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Leibniz and Natural Teleology in the 18th Century. Introduction [p. 2-9]

[p. 3] The importance of teleology in the 18th century has mainly been studied from the point of view of a few specific authors. Hume's criticisms of teleological proofs for the existence of God in his *Dialogues concerning Natural Religion* are well known, as well as, of course, Kant's conception of purposiveness in the *Critique of the Power of Judgment*. In recent years, many works on the place of teleological and reflexive judgments in the critical philosophy have indeed been published; especially on their use for explaining the structure and reproduction of living beings, since Kant maintains a sort of methodological conciliation between finalism and mechanism in biological theories.¹ Other studies have been devoted to the development of deism, for instance in Voltaire, who admits final causes to a certain extent and believes that they prove the existence of a divine design. In his *Dictionnaire philosophique*, he maintains that natural phenomena, or those [p. 4] that cannot be reduced to geometrical principles, must be explained teleologically.² Far from excluding final causes in philosophy and physics, Voltaire and Kant integrate them into their respective doctrines and thus give a notable role to teleology.

The sources of these conceptions are obviously multiple. The terms *teleology* and *final cause* possess of course different meanings, but are generally defined at that period with reference to a kind of explanation that takes ends and purposiveness into account, and is thus distinct from mechanical and geometrical principles. Scholars have underlined the influence of physico-theology on the philosophical evolution of finalism in the 18th century.³ Considering the progress in experimental physics and astronomy, especially by Boyle and Newton, attempts were made to establish proofs of the existence of God on the basis of the teleological structure of the universe that physics had helped to discover. Boyle himself defends such an approach against Epicurus and Descartes, who banished final causes from natural philosophy.⁴ For him, teleological causes in nature are important tools for defending religion against atheists. After his death, the *Boyle Lectures* were launched to resume such a project and show the positive relationship between natural philosophy and religion. More particularly, they show how sciences contribute to the knowledge of the divine being. On the basis of the Newtonian physics, physico-theologians like Bentley, Clarke, and Derham delivered lectures that also heavily relied on the use of final causation⁵. During the first half of the 18th century, many other thinkers took a similar

¹ In particular: Hunneman, P., *Métaphysique et biologie. Kant et la constitution du concept d'organisme*. Paris: Kimé, 2008; Gingsborg, H., *The Normativity of Nature: Essays on Kant's Critique of Judgement*. Oxford: Oxford University Press, 2015; Goy, I., *Kants Theorie der Biologie. Ein Kommentar. Eine Lesart. Eine historische Einordnung*, Berlin/New York, De Gruyter, 2017.

² Voltaire, "Fin, cause finale", *Dictionnaire philosophique*, Paris, Garnier, 1967, p. 200.

³ Israel, J., *Radical Enlightenment*, Oxford University Press, 2001, p. 456-464; Gaukroger, S., *The Collapse of Mechanism and the Rise of Sensibility*, Oxford University Press, 2010, p. 30-40.

⁴ Boyle, *A Disquisition about the Final Causes of Natural Things*, London, Taylor, 1688.

⁵ On the identification between Newtonianism and physico-theology, see E. Jorink, "Honouring Sir Isaac, or, Exorcising the Ghost of Spinoza", in S. Ducheyne (ed.), *Future perspectives on Newton scholarship and the Newtonian legacy in Eighteenth Century sciences and philosophy*, Brussels, 2009, pp. 20-32.

approach to natural religion, such as Pluche, Nieuwentijt, and Réaumur. Certainly, the ways in which Voltaire and Kant later came to understand the functions of teleology in science and philosophy partially originate from the works of these physico-theologians.⁶

