Revaluing Laws of Nature in Secularized Science

Eli I. Lichtenstein [†‡]

Abstract: Discovering laws of nature was a way to worship a law-giving God, during the Scientific Revolution. So why should we consider it worthwhile now, in our own more secularized science? For historical perspective, I examine two competing early modern theological traditions that related laws of nature to different divine attributes, and their secular legacy in views ranging from Kant and Nietzsche to Humean and 'governing' accounts in recent analytic metaphysics. Tracing these branching offshoots of ethically charged God-concepts sheds light on how our ethical ideals and ideas of natural order can still be valuably integrated. Early modern intellectualists valued the law-governed order of nature as a sign of divine Reason. In turn, Reason traditionally ascribed to God has now been partly reclaimed for humans, reframing the value of natural order anthropocentrically, in terms of the value of our own intelligence. Alternatively, Reason may be reclaimed for nature itself, as in an 'objective' idealism or metaphysical rationalism. However, beyond divine Reason, an influential voluntarist tradition in theology stressed a connection between laws of nature and God's Power or free Will. Tracking how divine Power has been reinvested in human beings provides a broader context for instrumentalism and related lineages of empiricism. But secularization can also transfer Power from God to the impersonal natural world. In this light, current scientific interest in lawlike order may also reflect the inherent value of brute necessity or inhuman causal power in nature: this is a deeper way to reject anthropocentrism and to show our respect for the environment.

1. Introduction

As the idea of laws of nature rose to a new, more central status in science during the 17th century, it was framed by Christian visions of a law-giving God.[1] But if searching for lawlike order in nature was closely tied to religious glorification during the Scientific Revolution, its value in our more secularized science is less clear. It may seem obvious that any remaining value in a non-religious concept of laws of nature is epistemic, if not

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† University of Michigan; elicht@umich.edu

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1 Many historians locate a rapid rise to prominence of the idea of laws of nature in the 17th century, often identifying Descartes as its first major figure. See e.g. Oakley 1961a, 433; Henry 2004, 87–88; Garber 2013, 45; Crombie 1996, 86–87; Daston and Stolleis 2008, 2. Joseph Needham (1951a, 29) points to the 16th century, too. On pre-16th-century ideas of laws of nature, see also Ruby 1986, Kedar & Hon 2017.

pragmatic. But reflecting on how competing early modern theologies linked law to God, and on their varied paths to secularization, can reveal a wider, more dynamic landscape.

Intellectualists in theology stressed connections between laws of nature and divine intellect or reason. In turn, Reason once ascribed to God has now been partly reclaimed for humans, recasting the value of natural order anthropocentrically, in terms of the value of our own rationality or ability to impose intelligible form onto the raw matter of sensations or disjointed facts. While overt in Kant, who views the idea of a law-governed system of nature as 'required by reason', this shift extends even to recent Humeans who see laws as simple summaries of the total set of basic physical facts. Or Reason can be read back into nature itself, in the spirit of an impersonal rationalism that sees intelligible structure as an ultimate ground of events, like Plato's 'most real' Forms. This unites some recent views in which laws of nature 'govern' physical reality with many older idealisms.

But a distinct voluntarist tradition in theology, which heavily influenced Newton and Boyle along with many other scientific pioneers, instead emphasized a link between law-governed natural order and God's power or free will. Noting how divine Power has been reinvested into human beings sheds light on other secularized accounts of science, like instrumentalism and related lineages of empiricism, as we will see. But some free exercises of power imputed to God can also be transferred to nature. It also pays, then, to consider how interest in natural order may reflect the value of impersonal causal power, rather than the value of pragmatic utility, human intellect, or the intelligibility of reality. This is a way to more deeply reject anthropocentrism and embrace environmental value.

Tracing these theological legacies illuminates the current range of opinion about what laws of nature are, and why they matter. It brings into view certain secularized ideas of natural order and its value which, though marginalized or untested, merit more focus. And it suggests promising ways of thinking about how natural science connects to ethics.

Minimizing the religious genealogy of scientific ideas and methods is therefore less benign than it may seem. Positing a clear divide between religious and secular views of science, with the secular taken to be largely insulated from skepticism of the religious, obscures how science relates to other forms of understanding, and makes it all too easy to ignore ideological assumptions that influence current science. Even when they seem to be purely descriptive, secularized views of laws often rely on implicit value judgments for motivation. And accounts of laws of nature that implicitly value 'reason' over 'sense', or stress human control over nature, often look worse after taking stock of their conceptual ties to contentious historical ideas of God. At a minimum, this context shows how metaphysical analysis of order in nature can be as much an expression of values as it is a dispassionate inquiry into the basic structure of reality. But even where value-neutral metaphysical analysis is possible, it may still be undesirable. In this light, the role of ethically charged God-concepts in the history of the idea of laws of nature offers insight into how secularized ethical ideals and ideas of natural order can be valuably integrated.

2. Laws of Nature Beyond the 'Death of God'

The influence of Christianity on the Scientific Revolution is widely recognized, but the idea that this religious context bears deeply on current science is just as widely contested. We can easily find that Descartes asked his friend Mersenne, in l630, to "not hesitate to assert and proclaim everywhere that it is God who has laid down these laws in nature just as a king lays down laws in his kingdom."[2] In *Principles of Philosophy*, Descartes even tries to show that specific 'laws of nature', like the straight-line motion of unimpeded bodies, follow directly from God's immutability and simplicity.[3] Newton, too, suggests openly in his treatise on *Opticks* that it was "by the Counsel of an Intelligent Agent," with the "help" of "active Principles" or "Laws of Nature" like gravity, that "all material Things seem to have been composed" of "Particles[...]associated in the first Creation."[4] To be sure, he was often more circumspect about theology. Still, for Newton just as much as Descartes and countless other early modern natural philosophers, the law-governed cosmos that they had come to reveal was a clear and awe-inspiring sign of God —again, this much is largely uncontested.[5] Yet many who accept it are still extremely reluctant to identify any strong trace of early modern theology in present-day science.

Even historians of science and religion tend to downplay the current significance of this religious backdrop. Joseph Needham claims, for instance, that "[i]n the outlook of modern science there is, of course, no residue of the notions of command and duty in the 'laws' of Nature."[6] In a similar vein, Richard S. Westfall suggests that natural philosophy "does not[...]have to concern itself with God at all," although it once did—and even asserts that "[w]ith us it does not."[7] It is no great surprise, then, that one is even harder-pressed to find influential accounts of laws of nature in recent philosophy of science or metaphysics which ascribe any deep importance to the idea's religious genealogy.[8]

But if this situation is to be expected in one sense, in another it is still strange: ahistorical and an artificial limit on the analysis of science, at least, if not just untenable. After all, why would there not be 'residues' of divine command in the idea of laws of

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2 Letter to Mersenne, 15 April 1630 (Descartes 1991, 23).

3 Descartes 1982, 59–62.

4 Query 31 (Newton 1730, 377–378). See also Newton to Bentley, 10 Dec. 1692 (Cohen 1958, 280).

5 On historians' view of Newton on God, see Henry 1994, 123; Snobelen 2001, 198. See also note 37.

6 Needham 1951b, 229. His elaboration that laws are "now thought of" as "descriptions not prescription" (ibid., 229) is belied by ongoing interest in 'governing' accounts of laws. See also Needham 1951a.

7 Westfall 1986, 234.

8 Compare e.g. Lewis 1983, 1994; Ramsey 1978; Loewer 1996 ('best systems' accounts); Armstrong 1983, 1993; Dretske 1977; Tooley 1977, 1987 ('necessitarian' accounts); Carroll 1994; Lange 2000, 2009; Maudlin 2007 ('antireductionist' or 'primitivist' accounts). One partial exception is 'antirealist' accounts—e.g. Giere (1999, 23) argues that "the original view of science as discovering universal laws of nature had little basis in the actual practice of science, but was imported largely from theology"; so, for Giere, it is natural that 'laws' should be purged from secularized science.

nature, given its origins? Where even historians draw this sort of stark divide between past and present, it is fair to surmise that we may not want to know. Seeing residues of theology in science might make us uncomfortable, of course, as it can seem tantamount to rejecting scientific naturalism or endorsing epistemological relativism. But early modern ideas of God have left an imprint on current views of lawlike order in nature, regardless.

This is not to deny that science has undergone a process of secularization. It is not to fall prey to the genetic fallacy. And it is certainly not to say that scientists do or ought to believe in God or gods. But it is to say that we would do well to more frankly examine deep currents of structural continuity, as well as discontinuity, between the religious metaphysics underlying early modern science and the secularized metaphysics of current science. This can productively recontextualize debates about how to analyze the scientific concept of law. Confronting the early religious framing of laws of nature may even call into doubt the ongoing viability of the idea.[9] But this approach also illuminates a basic question that is even more often overlooked: why think that finding laws of nature would be valuable, in the first place? Distinct early modern theological traditions valued laws in relation to different attributes of God. Some of these traits are more commonly or more easily secularized. And secularization has shifted divine traits into many different things.

