

Eternal truths and the laws of nature

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In his never-completed *World* and in the *Principles* Descartes made fundamental to physics the concept of law. Laws provide the starting points for the explanation of sensible phenomena, ideally by deduction, in practice by more or less intuitive inferences from analogic models. They also mediate between the unchanging Creator and an ever-mutating world. Descartes can affirm without paradox that only because God's will, and therefore his creative act, is immutable is the diversity of nature attested to by experience possible. Laws so conceived are part of Descartes' permanent legacy to natural science. Huygens, Leibniz, and Newton, however harshly they criticized their predecessor, did not reject that part of his program.

Among the oddities in Descartes' presentations of his physics is that the concept of law, despite its centrality, receives little in the way of an account. In particular it is not entirely evident where they stand in relation to the eternal truths. Descartes asserted, as we know, that certain truths, commonly called the "eternal truths", are created or produced by God. Though Descartes includes laws among the things that depend on God (*Resp.* 6, AT 7:436 = Text [9]), and by implication among created things, the bulk of his examples are mathematical and moral. He does not, in either of his demonstrations of the laws, refer to them as eternal truths. As we will see, though there is no reason to doubt that the first law is an eternal truth, there is some reason to doubt that it is a *created* truth. The argument in brief is that the first law follows, in its most general form, immediately from the immutability of the divine will; that the divine will is immutable is an

eternal but not a created truth. It is a formal condition on the will, hence the act, of God. Indeed Descartes says in *The World* that even if God had chosen to create other worlds than this one, the laws he proposes would hold in them too (AT 11:47). The context suggests that in those other worlds, the eternal truths, which Descartes here seems to distinguish from the laws of nature, would also hold. But since Descartes insists so firmly on divine freedom, and on the strictness of creation *ex nihilo*, any suggestion of invariance across worlds is striking.

The doctrine of the creation or production of the eternal truths is a busy node in the network of Cartesian thought. Meeting there are the omnipotence of God, the incomprehensibility of the divine nature and the comprehensibility of created nature, the unity of divine powers, and the nature of the causal relation between infinite and finite being presupposed in the term 'creation'. For Jean-Luc Marion nothing less than the place of Descartes in the history of being is implicated in the doctrine (see Marion 1981:268, 443, 455–456). It is easy to understand why such dense thickets of scholarship have sprung up around just a handful of texts (Marion 1981:270). Even Marion, for all his ingenuity in such matters, can adduce only a dozen passages, not all of them immediately relevant. Some authors have for that reason been inclined to give the doctrine short shrift. Yet I am inclined to agree with Marion and Stephen Menn that the doctrine is essential to understanding Cartesian science. Descartes did not dwell on it after its appearance in letters to Mersenne in the early 1630s. Nevertheless, he certainly retained it, and continued to be guided by it to the end of his career (see Text [10], [11], [14]). It is not, in short, a mere curiosity, a one-off bit of philosophy like his explanation of birthmarks or the pedagogical remarks in the letter to Voetius.

Natural philosophy

The laws of nature turn up early in Descartes' career. His first recorded efforts in natural philosophy occurred in collaboration with Isaac Beeckman, a Dutch schoolmaster whose *Journal* indicates an interest in physical problems, and in rules or laws of motion dating from several years before his encounter with Descartes. To his delight Beeckman found in Descartes a fellow *physico-mathematicus*. Soon they were solving problems in mechanics and hydrostatics. In the

Journal we find not only the first formulation of the laws of motion but also a version of the rules of collision.

There is no indication, however, that Descartes was yet thinking of any derivation of the laws. The *Regulæ* of the late 1620s, though they allude to the laws in discussing the law of refraction, do not state any. We know that in 1628–1629 Descartes was working on metaphysics. What came of it is a matter of speculation. Beginning in 1630, however, a remarkable series of letters to Mersenne lays out the doctrine on eternal truths; at the same time, Descartes is embarking on a compendious treatment of his natural philosophy, the remains of which are *The World* and *Man*, left incomplete in 1633 after Descartes learned of the condemnation of Galileo.

