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## Nancy Cartwright's Rejection of the Laws of Nature and the Divine Lawgiver<sup>1</sup>

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*Well-known for her thesis that the laws of nature 'lie', Cartwright argues for a return to the capacities, conceptually close to Aristotelian natures. The religious references so dispersed in Cartwright's writings could, at first, lead one to think that her religious influences played a negligible role in the elaboration of her conception of natural order. However, when these few indications are considered alongside biographical information, it becomes clear that the absence of faith in God is of crucial importance, not only to her rejection of laws, but even more so to her adoption of the capacities, and to her preference for the 'dappled' world, that is, a world-view that sees unified scientific description as impossible. Thus, Cartwright gives us a significant example of what might well be the paradoxical situation of a certain number of philosophers of science writing in the analytic tradition: the (relative) rareness of references to their religious convictions hides their truly fundamental influence.*

**Key words:** laws of nature, matter, Aristotelian natures, hylomorphism, exact science, idealisation, atheism, empiricism, Nancy Cartwright.

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At the heart of the doctrine of creation lies the idea that all things absolutely and ultimately depend upon God's free will for their existence. This implies that God created from no compulsion or necessity and that he did not make use of any pre-existing material, as nothing could exist, apart from God himself, before his act of creation. Thus the initial act of creation was *ex nihilo*, 'out of nothing'. The doctrine of creation *ex nihilo* led the Church fathers to reject the idea of a demiurge who imparts form to pre-existing matter, in order to 'create' the world. Instead, they affirmed the creation of matter. This Christian concept had the potential to revolutionise the Greek matter-form scheme, which provided the framework for much ancient and medieval science. The creation of matter implied a new perspective on the contingency of our world: that contingency is not the result of an imperfect formation process, but stems from the free will of the omnipotent Creator.<sup>2</sup>

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1 This paper is the extended version of one section of a lecture given in Edinburgh on 3 August 2007 to the joint conference of the *American Scientific Affiliation* and *Christians in Science*. For an in-depth analysis of Cartwright's account of natural order, see Jaeger, L. *Lois de la nature et raisons du cœur: les convictions religieuses dans le débat épistémologique contemporain*, Bern: Peter Lang (2007), esp. chap. 4, pp. 249-257.

2. See Jaeger, L. 'The challenge of modern science to Thomistic ontology', *Faith* (2009) 40, 7-11.

While for the Greeks (and in particular Plato), matter was only understandable inasmuch as it was ‘in-formed’, matter created by an orderly and wise God does not in principle pose any obstacle to rational understanding. The new philosophy of nature that took shape in the seventeenth century was based on the conviction that the perceptible, the material, in itself, is the subject of rational knowledge. On this point it is perfectly in agreement with the idea of creation: since all that exists is the work of an infinitely wise God, nothing is fundamentally irrational. In turn, this idea leads to the universality of the reign of the laws of nature, another key element of modern science.

Theological convictions undoubtedly played an important role at the birth of modern science. The idea of creation in particular assisted the transition from Aristotelian substantial natures to universal natural laws.<sup>3</sup> Given the historical background of the modern notion of scientific law, the proposal of contemporary philosopher of science Nancy Cartwright is of great interest. She intentionally renounces the concept of exact law and favours instead a return to Aristotelian-like natures. In fact, she provides us with a very telling contemporary example of the links between the (revisited) matter-form scheme, scientific methodology and the rejection of divine creation as the framework to understanding laws of nature – despite the popular idea that modern science and philosophy of science are free of any religious presuppositions.

Cartwright’s best-known thesis is her allegation that ‘the laws of physics lie’:<sup>4</sup> far from being a key concept in the sciences, in her opinion the laws of nature only supply an adequate description in a limited number of situations. Nature as a whole resists a universal description, and science should take into account the fragmentary and partial character of the natural order. To understand this partial order, she proposes a return to capacities, conceptually similar to Aristotelian natures.<sup>5</sup> The metaphor of the ‘dappled world’ in her writing thus signifies a world (ours) from which universal laws are absent. Of course, Cartwright accepts the amount of order which the sciences currently bring to light, but she refuses to read into this the hint of a universal order. One should instead take seriously the image that current science gives us:

Science as we know it:...pockets of great precision; large parcels of qualitative maxims resisting precise formulation; erratic overlaps: here and there, once in a while, corners that line up, but mostly ragged edges; and always the cover of law just loosely attached to the jumbled world of material things.... The dappled world is what, for the most part, comes naturally: regimented behaviour results from good engineering.<sup>6</sup>

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3 Jaeger, L. ‘The idea of law in science and religion’, *Science and Christian Belief* (2008) 20, 133-146.

4 Cartwright, N. *How the laws of physics lie*, Oxford: Clarendon (1983).

5 Cartwright, N. *The dappled world: a study of the boundaries of science*, Cambridge: Cambridge University Press (1999), pp. 72, 85.

6 *ibid.*, p. 1.