In particular, it will prove helpful to contrast divine Reason or Intellect against divine Power or free Will. And it will prove helpful to distinguish two areas into which these traits can be displaced through processes of secularization: *anthropocentric* theories reinvest divine traits into humanity, while *ecocentric* theories reinvest divine traits into impersonal nature. Taken together, these two divides suggest four basic secularized views about the value of laws of nature: anthropocentric and ecocentric forms of *rationalism*, which ground the value of laws in the value of human intellect or rational intelligibility; but also anthropocentric and ecocentric forms of *dynamism*, which ground the value of laws in the value of power—whether it be human control over nature, impersonal causal forces, or brute constraints imposed by arational patterns in nature that we cannot control.

Many of these positions are compatible, since we can value several things at once. But they often come apart in practice, particularly when tied to distinct views about what laws of nature are. And while some paths to secularization have been historically favored, others have been largely overlooked—especially forms of dynamism that find basic value in arational order or impersonal force, focusing less on reason or human causal power.

3. Intellectualist and Voluntarist Theology at the Rise of Modern Science

A voluntarist tradition in theology made a deep impact on early modern thinking about laws of nature. Voluntarists placed particular emphasis on divine power or will, celebrating "an omnipotent God from whom the world did not proceed by any necessary

[9] E.g. see Ben-Menahem and Ben-Menahem 2020, 53. See also Giere 1999.

emanation, but who called it into being by the autonomous *fiat* of his will."[10] And they came to see laws of nature as a paradigmatic expression of this free Will or Power. As Francis Oakley has shown, although the "principal source" of this conception of a "legislating God whose most striking attribute was his irresistible power" was the Old Testament, it only achieved a "wide currency" in the 16th and 17th centuries, in a form "directly descended" from nominalist positions worked out after the Condemnation of 1277, by theologians like William of Ockham.[11] A competing intellectualist tradition in theology instead placed more central emphasis on God's intellect, wisdom, or reason.

In the medieval context in which it came to the fore, this voluntarist-intellectualist rivalry derived from divergent views about the status of neo-Aristotelian philosophy vis-à-vis Christian theology.[12] Voluntarists worried about Aristotelian theses that seemed to deny or stand in tension with God's power or autonomy. As the historian of science John Henry explains, for example: "[i]f Aristotle said creation of a vacuum was impossible then it did not undermine God's omnipotence to say God could not create a vacuum—for these [intellectualist] thinkers it was as though creation of a vacuum was not simply a physical impossibility, but a *logical* impossibility."[13] Voluntarists were skeptical, stressing that God acts with free Will. In so doing, their point was "not to insist that God did things in an irrational way"; it was simply "to ensure that supposedly logically-driven conclusions did not get out of hand," by denying God's power or implying that "he was not fully in control of his own actions, because he always had to follow fully the dictates of reason, and acted, therefore, out of necessity."[14] Voluntarists could even allow some genuine contradictions that God could not circumvent. They just denied that everything deemed 'contradictory' by intellectualists was truly contradictory or impossible for God.

In turn, throughout the past century, a range of historians of science, religion, and philosophy have argued that voluntarist theology played a pivotal role in the development of modern science. This impact was perhaps most notable in relation to Newton, Boyle, and others in England,[15] but voluntarism also influenced continental natural philosophers like Gassendi and (some argue) Descartes.[16] In a study of 17th-century science, Eugene M. Klaaren thus finds that "hypotheses, attention, the search for particulars, and laws of nature were all part and parcel of a new empirical way of knowing indebted to a critical

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10 Oakley 1961a, 450–451.

11 Oakley 1961a, 449 *et passim*; see also Oakley 1961b.

12 Henry 2009, 80.

13 Henry 2009, 80.

14 Henry 2009, 80.

15 On Newton's voluntarism, see Force 1990a, 89; Shapin 1981; Snobelen 2001, 176–177 . Cf. Harrison 2004. On voluntarism's influence on Newton's teacher, Isaac Barrow, see Malet 1997. On Boyle vis-à-vis voluntarist views of creation in 17th-century England, see Klaaren 1977. See also Burtt 1925, 290.

16 On Gassendi's voluntarism, see Osler 1991, 157 *et passim*. See also Osler 1994. On scholarly debate regarding Descartes, vis-à-vis voluntarism and intellectualism, see note 22 and references therein.

(and carefully constructive) voluntarist theology of creation."[17] John Henry qualifies that the sudden 17th-century rise of the idea of laws of nature is "best seen as the exploitation of a ready made theological tradition *in support* of innovations," rather than a genuine "*explanation for* those innovations."[18] But, with this caveat, Henry still judges that "there can be no doubt of the relevance of providentialist disputes, and theological voluntarism in the efforts of Descartes, Boyle, Newton and Leibniz to justify their use of laws of nature."[19] Certain historians do remain more deeply skeptical of any 'voluntarism and science' hypothesis.[20] But the real force of the conceptual connections that its proponents adduce, together with the fact that many historians have ably defended stronger claims of influence, more than suffices for my purposes, which are largely conceptual and ethical.

The most widely discussed aspect of this link between voluntarism and science goes beyond laws of nature, to broader connections between voluntarism and empiricist orientations toward knowledge. Correspondingly, there is said to be a regular (albeit not inviolable)[21] link between intellectualist theology and rationalist views of knowledge. Figures like Newton and Boyle are taken to be paradigmatic voluntarist-empiricists, while philosophers like Leibniz—and perhaps Descartes, although again here there is more debate[22]—are paradigms of the intellectualist-rationalist camp.[23] One locus classicus for this thesis is a series of papers by Michael B. Foster, published in *Mind* in the 1930s.[24]

Foster surveys several helpful points of contrast between empiricism and 'Greek' rationalism.[25] First, the modern empiricist "describes" natural substances, whereas the ancient Greek rationalist (or medieval Scholastic) "defines" them. Here to 'define' is to specify an object's essence in a way that allows for a priori species-genus classifications going beyond the empiricist's a posteriori "comparison of similar sensible qualities."[26] For an object to be definable, Foster suggests, its form must be both intelligible and its real (not merely nominal) essence.[27] This is the case for objects produced by a Greek-

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17 Klaaren 1977, 123.
18 Henry 2004, 91.
19 Henry 2004, 91.
20 See especially Harrison 2002, 2004, 2009.
21 See note 22.
22 Harrison (2002) argues that Descartes was both a rationalist and a voluntarist, and uses this example to "break[] the inexorability of the logic of a connection between voluntarism and empiricism" (Harrison 2002, 66). Note that others have argued that Descartes is better described as an intellectualist (e.g. Osler 1994; Davis 1991). Here I would also echo John Henry (2009, 84): positions like voluntarism and empiricism can be deeply linked, historically and also conceptually, even if there is no "inexorable logic" binding them together—as the case of Descartes arguably illustrates. Cf. Harrison 2004, 2009.
23 In England, Henry More and his notion of "divine reason" is a plausible example (Klaaren 1977, 122).
24 Foster 1934, 1935, 1936. Foster's focus is on voluntarism. Henry (2009, 79) also invokes Lovejoy's *The Great Chain of Being* (1936) as a canonical study of the opposing (now 'intellectualist') approach.
25 Foster 1934, 454.
26 Foster 1934, 461.
27 Foster 1934, 461.

style Artificer, who purposively forms pre-existing matter toward some prior end. But the empiricist's Creator-God is less a technician and more an artist, with no end in mind before creation. For this Creator, the goal of creation is just the created world itself, such that a natural object has no intelligible form or purpose as a prior ground.[28] God creates nature's matter and form simultaneously and bound inextricably. Foster takes the analogy to art even further: the meaning of a painting cannot be abstracted from the work, as it is tied to its sensuous qualities and not to any pre-conceived plan; so the meaning of a painting is "not intelligible in the sense in which the purpose of a wheelbarrow is."[29] (One might add that a beautiful work of art exceeds its generically-describable features, if not even any fixed 'meaning'.) Likewise, then, there is "something more" in the world made by a Creator, which is "*not* capable of being conceived in distinction from the sensible material in which it is expressed."[30]

The empiricist thus discovers things' properties "by observation and experiment," whereas the rationalist does so "by 'intuitive induction' and demonstration."[31] And the empiricist seeks relations of cause and effect, not the rationalist's ground and consequent. Here think of Newton invoking impressed force as the cause of acceleration; by contrast, think of Descartes claiming that extension is the essence of matter, and arguing that this entails the impossibility of a vacuum. Experience can be crucial to rationalists, too, but in a distinct way: rationalism "implies that, however sensuous experience may be necessary as a step preliminary to the discovery of essence, every sensuous element is discarded from the act in which the essence is known"[32]—as in the case of Aristotelian induction.

