

Renaissance Idea of Natural Law*

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Abstract

The introduction of laws of nature is often seen as one of the hallmarks of the Scientific Revolution of the seventeenth century. The new sciences are thought to have introduced the revolutionary idea that explanations of natural phenomena have to be grounded in exceptionless regularities of universal scope, i. e. laws of nature. The use of legal terminology to talk about natural regularities has a longer history, though. This article traces these earlier uses.

1 Introduction

The introduction of laws of nature is often seen as one of the hallmarks of the Scientific Revolution of the seventeenth century. Aristotelian natural philosophy ascribed specific forms to the different kinds of things in nature to explain their behavior. For example, the form "oak tree" explains why a particular oak tree loses its leaves in autumn, by inhering in it as an intrinsic power. The new sciences are thought to have introduced the revolutionary idea that there are exceptionless regularities of universal scope that are doing the main explanatory work (possibly with the additional claim that these regularities are mathematical in nature). These explanations assume a much greater material homogeneity in nature, and do not ground explanations in natural kinds that would themselves be directly observable. The paradigmatic formulation of this ideal is found in Descartes' *Principia Philosophiae* from 1644, where Descartes introduced three laws of nature, grounded in the unchanging nature of God, that govern the behavior of all material bodies. Starting from these laws one supposedly can deduce a number of consequences (central among which the mathematical rules characterizing the collision between bodies) which in turn help explain a whole array of natural phenomena.

In investigating the history of the idea of laws of nature, a number of distinctions have to be drawn. It is one thing to search for a certain kind of regularities, such as e. g. Galileo's "law" of free fall (never so called by him), and possibly quite another to interpret these regularities as being laws of nature. It is again one thing to call a natural regularity a "law" or a "law of nature", and possibly quite another to use this

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terminology to refer to a precise philosophical concept, such as e. g. Descartes'. And it is open to debate to what extent Descartes' writings even came close to capturing the core of an idea that was effective in shaping the new sciences of the seventeenth century – even if Newton seems to have thought so in calling the axioms of his *Philosophiae Naturalis Principia Mathematica* "laws of motion". (See [28] and especially [22] for further reflections and a useful overview of the different uses of the terminology in the seventeenth century. [12, 9, 29] are recent collections which offer excellent entry-points to many facets of the history of the idea.) The search for the "origins of laws of nature" (once a popular topic in historiography [31, 21, 20, 23]) is consequently fraught with difficulties and possibly ill-conceived (but see [13, 24] for recent contributions to this debate). In what follows we will start from a more simple task: to trace the use of legal terminology to refer to different aspects of natural regularity before the seventeenth century.

2 Heritage

Ancient philosophy

Apart from a passing remark in the *Timaeus* [31, p.250], legal terminology was not used by Plato or Aristotle to talk about natural regularities (though it is worth pointing out that the whole creation story in the *Timaeus* unfolds within a political context, a connection not missed by Francisco Suárez in the sixteenth century (see [1, pp.271-272])). The most extensive use is found in Lucretius' *De Rerum Naturae*. Lucretius repeatedly talked about "foedera naturae", "treaties of nature", as a kind of mutually constraining relationships between things in nature that set inviolable limits to their respective powers [3]. These treaties allow each kind of thing to flourish in its own way, within its own domain, and "without participation by the gods" (quoted in [3, p.147]). Strikingly different from Lucretius, the Stoics stressed that all order in nature is the result of Divine governance that has imposed a rational structure upon it. They also extensively used legal talk to characterize order in nature, but only when discussing the moral realm, with "natural law" the commanding rational force that guides human beings in their moral behavior. (It has even been pointed out that from a Stoic perspective the addition "of nature" to "law" is strictly speaking redundant [2, p.3]).

Talk about "laws of nature" to refer to natural regularities seems not to have gathered much momentum in antiquity, but it was not completely uncommon either. Latin authors did speak about the "laws" or "laws of nature" according to which certain geographical locations allow the growth of particular crops (Vergil), by which the stars move (Ovid, Manilius), according to which rivers flow downhill (Ovid), or that govern the regularity of the winds (Pliny) [16, pp.537-538].

