metals are conductors’ is a law of nature. A regular sequence whereby one event always follows another constitutes a law. Nothing on this account ensures such regularities will continue now and forevermore, like an underlying disposition. The law simply states what has been observed. In terms of ontology, one need not believe in anything other than the events themselves.

The challenge for regularity theory has been stating which series of events count as laws and which do not. ‘All metals are conductors’ is a good candidate. ‘All American presidents are male’ is not. Students often believe that saying why one counts as lawlike but the other not should be relatively easy. However, in the face of many failed attempts, most philosophers have given up (Dretske 1977; Hildebrand 2023, sec. 2.3).

Humeans have more recently turned to a ‘best systems’ approach. Say that reality is made up of individual events, like a leaf turning colours or a stone bouncing off a hard surface. All these events together constitute the so-called ‘Humean mosaic’.<sup>4</sup> Now consider different deductive systems for deriving truths about the mosaic from a set of axioms. Presumably, some of these proposed systems will allow for the derivation of more truths than others. Some will be easier to use. Choose the axioms that best balance empirical adequacy – deriving as many facts as possible – and simplicity. On a best systems account, the axioms in that deductive system are the laws of nature.<sup>5</sup> The laws are propositions that organize and systematize the facts in the mosaic.

Unlike dispositionalism, the laws of nature play a central role for the Humean. Could this be a way of understanding what the early moderns had in mind? No, and not just because God is not part of the picture. They agreed with the Aristotelians that something is responsible for keeping nature on track. Not only do rocks not levitate as a matter of experience, they cannot do so. Aquinas believed such behaviour would be impossible given the essence of a rock. Likewise, there is no sense in which there might be a cat that is not a mammal. For the early moderns, this sort of work was instead done by laws. The spontaneous levitation of a rock would violate the law of gravity. Such an event is therefore physically impossible. Humean laws, in contrast, carry no such guarantees. They merely describe what happens: patterns of events in the mosaic. They do not describe what can and cannot happen.

There is also a mismatch between what the early moderns and Humeans mean by ‘law of nature’. For the latter, laws are nothing more than law-statements – propositions, like the axioms in the best system. The laws in this sense are not part of the fabric of reality, ‘out there’ to be discovered. Law-statements merely organize our knowledge of the events in the Humean mosaic. Apart from intelligent beings like us who want to organize and understand those events, there would be no laws of nature in the Humean sense. Seventeenth-century natural philosophers were trying to discover the governing principles of nature, not propositions that systematize scientific knowledge. They might have considered Humean law-statements to be descriptions of laws, but they could not be laws of nature themselves.

### *Nomological realism*

Nomological realists deny that the laws of nature can be replaced by dispositions or reduced to law-statements. The best-known example is associated with David Armstrong (1991), Fred Dretske (1977), and Michael Tooley (1977). They take laws to be grounded in relations between universals. Consider a law-statement like ‘all protons are positively charged’. Armstrong et al. believe *being a proton* and *being positively charged* are universals – properties that can be in more than one place at a time. If this law-statement is true, then those universals are related in such a way that the former brings about or ‘necessitates’ the latter. In general if ‘all Fs are Gs’ is true, then the instantiation

of *F-ness* will ensure that *G-ness* will also be the case. A law is a particular relation between universals.

This account works well in my view so long as one is willing to accept its ontology. Empirically minded philosophers will not, as they are squeamish about universals and are especially bothered by the necessitation relation. While the idea of universals goes back as far as Plato, necessitation is unique to this type of nomological realism. Like Molière's dormitive virtue, it looks suspiciously like a name for something we do not understand (Van Fraassen 1989, 104–107). In any case, it is again not something the early moderns would have considered. If these connected universals – created by God or not – govern nature, they would be yet another intermediary to be rejected. They believed that God needed no such powers or entities to govern.

Philosopher Tim Maudlin instead argues for *primitivism* about the laws of nature. He rightly notes that the concept of laws has been extraordinarily useful for centuries. Given the many failed attempts to reduce the laws to regularities, relations between universals, etc., we should abandon any hope of doing so. A law of nature cannot be reduced to something more fundamental. His alternative is to accept the idea as a basic, unanalyzed concept within our conceptual scheme. We are familiar with many laws of nature. Scientists and engineers know how to use them. Philosophers should simply accept that physical reality contains laws and get on with it. Every metaphysical scheme involves primitives. The laws are a good candidate.