Lastly, and most to the point here, Foster connects empiricism to voluntarism. The rationalist construes materiality, or the sensuous aspect of things, as a "defect" or deficit of being.[33] Again, that is, for the rationalist, intelligible form or universal quality is the essence of sensible objects, such that the concrete particular is reduced to a mere appearance or incomplete realization of the universal—'less real' than it and 'due to' it as a formal cause, if not a final end toward which an Artificer formed matter.[34] Intelligible form thus grounds the reality of concrete things, exhausting their essential traits. For the modern empiricist, by contrast, materiality is a more positive aspect of being: that aspect of reality exceeding intellectual intelligibility or rational determination, that which is fully real and yet not fixed by universal form or necessitated by reason. Foster relates this

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[28] Foster 1934, 462.
[29] Foster 1934, 462.
[30] Foster 1934, 462.
[31] Foster 1934, 454.
[32] Foster 1936, 2.
[33] Foster 1934, 455 and 463–464.
[34] Here I am elaborating more freely on Foster's account. Compare Plato's view that Forms are 'really real Being' (*Phaedrus* 247e), 'more real' (*Republic* 515d) than the sensible particulars that participate in them. Note that this does not mean really or more *existent*—see Vlastos 1965, 1966; Guthrie 1975.

excess of rational necessity to God's freedom. And this ties voluntarism to empiricism: "*voluntary* activity of the Creator[...]terminates on the *contingent* being of the creature"; but if "the contingent" is thus "essential to nature" while also being "knowable only by sensuous experience," then "experience must be indispensable to the science of nature."[35]

Rather than investigating the logical (im)possibility of vacuums, then, early modern voluntarists emphasized that the only way to tell whether God had allowed empty space was to see if one could in fact find or make it. Why? Because, they said, God had a free choice in the matter. God's power is thus not rationally necessitated, but 'arbitrary'.[36]

Likewise, for voluntarists, the only way to tell whether matter could be active was to empirically investigate bodies. Again, their assumption was that there is nothing in the essence of matter which makes it impossible for God to choose to make it active. Here there are two things that God might be doing 'freely' or 'arbitrarily'. God could directly order matter, imposing law by physically arranging material objects at every moment. Or God could do something more indirect, like adding activity to inherently inert matter.[37] (Compare Newton's claim that "[i]t is inconceivable, that inanimate brute Matter should, without the Mediation of something else, which is not material, operate upon, and affect other Matter without mutual Contact." This is "one Reason why I desired you would not ascribe innate Gravity to me." Indeed, "[t]hat Gravity should be innate, inherent and essential to Matter" is "so great an Absurdity" that "no man who has in philosophical Matters a competent Faculty of thinking, can ever fall into it."[38]) Either way, however, law-governed order manifests God's total power or free will, more so than God's reason.

In contrast to current philosophers of science or metaphysicians who defend so-called 'governing' accounts of laws of nature, then, 17th-century voluntarists like Newton and Boyle thought that abstract patterns are the wrong kind of thing to govern, constrain, or produce physical effects, in themselves. Rather, an early modern voluntarist might see abstract patterns simply as summarizing the impact of laws taken as acts of Will: laws govern nature only insofar as they are free exercises of power, not just intelligible rules. To the extent that they can be viewed as intelligible rules, laws are like the abstracted 'meaning' of a painting, not like the pre-conceived purpose of a tool or the geometric essence that a visible line imperfectly copies. The artwork is not a copy of its meaning—the artwork grounds its meaning, not vice versa. Just so, nature grounds its intelligible

[35] Foster 1934, 464.

[36] Peter Harrison (2013, 147), a skeptic of 'voluntarism and science' hypotheses, stresses that 'arbitrary' just meant that "God's will is not bound by considerations external to him"; still, he allows that the Newtonians here differed from Leibniz, who thought God had to create the best of all possible worlds.

[37] Newton scholars disagree on this issue. E.g. Henry (1994), arguing against A. Rupert Hall's, Alexandre Koyré's, and I. Bernard Cohen's view that "Newton relied more or less directly upon God to explain the force of gravity" (Henry 1994, 125), suggests that Newton did believe in the possibility of gravity as action at a distance, grounded in a *non-essential* power of attraction *superadded* to matter by God. Cf. Janiak 2008, 2013; for responses to Janiak, see Henry 2011, 2014. See also Koyré 1965, 149.

[38] Newton to Bentley, 25 Feb 1692/3 (Cohen 1958, 302–303).

form. Viewed as intelligible patterns, laws describe but do not govern nature. But viewed instead as acts of Will that give rise to a world displaying these patterns, laws do govern nature. God governs nature in virtue of the act of Will through which God creates nature.

There is no prior idea of, or rationale for, specific laws of nature, on this view—just God's free choice in the act of creation. And brute matter does not obey laws by its own nature. So it takes Will or Power, not just Reason, to produce a law-governed world. This connects to voluntarists' emphasis on God's transcendence, as opposed to immanent presence in nature: voluntarists stressed that law is imposed on nature from without. By contrast, rationalists might say that divine Reason permeates nature, that matter conforms to law by its own nature, or that intelligible form is the inner essence of natural objects.[39]

This voluntarist emphasis on divine transcendence is on display in Newton's view that "[t]his Being governs all things, not as the soul of the world, but as a Lord over all; and on account of his dominion he is wont to be called Lord God[...]or Universal Ruler."[40] Newton's insistence that God is 'not the soul of nature' is a repudiation of the rationalist conceit that divine reason is immanent in nature, or that intelligible form is the essence of material substance. (For Boyle, too, it is "the *Creator* who, and not the *World*, nor the *Soul* of It, is the True God."[41]) Newton's emphasis on 'dominion' in turn relates to voluntarists' focus on divine Power. And God displays this Power by imposing law on nature, since (the idea is) order can be imposed on nature only if not already present in it:

> Matter does not move[...]in accord with mathematically precise laws of nature [...]because of any Neoplatonic overflow of God's being into the world or because of any Hobbist, Cartesian, or Leibnizian notion of necessary rational order intrinsically immanent within matter or imposed once and for all long ago by a deity who long since has absented himself from the daily operations of creation. Such metaphysical views dilute the total subordination of matter to the will of God and are the metaphysical equivalent of theological idolatry. Rather, matter exists and ordinarily operates in accord with natural law for one reason: God wills it so by divine *fiat*.[42]

God's dominion may thus be the "first metaphysical principle" of Newtonian science.[43]

More broadly, early modern voluntarists—following Calvin, as well as Ockham[44]—saw the idea that God "Pervades all things" as a blasphemous way of "making a shadow deity to drive away the true God":[45] an all-powerful Lord who imposes law on nature from without. Intellectualists valued laws vis-à-vis God's Reason, if not nature's rational

[39] On transcendence and immanence, see also Dupré 1976 (theology), Crosby 2003 ('religion of nature').
[40] Quoted in Burtt 1925, 291.
[41] Boyle 1686, 120.
[42] Force 1990, 84. See also Jacob and Jacob 1980, 265; Shapin 1981, 195; Oakley 1961a, 436.
[43] Force 1990, 84.
[44] On the influence of Calvinism on 17th-century scientific thought, see Klaaren 1977.
[45] Calvin, *Institutes of the Christian Religion* I:5:5 (Calvin 1960, 58).

soul. But voluntarists valued natural law more so as a sign of God's free and total Power.

4. Ecocentric Rationalism: Valuing Nature-As-Intelligible

It can seem self-evident that the value of a drive to find lawlike order in nature is epistemic, whether one takes the relevant epistemic ideal to be truth, empirical adequacy, knowledge, or basic explanation. But now-intuitive epistemic views of laws of nature can obscure secularized offshoots of the voluntarist theology that guided many central figures in the Scientific Revolution, notably in England. Narrowly epistemic views of laws of nature partly reflect value-laden decisions to emphasize human reason or impersonal intelligibility at the expense of other basic ideals, just as the theological divide between intellectualists and voluntarists was—more obviously—partly rooted in divergent values. It is not a genetic fallacy, or conflation of the current and past meaning of science, to acknowledge these ongoing value-laden decisions and their similarities to past theology.