Early Christianity

The Stoic idea of Divine governance was Christianized by early Christian authors, but they also included natural regularities under this Divine legal administration ([8, pp.70-75] for Philo of Alexandria and Augustine, [30, p.19] for Lactantius, [5, pp.43-44] for Eusebius). In doing this, they were not only following the example set by authors like Ovid and Pliny, but more importantly that of biblical passages, such as one from the book of Job where it is stated that "God made a decree for the rain" [1, pp.274-276]. The following quote from Augustine's *De Genesi ad litteram* nicely sums up his view: "The most customary course of all this nature has certain natural laws of its own according to which both the spirit of life, which is in a creature, has in some way certain settled desires of its own, which even malevolence cannot overcome, and the elements of this corporeal world have their settled power and quality, what any of them may or may not effect and what may or may not come from what." (Quoted in [8, p.73].) Augustine furthermore used the expression of God's "eternal law" as the divine "ratio or will" by which the conservation of the natural order is decreed, and its disturbance forbidden, introducing crucial ideas that would shape scholastic discussions [27, p.67].

The medieval scholastics

In Thomas of Aquino we find the most elaborate treatment of the idea that God ordered the whole of nature by an "eternal law". Insofar as this law can be understood by a rational creature in whose minds it is inscribed, it constitutes "natural law" that provides the creature with normative reasons for acting; nonrational creatures can only be said to participate in eternal law analogically, through the causal dispositions that have been imprinted in them [18, pp.9-10]. In opposition to Thomas, Scotus and Ockham limited the application of law terminology to voluntary agents and saw no place for the analogical extension to the rest of nature [18, p.24]. More generally, the Scotist tradition doubted whether it made sense to speak of an eternal law which is somehow in God [1, pp.266-269].

A closely related topic was the distinction between God's absolute power and his ordained power, the former his unlimited power considered in abstraction from his will, the latter his power as it expresses itself in the order given to the world. Considered as ordained, God freely chooses to limit his power, binding himself to the order he has willed for the world. The distinction between both aspects of divine power was also increasingly understood in legal terms from Scotus onwards, by linking it with the distinction between acting according to the law (ordained power) and God's ability to act apart from the law (absolute power) [6, pp.251-254][11, pp.132-133]. In this way the order established through God's ordained power can again be understood as having the nature of law, this time a law to which God has freely bound himself rather than one in which non-rational entities "participate" [8, pp.80-81].

Another distinction that could be expressed using legal terminology was the difference between particular and universal nature. This distinction, which was regularly appealed to from the thirteenth century onwards, was used to explain many phenomena in nature where a thing's particular nature is constrained or overturned by the broader frame of "universal nature" to guarantee that the thing's behavior contributes to the order of the whole of nature (e.g. Roger Bacon uses it to explain why water in a clepsydra rises in order to avoid the formation of a vacuum, contrary to its particular tendency towards downward motion, and Albertus Magnus uses it to explain why all natural beings will perish even if their particular nature does not aim at corruption) [17]. Bacon, who attributed the distinction to Avicenna, explicitly talked about the "law of universal nature" that overturns the bodies' particular nature [25, p.203].

The mathematical tradition

It was not uncommon for medieval authors to designate general rules of a discipline as "laws", e. g. the *lex contradictionis* for the principle of non-contradiction. It has been suggested that this lies at the origin of Roger Bacon's consistent use of *lex* to express the regularities established in his optics, such as the laws of reflection and refraction [23, p.349]. Interestingly, Bacon also connected this more restricted use of the terminology to the distinction between laws of particular and of universal nature in a passage where the geometrically demonstrated "law of refraction", a "common law of nature", is overturned once the optical species reaches the optic nerve, "so that it should not transgress the laws which nature keeps in the bodies of the world" [8, p.76].