Now more than 300 years since the publication of Newton's *Principia*, the laws have no doubt proved their worth. There is no getting around the idea when doing physics. That Maudlin can make a plausible case for primitivism is itself a point in favour of nomological realism. If the laws were not central to the success of science, then his proposal would be easily dismissed.

Primitivism was not, however, an option for the early moderns. Having just introduced the idea in natural philosophy, they could not appeal to its track record to defend the laws as basic.<sup>6</sup> Moreover, they believed the notion of law *could* be further analysed in terms of God's commands. Plantinga calls this type of nomological realism *decretalism*. Hildebrand and Metcalf (2021) prefer the term *divine voluntarism*, which fits well with the early modern belief that God could have chosen many different sets of laws. God was not constrained by the Principle of Sufficient Reason, as Leibniz would have it. The key decretalist idea is that when an omnipotent being declares how events will proceed, they do so. More precisely, 'God is the being such that, *necessarily*, for all statements *p*, 'God wills that *p*' entails *p*', what Hildebrand calls the Omnipotence Axiom (Hildebrand 2023, 31). Unlike other non-Humean views on the laws of nature, they deny that there are any metaphysical entities or powers ensuring that, for example, electrons repel each other in a particular way. God has instead ordained that electrons would behave in the way they do and events unfold accordingly.

Given naturalism's popularity among philosophers and scientists, decretalism is a small minority view today. There are two points in its favour. First, it is in the right camp in my view – nomological realism. The laws cannot be reduced to Humean law-statements, and dispositionalism has its own bevy of problems. Let's consider one.<sup>7</sup> Dispositions can account for regularities involving a system's evolution over time. When salt is placed in water, it dissolves. When like charges are brought close to one another, they repel. Both of these examples can be described as dispositions. In general, thinking of dynamical laws in terms of dispositions is plausible. There are, however, types of laws that dispositionalism cannot easily account for. Conservation laws, for example, do not specify how a system evolves over time, but rather restrict the set of possible changes. Principles of least action similarly select a preferred evolution of a system from among many possible ones. Neither involves a change resulting from some stimulus, like exposing the salt to



water. Dispositionalism has no natural way of accounting for such laws. These laws do not describe the disposition for some substance to act given its circumstances. Dispositionalist Alexander Bird agrees but then argues that neither least action principles nor conservation laws are genuine laws and so do not need to be analysed in terms of dispositions (Bird 2007, 214–215). To a nomological realist, this looks a bit ad hoc – ruling out examples of law that one’s preferred view cannot account for. Instead, we should accept that physics has discovered laws that do not in themselves dictate a change of state. In short, dispositionalism has difficulty accounting for laws that nomological realists readily accept.

Second, decretalism is a parsimonious move for a theist to make in accounting for laws. Decretalism requires no additional ontology – no universals, necessitation, dispositions, or essences. From a theistic perspective, the principle of parsimony favours decretalism.<sup>8</sup> But unlike primitivism, it provides an account of why there are laws.

One might ask, as one anonymous referee did, whether any of this is relevant to scientific practice. The answer is that the concept of laws is very much a part of scientific practice, at least in physics. The discovery, testing, and application of laws concern both the theoretician and the experimentalist, but some accounts discussed here fit more naturally with this work than others. Humeans have a well-known difficulty in justifying the use of induction, for example (Henderson 2022). Most inductive inferences presuppose that lawlike regularities in the past will continue to hold in the future. The problem is that the Humean mosaic eschews all necessary connections between events. The Humean has no reason to trust that textbook law-statements linking past events will correctly describe those yet to be observed. Non-humeans, in contrast, believe there are such guarantees. There is something that keeps nature uniform, although they disagree about what that something is. Non-Humean laws keep nature on track, as it were, ensuring that future regularities will continue to resemble those in the past. Given this stability, we have reason to believe that induction will continue to work. For this and other reasons, I believe that nomological realism fits best with scientific practice, although that claim is disputed.