Of course, this does not mean that anyone who focuses on connections between laws of nature and ideals like intelligibility must be a hopeless 'rationalist', or that those who instead stress the pragmatic utility or contingency of laws 'do not value rationality'. Early modern voluntarists still praised God's reason, after all, and intellectualists still respected God's power. Still, divergent views about how to weigh shared values can be real disagreements, with substantial impact on scientific decision-making.[46] In secularized societies, it may also be easier to focus on epistemic values in science even while attending appropriately to other kinds of value in other areas of life. But this sort of compartmentalization is not necessarily to our credit. And since it is hard to take a broad perspective on ourselves, we often behave in ways that reflect and reinforce contentious or culturally-specific hierarchies of value without seeing that we are. Adopting a certain view of laws of nature may well be ethically loaded, then, even when this is not intended.

In this light, and as an inroad to understanding how voluntarist ideas about laws of nature have been secularized, we may first consider the secularization of intellectualist focus on God's reason. A rationalist position intermediate between traditional theism and full atheism might look like Einstein's view: he saw the universe as a "single significant whole,"[47] whose "harmony of natural law[...]reveals an intelligence of such superiority that, compared with it, all the systematic thinking and acting of human beings is an utterly insignificant reflection."[48] Einstein meant this 'intelligence' to be impersonal—not benevolent or purposive, for example—such that he also believed that "there is no anthropomorphic conception of God" underwriting the "cosmic religious feeling" he approvingly described.[49] Still, Einstein's appeal to an inhuman intelligence clearly evokes

[46] See e.g. Kuhn 1977; compare Longino 1995, Lichtenstein 2021a.
[47] Einstein 1949, 26.
[48] Einstein 1949, 29.
[49] Einstein 1949, 26.

earlier intellectualist currents in natural theology, and especially calls to mind his claim to "believe in Spinoza's God, who reveals himself in the lawful harmony of being."[50]

To many, of course, Einstein's account of this amoral cosmic intelligence will still seem too anthropomorphic. This suggests two more thoroughly secularized versions of intellectualism: first, a retreat from claims about cosmic intelligence to more modest ones about the *intelligibility of nature*; second, a focus on the *intelligence of humans* engaged in scientific inquiry. These are not mutually exclusive. For instance, scientists may focus on nature's intelligibility, while valuing it derivatively upon the value of our intellect. Focus on intelligibility in nature can therefore belie a kind of indirectly *anthropocentric* approach. Still, at least in principle, a more robustly *ecocentric* version of rationalism is possible, on which the value of laws of nature stems from the inherent value of impersonal intelligibility, not human intelligence. In practice, however, most forms of secularized intellectualism are plausibly anthropocentric, whether directly or indirectly.

Focusing on the intelligibility of nature involves recovering common tropes from ancient idealism, early modern rationalism, or even more 'objective' strands of post-Kantian idealism. Explicitly reverting to older idealisms may also be preferable, in several ways, to the views of laws of nature recently advanced by 'antireductionists' like Tim Maudlin or advocates of related 'governing' accounts.[51] On Maudlin's view, laws of nature "operate to generate or produce" later states of the universe from its initial state.[52] But Boyle and other early modern voluntarists had perfectly good reason to deny that laws of nature can generate physical effects. Boyle proposes what seems like a stronger explanatory scheme, setting aside his appeal to God, in *The Christian Virtuoso* (1690):

> I look upon a law as a moral, not a physical cause, as being indeed but a notional thing, according to which, an intelligent and free agent is bound to regulate its actions. But inanimate bodies are utterly incapable of understanding what a law is, or what it enjoins, or when they act conformably or unconformably to it; and therefore the actions of inanimate bodies, which cannot incite or moderate their own actions, are produced by real power, not by laws; though the agents, if intelligent, may regulate the exertions of their power by settled rules.[53]

As Boyle rightly observes, unthinking objects are not able to understand laws of nature.[54]

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[50] Letter to Rabbi H. S. Goldstein, 25 April 1929 (The Albert Einstein Archives at The Hebrew University of Jerusalem, Reel 33, Item 272).

[51] On "governing" vs. "descriptive" or "Humean" accounts of laws, see e.g. Loewer 1996, Beebee 2000, Schneider 2007, Bhogal 2020. For a recent survey of non-Humean views, see Hildebrand 2020. For an account looking to combine aspects of governing and Humean views, see e.g. Roberts 2008.

[52] Maudlin 2007, 174.

[53] Quoted in Crombie 1996, 85

[54] Compare Suárez's similar view that "acceptation of law" in nature is "metaphorical, since things which lack reason are not, strictly speaking, susceptible to law, just as they are not capable of obedience"

So, while a causally powerful God might 'produce' physical effects in inanimate objects, abstract rules or ideas seem incapable of doing so. Boyle's picture may make better sense than Maudlin's, then: God produces law-governed order in a display of Power; insofar as laws of nature are abstract Rules and not displays of Power, they cannot affect unthinking matter; and matter does not obey laws of its own accord, since it is inherently passive.

Maudlin does qualify elsewhere that when he says laws 'generate' or 'govern' the universe's evolution, these are "metaphors" that can "fire the imagination," but which are "not offered as analyses."[55] In clarifying his view's non-metaphorical content, however, he then says that "[l]aws are the patterns that nature respects; to say what is physically possible is to say what the constraint of those patterns allows."[56] But why 'respect' and 'constraint' are here any less metaphorical than 'produce' or 'govern' remains unclear.[57]

Suppose that laws of nature are 'the patterns that nature respects'. Are these patterns abstract or concrete? It is not clear what Maudlin thinks. But claiming that *abstract* patterns generate physical states is extravagant, or else metaphorical to a fault. More restrained is something like an old-fashioned rationalist view: natural phenomena are not caused or temporally *produced* by the intelligible patterns they instantiate; rather, they are non-causally and atemporally *grounded* in these patterns. Indeed, atemporal grounding is what many advocates of governing accounts of law seem to have in mind.[58] Maudlin's picture, in which laws of nature take the initial state of the universe as input and produce later states as output, is a more unusual sort of reification of deductive-nomological explanation—although this may be what certain others mean by 'govern'.

As one example of an older rationalism invoking something like grounding, note that for post-Kantian absolute idealists, "everything in reality conforms to reason, which

(Suárez 1944, 22; quoted in Ben-Menahem & Ben-Menahem 2020, 50). Spinoza also suggests that this use of 'law' is only metaphorical—see Spinoza 2007, 58; Ben Menahem & Ben-Menahem 2020, 51.

55 Maudlin 2007, 15.

56 Maudlin 2007, 15.

57 'Respect' is ambiguous: for a state to respect laws could just mean that it *conforms* to laws; but it could also mean that it *considers* laws, or *refrains from interfering with* them. The first, weaker sense is innocuous, but fails to distinguish Maudlin's view from Humean accounts, which he rejects. So he must mean something stronger, related to 'ontological dependence' (Maudlin 2007, 174–178). But this is also ambiguous: Humeans can agree that facts would be different if the laws were very different, e.g.—since facts would have to be different in order for laws that just summarize facts to be very different—so even Humeans can admit a weak sense in which facts 'depend on' laws. So Maudlin seems to need a stronger notion of causal influence or acausal grounding, to insist that laws cause or ground events, and not vice versa. But laws are ill-suited to causally affect inanimate objects—despite Maudlin seeming to rely on 'production' being quasi-causal, or not being able to run backwards in time—see Lichtenstein 2021d. Or, if it is grounding that is in play, then causal terms like 'produce' are misleading, even as metaphors.

58 The relevant kind of 'grounding' is often associated with 'ontological dependence', and has to be more than "purely logical" determination, since a 'descriptive' Humean about laws could agree that "you can *deduce* future facts from current facts plus the laws" (Beebee 2000, 578). For a Humean view on which laws "generate descriptions of particular cases" in something like a purely logical way, see Ward 2007.

consists in the forms, ideas, or purpose of things."[59] For Friedrich Schlegel and other Early German Romantics, this view had a "Platonic provenance" and aesthetic dimension: for them as for Plato, "reason is the intelligible structure of things, what we perceive in beauty through the power of intellectual intuition."[60] Despite widespread concern about the speculative character of post-Kantian idealism or the apparent mysticism of Romanticism, this appeal to the essential 'conformity' of reality to reason may well be more defensible than Maudlin's appeal to the 'productive' power of laws. Or perhaps Maudlin could say that laws are *concrete* patterns. But then they would be tasked with generating the patterned phenomena they comprise—that is, laws would have to 'produce' and then 'respect' themselves. Again, many traditional idealisms may be better.

Maudlin's picture of laws producing later states of the universe from its initial state, if not also some other recent governing views of law, conflates old idealistic tropes with modern ideas of causation, to the detriment of both. Metaphor or not, the idea that laws of nature generate physical states is a relatively implausible residue of older visions of God performing double duty as both a physical Cause and a moral-rational Ground.