Another main source for understanding the development of teleology of that period is obviously Leibniz's philosophy. Among early modern thinkers, Leibniz is one of the most convinced advocates of the use of final causes in both physics and metaphysics. In almost all of his main philosophical treatises known at that time Leibniz claims that the search for final causes must complete efficient and mechanical explanations. More precisely, he maintains that final and efficient causes are harmonious and correspond to the distinction between the spiritual and the corporeal realms: "Souls act according to the laws of final causes, through appetitions, ends, and means. Bodies act according to the [p. 5] laws of efficient causes or of motions. And these two kingdoms, that of efficient causes and that of final causes, are in harmony with each other."⁷ This distinction even allows him to give ontological priority to final reasons: against the Cartesians, who believed that mechanical and geometrical laws were in themselves intelligible, Leibniz maintains that they are actually founded on higher metaphysical and end-directed principles.⁸ He is also known for his defense of final causation in specific scientific disciplines, particularly in optics. According to him, the discovery of the law of refraction relies on the fact that the light ray always takes the most determined path, an account that is clearly teleological in nature.⁹ Contrary to what Descartes maintained, once again, final causes must thus be given a place in physics. The same idea would also have an impact on the methodology of the life sciences, in which Leibniz acknowledges the heuristic role of teleology. Even if the application of efficient causes is deeper and more *a priori*, the application of final causes, because of their more accessible character, can help us discover new truths in science.¹⁰

Despite its significance for the history of teleology, very few studies were in fact devoted to the influence of the Leibnizian doctrine during the 18th century. Apart from the discussions on his theodicy, which pertains to the metaphysical and final reasons of nature, the various debates concerning his positions were generally ignored.¹¹ Admittedly, several recent studies reassessed the opposition between so-called Leibnizo-wolffism and Newtonianism, but they did not investigate the problem of teleology.¹² Commentators were for the most part interested in the Kantian interpretation of teleology, which would seek to overcome the difficulties of these kinds of dogmatic views, and not in philosophers who are more favorable to Leibniz's teleology. A notable pre-Kantian exception is Maupertuis, who believes that his principle of least action should replace former teleological principles, including Leibniz's law of conservation of living force; recent analyses are however mostly interested in the origin and development of the

⁶ For example, Derham is mentioned by Kant on several occasions: *Allgemeine Naturgeschichte* AK I, 233; *Der einzig mögliche Beweisgrund*, AK II, 160.

⁷ *Monadologie* § 79, GP VI, 620, trans. AG, p. 223. Leibniz repeats this idea on other occasions: *Specimen Dynamicum*, GM VI, 243; *Essais de théodicée* § 63, GP VI, 137.

⁸ *Tentamen Anagoricum*, GP VII, 271-272; *Principes de la nature et de la grâce* § 11, GP VI, 603.

⁹ *Tentamen Anagoricum*, GP VII, 275.

¹⁰ *Discours de métaphysique*, § 22, A VI, 4, 1565.

¹¹ Let's mention notable exceptions: M. Schramm, *Natur Ohne Sinn? Das Ende des teleologischen Weltbildes*, Graz/Wien/Köln, 1985; Charrak, *Contingence et nécessité des lois de la nature au XVIII^e siècle*, Paris, Vrin, 2006, p. 63-87.

¹² See for example R. Hagengruber (ed.), *Emilie du Châtelet between Leibniz and Newton*, Dordrecht, 2012; A.-L. Rey, "Le leibnizo-wolffisme : la construction d'une philosophie naturelle complexe dans la première moitié du 18^e siècle", *Dix-huitième siècle*, 45 (2013), pp. 115-129. Generally speaking, secondary literature on the topic focused rather on the notion of force and its metaphysical foundation.

principle of least action, rather than in the Leibnizian influence.¹³ The lack of studies is particularly obvious in regard to natural teleology, to which Leibniz made, as just mentioned, [p. 6] significant contributions. The present issue aims at examining the various ways in which Leibniz's ideas about the role of final causes in metaphysics and natural philosophy influenced philosophers of the Enlightenment prior to Kant. Not only were his positions largely discussed and sometimes adopted, but so too has the reception of the Leibnizian doctrine contributed to the development of original hypotheses concerning final causation. It also seems evident that Kantian and post-Kantian philosophies owe much to these prior teleological doctrines, which is an additional reason for analyzing them.