The main goal of this section was to put the early modern view of laws on the contemporary map. The brief defence of decretalism provided along the way shows that it is a viable option.<sup>9</sup>

### Decretalism and occasionalism

What then is the relation between decretalism and occasionalism? There was the historical tendency for the former to evolve into the latter, with Malebranche being the clearest example.<sup>10</sup> Some scholars today endorse occasionalism for independent reasons.<sup>11</sup> For example, Hugh McCann and Jonathan Kvanvig argue that, given the lack of a coherent account of event causation, we should conclude that Hume was correct: There is no such thing as a natural causal nexus. Furthermore, the doctrines of divine sustenance and providence lead directly to occasionalism:

Properly taken, they imply that God is responsible for the complete nature of things, for their essence as well as their existence, for their accidental characteristics along with their essential ones . . . [The] existence of things is to be explained by the creative activity of God, which is direct and immediate, and owes nothing to the assistance of a causal nexus. (McCann and Kvanvig 1991, 612)

Note that the argument here is based on the nature of causation rather than a decretal view of law.

Plantinga, in contrast, sounds much more like the early moderns:<sup>12</sup>

Perhaps the relation between God and the laws is that God just decrees that objects – material objects, say – shall behave in accordance with the laws. Material objects do not, in fact, exert force on each other and they do not, in fact, display causal efficacy; rather, God issues a decree. He says: let it be that material objects behave as if there is an attractive force between any pair of them, a force that varies directly with the product of their masses and inversely according to the square of the distance between them. On this alternative, there is not really any force between them – i.e., they do not exert forces on each other – but they behave as if there were. These objects do not really have any causal powers; they do not in fact exert any forces on each other. They simply behave in accord with the divine decree. (Plantinga 2016, 135–136)

Plantinga rejects the reification of forces, like gravity and electromagnetism. There are no such things in nature. A dispositionalist would agree but would go on to say that it is the disposition/capacity/causal powers of charged substances to attract or repel each other. Plantinga instead believes that God directly intervenes in the relevant circumstances to produce the change that leads to lawlike behaviour.

Occasionalism has been more readily accepted among Muslim scholars. Some, like Shoaib Malik, hold the continuous recreation version mentioned earlier (Salim and Malik 2022, sec. 12.5). Edward Moad (2018) starts with Freddoso's trichotomy of divine action (Freddoso 1994, 133–134):

- (1) *Mere conservation*. God upholds the universe in existence but does not otherwise act in nature. God does not violate the laws of nature or intervene in its processes.
- (2) *Concurrentism*. Each physical effect is produced jointly by God and a given substance. The Thomist view of primary and secondary causation is one example.
- (3) *Occasionalism*. God is the only efficient cause in nature.

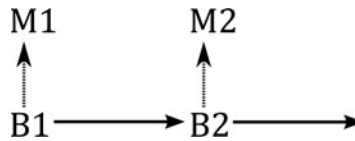
Moad argues that (1) collapses into deism and that no coherent account has ever been given of (2). This leaves (3) as the best option.

As a decretalist about law, my own view is closest to Plantinga's. So why not accept occasionalism? One reason is that it conflicts with scientific realism. Let's start with an analogous situation in the philosophy of mind. Both non-reductive physicalists and mind–body dualists generally believe that some mental states bring about others. My desire to drink is (at least in part) causally responsible for my intention to lift a glass. Epiphenomenalism, in contrast, is a type of anti-realism about mental causation. In Figure 1, B1 is a brain state that causes both a subsequent brain state B2 and mental state M1. Let M1 be my desire for a drink and M2 be my intention to drink from the glass. According to epiphenomenalism, while B1 causes B2, M1 has no causal connection to any other mental state. M2 occurs, but only because it is an effect of B2. Mental states are only effects, never causes. Hence all causal claims involving mental states are false.