The more overt ethical content of early modern natural theology is also to its comparative advantage. For Boyle and Newton, God's ability to command nature through a freely 'ordained' rule of law was related to the nature and value of freedom or creative power. For intellectualists, law-governed natural order displayed reason and its value. For Maudlin and other contemporary metaphysicians discussing laws of nature, however, it seems that far less is ever at stake. From one standpoint, of course, this is to respect a real fact-value distinction. But from another standpoint, it is to lose a sense of how modern science and ethics can and should be interrelated. If one were to integrate the most plausible version of a governing account of laws of nature into a broader worldview, in this spirit, the result might well be a more frank metaphysical idealism and exaltation of 'ideal' form or rational intelligibility across ethics, politics, and art, as well as in science.

More generally, now-intuitive ties between laws of nature and epistemic ideals like truth, knowledge, or understanding partly reflect the legacy of intellectualist currents in the theology that underwrote the development of the concept of laws of nature. And the most promising version of this intellectualist program, in a more secular context, may well be a fairly traditional philosophical idealism. Distinguishing subjective and objective forms of idealism is crucial here. As a scholar of post-Kantian idealism puts it, the basic idealistic thesis that "reality depends upon the ideal or the rational" includes subjective variants in which the ideal or rational is "the subjective, mental, or spiritual," but also objective variants in which the ideal is just "the archetypical, intelligible, or structural."[61]

Ecocentric rationalism, in the present sense, simply adds two twists to objective

[59] Beiser 2003a, 69.
[60] Beiser 2003a, 70. See also Beiser 2003b.
[61] Beiser 2002, 11.

idealism: an emphasis on *law-like order* as the kind of 'ideal' or 'rational' structure that is at issue; and an evaluative claim to the effect that the rational is not just the highest reality or ultimate ground, but also *inherently valuable*. This shift in focus, from an older idealistic view of Form as genus or kind to a view of Laws of Nature as the quintessential 'ideas', might also be connected to wider intellectual historical dynamics. Informed by his reading of major developments in early 20th-century physics, for instance, the neo-Kantian philosopher and historian of ideas Ernst Cassirer described a broad shift from old concepts of objects as reified 'substances' to modern ideas of objects as mere principles of 'functional' interconnection among measurable properties.[62] Differences may remain between those who take laws to govern nature from without, as with a transcendent God, and those who see law as nature's inner essence. Either way, the idea that laws govern nature is, in part, a residue of the idea that divine Reason is the ground or soul of nature.

5. Anthropocentric Rationalism: Valuing Human Intellect

A second kind of secularized rationalism is more overtly anthropocentric.[63] Here consider Kant's view that a "systematic unity" of knowledge is "required by reason"—albeit as a purely "regulative" ideal, not a "constitutive" part of our experience like space, time, or causality.[64] Kant ties this unity to laws of nature, claiming that reason transforms cognition from "merely a contingent aggregate" to a "system" connected "in accordance with necessary laws."[65] So, Kantians may say that laws of nature are "statements that play a particular role in the system that would emerge from an ideally extended inquiry."[66] Kant arguably takes particular laws' necessity to stem from their role in systematizing experience.[67] But he at least views it as an a priori constraint on all laws that they figure prospectively in a total system of nature, posited by reason itself as a purely ideal limit.

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[62] Cassirer 1910. For analysis of Cassirer's view and its intellectual historical context, see Friedman 2000.

[63] Even objective idealism can be indirectly anthropocentric, insofar as it values things as possible objects of the kind of rational or intellectual capacity that many take to elevate us above less intelligent animals.

[64] *Critique of Pure Reason,* A648/B676 (Kant 1998).

[65] *Critique of Pure Reason* A645/B673 (Kant 1998). Compare Kitcher 1986, 206.

[66] Kitcher 1986, 215.

[67] Kitcher 1986. Messina (2017) labels Kitcher's view of Kantian laws, as deriving their necessity directly from systematic unification, a 'Best System' interpretation, in contrast to accounts according to which Kant thinks that (i) knowing particular laws to be necessary requires deriving them from underlying synthetic a priori principles, along with empirical data (e.g. Friedman 1992, 2013); or (ii) empirical laws are necessary rules that obtain by virtue of specific objects' natures (e.g. Watkins 2005, Messina 2017). See also Breitenbach 2018. I take no real stand on this debate—I am mainly concerned to survey secularized views of the value of laws of nature, and my basic point about Kant is just that he takes the idea of nature as a law-governed unity to be a purely regulative ideal rooted in 'reason' rather than inherent in nature as sensibly given to us. Kitcher's account is the most superficially compatible with the analogy I draw between Kant and Lewis. Watkins-style necessitation accounts draw Kant a bit closer to 'bottom-up' dispositional essentialists like Ellis (Messina 2017, 137; see section 7, below). And Friedman's view draws Kant a bit closer to rationalists like Descartes. But all parties to this debate can still agree that Kant thinks that particular laws must conform to the pure idea of a system of nature.

Kant's functional description (if not analysis) of laws of nature vis-à-vis their role in idealized rational inquiry is similar, in important ways, to David Lewis's 'best system' account. This approach, anticipated by Mill and Ramsey, analyzes laws of nature as truths that summarize the 'Humean mosaic' of basic natural properties at each spacetime point in whichever way best balances theoretical virtues of simplicity and strength.[68] Lewis's view is Humean in two senses: laws summarize the world without 'governing' it, and modal properties like causal dispositions are excluded from the mosaic that the laws summarize. Other best-systems accounts of laws admit fundamental powers into nature.[69]

Lewis has been diagnosed as a "transcendental [i.e. Kantian] idealist" by Gordon Belot, tracing a chain of his theses: "the causal relations of our world are determined by which counterfactual statements are true (Lewis 1986a); which counterfactual statements are true depends on the laws of nature (Lewis 1986b); and the laws of nature depend on our cognitive capacities (Lewis 1986c, Appendix C)."[70] Lewis does admit that his view "makes lawhood depend on us"—"a feature of the approach that I [Lewis] do not at all welcome!"—since the relevant standards of simplicity, strength, and their balance are just "to be those that guide us in assessing the credibility of rival hypotheses as to what the laws are."[71] This does not entail certain egregious kinds of relativism: since we can "take our actual standards as fixed" when asking what the laws would be under counterfactual circumstances, a best systems analysis does not entail that eras or cultures with different standards have different laws of nature.[72] Still, Lewis is here closer to subjective idealism about laws and causes (albeit not the Humean mosaic) than to Kantian idealism, since our present cognitive standards of simplicity and strength are evidently more contingent than Kant intends for his 'ideas of reason'. Kant's transcendental subject is meant to be more generically rational than a subject of 'actual standards' of present-day scientific practice.

Kant's approach is still anthropocentric, in that he sees space and time as nothing more than forms of our sensible intuition—which is not shared by intuitive intellects like God, and maybe not even by other finite rational beings, like intelligent aliens.[73] Even so, it might be that all rational beings are beholden to an idea of systematic unity. God might thus intuit reality as a non-spatiotemporal but still law-governed whole. Or perhaps God's direct grasp of reality as a whole, for Kant, precludes cognition via laws of nature uniting its (derivative) parts.[74] Either way, laws' teleological connection to an idea of systematic unity shared at least by all rational beings like us, if not just by all rational beings, is less subjective than laws' dependence on 'actual standards' that vary across time and cultures.

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[68] See Lewis 1983, 1994. Compare Mill 1843; Ramsey 1978.
[69] E.g. see Demarest 2017.
[70] Belot 2010, 430. See also Belot (forthcoming).
[71] Lewis 1986c, 122.
[72] Lewis 1986c, 122.
[73] For analysis of Kant's views on aliens and alternate forms of sensible intuition, see Belot (forthcoming).
[74] Compare Kant 2000, 5:406–408. I take no stand here on which of these options is closer to Kant's view.