The new physics of *The World* promises to combine the physicomathematics of 1619 with the methodological precepts of the *Rules*. Body is reduced to extension and its modes, motion to local motion, Nature to matter and motion subject to the condition that God conserves the world in the condition in which he created it. The “rules following which [natural] changes occur” he calls the “laws of Nature” (*Monde* 7, AT 11:37). Thus is introduced without ceremony a key term in modern science. Since natural change consists entirely in alterations of the figures of bodies and in the transfer of motion from one to another, according to the laws of Nature, in principle we could, given any state of the world, demonstrate all its subsequent states. Descartes had at one point great ambitions for his program, boasting at one point that he is going to look for “the cause of the situation of each fixed star” (To Mersenne 10 May 1632, AT 1:250).

The ground of Descartes’ optimism is that, if the laws of Nature are given, all the rest is mathematics. There are no forms or natures to be known in addition to the modes of extension pertaining to each thing. Aristotelian physics not only admits of a perhaps infinite variety of irreducible natural forms, it also denies direct access to them; they are certainly not immediately intelligible by us; our only access to them is through the sensible qualities of the things that have them. In Cartesian physics, in its most ambitious formulation, knowledge of the “order” of Nature yields *a priori* knowledge of “all the diverse forms and essences of terrestrial bodies” without which “we must content ourselves with divining them *a*

posteriori, and by their effects” (AT 1:251; the order here is specifically that of the heavens). Whatever Descartes had in mind in this passage, it is clear from the corpus of his natural philosophy that the attainment of that goal rests on our having access to Nature through intuition, as the *Rules* call it, or through clear and distinct ideas of mathematical objects.

The ambitions of Descartes’ natural philosophy are scaled back somewhat as time goes by. What remains true is that the outcome of any physical situation would, if it were simple enough for us to comprehend, be deducible from the laws of nature. Of the three laws that Descartes proposes, the first is the most basic. It says, in the version of the *Principles*, that “each thing, insofar as it is simple and undivided, remains, *quantum in se est*, always in the same state; nor does it ever change unless by external causes” (2§37; AT 8/1:62). Although Descartes immediately specializes *thing* to bodies, the law itself is perfectly general. It follows immediately from the immutability of God. “We understand”, Descartes says, “that it is a perfection in God not only that he should be immutable in himself, but also that he should operate in the most constant and immutable manner” (2§36, AT 8/1:61). In particular, the operation of conservation, which is simply the continuation of creation, should be immutable in every possible respect: it should include not only matter but motion.

The second and third laws are special cases of the first. The second concerns the direction or “determination” of motion, the third the distribution of motion in those cases where bodies, being impenetrable, must change their motion on pain of contradiction. Each law requires mathematical notions merely to be stated, and presumes the eternal truths of mathematics in any application. The first, however, does not. It would still hold, for all we know, in a world without bodies or ideas of bodies. Though it is undoubtedly to be counted among the eternal truths, it is not clear whether it is a *created* truth. At this point we must extravagate into metaphysics.

The divine will in creation and conservation

To what question is the doctrine of eternal truths an answer? Start with a few basic propositions. Everything depends on God. Descartes takes dependence to

mean, for anything but God himself and whatever exists in him, *causal* dependence. Everything is a creature. From this it follows that:

- (i) Creation is in the strictest sense *from nothing*.
- (ii) God is utterly simple.
- (iii) The divine act of creation is unique.

Each of these propositions expresses a significant choice among options available at the time. To construe dependence not only as causal but as efficient-causal, already rules out one late Scholastic account of the eternal truths. Let us suppose for a moment that eternal truths are derivative upon essences (see Menn 1998: 343–344). ‘The human is animal’ is an eternal truth based on a necessary connection between humanness and animality. Suppose, moreover, as some Scholastics did, that essences reside, as ideas or *entia cognita*, in the divine understanding. In Suárez’s view, for example, they originate from God’s understanding of his own infinite power. Knowing essences, God also knows eternal truths. Those truths certainly depend on him, and even as their efficient cause, but the immanent act by which they are produced is distinct from the transeunt act of creating the world, and could exist without it. The essences originating from divine self-knowledge function in the act of creation as exemplars, notions upon some of which God confers actual existence. The divine act is therefore separable in reason into one of knowing and one of making. Creation is not from nothing.