3 Innovation

Laws for non-rational entities

The question whether non-rational entities can properly be said to operate according to laws remained a contentious one within late scholastic philosophy. For Francisco Suárez, e. g. , the situation was clear from the point of view of philosophy of law: this could only be stated in a "metaphorical" way (surely not to be conflated with Aquino's analogical participation), as true laws required both a command and a capacity to obey [7, pp.106-107]. At the same time, when discussing metaphysical issues he abundantly used law-talk in describing God's establishment and maintainance of order in the natural world through his permanent "concursum" [26]. This can be understood following the earlier mentioned association of the distinction between ordained and absolute power with acting according to law and acting apart from law: the lawful behavior in the natural world is in the first place God's who has freely chosen to bind himself to law, to uphold his "promise" towards natural entities to continually assist them in carrying out

their established roles in the system of the world [27, pp.70-71].

Suárez also discussed (without endorsing) a different model on which the natural world could be seen as law-governed: by making the distinction between two kinds of law, *lex morum* and *lex artificiorum*. He explained: "all that God does relates to God as an artifact does to its artisan. In the same way that the idea of the artisan can be called a law which imposes itself to produce artifacts that conform to that idea, this eternal law is the idea by which God as supreme artisan decides how to establish all things for all of eternity." (As quoted in [1, p.274], see also [7, p.109] for the context of this quote.)

Other authors saw no problem in talking about non-rational entities observing laws, as the example of Richard Hooker shows: "Whereas therefore things naturall which are not in the number of voluntarie agents . . . do so necessarily observe their certaine lawes, that as long as they keepe those formes which give them their being, they cannot possiblie be apt or inclinable to do otherwise than they do." (As quoted in [19, p.681].) Hooker's text dropped Thomas' careful reference to "analogical participation" and it also testifies to a further terminological shift, as he called the collection of these laws "natures law" and "law of nature", while he reserved "law of reason" for what most of the tradition called *lex naturalis* [14, pp.51-52]. But when Hooker explained "what that is which keepeth nature in obedience to her owne law", we have to return to God, since "those things which nature is said to do, are by divine arte performed, using nature as an instrument", coming very close to the option discussed but discarded by Suárez [14, pp.53-54].

The discussions in Suárez and Hooker testify to the continual shifting between "law" as that "rule of working which superior authority imposeth", which necessarily implies notions of command and obedience, and "law" as also being applicable to "any kind of rule or Canon whereby actions are framed" [14, p.51]. But as Hooker's example shows, laws of nature as regularities in the behavior of non-rational entities were also firmly anchored in (or "framed by") divine agency.

The necessity of universal laws

Laws were often called "certa", "infallibilis" (see e. g. the examples in Suárez quoted in [26, p.419]) or "necessary" (see the quote by Hooker given above). At the same time, Aristotelian natural philosophy did allow for exceptions to regular natural behavior. This shows the relative distance between the metaphysical notion of law-governed behavior (whether God's or natural entities') and the explanations based on natural kinds in natural philosophy that had to take into account the variety of natural circumstances under which particular phenomena take place (which could conceivably lead to an oak tree loosing its leaves in summer rather than in autumn).

Renaissance authors were often keen to distinguish between different kinds of necessity that accrue to different kinds of causes, which also involved the distinction between

universal and particular nature. The Wittenberg philosopher Bernhardt Velcurio, e. g. , distinguished between fate "as a perpetual order of causes and events, depending on the providence of God as a primary cause, imposing inevitable necessity on fatal things" and nature "as the principle and cause of motion and rest in things that have that principle in themselves *per se* and not *per accidens*" (quoted in [15, p.108]). At the level of the natural world, "physical fate" shows itself in the general principle of universal nature that dictates the conservation of species, which mirrors the perpetual motion of the heavens ([15, p.110]). It is at the level of these general principles rather than that of particular behavior guided by internal natures that strict necessity can be found. These ideas were by no means limited to a protestant context, as shown by Jacopo Zabarella, who used explicitly legal language to express this distinction, defining fate as a "law laid down by the universal nature for every thing to be generated and corrupted", a law "which cannot be set aside" (quoted in [17, p.27, p.26]). Zabarella's language in turn found its way in Goclenius the Elder's *Philosophicum Lexicon* from 1613 [15, pp.119-120].