In Leibniz's scholarship, several recent debates have revolved around natural teleology. The first one – and without a doubt the most discussed – concerns the role of final causes in Leibniz's philosophy of mind and the different kinds of teleology involved in monadic activity. Leibniz presents the realm of souls or monads as the kingdom of final causes, but should we think that immanent finality always implies cognition and mentality¹⁴? How can we understand the respective roles of teleological appetitions and unconscious perceptions in our mentality? Is there a necessary connection between end-directedness or teleology, on the one hand, and goodness-directedness or striving for the good, on the other hand¹⁵? These discussions, which sought to clarify the harmony between finality and efficiency, partly encountered a second kind of debate on Leibniz's natural teleology: the question of Aristotle's influence on Leibniz and the possibility of conciliating Leibniz's criticism of scholastic "occult qualities" with his rehabilitation of entelechies¹⁶. This last problem mainly focused on two fields belonging to natural philosophy: physics, and more precisely dynamics, in which phenomenal forces and motions are ultimately based on the Divine wisdom¹⁷; and life sciences, in which the notions of "machines of nature" or "divine machines", coined by Leibniz, emphasize the relationship between organic structures and ends in living beings¹⁸. However, most of the studies have only incidentally addressed the issue of the epistemological value of teleological principles for the intelligibility of natural phenomena. Yet there are some notable exceptions. François Duchesneau has highlighted both the architectonic and heuristic roles played by the principle of finality in Leibniz's "method of science"¹⁹. More recently however, Jonathan Bennett has bluntly claimed that "Leibniz simply did not think hard about the essentially explanatory nature of teleological concepts," even [p. 7] in optics, which would be, according to him, the "only one example of the

¹³ See, among others: Stöltzner, M., "Drei Ordnungen formaler Teleologie. Ansichten des Prinzips der kleinsten Wirkung", in M. Stöltzner and P. Weingartner (Hg.): *Formale Teleologie und Kausalität*, Mentis, Paderborn, 2005, S. 199-241; Charrak, A., *Contingence et nécessité des lois de la nature au XVIIIe siècle*, Paris, Vrin, p. 98-113; Leduc, C., "Maupertuis et le système leibnizien des *Essais de Théodicée*" in *300 Jahre Essais de Théodicée. Rezeption und Transformation*, hrsg. von W. Li und W. Schmidt-Biggemann, *Studia Leibnitiana*, Sonderheft, 2013, p. 285-298. Rojo, A and Bloch, A., *The Principle of Least Action. History and Physics*, Cambridge University Press, 2017.

¹⁴ M. Rozemond, "Leibniz on Final Causation", in Newlands and Jorgensen (eds.), *Metaphysics and the Good: Themes from the Philosophy of Robert Merrihew Adams*, Oxford, 2009, pp. 279-284.

¹⁵ J. Jorati challenged this very assumption in *Leibniz on Causation and Agency*, Cambridge, 2017, pp. 78-82.

¹⁶ On the neo-aristotelian dimension of Leibniz's natural philosophy, see P. Phemister, *Leibniz and the Natural World: Activity, Passivity and Corporeal Substances in Leibniz's Philosophy*, Dordrecht, 2005 (concerning finality, see p. 234).

¹⁷ On physics, see for example D. Garber, *Leibniz: Body, Substance, Monad*, Oxford, 2009, pp. 225-266.

¹⁸ On Leibniz's machines of nature in recent literature, see F. Duchesneau, *Leibniz, le vivant et l'organisme*, Paris, 2010, pp. 85-119; O. Nachtomy and J. Smith (eds.), *Machines of Nature and Corporeal Substances in Leibniz*, Dordrecht, 2010; J. Smith, *Divine Machines: Leibniz and the Life Sciences*, Princeton, 2011; R. Andrault, *La vie selon la raison: physiologie et métaphysique chez Spinoza et Leibniz*, Paris, 2014, pp. 133-150.