Descartes rejects this view. Nothing precedes creation, nothing determines the free act, not even anything within God himself. Only then can God be said to be omnipotent in the strongest sense. Descartes has often been taken to be, on the basis of those assertions, an extreme voluntarist. If, however, by voluntarism one means the proposition that God’s will precedes his understanding, Descartes is, as Menn and Marion both argue, no voluntarist. He insists instead on the *unity* of the divine will and intellect. There is in God neither knowing without willing nor willing without knowing. The divine command, “Let there be light”, is at once the act by which light came to be and also the act by which God, in creating its essence, knew it, and knew also that it was good, as Descartes say, citing Genesis (*Resp.* 6; 7:436).

Such an act cannot be construed on the Aristotelian analogy of house and carpenter, or as the act of a Platonic demiurge. Descartes instead, in his letters to Mersenne, resorts to the analogy of the law-making sovereign. Justice, on this conception, is not an antecedent aim in law-making. It is created with the laws themselves. In the Sixth *Replies*, Descartes, recognizing the unsuitability of the Aristotelian analogy to his account of the causal relation between God and things, hesitates before using the term *efficient cause* to denote that relation, and turns again to the analogy between God and king: but the people who classify causes do impose a name [on God as the cause of creation]: he can be called the efficient [cause], by the same reason by which a King is the effector of laws, even if the law itself is not a physically existing thing, but only, as they say, an *ens morale*” (AT 7:436; Text [24]). We should not infer from this that divine laws are also only *entia moralia*; that need not be the point of the analogy. The point is rather that God does not operate in relation to an end (and so there is no final cause of his acts), nor does he realize a form existing objectively in his intellect (and so there is no formal cause), nor of course does he introduce a form into pre-existing matter (and so there is no material cause). Aristotelians themselves had, of course, noticed the last of these differences, and had acknowledged some difficulty too with the final cause, because God cannot (as other agents were said to do) “perfect himself in acting”. But on most accounts the *exemplar* or *idea* in the intellect remains. What Descartes proposes is yet more removed: one might say that he is taking to the extreme the conception of God as *pure act*.

More than once Descartes announces his reluctance to say of anything that God could not bring it about. In the first of the letters to Mersenne, Descartes conducts a brief dialogue with a Thomist opponent. He defends his doctrine against the charge that created truths will not be eternal:

It will be said to you [Descartes has given Mersenne leave to proclaim the doctrine everywhere] that if God established these truths, he could change them as a king does his laws; to which one must answer that yes, if his will can change. — But I understand [those truths] to be eternal and immutable. — And I judge the same of God. — But his will is free. — Yes, but his power is incomprehensible; and generally we can be well assured that God can do all that we can understand, but not that he cannot do what we cannot understand [...] (15 April 1630, 1:145–146; Text [5]; see Marion 1981: 277–279).

The principle is restated much later in letters to Arnauld and More (Text [10], [11]). There is but one condition on God's will. It will be immutable. We must suppose, given the absolute indifference with which God acts, that immutability is not a principle by which God's acts are guided. It is not even a self-imposed principle like the second rule of the provisional morality which it otherwise resembles (*DM* 3, AT 6:24). It must instead follow from the divine nature itself.

Immutability, like the rule of the provisional morality, is a *formal* principle. Whatever you decide—good or bad—stick to it: that is what Descartes said to himself as he sat by the stove. Immutability says: whatever God does, he does always in the same way. It is a consequence, first of all, of the absolute indifference of God's will *ante factum*, an indifference that according to Descartes is the necessary condition of divine, but not of human, freedom. To the extent that a decision is made in a situation of indifference, it cannot be altered in the face of any reason. There was none for it, there can be none against. That argument, however, hews too closely to the model of human action. God did not act on reasons when he created the world.

