Antonio M. Nunziante

Between Laws and Norms. Genesis of the Concept of Organism in Leibniz and in the Early Modern Western Philosophy

Abstract: The word "organism" represents an original keyword of the early-modern philosophical world. As it was first developed by Leibniz, it seems to blend together two different conceptual paradigms: the Cartesian model of the "machines" and the Aristotelian legacy of the "individual natures". According to the first, nature represents itself the prototype of any good mechanical functioning, but at the same time its inner development is explained by the occurrence of a normative dimension that rules the world of primitive forces in the dynamics. For such reasons, the "organism" lexicon is affected by an internal stress that is extremely interesting to analyze for it seems to posit a normative turn acting from the within of a mechanically conceived notion of life.

1 Introduction

As it was first construed, between late Scholasticism and early Modernity, the concept of the organism carried within itself a characteristic dichotomy. This is because two distinct epistemological models, each based on different ontological intuitions, coexisted within it. Using a remark pointed out by Wilfrid Sellars, we can say that the first model was typical of the Aristotelian and late-Scholastic tradition (the so called "thing-nature framework");[1] whereas the second belonged to the nascent tradition of natural sciences and modern mechanics ("event-law lexicon").[2]

1 In this model, the core elements of the framework consist of individuals endowed with their own "nature" (e.g., a fig plant, a labrador dog, an individual named Anthony). According to Sellars, the Aristotelian world is characterized by a realistic intuition regarding individuals: there are flowers, animals, humans, planets; in other words, there are natural individualities endowed with specific forms. Cf. Sellars 1949, p. 565–566.

2 In this case, the dominant aspect is physical legality. For modern scientists there are no "things", but processes governed by mechanical laws. Sellars 1949, p. 566.

Antonio M. Nunziante, University of Padova

https://doi.org/10.1515/9783110604665-002

The purpose of this paper is to analyze the tension subsisting between these two models, namely between the idea of a processuality governed by mechanical laws and the idea of a self-normativity rooted in the nature of individuals. In other words, the idea is to show how the dichotomy between the "thing-nature" and the "event-law" frameworks needs to be better explained, but also made less abstract by considering it from within, analyzing the very way in which the concept of organism had originally been construed.

Taking this internal perspective, we will see how both teleological elements and mechanical categories coexist in this newborn early-Modern concept; it will be also shown, however, that it is somewhat misleading to regiment the question in terms of an abstract dualism.[3]

The topic discussed here thus deals in some ways with a technical issue that would seem to be peripheral to the great themes of modern philosophy (the word "organism" appears only rarely in Leibniz's writings, for instance, and with a very different meaning from subsequent uses of the term.) In actual fact, however, it is by no means a lesser issue, because the semantics of the term have long-lasting metaphysical and epistemological effects that only become fully apparent in the post-Darwinian age.

"Perhaps it will take a long time," wrote Heidegger strikingly, "to realize that the idea of organism and of organic is a purely modern, mechanical-technical concept, so that what grows naturally by itself is interpreted as an artifact that produces itself" (Heidegger 1976, p. 255). The philosopher who is better able than others to help us sketch the details of this theoretical story is undoubtedly Leibniz.

2 The First Occurrences of the Term: The Shift Between Its Countable and Uncountable Meanings

Despite its simplicity, Sellars's remark that in early Modernity the application of the concept of "individuality" to natural phenomena had been based on two different epistemic models has the merit of highlighting an ontological ques-

3 This is something that Sellars does not do, whereas McDowell hypostatizes (probably to an excessive degree) the dichotomy between "space of reasons" and "realm of law" (cf. McDowell 1996, p. 71).

tion that has often engendered many controversies.[4] In some ways, it brings to mind the ancient, never-ending dispute over universals, except that, in this case, the focus of the discussion is not on the ontological status of genera and species. This is because, as Sellars puts it, modern scientists did not know what kinds of things existed until they succeeded in formulating a law that could subsequently be translated into the language of things (Sellars 1949, p. 566).

While the thing-nature framework, in fact, took for granted the existence of natural individualities endowed with properties (the appropriate ontological status of which would have subsequently been discussed), the event-law lexicon questioned the very existence of what common sense presents to us as individual, while concentrating on the procedural dimension of the event and of the laws-of-nature dimension. For the scientist, that there are "things" that have individual shape is part of the immediacy that forms our ordinary experience, but what lies at the deep, primary level of the natural world is the legality of the principles that cause the appearance of such events. Such principles concern the motion of bodies, which could be understood with the aid of phoronomy, kinematics, dynamics, and which pertained, more generally, to the domain of disciplines that comprised the framework of classical mechanics.

The other relevant aspect of this dichotomy regards its characteristic epistemic asymmetry. Although these two levels were often confused in early modern philosophy (at least in Sellars's opinion), the dominant mode of understanding was soon to become the event-law lexicon. The ancient Aristotelian world of forms, substances and properties would in fact regress until it was eventually replaced by Darwinian evolutionary theories.[5] Taking for granted, therefore, the efficacy of Sellars's descriptive tool, which seems to work especially well if applied to long-term historical trends (his analyses are aligned in some ways with Hus-

4 Of course, the diversity of epistemic models described by Sellars cannot be confined in the straitjacket of a merely dichotomous contraposition. This is particularly evident from research on corporeal physiology, in which the contrast between models often became reason for cooperation or contamination. In the seventeenth century, the Aristotelian-Galenic tradition was still very relevant, but there were many overlapping lines of research, from Cartesian iatromechanics to Van Helmont's iatrochemistry (based on the consideration of chemical phenomena linked to fermentation and the production of gases), from Glisson's *fibrillaire* approach to studies like Robert Hooke's "micrographia". As usual, seen from closer up, the picture becomes much less clear. On the topic, cf. Grmek 1990, Duchesneau 1998, Clericuzio 2000, Nunziante 2011.
5 On the distinction/confusion between the two frames of intelligibility, see Sellars 1959, p. 154; p. 162. On the part played by the evolutionary theories in overcoming the manifest image, cf. Sellars 1963, p. 17.

serl's in the *Crisis of European Sciences*),[6] we can however contextualize it better by restricting its field of application. There is a semantic dimension, in fact, characteristic of early Modernity, in which such dichotomous tension displays all its strength, namely the lexical dimension that refers to the world of organisms, organizations and "organic mechanisms".