Several passages suggest that the dappled world is motivated by a separation reminiscent of the distinction between form and matter, or between actuality and potentiality. Capacities indicate a certain order, but one that does not manage to impose itself completely when faced with the resistance of real situations – form only partially ‘in-forms’ matter. Thus, Cartwright seeks to establish ‘the distinction between the tidy and simple mathematical equations of the abstract theory, and the intricate and messy descriptions, in either words or formula, which express our knowledge of what happens in real systems made of real materials’.<sup>7</sup> She believes that such a distinction enlightens our experimental practices. We cannot move directly from theoretical concepts to experimental design:

We need to know about real materials and their properties, what the abstract concepts amount to there, before we can build anything. But telling us this is no part of theory.<sup>8</sup>

Theoretical concepts only exist in theory, or – to use scholastic terms – in potentiality. To know what really exists – in actuality – one must leave the realm of theory and look at matter. The world of Ideas, to use Platonic language, has no place for ‘real systems made of real materials’ which physicists are interested in.<sup>9</sup>

The privilege which Cartwright gives to ‘all things counter, original, spare, strange’,<sup>10</sup> results in an attitude that is diametrically opposed to that which is customary in modern science: in her scheme one feels no productive tension of wanting to extract increasing amounts of natural order from experimental data which at first glance often seem chaotic. In current scientific practice, the researcher is, of course, aware of the approximate nature of any mathematical description of a given situation: the number of factors involved in every real situation is simply too great to allow a comprehensive description. But a research programme, brought to maturity, always includes means of self-correction. Where more precision is required, there is no need to leave the theoretical framework; rather a more sophisticated application is developed to take into account the extra complexity. In fact, the Galilean method of using idealised models is based precisely on the belief that mathematical description does apply to the concrete things of the material world:

Galileo... does not compare an ‘ideal’ state to a ‘deficient’ reality; the very deviation of the real from the ideal can be measured and explained with an

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7 Cartwright *op. cit.*, (4), p. 128.

8 Cartwright *op. cit.*, (5), p. 58.

9 Mueller, I. ‘Mathematical method and philosophical truth’, in Kraut, R. (ed.) *The Cambridge Companion to Plato*, Cambridge: Cambridge University Press (1992), pp. 192-194, emphasises, based on *The Republic* 530b6-c1, that with Plato, even astronomy is not concerned with the visible heavens, but with the realm of forms.

10 Cartwright, N. ‘Reply’, in ‘Symposium on *The dappled world*’, *Philosophical Books* (2002) 43, 271, quoting Gerard Manley Hopkins, ‘Pied Beauty’, 1990.

even more complicated model. Rather than comparing reality to the ideal, he compares the complex to the simple.<sup>11</sup>

The process of idealisation in modern science does not in any way reintroduce the ideal world, as used in Greek science; it only makes sense in a scientific approach unabashedly involved in this 'lowly' world.

Given the harmony between the idea of creation and the universality of natural order, it is very striking to observe that Cartwright's opposition to law is linked to her atheistic outlook. In her writing can be found an initial hint – and that an indirect one – that suggests a dependency between her account of natural order and theological ideas: she quite frequently uses theological metaphors when talking about the laws of nature. For example, in two creation accounts, she contrasts the difference between the 'fundamentalist' belief and that of a patchwork of laws.<sup>12</sup> She evokes, by the phrase 'God's completed theory'<sup>13</sup>, the all-encompassing theory that the 'fundamentalist' believes in, despite the fragmentary state of our current knowledge. Similarly, she uses the image of the divine origin to convey the belief that natural order (or disorder) is a quantity to be measured, so that we should record, by experimental means, the actual amount of order, rather than postulate a priori (as we would be allowed to do if we were its creators).<sup>14</sup> When she refers to the distinction that Pierre Duhem made between the French mindset – fascinated by elegant description in unified mathematical terms – and the English mindset – more concerned with engineering -, she asserts that she distinguishes herself, by an 'almost theological' difference, from those who postulate the universal reign of laws. On the one hand, one 'thinks that the creator of the universe worked like a French mathematician'; on the other (that Cartwright favours), 'God has the untidy mind of the English.'<sup>15</sup>

The frequent occurrence of theological metaphors in relation to the laws of nature could lead one to think that this is more than simply a figure of speech in Cartwright's work. And in fact, the linguistic clue is a good one: Cartwright asserts clearly that the concept of a law of nature necessarily implies a theological context. The explicit connection is rare in her writings: I found only one

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11 Funkenstein, A. *Theology and the scientific imagination: from the Middle Ages to the seventeenth century*, Princeton, NJ : Princeton University Press (1986), p. 177f, referring to Blumenberg, H. *Die Genesis der kopernikanischen Welt*, Frankfurt am Main: Suhrkamp (1975), pp. 470-488 (esp. pp. 482ff).

12 Cartwright, N. 'Fundamentalism vs. the patchwork of laws', in Papineau, D. (ed.) *The Philosophy of Science*, Oxford: Oxford University Press (1996), p.324, and Cartwright *op. cit.*, (5), p. 33.