More essential, though farther removed from our experience, is the simplicity of the act. An omnipotent God for whom (except for what he knows of himself) knowing and making coincide accomplishes the act of creation all at once. Descartes dwells on this point when in explaining how the merits of saints can have eternal life as a consequence:

they are not a cause [of eternal life], as if they determined God to will something, but only the cause of an effect, a cause of which God has willed eternally that it should be a cause (6 *Resp.* no. 6; 7:432; compare To Burman [*Conversation with Burman*] 16 April 1648, AT 5:166).

The whole chain of causes and effects by which saints achieve blessedness is the result of a single divine volition. Similarly the conservation of motion in nature, especially the conservation of the total quantity of motion according to the third law, presupposes that the creation and conservation of material nature is a single act which by reason we divide into partial acts. In other words, to state, for example, the third law we separate in thought the two bodies whose motions cannot continue unchanged on pain of interpenetration from their surroundings; we pro-

ceed *as if* God intended *of those two bodies* that their total quantity of motion should be preserved. But the only adequate object of God's unique act of creation is the whole world. The only proposition that follows immediately from immutability, without the sort of abstraction I have mentioned, is that of the conservation of the total quantity of motion in the world. (What Descartes needed in his physics was a "Hamiltonian": a mathematical statement of conservation of motion in terms of the entire system of bodies. The actual first law would be the application of this to a one-body system.)

Return for a moment to the dialogue in the letter to Mersenne. The interlocutor's last objection is that God's will is free. Descartes' answer, oddly enough, is "Yes, but his power is incomprehensible". One point of that reply, as I have just noted, is that the inconceivability of an act—the inconceivability, for example, of making twice 4 equal to 8—cannot be argued against God's being able to perform it. The human mind is not the measure of divine power. But that doesn't quite account for the sense that the reply doesn't match the objection. Marion, in his treatment of the eternal truths, quite rightly emphasizes Descartes' assertion of the incomprehensibility of God's power. The very indifference with which he acts makes those acts incomprehensible; they cannot be brought within the scope of a principle of sufficient reason.

That same indifference, in God's case but not in ours, is the mark or *argumentum* of freedom. The interlocutor in the letter to Mersenne is urging an account of divine freedom in which the possibility of doing otherwise is a necessary condition; that possibility seems to confer arbitrariness on the eternal truths. Descartes' reply addresses first of all the possibilities alleged by the interlocutor. He does not deny them, since to do so would be to limit God's power. But the deeper motive for referring to the incomprehensibility of God's power is to undermine both the notion of freedom and that of necessity that the interlocutor is appealing to. What is essential to divine freedom, as we *understand* it, is that God wills absolutely, without prior determination. The necessity of the eternal truths, moreover, is grounded not in any connections among essences but those established by God himself.

Gassendi, who has only the Fifth *Meditation* before him, and not the letters to Mersenne, mistakenly takes Descartes, because he speaks of what the Schools call “eternal natures or essences”, to hold what he thinks of as the common view: God creates on the model of essences or exemplars existing “independently” of him. In that case, Gassendi says, when God produces the existence of Plato he does no more than what a tailor does when he puts clothes on someone (7:319; Text [12]).

Descartes replies that “just as a Poet imagines that the fates were established by Jove, but that after it was established he obliges himself to obey them”, so God “wills” and “disposes” that the essences he creates should be immutable and eternal, later construing ‘eternal’ as ‘always true’ (7:380, 381; Text [13]). In other words, it is within God’s power not only to make truths, but to make them *eternal*; indeed he must by the argument I am pursuing here.

Immutability is no restriction on God’s freedom. It does not attenuate the indifference under which he willed the creation. The reason for this I have already mentioned: immutability is a *formal* condition. In that respect it resembles the law of non-contradiction. Menn argues, against Marion, that noncontradiction, because it is a purely formal condition, and involves no particular essences, is not a restriction on God’s freedom, and is therefore not an eternal truth. A contradictory essence is nothing; to say that God cannot create nothing is to take nothing away from his power. Without judging the issue between Menn and Marion, I will use the analogy suggested by Menn’s word ‘formal’. It is no restriction on God’s power to hold that whatever he wills he wills immutably. On the contrary: as Descartes says, the indifference with which God wills is the “argument” for his omnipotence (7:432; Text [19]).