There is a similar situation for occasionalism and causal claims in science. According to classical field theory, the signal received by a radio is caused by electric charges moving along the antenna of a transmitter. According to occasionalism, the fine-grained sequence of causes from the changes in voltage in the antenna to the output of the radio's speaker is strictly speaking false. Voltage gradients cannot cause electric charges to move because no natural entity or event can cause anything. The same applies to every causal claim in the natural sciences. Occasionalism is thereby in tension with scientific realism.<sup>13</sup>

This shows why a decretalist who is also a scientific realist would like to avoid occasionalism. Realists take most well-established claims in science as (at least approximately)





**Figure 1.** Epiphenomenalism.

true. Occasionalists cannot. The remaining question is whether there is any way to accept decretalism without landing in occasionalism.

### Decretalism without occasionalism

The short answer is ‘yes, there is’, but only under a modified version of decretalism. Let’s start with a point that Eddy Chen and Sheldon Goldstein make about dispositionalism and most forms of nomological realism. Both, they say, presuppose a ‘dynamic production’ view of law (Chen and Goldstein 2022, 23) or what is informally called *oomph*. Heather Demarest describes it this way:

According to the governing approach, the laws of nature have nomological and productive force. The laws metaphysically determine what happens in the worlds that they govern. It is common to see governing laws given a metaphorical gloss. They are said to have ‘oomph’ or that they ‘push’ and ‘pull’ stuff around the universe. (Demarest 2015, 335)

On this view, laws are active powers. The laws move systems from one state to the next. Most nomological realists would say that laws ‘govern’ physical reality in this way. Dispositionalists agree but instead ground dynamic production in dispositions rather than laws themselves.

A small number of nomological realists have begun to deny governance.<sup>14</sup> Laws do not govern in the pushing and pulling sense described by Demarest. Laws constrain. Consider conservation laws again. Such laws do not specify how a system will evolve over time. They do not describe changes of state given a set of initial and boundary conditions. They instead place constraints or limits on how the evolution of a system can evolve. Conservation of energy allows for any change in an isolated system so long as its total energy remains constant. This and other conservation laws limit how systems can change over time.

Under *oomph*-free nomological realism, all laws work like conservation laws. They place constraints rather than provide impetus toward change. Let’s take an example, but drop the distinction between laws and law-statements for ease of exposition. Coulomb’s law precisely describes how electrostatic force attracts opposite charges and repels like ones. But the law could have been different. Electromagnetism could have been a stronger force, so Coulomb’s constant  $k_e$  would have been larger. The law could also have had a non-linear relation to distance.<sup>15</sup> Coulomb’s law, on this view, is a constraint on electrostatic force so that it acts just the way it does. It cannot be a little more or less. It cannot change over time or vary in different locations. Notice that it is electromagnetic force that attracts or repels electric charges, not the laws of electromagnetism. The laws constrain whatever it is that they apply to. The laws themselves do not create change. They do not provide *oomph*.

What does, then, account for change in nature? Physics explains changes of state in terms of forces, momentum, and energy potentials. There is no need for an additional layer of metaphysics to say why change happens. Dynamic production in the laws themselves is redundant.

Decretalism is best understood in this *oomph*-free sense. The laws are God's decrees, and what God has decreed are constraints. Unlike the early moderns, I deny that laws involve dynamic production. There is no need for it. The laws instead ensure the uniformity of nature. They keep natural processes on track.

All forms of occasionalism presuppose a dynamic production view of the laws of nature, where God is the one who provides the *oomph*. God alone accounts for changes of state. But if decretalism is understood as *oomph*-free, as I believe it should, then the laws merely constrain. They do not provide dynamic production. God's decrees do not move systems from one state to the next. *Oomph*-free decretalism is therefore not a form of occasionalism.

### Larmer's objections

Robert Larmer (2023) argues that all forms of decretalism are logically committed to occasionalism regardless of explicit denials to the contrary. Let's consider two of his criticisms.

First, he argues that the appeal to constraints instead of dynamic production still involves causation:

To put the point more generally, constraint is a causal concept. Thus, for example, to constrain someone's behaviour is to exert causal influence on how they behave. Equally, to say that a law of nature constrains how a particle will behave is to say that it exerts causal influence on the particle. (Larmer 2023, 112)

*Oomph*-free nomological realists might characterize the role of laws as constraint rather than governance, but it's all still causal, says Larmer. That is a problem for any decretalist who denies occasionalism. If the laws exert causal influence and yet the laws are nothing more than God's decrees, then God exerts causal influence whenever there is a law at work. This causal influence entails occasionalism.