¹⁹ See François Duchesneau, "Le principe de finalité et la science leibnizienne", *Revue philosophique de Louvain*, 1996, vol. 94 n°3, pp. 387-414 and *Leibniz et la méthode de la science*, Paris, 1993, p. 262 sq.

heuristic value of teleology in Leibniz²⁰. For his part, Jeffrey McDonough has challenged such a reading by carefully analyzing the teleological dimension of the “most determined path principle”, not only in optics, but also in other areas of physics²¹. But these investigations encounter an important historiographical obstacle: Leibniz did not explicitly develop what one would call “a teleology,” that is, according to Wolff’s innovative expression, a science of final causes. In his texts on optics, or also in programmatic drafts on the development of medical sciences²², Leibniz does not explicate in any detail how final causes help us to discover “something useful in physics and in medicine”.²³ Leibnizian scholars are actually led to speculate on the particular phenomena for which teleological principles, final causes or end-directed appetites would have a concrete and obvious heuristic value.

The study of the reception of Leibniz in 18th-century natural philosophy is one possible means of addressing the precise issue of the heuristic value of teleology. Accordingly, Leibniz’s reception allows us not only to understand his own views on teleology in virtue of the various teleological interpretations that 18th-century thinkers ascribed to him, but also to feed the conceptual debate on the legitimate articulation of finality and efficiency in natural philosophy in that period. Let us give an example. Several of Leibniz’s commentators have recently proposed methodological distinctions between divine teleology and natural teleology²⁴. Their aim is to focus on the epistemological contribution of teleological principles in Leibniz’s natural philosophy and to set aside the much-discussed problem of theodicy. Julia Jorati distinguishes for example between intrinsic teleology (end-directedness due to intrinsic features of the agent) and extrinsic teleology (end-directedness that creaturely actions have in virtue of serving God’s ends). Glenn Hartz makes a similar, useful distinction between macro-teleology, which “inquires into the relationship between events in the world of mechanism and the purposes and goals God had in mind as he selected this”, and micro-teleology, which “aims [p. 8] at relating a delimited set of mechanical events to a set of goals and purposes of finite beings”²⁵. But the possibility of distinguishing between the intentional purposes of a divine creator and the intrinsic goals of created beings is challenged by the very “physico-theology” that Leibniz regarded as both epistemologically and theologically useful. Consequently, studies on 18th-century physico-theology may help us to clarify the different terms at issue: is the same kind of finality at stake in the “*hymnus Galeni*”²⁶ concerning organic functions and in the architectonic use of the principle of optimum in physics? And how exactly do “the details of physics” instantiate the general

²⁰ J. Bennett, “Leibniz’s Two Realms”, in D. Rutherford and J. A. Cover (eds.), *Leibniz: Nature and Freedom*, Oxford, 2005, pp. 135-155, here respectively p. 146 and p. 137. See also D. Garber, *op. cit.*, p. 265.

²¹ J. McDonough, “Leibniz on Natural Teleology and the Laws of Optics”, *Philosophy and Phenomenological Research* (78: 3), 2009, pp. 505-544. See also “Leibniz’s Two Realms Revisited”, *Noûs*, 42:4 (2008), pp. 673–696, where he shows that “genuine causal powers postulated both at the physical and mental level are in and of themselves neutral with respect to being characterized as efficient or teleological” (p. 690).

²² “Unicum Opticae, Catoptricae & Dioptricae Principium,” *Acta Eruditorum*, June 1682, in Dutens III, 145-150; “De scribendis novis Medicinæ Elementis”, LH III 1, 1, ff1-3 and “Corpus hominis et uniuscujusque animalis machina est quaedam”, LH III, 1, 2, ff. 1-2, edited in E. Pasini, *Corpo e funzioni cognitive in Leibniz*, Milano, 1996, pp. 212-213, and pp. 217-219. On the teleology in these last texts, see Andrault, *La raison des corps: mécanisme et sciences médicales*, Paris, 2016, pp. 105-122.

²³ *Discours de métaphysique*, art. 22, A VI, 4, 1564: “Il est bon de faire cette remarque pour concilier ceux qui esperent d’expliquer mechaniquement la formation de la premiere tissure d’un animal, et de toute la machine des parties, avec ceux qui rendent raison de cette même structure par les causes finales. L’un et l’autre est bon, l’un et l’autre peut estre utile, non seulement pour admirer l’artifice du grand ouvrier, mais encor pour découvrir quelque chose d’utile dans la physique et dans la medecine”.

²⁴ J. Mc Donough, (2009).