The operation of universal nature was usually thought to be mediated by the celestial realm, a position also upheld by Suárez [17, p.24]. This dovetailed nicely with the higher degree of necessity that could be observed in celestial motions. It has also been pointed out that possibly for this reason Philip Melanchthon reserved the language of laws to describe celestial regularities, whereas he used "regula" for sublunary regularities [15, pp.114-115].

The mathematical tradition

It is very common to find law-talk in sixteenth century mathematical astronomy, which can be linked to the etymological explanation of astronomy as the study of the *lex astro-rum* [23, pp.352-357][22, pp.548-550]. The example set by an author like Manilius may have played a further role, but the frequent characterization of laws as being "certa" and "unchanging" or "perpetual" also suggests a philosophical inspiration. One also finds astronomers talking about the "laws of motion" of planets (Copernicus, Peucer). In optics, we find Kepler using designations like "law of reflection", "law of propagation", and more generally "optical laws" frequently [23, p.351][22, p.549]. In mechanics, the situation is different. Sixteenth century authors seem not to have talked about e. g. the "law of the lever" (although Kepler talks about the lever as providing the "*exemplum*" for the "laws" that characterize the speed and slowness of planets [22, p.549, fn.57]). The fact that mechanical instruments allow humans to constrain heavy bodies to move against their nature by using only a small force is most commonly expressed by calling these effects "praeter naturam" or "contra natura" but sometimes they are also called "praeter naturae legem" or it is stated that "ars naturae transgressa leges" [10, p.243].

4 Legacy

Using legal terminology to talk about natural order was not unexceptional in antiquity and the middle ages. It could present itself both as a rather natural way of speaking, without necessarily involving much metaphysical subtleties (as testified by the Latin authors, and also partly by the patristic tradition), and as part of a highly developed metaphysical framework (as testified by the scholastics). Renaissance thinkers picked up on both these strands.

The astronomers' frequent use of "law" probably played a role in the attractiveness of this terminology for the *novatores* of the seventeenth century, who were fascinated by the possibility of describing natural order in mathematical terms. The late scholastic discussions also left their marks, though. The mathematicians' use of "law" often limited the scope of a law to e. g. the planet of which it was the law [22, pp.548-549], whereas the universal scope of early modern "laws of nature" seems more closely related to the focus on "the law of universal nature" that characterizes many late scholastic discussions. It is the latter stress on universal lawfulness that involves the more far-reaching reconfiguration of Aristotelian philosophy. In this respect it is suggestive to point out that the law of universal nature of late scholastic philosophy could be formulated as a conservation principle, as were Descartes' laws of nature. The nature of that which is conserved is of course crucially different in both cases because of the complete disappearance of specific forms in Descartes, with far-reaching consequences for the question where to locate causal activity in the world – putting a much greater explanatory burden on the universal laws (which are now even characterized as "particular" causes by Descartes in distinction from the "universal" and primary cause, God's immutability, see [4, pp.152-153] for some comments). But as pointed out in the introduction, there is no reason why we should take Descartes as the final word on the matter. Throughout the seventeenth century, authors frequently keep on using "law" in a more restricted, specific – and often biblical – sense (see [30, pp.21-22] for just some examples: Charleton, Culverwel, Locke). Laws of restricted scope could also be formulated in terms of abstract, mathematical parameters, closer in spirit to the mathematical usage we found in Roger Bacon and Kepler than to the biblical law of the winds and the seas. The hierarchical relation between particular and universal laws also recurs, e. g. in Boyle's distinction between specific, "municipal" laws and "fundamental" ones which can overturn the former ([28, pp.337-338]).

The puzzle concerning the applicability of legal terminology to talk about natural order also kept on recurring. Suárez' explicit denial of its validity was echoed by Boyle ([8, p.85]), who just as Suárez went on to use it nonetheless. As we saw, the tendency to interpret the law-governed behaviour as being ultimately God's, either as linked to his concurrent action implied by his ordained power or to his instrumental use of nature, had become more or less commonplace in the renaissance. Again, both approaches

would endure in the seventeenth century (see [21, 8, 27]).

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