The problem is that when Larmer insists that constraints are causal, he is using 'constrain' in the ordinary sense of the word. One must tread carefully here. In everyday conversation, the idea that momentum can be negative makes little sense, but it makes perfectly good sense in terms of physics. The same issue can arise when philosophers of physics use ideas with roots in physics itself. One should not draw philosophical conclusions from the ordinary language meanings of technical terms.

Adlam explains several ways constraints come into play in physics and are used in the context of laws (Adlam 2022, sec. 2). One example is Lagrangian mechanics. While force was the central concept in Newtonian mechanics, the Lagrangian approach was built around a least action principle and energy. According to Hamilton's Principle, of all the possible ways that a dynamical system might evolve, its actual evolution is the one that minimizes a particular quantity (Marion and Thornton 1988, 192).<sup>16</sup> This yields an equation for calculating a system's behaviour without knowing what forces are involved. This is a key difference between Hamilton's Principle and force laws, like universal gravitation. The principle does not refer to something like an efficient cause that moves a system from one state to the next. The law instead gives the constraints under which a system evolves. Conservation laws work much the same way.

The upshot is that when physicists talk about dynamical evolutions being 'confining' or 'restricted' by least action principles and conservation laws, the causal connotations of those terms cannot be taken at face value. Nothing physically pushes the system to stay within the boundaries of those laws, like the gutters in a bowling alley.

The *oomph*-free decretalist takes all laws to be constraints analogous to conservation laws and principles of least action. Consider electrostatics again. The laws dictate how electrostatic force behaves, or more precisely which charge, distance, and force values can be co-instantiated.<sup>17</sup> All others are forbidden. God does not continually step in to channel the force one way rather than another. The one-time decree of an omnipotent being is sufficient to guarantee that all forces will continue to behave as they do – a far cry from occasionalist interventions.

Larmer's second charge is that one cannot ignore the metaphysics of change. Rejecting dynamic production leaves an explanatory gap:

[One] concern is Koperski's dismissal of any need of a metaphysical account of how change is possible . . . This insistence is, perhaps, not surprising, since Koperski is wary of taking on what he considers needless metaphysical commitments. Nevertheless, this insistence that one need not involve oneself in metaphysics in accounting for change appears ill-considered. (Larmer 2023, 113)

Change, argues Larmer, requires some sort of metaphysical account, which decretalism without occasionalism fails to provide.

The reader may note that a reply to this objection has already been given. *Oomph*-free nomological realists deny that the laws govern. They are not responsible for change in nature. What is? At the level of physics, textbook answers are wholly adequate in accounting for change in terms of force, momentum, etc. No additional metaphysics is needed. Rocks fall because of gravity, not because of Aristotelian formal and final causes. What explanatory work has physics failed to do that requires metaphysical attention?

I suspect a deep-seated intuition lurks here about dynamical production: providing for change is fundamentally what laws *do*. In many ways, we have been raised to see the world in Newtonian terms. We readily accept that there is an invisible something – the force of gravity – that pulls objects towards the Earth even though there are no mechanical ties between those objects and the planet. Philosophers also have at least a passing knowledge of Newton's laws. Newtonian forces move things along, much like how philosophers talk about *oomph*. Here, I suggest, is where a subtle shift takes place. Forces produce change. Force laws are paradigmatic laws. It is a small step to the idea that laws produce change. Instead of thinking of gravity pulling objects downward, one instead talks about the law of universal gravitation doing so, all with a dynamic production gloss. The temptation is to think that the law of gravity accounts for attraction rather than gravity itself. In this sense, the Newtonian picture exercises too much influence (Adlam 2022, 28). Had Lagrangian mechanics been discovered first, the intuition that laws must account for change would be less tempting.