Lewis himself later came to doubt that he could escape the "ratbag idealist" view that "we can change the laws[...]just by changing the way we think" simply by focusing on "our actual and present standards." Rather, we must "hope" if not "presuppose" that "nature is kind," in the sense that "the best system will be *robustly* best—so far ahead of its rivals that it will come out first under any standards of simplicity and strength and balance."[75] While it seems doubtful that this aim is satisfiable, given the wide scope of 'any' standards and the fact that even reasonable scientists often disagree, it is at least somewhat closer to Kant.[76] At any rate, both views raise a similar prospect: valuing the pursuit of laws of nature may be a way of valuing our own theoretical rationality. After all, for Lewis or Kant it is we rational beings who evidently 'govern' nature by imposing lawlike order on lawless mosaics or sensations. Of course, lawlike patterns are really 'out there' in the Humean mosaic, on Lewis's view. But so, too, are all the other patterns that are not laws. The only extra ontological weight laws have is their fit with standards of simplicity etc. that are framed as generically rational. So Lewis is right: his laws really do depend on us—if not in a ratbag idealist way, then in a loosely Kantian way. In this light, it seems fair to view Lewis, like Kant, as valuing human reason via ideas of natural law.[77]

Kant's path toward secularization suggests an analogy: the constructive role of the transcendental subject vis-à-vis the phenomenal world, for Kant, is broadly like God's creative role vis-à-vis nature, for earlier natural philosophers. Newton's view of space as the 'sensorium' of God even seems to have directly influenced Kant's account of space and time as pure 'forms' of human sensible intuition.[78] Likewise, Kant's claim that a total system of nature is required by reason seems to be a secularized legacy of intellectualist claims about natural order reflecting God's Reason. Kant's view of systematic order in nature as a merely "projected" unity or "regulative" ideal—"to be regarded not as given in itself, but as a problem only"[79]—is also productively viewed as a residue of religious views of a transcendent God, beyond nature. The constructive power of Kant's cognizing subject is a secularized recapitulation of Christian ideas of divine Creation. And Kant's creation myth has a rationalist tenor, despite his overt aim to analyze the limits of reason. Despite this critique, Kant treats 'rational' ideas of God, freedom, and nature's law-

[75] Lewis 1994, 479.

[76] This 'hope' that nature is 'kind' also evokes Duhem's appeal to an "act of faith" from which we are "powerless to rid [our] reason," in assuming that the "logical order" into which physical theory arranges experimental laws reflects "real relations among things" (Duhem 1991, 26–27).

[77] Lewis's appeal to simplicity and strength arguably does less to establish that laws or causal relations have species-wide intersubjective validity than do Kantian tactics like the 'metaphysical deduction' of categories from forms of judgment or the 'transcendental deduction' meant to show that any object given to us via sense must be categorically determined. That said, standards like simplicity may inform Kantian science aimed at law-governed unity, as scientists judge which theories are most 'systematic'. Kant and Lewis may hope that reasonable people will agree, but this is a value-laden article of faith.

[78] Insole 2011.

[79] *Critique of Pure Reason* A647/B675 (Kant 1998).

governed unity as regulative aims that give ultimate purpose to all our action and inquiry.

While Kant's metaphysics may be abstruse, the core idea of anthropocentric rationalism is intuitive: the value of the scientific drive to disclose law-governed order in nature derives from the value of our own basic power to impose rational order on the phenomena we encounter in experience. Pursuing laws of nature is thus valued as a kind of collective self-expression on the part of humanity. That is, it is valued as the joint expression of a basic human capacity—and, in particular, a power of reason or intellect.

Rationalistic accounts of the value of the scientific pursuit of law-governed order may thus be tied to contentious theories of human nature as comprising a basic power of 'reason' or 'intellect', often systematically opposed to 'sense', which supposedly makes us better than less intelligent animals, plants, and inanimate objects. But this hierarchical view of humans' bipartite nature as 'rational animals', 'embodied minds', or 'conditioned and yet free beings' is far from clearly true or basic. So, accounts of laws of nature and their value arguably should not be predicated on it. Of course, current analyses of laws of nature typically do not involve explicitly endorsing a view of human nature as two-sided and asymmetrically valuable. Still, intellectualist currents in secularized accounts of laws of nature are plausibly tied to rationalistic conceptions of human nature more implicitly.

Dynamism—here meaning any position that grounds the value of laws of nature in the inherent value of power—could be viewed, in this light, as a 'sensuous' correlate to intellectualist focus on 'rational' aspects of lawlike order. Together, these two approaches may suggest a more balanced picture of humans and their value. Or, more hierarchically, dynamists may insist that lawlike order is grounded in causal relations, not vice versa.[80] This inverts intellectualist views, if order represents the ideal or rational and causal power represents the natural or arational. This inversion could be valuable, in turn, if one takes an affirmation of physical reality to be better than the kind of deference to ideal Form or mathematical structure that one finds in Plato or newer idealisms. In this vein, Nietzsche criticizes the metaphysical drive to dismiss the sensuous world as a mere appearance of some higher reality, arguing it reflects an unhealthy "instinct of slander, detraction, and suspicion against life."[81] By contrast, he claims that "[t]oday we possess science precisely to the extent to which we have decided to *accept* the testimony of the senses"[82]—evoking earlier links between empiricism and non-intellectualist theology. Or dynamism about laws of nature could move further past contrasts like reason-sense and subject-object. For instance, the relevant idea of legislative power may be one that subsumes both arational

[80] Compare Nancy Cartwright's view that "the source of order in nature is not laws but powers and mechanisms" (Cartwright 2016, 56). She denies that there are "universal laws, laws that hold everywhere and everywhen" (ibid.; see also Cartwright 1983, 1999; Cartwright & Ward 2016; cf. Sklar 2003). My 'dynamism' is less concerned with universality: causal powers can ground universal laws.

[81] *Twilight of the Idols* "'Reason' in Philosophy" §6 (Nietzsche 1974b, 481).

[82] *Twilight of the Idols* "'Reason' in Philosophy" §3 (Nietzsche 1974b, 484).

causal power in inanimate objects and the intellectual power of cognizing humans.[83]

One might protest that to view *God* as a disembodied Mind, or *law* as a rational Ground, is not to worship *ourselves* as disembodied minds or just rational. But this is to misunderstand the charge of projection. Of course, as Feuerbach puts it, "God is not what man is" and "man is not what God is": humans are imperfect, finite, temporal, weak, and sinful, whereas God is perfect, infinite, eternal, almighty, and holy.[84] Still, as Feuerbach goes on to suggest, it could be that God's traits are ultimately just "our positive, essential qualities, our realities," projected beyond actual human limitations by our understanding in the fullest expression of its abstractive power.[85] God is humanity "purified" of all traits that the believer sees' as evils or imperfections.[86] A disembodied God (not as Christ)[87] is a vision, not of how humans are in all respects, but of how it is best for us to be—insofar as we are rational or free 'spiritual' beings, not just animals or sensuous beings. And secular rationalism can carry the same ethical baggage, whether intended or not. In fact, the risk of one-sided intellectualism may be greater for us now, as narrow focus on the epistemic payoff of laws of nature comes to substitute for praise of a more multidimensional God.

6. Anthropocentric Dynamism: Valuing Human Power

Given that the secular legacy of intellectualism remains ethically loaded in ways that we might not endorse, it is important to consider how focus on God's power or free will can also be secularized. A broad tradition of dynamism, which grounds the value of laws in the value of power, again includes both more and less anthropocentric positions.

A first way to secularize voluntarist focus on God's freedom is by translating it into focus on human freedom. And one way to do this is to reground scientific drives to lawlike order in our pragmatic interests rather than our theoretical rationality. Even if law-governed order is not 'required by reason', as Kant claims, finding lawlike patterns in nature can clearly still be useful. By the same token, even if laws of nature do not give insight into approximate truths about unobservable reality, as scientific realists may hope, it can still be pragmatically valuable to find lawlike patterns in observable phenomena.

One main legacy of early modern voluntarist theology in secularized accounts of laws of nature, then, is a pragmatic streak typical of neo-empiricist views. God's Power has been partly reinvested in our own power to order experience in ways that have extra-

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[83] Compare my suggestions about 'cognitive dominion' vis-à-vis 'ecological twists' on Nietzsche, below.

[84] Feuerbach 1957, 33.

[85] Feuerbach 1957, 38–39. This influenced Marx's similar view of religion—compare e.g. Marx 1978, 53.

[86] Feuerbach 1957, 181.

[87] Feuerbach (1957, 155) suggests that Christianity distinctively views "the individual by himself" as "a perfect being." Its divinity is the perfection of the human species made present under the alienated guise of God's self-standing individuality, reflecting man's desire to individually achieve a human mode of being that is in fact realizable only by a social whole (82–83, 150–160, 182–184). This individualism is in turn given its "most unequivocal expression" in the doctrine of God's incarnation as Christ (154).

epistemic value. Nor is this surprising, given voluntarism's historical ties to empiricism.