13 Cartwright *op. cit.*, (12), p. 318.

14 Cartwright, N. 'Is natural science "natural" enough?: a reply to Philip Allport', *Synthese* (1993) 94, 298.

15 Cartwright, N. *op. cit.*, (4), p. 19. Here she expresses herself in terms of opposition to the realists, but the distinction is easily transposed to her battle against fundamentalism' which she identifies later as her true enemy (*The dappled world*, p. 23). For the difference between the English and French mindset, see e.g. Duhem, P. *La théorie physique: son objet – sa structure*, Paris: Riviere (1914), p. 77-97.

instance, in the reply that she wrote to Philip Allport, when he objected to the anthropomorphism in her concept of cause. Cartwright defends her preference for causes over laws, emphasising the theological weight of the latter:

I think that in the concept of law there is a little too much of God. We try to finesse the issue with possible worlds, fictive regularities, and *ceteris paribus* clauses. But in the end the concept of a law does not make sense without the supposition of a law-giver.<sup>16</sup>

In private interviews, Cartwright has confirmed the motivation that one might guess lies behind the introduction of capacities: in her view, the laws of nature are incomprehensible without God. The difficulty of incorporating the laws of nature in an atheist world-view is one of the main reasons for her opposition to them: 'This is why I have been combating laws of nature all these years',<sup>17</sup> she admitted. Given this difficulty, she sees two possible options for the atheist: postulate Aristotelian natures, so that the active principles become immanent to the world, or adopt a strict empiricism, which rejects any need to explain the natural order. Cartwright believes that her position retains aspects of both solutions, since she acknowledges the need to explain in certain contexts (as in her arguments in favour of causal powers). Not without a humorous twist, she told me: 'Like anyone else, I believe that I just have the right empiricism, that is letting in only the right things.'<sup>18</sup>

Later, at a conference in Varenna, Italy in October 2004, Cartwright publicly defended her thesis that we cannot understand natural law without resorting to God. Of course, she did not conclude from that that God exists, but that one must try to take into account modern science, without bringing the idea of law into play. Cartwright examines four kinds of approach to natural order, which she calls 'empiricism' (which David Lewis's theory belongs to),<sup>19</sup> 'Platonism' (represented by David Armstrong)<sup>20</sup>, 'instrumentalism', and 'Aristotelianism' (which corresponds to her own approach). Of these four ways of understanding the natural order, only Platonism claims to possess a strong notion of laws, enough to say they 'govern events in Nature'.<sup>21</sup> Cartwright, however, rejects such a claim: 'Abstract relations [on which Platonism relies] are not the kinds

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16 Cartwright, N. *op. cit.*, (14), 299.

17 Private discussion, 20 September 2002 at l'École normale supérieure, Paris. She repeated her assertion that the concept of law is incomprehensible without a law-giver, during a walk in the Chiltern Hills, near Oxford, 16 August 2003. In a letter from ??, she approved of the publication of this and following private comments.

18 Private discussion, 20th September 2002 at l'École normale supérieure, Paris.

19 Lewis, D.K. *Counterfactuals*, Oxford: Blackwell (1973), p. 73.

20 Armstrong, D.M. *What is a law of nature?*, Cambridge: Cambridge University Press (1983), *passim*.

21 Manuscript from the presentation 'No God, no laws', at the conference 'God and the laws of nature', organised by the John Templeton Foundation, 11-13 October 2004, p. 4 <http://personal.lse.ac.uk/cartwright/Papers/NoGodNoLaws.pdf>. Cartwright gave a presentation with the same title on 25 November 2004 at the Ian Ramsey Centre for Science and Religion, at Oxford University.

of things that can make other things happen; they are not the kinds of things that have powers.<sup>22</sup> She concludes from this: 'None of the four contemporary accounts of laws... can make sense of laws of Nature without God. The last, Aristotelianism, can offer a stand-in for laws – natural powers – that satisfies the major requirements on laws without the need to call on God.'<sup>23</sup> Of course, this last assertion is questionable: Cartwright's capacities are a posteriori, they result from a 'brute-fact connexion'.<sup>24</sup> As such, they do not really explain physical necessity. If one does not simply accept that all electrons exhibit the same behaviour in a given situation, without asking for an explanation, neither should one accept as an unexplained fact that each has the same capacities.<sup>25</sup> Nevertheless, atheism has obviously guided Cartwright in her rejection of the laws of nature, given that legal metaphors make more explicit reference to the divine than the language of capacities. Her thinking provides us therefore with a striking contemporary example of how the rejection of the Creator-God may favour the reintroduction of the Greek concept of matter (or some close relation of it), leading to a significantly different conception of how scientific theorising applies to our material world.

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22 *ibid.* p. 14.

23 *ibid.* p. 24.

24 Cartwright, N. *op. cit.*, (5), p. 83, quoting Buchdahl, G. *Metaphysics and the philosophy of science: the classical origins, Descartes to Kant*, Oxford : Blackwell (1969), without page number.

25 Foster, J. *The divine lawmaker: lectures on induction, laws of nature, and the existence of God*, Oxford: Clarendon (2004), p. 115 ; Kistler, M. 'Laws of nature, exceptions and tropes', *Philosophia scientiae* (2003) 7, 199, n.18.