(Digression: Philosophers now tend to be dubious about necessity. They take contingency for granted. Descartes has, if anything, the opposite concern. There is no question but that God can make truths eternal and immutable. (How we recognize them to be such is another question.) But how can there be any *contingent* truths if all things depend, not just on the will of God, but on a immutable decision?

One answer, it seems to me, can be given by analogy with what was said earlier about the laws of nature. The adequate object of God's decision to create is all of creation; in all of creation, considered as one, there is *no* contingency. Contingency arises when we consider parts of creation. A part of matter can, in a way, be regarded as the object of a part of the act of creation, the difference being that parts of matter are really distinct, while parts of the divine act are distinct only in reason. When we conceive, for example, of God's annihilating *this* body while conserving all others, we imagine a different total act than the one God performed. It is different by virtue of the difference in God's conserving action, which we define by reference to this body. But that does not entail that the part of the act God performed that involves this body is really distinct from any other part. When we account for change in terms of the divine action (which is, to say, the laws of nature), we make distinctions in reason among parts of that action pertaining to individuals; the total act remains constant even as the parts of that act can be said to have different effects at different times. Our notion of contingency, then, rests on our considering only parts of the divine act; when we consider the whole, we see only immutability and eternity. If we *comprehended* the divine act in its totality, it would be as incomprehensible to us that this body should be in a different place now than the one it occupies as it is that twice four should be other than eight.)



From what I have said, it follows, I think, that the immutability of God's will, and so also the first law, is *not* a created eternal truth. The eternality or necessity of other eternal truths, far from being called into question by their dependence on God's will, is ensured by it. As Marion says, "There is no need to choose between the eternality of truths and their dependence on God, since their immutability itself results from their creation" (Marion 1981:391). Immutability itself, on the other hand, follows from the divine nature.

The first law and others

Just because it is a purely formal condition, immutability alone yields no laws. Only in conjunction with truths about essences can we bring it down to earth. We must know, for example, what extension is, and that the nature of body is extension alone, in order to state confidently the corollaries Descartes immediately

draws from the first law in its most general form. We know from that version of the law that whatever a thing is, it will remain, unless acted upon by others. But 'remain' implies a comparison of states over time. For that we need to know what sameness and difference are for whatever it is we want to apply the law to. We must also know what is composite and what is not; we do not expect the whole human body, for example, to obey the first law, but only its parts. If bodies grew spontaneously or altered their shape or the direction of their motion, we would be forced to conclude, not that the first law is false, but that we were mistaken about the nature of body. *A fortiori* the same holds for the second and third laws, which require geometry and the arithmetic of proportions to be stated and demonstrated. The order of revision, it would seem, is: claims about essences first, mathematics next, laws last.

(The second law requires that God's act of conservation of motion be not only immutable but *simple*: the term is injected into the proof of the second law without explanation. Implicit too in the third rule is an assumption of simplicity, since the actual manner in which motion is distributed among colliding bodies is not determined by immutability alone. Setting aside the usual difficulties attendant upon invoking simplicity outside a well-defined formal system, it is unclear how simplicity can be said to follow from the divine nature. As Leibniz is embarrassed to admit in the *Discourse*, a complicated order of nature is no more troublesome to an omnipotent creator than a simple one. His response is that "hypotheses take the place of costs". With Descartes, I think, the most one can hope for is an analogy, first between agent and act: God is simple, his acts must be; and then between creator and creation: simplicity *quoad nos* is simplicity *quoad Deum*.)