In this light, we may reconsider Lewis's best-systems view, and in particular his appeal to simplicity as a criterion for lawhood. For contemporary empiricists like Bas van Fraassen, super-empirical criteria like simplicity are "*pragmatic* virtues," which "do not concern the relation between the theory and the world, but rather the use and usefulness of the theory." For van Fraassen, simplicity is therefore just "a function of our pleasures and interests."[88] It is possible, then, to reframe a Lewisian best-systems account of laws of nature—although Lewis would presumably not do this—within a dynamist rather than rationalist framework, by stressing that simpler systems of law tend to be more useful.[89]

Van Fraassen's account has historical roots in earlier 20th-century empiricism. Ernst Mach, for instance, also took the scientific preference for systematic organization of experimental laws and data to be largely pragmatic.[90] Machian instrumentalists point out that scientific interest in simplicity ensures that empirical information is ordered into cognitively manageable and readily communicable forms. Deference to simpler theories is thus justified pragmatically, with an eye toward an "exquisite economy of thought."[91]

This association between natural order and human practical control over empirical information also sheds light on prominent late modern critiques of science. For example, Heidegger associates pervasive technical order with the modern triumph of an ethos of Nietzschean will to power.[92] In other words, trading partly on intuitive ties between science and technology, critics in this vein argue that modern science is at root concerned with controlling things—at least cognitively, if not also practically.[93] Law-governed order may thus be viewed as one product of a broader drive toward calculability, which critics like Heidegger see as a perverse impulse to flatten all things into just 'resources' standing by for efficient use or technocratic management. So, even if Kant is right that a lawful system of nature is required by reason, this may simply go to show that reason requires exerting a kind of cognitive dominion or intellectual mastery over its objects. In this more abstract way, secularized science may again recapitulate aspects of voluntarist theology.

However, one does not have to worship a 'will to power' in order to find the drive to predict and manipulate the world, partly by way of finding lawlike patterns in it, to be generally good. Being useful is no crime, after all. And even if the view that *knowledge is power* can reflect an unhealthy control-fetish, it need not. Also, while Nietzsche's basic vision of science as the "transformation of nature into concepts for the purpose of

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88 Van Fraasen 1980, 87–88. Compare Rowbottom 2010, 247.

89 For recent pragmatically-oriented best systems accounts, see Dorst 2019; Jaag & Loew 2020—both are framed as fleshing out alternatives to 'simplicity and strength', however, not as developing pragmatist interpretations of these standards. See also Cohen & Callender 2009.

90 Duhem is often grouped with Mach, but this ignores his notion of 'natural classification' (see note 76).

91 Mach 1895, 198.

92 See Zimmerman 1990, 34; Thomson 2019, 179. Compare Jünger 1993. See also Lichtenstein 2021b.

93 Compare e.g. Heidegger 1977, 23. See also Young 2002, Thomson 2019.

mastering nature" may be approving, he still harshly criticizes scientistic drives to render all things 'calculable'.[94] It may even be to Nietzsche's credit that his critique of scientism is less sentimental than Heidegger's critique of 'Nietzschean' scientism: concerns about human control should be met with more respect for power in nature, not fear of ourselves. Even if science masters its objects, that is, this may just make it like all forces in nature.[95] A deeper worry is that faith in science can lead us to conflate mastery with rationalization and so to devalue both arational natural forces and non-scientific kinds of understanding.

A second basic way to secularize voluntarism is to translate God's freedom into natural contingency, without invoking any anthropomorphic will. In a human-centered outlook, this could involve viewing laws of nature as partial constraints on events rather than as comprehensively determining them. This tracks a wider divide between 'freedom-excluding' and 'freedom-granting' ideas of legality, as Yemima Ben-Menahem notes:

> On the first, usually deemed applicable to state officials, everything that they are not mandated by law to do is prohibited. On the second, usually deemed applicable to citizens, everything that is not prohibited by law is permitted. Similarly, we can think of the constraints imposed on natural processes either as necessitating everything that happens, or as excluding certain occurrences, but leaving a considerable amount of freedom: whatever is not excluded may happen.[96]

Adopting one versus the other of these two legal models may affect empirical scientific methodology—the freedom-excluding model may, for instance, lead physicists to try to derive the values of physical constants, like particles' masses, from underlying principles instead of accepting them as 'brute facts'.[97] But the choice can also have important ethical implications. For example, Ben-Menahem points out that different views of contingency and inevitability in history can impact divergent explanations of, and attitudes toward, issues like gender-based sociopolitical inequality.[98] In this light, there may be deep resonances between value-laden emphasis on contingency in nature and adopting a freedom-including model of law that secularizes some aspects of voluntarist theology.

In a distinct variation on this theme, Nancy Cartwright advocates for abandoning the idea of "universal rule of law," replacing laws with "powers and mechanisms" as "the source of order in nature."[99] One benefit of this, she argues, is ethical: "[t]he contingency of events that can be allowed once the universal rule of law is rejected can leave space for

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[94] *The Will to Power* §610; *The Gay Science* §373. For discussion, see Lichtenstein 2021b.

[95] Not all interaction is or should be hierarchical, but many asymmetrical relations of influence in nature are unproblematic—and humans exerting control over various parts of nature is perfectly acceptable.

[96] Ben-Menahem 2018, 18.

[97] Ben-Menahem 2018, 19.

[98] Ben-Menahem 2018, 46–47.

[99] Cartwright 2016, 56.

us to play an active role in what the world will come to be like."[100] Of course, others will insist that agency is compatible with exhaustive determination by universal natural laws.

None of this is to say that ethical or political commitment to specific ideals of freedom can or should settle the answers to questions like *'Will we be able to find deterministic laws of history?'* or *'Is there an underlying reason why the Higgs boson has a mass of 125 GeV, rather than some other value?'*. These are empirical questions, in large part. Still, ideas about freedom can affect appraisals of the prior probability of different answers to questions like these. Ethical or political values can also affect extra-epistemic aspects of scientific method, like assessing which questions are most worth addressing. And, for better or worse, social values may even affect our basic standards of explanatory value or theoretical virtue. But also vice versa: scientific metaphysics and methods can influence ethics, just as ethical ideals can influence approaches to science.

7. Ecocentric Dynamism: Valuing Impersonal Power

Not all paths to secularizing voluntarist theology involve focusing on human freedom or pragmatic interests. According to a more ecocentric version of dynamism, the value of pursuing lawlike order in science directly reflects the value of impersonal causal power or arational patterns in nature. For those who accept that humans are not the center of reality but who also do not posit a personal God, this approach to laws of nature has clear advantages, despite being commonly overlooked. It also avoids the claim that abstract form ultimately grounds physical reality—which is contentious metaphysics, but also, in many cases, a way of indirectly praising our own rationality or intelligence.

One less anthropocentric way of secularizing emphasis on God's free will is to stress that laws of nature are contingent.[101] This could just mean that the specific content of laws of nature is not logically necessary or otherwise 'required by reason'. Intuitively, then, the actual laws of nature could have been different, whereas 1 + 1 is 2 in all possible worlds. For example, certain basic physical constants, like the elementary charge or the fine structure constant, may just be brute facts despite figuring in fundamental laws. It also may well be impossible to know a priori whether phenomena like action at a distance are too 'spooky' or 'unintelligible' to be real, or whether phenomena like straight-line motion are so 'natural' that they must be the physical default. Or, if laws are necessary insofar as they track necessary connections between causal powers and their effects, still, the existence of these causal powers is presumably contingent.[102] Laws of nature are also

[100] Cartwright 2016, 60. Cartwright qualifies that her focus on contingency is "not motivated by the free will problem," but rather stems from an aspiration to metaphysical modesty (ibid., 60). Still, conscious 'motivation' by ethical views is not the only way that metaphysics can reflect or reinforce ethical views.

[101] Certain metaphysicians do argue that (some or all) laws of nature are *necessary* truths—e.g. see Bird 2005; Ellis 2001. Cf. Sidelle 2002; Vetter 2012. I address Bird-style dispositional essentialism, below.

[102] Compare Bird's claim that his 'dispositional essentialism' "entails that laws are necessary at least in the weak sense that they hold in all possible worlds where the grounding universal exists" (Bird 2007, 169).

arational, if we reject personified gods, in the sense that no intelligent being has set them in place. Even if laws of nature provide reasons for (law-governed) phenomena, there are no reasons for basic laws themselves. Or, if causal relations are reasons for basic laws, still, most causal powers are wholly impersonal and arational. So, while intelligent beings like humans can use laws of nature to understand phenomena, there is a sense in which we ultimately cannot understand laws themselves: they are arational and so empirical.

For Newton, God's 'absolute' power was tied to the possibility of miracles, or violations of the laws that reflect God's regularly 'ordained' power.[103] But secular reinterpretations of divine Power may forgo miracles, insisting just that laws of nature are contingent (even if inviolable), and rejecting putative links between causal and rational order, or Spinozistic parallels between physical necessity and conceptual entailment.