²⁵ “Leibniz’s animal: Where Teleology meets Mechanism”, in Nachtomy and Smith (eds.), *op. cit.*, pp. 29-38, here p. 29.

²⁶ *Tentamen anagogicum*, GP VII, 273: “j’ay souvent souhaité qu’un habile Medecin entreprist de faire un ouvrage expres, dont le titre ou du moins le but pourroit estre Hymnus Galeni.”

harmony of the world?²⁷ In order to shed new light on these kinds of questions, the present issue explores how Leibniz's 18th-century readers embodied in their own philosophical doctrines multiple interpretative possibilities opened up by Leibniz's texts.

The first part of this volume is devoted to Christian Wolff's invention of a new science of final causes that he called "teleology". First, Matteo Favaretti Camposampiero examines the relationship between teleology and the science of perfection. On the one hand, he shows how an epistolary debate between Leibniz and Wolff in 1715 sheds light on the inherent teleological nature of the Leibnizian notions of perfection and harmony. On the other hand, he analyzes how Wolff eventually inverted priority relations between structure and function as a consequence of his doctrinal revision of the modal status of essences –a revision that was provoked by Leibniz. Then, focusing on physiology, François Duchesneau compares Leibniz's architectonic principles with Wolff's uses of teleological explanations. Among other points of divergence, it appears that in Wolff "the living being *qua* 'natural machine' has been dispossessed of its character of entailing 'organism' to infinity, and deprived of a sufficient reason for its operations equated with the finalized sequences of perceptions of the dominant monads." As a consequence, while the Leibnizian machines of nature differ from any man-made mechanism, the living being, according to Wolff, is a natural machine whose composition may be legitimately « modeled after a set of mechanist models.

The second part of this volume deals with the uses and criticisms of Leibniz's teleological principles in the physics of the late 17th and the beginning of 18th centuries. According to Andrea Sangiacomo, Johann Christoph Sturm's natural philosophy, with which Leibniz engages in *De ipsa natura*, as well as Van Musschenbroek's epistemology, constitute important steps in the process of the '*speciation*' of physics. In this case, *speciation* is understood as the process through which the explanation of natural phenomena via empirical regularities comes to define the whole domain of the newly established niche of physics, to the exclusion both of teleology and efficient causality. Tinca Prunea-Bretonnet discusses the respective influences of Leibniz and Wolff on Émilie du Châtelet's *Institutions de physique*. If we contrast an 'idiographic' teleology (which is [p. 9] interested in details and singularities) with a 'nomothetic' one (which is based on the regularities of natural laws), then du Châtelet is definitely closer to the later. Her aim was indeed to ground physics in metaphysical foundations for which the principle of sufficient reason would play a unificatory role. Lastly, Guillaume Coissard studies the paradoxical influence of Leibniz on Diderot's materialism. Indeed, by using the principle of indiscernibles, the principle of continuity and the notion that force is inherent to matter, Diderot develops a materialistic explanation of the apparent order of nature that he opposes to the "empirical finalism" of "Leibniz, Newton and Clarke", as well as to "metaphysical finalism".

The third part of this book investigates the theological use of finalist arguments in the works of Bernard Nieuwentijt and Hermann Samuel Reimarus. Raphaële Andrault distinguishes four kinds of finalities at stake in Nieuwentijt's "scopologia" (general design, teleology of health, particular final causes and organic uses). She shows how the tension between the principle of economy and the assignation of particular final causes in Nieuwentijt's physico-theology perfectly illustrates what Gould and Lewontin have called the problem of 'panglossism' in biology. It was a problem to which Leibniz himself drew attention in different texts. Christian Leduc examines how Reimarus reorients concepts borrowed from Leibniz and Wolff –the principles of perfection, harmony and continuity– in order to realize his own natural religion project. Teleological reasoning is understood with respect to a doctrine aiming at proving not

²⁷ *Discours de métaphysique*, art. 10, A VI 4, 1543.

only God's perfections, but also the effects of the divine wisdom on creatures. Consequently, recourse to final causes in natural philosophy cannot remain at the level of general reasons, as Maupertuis' principle of least action does, but rather ought to be used in the explanation of the specific purpose of beings.

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