The transition from theology to physics occurs at the point where we have established that the nature of body is extension. Before that we have only the *schema* of a physics. The epistemological status of the laws of nature is therefore complex, one might say "stratified". The weakest layer, if one may compare certainties, is the claim that the nature of body is extension. Antecedent to that is geometry—what we might call the topology and metric of space. God could have created the truths of geometry, or the essence of body, without creating bodies. That is even conceivable to Descartes in a way that non-Euclidean geometries are

not: it is the situation of radical doubt (or rather the situation at the end of the *Fifth Meditation*). God could also have willed that we should have certainty in mathematics but none regarding bodies. In that case the laws of nature, applied to bodies, would be reduced to probabilities. The lowest and most secure layer is immutability. Though we cannot comprehend God, what we know of him we know with a certainty unmatched by any other knowledge except the *cogito*.

Before I conclude I want to consider a question raised by our host in her discussion of the laws of nature. She detects a non sequitur in the derivation of the laws of nature from immutability. Descartes holds that God's continuing act of creation is immutable. He infers not only that the laws of nature do not change but that they will prescribe that certain properties of bodies do not change. Laws that are conserved need not of course be laws of conservation (Osler 1994:138). God could have prescribed once and for all the bodies should all speed up spontaneously when not acted upon by others. The answer is that God's act is directed not only toward laws but toward things. Even as a judge can be said to will both that justice be served and that each person shall be treated justly, so God wills not only that at each moment the same principles shall hold but also that each individual shall remain, so far as possible, in the state in which it was created.

A more serious difficulty runs in the opposite direction. Return to our judge. In a nominalist mood, she might insist that all she wills is that in each case that comes before her, her decision will be just. That is consistent with denying that she wills any principle of justice. An observer will be able to formulate more or less general rules governing her decisions. But those rules are, in relation to the judge's will, mere fictions. Similarly one must ask why, if a world in which God conserves each individual so far as possible is by that very fact a world in which the first law holds, there is any need for God to will the law in addition to the individual instances of conservation.

Descartes does not regard the laws of nature as mere beings of reason. He is in that respect no nominalist. The laws are not nothing. Far from it. They are, he says, secondary causes of natural change, the only ones he admits. This is puzzling. The laws, as we have seen, are nothing other than God's immutability conjoined with the truths of geometry and arithmetic to yield contentful claims about

bodies. Immutability is nothing other than God's will itself, which is not a secondary but the primary cause. The truths of geometry and arithmetic are not causes, or at any rate are not the laws themselves.

It is tempting to dismiss the phrase *causæ secundariae* as a rhetorical device. Descartes knows that the Aristotelians whose textbooks he wants to supplant argue at some length that the natural world includes genuine causes. His physics excludes all their instances. Perhaps the best way to interpret *causæ secundariae* is to treat it as designating God's will itself under the aspect of immutability as that applies to bodies. The laws would then be distinct in reason from God's will, as duration is from substance, and so the phrase is not a mere sop; but to the extent that it is meant to satisfy the Aristotelians, it is not wholly ingenuous.

Conclusion

Menn and Marion both hold that the intelligibility of the world, far from being called into doubt by the creation of the eternal truths, is alone assured by it. Setting aside the great differences in the manner in which they reach that conclusion, they agree that only because God, rather than being determined in his creation of the eternal truths by essences independent of his will, was absolutely indifferent, the human mind has an access, by way of the seeds of truth implanted in it, to the natures of things that it could not have had if Aristotle were right. God at once creates essences and gives them existence both objective and real. Descartes says in the Second *Replies* that his idea of the Sun is the Sun itself existing in the manner in which things exist in thought. Ignoring all objections to that claim, I would say that such happy coincidences are, if Menn and Marion are right, possible only because God freely—which is to say, with absolute indifference—created the essence of the Sun, the Sun itself and the mind that thinks of it.

The role of law in all this is crucial but limited. Without the first law, no necessity can be ascribed to what would otherwise at best be empirical generalizations about the behavior of bodies. But that law, considered apart from the mathematics and the assertion that the nature of body is extension, amounts only to a formal condition on God's will; it is merely God's will itself considered under the

aspects of conserving bodies and immutability. Without its theological backing, therefore, it is nothing. The wonder then is that the notion of law should have thrived even after theology and physics parted company.