I believe this intuition is why Larmer has difficulty with any form of nomological realism that rejects dynamic production. He believes that providing *oomph* is an essential part of what laws do.<sup>18</sup> Perhaps he is correct, but that would require an argument. Until then, *oomph*-free nomological realists can rightly deny it.

Once the link between law and dynamical production is severed, so is the entailment from decretalism to occasionalism. God decrees the laws, but the laws are not efficient causes. There is no causal gap between events that God needs to fill.

## Conclusion

Given the philosophical landscape of the seventeenth century, the move from a decretal view of laws to occasionalism was a natural one. The question here is whether the former

entails the latter. The answer is that decretalism does lead to occasionalism but only under a dynamical production view of the laws. In contrast, recent constraint-based accounts of nomological realism deny that laws govern physical events. There is no need for laws, dispositions, and the like to account for change. When decretalism is understood this way, the link between it and occasionalism dissolves.

As we have seen, most decretalists are content to endorse occasionalism. Nothing here says that particular tandem of beliefs is incoherent. For the rest of us, this article provides an alternative. Occasionalism thankfully turns out to be a deniable artefact of early modern thinking.

## Notes

1. David Hume also famously rejected causation as anything more than a psychological projection induced by our experience of the constant conjunction of events. While Hume's view was informed by occasionalism (Wright 1983, ch. 4), his empiricist motivations were quite different.
2. While this is the traditional take on al-Ghazālī, recent scholarship is mixed regarding his belief in occasionalism (Lee 2020, sec. 3.3).
3. While the discussion here focuses on the laws of nature, this was not the only motivation for occasionalism. See Lee (2020, sec. 3) for more.
4. David Lewis reduces the tiles of the mosaic down to individual points in spacetime, each with their own intrinsic properties (Lewis 1986, ix).
5. While the idea behind the best system approach is attributed to John Stuart Mill, Frank Ramsey, and David Lewis, there are now many variations.
6. While the notion of law as a description of natural phenomena had some precedents (Ruby 1986), it only becomes central in the seventeenth century.
7. For more, see Koperski (2020, sec. 5.2.1), Hildebrand and Metcalf (2021, sec. 3.2), and Chen and Goldstein (2022, sec. 4.3).
8. An anonymous referee questions the value of parsimony here. One reason for including it is that Humeans routinely appeal to parsimony as a point in their favour. If it is, then decretalists should be able to make the same appeal.
9. A more comprehensive analysis shows that decretalism is among the strongest views in the literature. See Koperski (2020) and Hildebrand and Metcalf (2021).
10. Philosopher Nancy Cartwright believes the relation is just as strong today:
 

[Decretalism] is a kind of Occasionalism: the source of the necessity of the relations between force and mass and acceleration is that, whenever God sees a force acting on a mass, He ensures that the acceleration is what it's supposed to be. That would be the Occasionalist sense of calling the relationship between  $F$ ,  $m$  and  $a$  'necessary'. (Cartwright 2015, 119)
11. Two will be mentioned here, but also see Vallicella (1999) and Schultz and D'Andrea-Winslow (2017).
12. Plantinga (2016) sketches two possible ways in which God might be related to the laws. The passage here is from the first. Both lead to occasionalism in his view.
13. The antenna example only speaks to the issue of whether an occasionalist can take these causal claims as true. The question of how causes are related to laws is beyond the scope of this article.
14. See Koperski (2020, 102–104), Bishop, Silberstein and Pexton (2022, 278–279), Chen and Goldstein (2022), and Adlam (2022). Robert Bishop first introduced the idea to me several years ago (private conversation). While Chen and Goldstein affirm governance, they mean something different by it. They say 'laws govern by constraining the world (the entire spacetime and its contents)' (Chen and Goldstein 2022, 39), not by moving the world or its systems from one state to the next. I instead reserve 'governance' for laws involving dynamic production.
15. This is a simplified example in that electrostatics has to fit in with electromagnetism as a whole. The idea that Coulomb's law might not have been an inverse-square relation has much larger ramifications than one might think.
16. It is minimizing the time integral of the Lagrangian  $L$ , which is defined in terms of kinetic and potential energy.
17. Cf. Collins (2009, 147–148) on functional laws.
18. Or some law-surrogate, like dispositions.

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