In this light, consider ongoing efforts to analyze laws of nature in terms of a relation of "non-logical or contingent necessitation" between universals, as in views developed by Dretske, Tooley, and Armstrong.[104] In response to challenges to elaborate what this necessity relation comes to, Armstrong later identified it with "the causal relation[...]now hypothesized to relate types not tokens."[105] So, even if laws of nature do not govern the world themselves, merely descriptive laws may still track concrete powers which govern nature by causing regular physical effects.[106] One might value the scientific pursuit of laws of nature, then, at least partly insofar as one values causal power itself—if not especially the causal power exerted by general kinds of concrete things, like magnetic fields generically. This is one basic path to secularizing voluntarist focus on God's freedom, by way of teasing impersonal Power further apart from anthropomorphic Will.

But the most de-anthropomorphized, and in this sense secularized, analyses of causality may be Humean ones that divorce it from power, too. Robust natural necessity or causation can be tied to actions and hence to agents, after all, whereas a thin notion of regular association (as in Humean supervenience) can be understood without agents.[107] On the other hand, to the extent that this Humean landscape is a more disenchanted field of inert patterns—just one static little fact after another,[108] with no active agents or even impersonal 'doers' to identify with—it may be harder to find deep value in it. This is one reason why Humean views fit well with focus on a quasi-transcendent human subject of

[103] See Harrison 1995, 2002; Henry 2009.

[104] Armstrong 1983, 85. See also Dretske 1977; Tooley 1977, 1987.

[105] Armstrong 1993, 422.

[106] Views of this sort may even have a Humean dimension. E.g. Demarest (2017) defends a "Potency-Best System Account of Laws," pairing a Humean view of *laws* (as systematizing, not governing, the world) with an anti-Humean *fundamental ontology* (including basic 'potencies' in nature). Compare Bird 2007. Demarest (2017, 44) takes Drestke, Tooley, and Armstrong all to claim that laws govern nature. Note, then, that when I say laws describe causes without governing, I do not ascribe this view to Armstrong.

[107] Thanks to Yemima Ben-Menahem for this suggestion.

[108] Compare Lewis's description of Humean Supervenience as the view that "all there is to the world is a vast mosaic of local matters of particular fact, just one little thing and then another" (Lewis 1986d, ix).

practical or theoretical rationality: they present fundamental physical reality as devoid of immanent reason or power, in a way that can make human agency seem more valuable, by contrast.[109] Nature becomes a blank slate that has deeper meaning only in relation to us. This image of a world stripped of its own reason and power can be tied to Heidegger's critique of a modern drive to reduce all things to just resources standing by for use. Or, in an ecological twist on Nietzsche, one might embrace this objectifying aspect of Humean views, while also valuing how impersonal forces in nature equally work to 'objectify' us.

Why would impersonal causal power or arational necessity be valuable, in itself? The idea is less strange than it may seem; in fact, it is intuitive. Think of being awestruck in the face of overwhelming natural forces, like hurricane winds or the sheer mass of a cliff face. Or consider how often polytheistic religions posit gods that personify powers like the sun and ocean, or phenomena like life and death or time and necessity. Maybe natural order is an image of primal forces broadly like these, then, and less so a mark of cosmic rationality or human interests. To pursue lawlike natural order out of basic respect for causal power or physical necessity is no more odd, in itself, than are attitudes of awe or respect before the causal power of 'divine' forces. Nor does this have to be the only source of value in revealing laws of nature, for it to be one important source of this value.

Rationalists like Kant work to explain aesthetic experiences of the sublime, like those elicited by forces of nature, in terms of a feeling of the deeper superiority of reason over sense[110]—just as he works to relate law-governed order to a pure 'idea of reason'. But Kant may be wrong, in both cases. It may seem absurd to respect impersonal forces. But from another standpoint it seems equally absurd to treat natural science or aesthetic response to nature as just an occasion to celebrate our own intellect or power over nature. This is a basic failure of objectivity: a lack of receptivity to value in the broader world.[111]

Dynamists may further distinguish internal and external physical necessity, in the spirit of Aristotle's distinction between nature (*physis*) as "a cause of movement in the thing itself" and force (*dunamis*) as "a cause in something else, or in the thing itself regarded as something else."[112] Stones move downwards by nature, then, but upwards only "on compulsion and by force."[113] As the religious idea of an omnipotent Law-Giver is secularized, it can thus be replaced either by the idea of matter conforming to lawlike patterns by its own nature, or else by the idea of patterns in observable phenomena which are caused by underlying forces.[114] In this light, one might value lawlike order vis-à-vis

[109] A similar critique applies to Kantians vis-à-vis (what they see as) inscrutable 'things in themselves'.
[110] Compare Kant 2000, 5: 251–260.
[111] For elaboration of this ideal of objectivity in application to art, see Lichtenstein 2021c. On how Kant's aesthetics encodes a rationalistic view of humanity, and a distinct approach, see also Lichtenstein 2019.
[112] Aristotle, *De Caelo* 310b. See also Machamer 1978.
[113] Aristotle, *Eudemian Ethics* 1224a15.
[114] Compare T. C. Hammond's claim that natural processes are "no longer conceived as the arbitrary determinations of creative power," but rather as "the necessary expressions of an inner reality

either 'natural' or 'enforced' order. That is, building on Nietzsche's claim that the idea of laws of nature can be analyzed either so as to "comfortably accommodate the democratic instincts of the modern soul"—by reading "equality before the law" into nature[115]—or else in terms of "a tyrannically ruthless and pitiless execution of power claims," the value of laws of nature could be rooted in the value of either obedience to internally-given laws or compulsion by superior external force.[116] This difference may have ethical and political implications, as well as effects on scientific imagination. Inner necessity is intuitively tied to freedom, for instance, in a way that external force is not. Freedom, not to do otherwise, but in a sense closer to autonomy: acting in accord with one's own nature. We arguably fail to be free in this sense when we are weak-willed, or ruled by alien desires. But even a stone may be 'self-determined' insofar as its own mass makes it fall or press down, and 'unfree' insofar as it is cast up by force. So, ecocentric dynamism could be tied to seeing freedom as an inner necessity ubiquitous in nature. Or it could be tied to shifts away from moralized focus on freedom, toward frank recognition of external conditions of and limits on agency. After all, a stone falls to the ground 'by its nature' only given Earth's gravity.

Finally, lawlike order can be valued as constant being. By contrast, as Water Stace notes, the "unreality of the world" has often been associated with "its character as *flux*":

> In Plato's doctrine it is always on the becoming of the world that the predicate of unreality is fastened. Being is real, becoming, because it participates both in being and in non-being is the half-real. In Indian thought, too, it is especially the fleetingness of things which makes them unreal. And the unreality of time has always been a favorite doctrine of idealistic philosophers.[...]The passage of time means to most men primarily the loss of dear ones, the onset of old age, death. Therefore the flux of the world is, in the imagination of men, deeply identified with the evil of the world, the inner worthlessness of things. Hence if unreality means worthlessness, it is above all time and change which are felt to be unreal.[117]

Stace's focus is mysticism in religion. But it is no more inherently religious to value laws of nature as a sign of fixed order than it is to value them as a sign of cosmic intelligibility or the dignity of human reason. And if laws are analyzed as concrete patterns or in terms of causal powers, one avoids most of what can make Plato's view seem too otherworldly. Impermanence does not have to be worthless, for timeless being to merit our respect. But laws of nature can also help us to understand how change and stable form are interrelated.

Regardless of its exact elaboration, ecocentric dynamism about laws of nature can reflect a rejection of anthropocentrism and a basic embrace of environmental value.

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developing itself in and by these very processes"—which he links to the idea of an immanent God (Hammond 1911, 198). To others, 'arbitrary determinations of creative power' presumably sounds apt.

[115] Compare Jacob and Jacob 1980, 255–256; Christianson 1984, 307 (cf. Force 1990, 91–92).

[116] Nietzsche 2002, 30; see also Ben-Menahem & Ben-Menahem 2020, 53. Compare Nietzsche 1996, 216.

[117] Stace 1952, 129–130. To be clear, Stace is here discussing religious mysticism and not laws of nature.

Whether one shows respect for causally-central natural kinds, or arational necessity, or brute patterns, or natural motion, or enforced order, or fixed being, one emphasizes traits that are fully expressed within impersonal nature at least as much as within humans. Physical necessity and causal power are not bound to intellect or reason in the way that laws of nature are, for religious or secular rationalists. But if lawlike order reflects the impact of inhuman causal powers, it is also less directly tied to human freedom or control over nature than it is for anthropocentric offshoots of voluntarism. By shifting focus away from distinctively human virtues and interests, views that connect lawlike order to more impersonal forces may help us to recover a deeper feeling for value in the natural world.

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