As it is known, the word "organism" does not exist in Ancient Greek, and it was also very little used in Medieval Latin (Cheung 2006, p. 321).[7] The most striking thing about its first occurrences in the seventeenth century is that the noun "organism" was uncountable, not countable, since it denoted a "mass or complex of things that have the property of being organized" (Pasini 2011, p. 1219). In other words, it referred to a "principle of order" (Cheung 2006, p. 395), and did not mention individuals; this would happen later, towards the end of the eighteenth century. In this case one might say, using Sellars's analytical tool, that the pragmatics of the term is entirely internal to the event-law lexicon: the organism designates a procedural form, a way of organizing, and not a substantial individual. It does not mean "living substance", rather it is the "lifeless disposition of parts": it is that mode of organization necessary to the unfolding of the vital effects of the soul (Cheung 2006, pp. 324–325). To use the language of our proto-Modern ancestors it is an "organic mechanism". There is in fact something more that is needed for there to be life, something that cooperates with the organism: it takes a soul, a plastic nature, a dominant monad. In other words, there is the need of natures endowed with a certain form (be it in the entelechial-Aristotelian sense brought to light by Leibniz, or in the Platonic sense of spiritual principle highlighted by More and Cudworth): that is to say, something that serves as the principle of metaphysical unity.[8] All this naturally represents the other side of the coin, since it refers to the thing-nature framework and it is only by assuming this more specific perspective that we can see why organisms

6 See Husserl 1970, pp. 21–59. On the relevance of Husserl's analysis on Sellars, cf. Hampe 2010.

7 In the first text acknowledged by scholars (tenth-eleventh centuries), an unknown author describes an alchemic method for distilling fluids, and the Greek term "*organismòs*" refers to "an apparatus in which liquids are distilled" (see Cheung 2006, p. 321). In the second text known to us (eleventh-twelfth centuries), the word only occurs in the plural and indicates a "polyphony" of human voices; so it is related to the idea of a melodic harmony, though the text in question refers to a disharmonic tune sung by human voices (see Cheung 2006, p. 321).

8 Ralph Cudworth (1617–1688) and Henry More (1614–1687) were leading figures among the so-called Cambridge Platonists. They believed that there was an echo of divine Reason in the human soul. They assumed the presence in nature of intelligible forms they refer to as "plastic natures" (Cudworth) or "hylarchic principles" (More). Cf. Duchesneau 1998, pp. 149–181.

went on to become the prototype of what we call living beings (as in Kant, for instance).[9]

The peculiar feature of the lexicon of organisms therefore lies in the fact that it establishes a sort of correlation "between metaphysics and physiology" (Pasini 2011, p. 1231). It provides a way to hold together the procedural organization of the body's physiology as well as the metaphysical dimension of its individual form. It is a lexicon that serves as an interface between the legality of the body and the normativity of (living) individuals.

The tension then also reveals its effects on the epistemic level. To understand *scientifically* how the body-machine works, we must refer to the laws governing animal physiology (in his controversy against Stahl, Leibniz argued that the physician must take care of the body, not of the soul).[10] On the other hand, to understand *metaphysically* what a living substance is, we must refer to its intimate normative structure (the dominant monad as the generating principle of an individuality).[11] This consideration raises another issue, which is probably the most decisive of all: in the Cartesian-mechanistic age (and particularly for Leibniz) the world of proper natural objects – in the Aristotelian sense of "things of which the final cause coincides with the formal, and the what-it-is-for and the what-it-is are one" – is a world of machines (Pasini 2011, p. 1229). The expression "organic mechanism", that to us sounds like an oxymoron, was pleonastic before the seventeenth century, since "mechanical" and "organic" simply meant the same thing (Pasini 2011, p. 1217). Nature is essentially a machine ("*horologium Dei*" – Leibniz, A II 1, pp. 22–23), precisely in the sense of a mechanical device whose position is defined by the realm of the law:

> everything must happen in the bodies in such a way that it is possible to explain it distinctly from the very nature of the bodies, that is, from the size, the figure and the laws of motion: this is what I call "mechanical" (*Animadversiones*, p. 68).

The laws of motion explain the mechanical dimension of bodies, and the latter should not be perceived in a metaphorical sense because it is not that bodies *resemble* machines, *they are* machines. The technical-artefactual model becomes

---

9 In Kant's late works, we find both types of occurrence, with "organism" used to mean a "principle of order", and as a generic name for "individuals". See Cheung 2006, p. 331.

10 Georg Ernst Stahl (1659–1734) was a German chemist and physician. He published an important work entitled *Theoria medica vera* (Halle 1708) in which he somehow defended a peculiar form of animism. The book prompted a famous controversy with Leibniz (see Nunziante 2011).

11 The use of the adverbs "scientifically" and "metaphysically" has a rhetorical (though not arbitrary) function in this case.

the epistemological model that encompasses, in a broad sense, the very concept of "natural". But there is more than this, because Leibniz himself gives a further twist to this mechanical ontology, making it almost burst from within. In the multifaceted world of machines (everything around and within us is a machine), some machines in fact have a particular shape. Some are so perfectly machined that they steadfastly remain the same. What Leibniz baptizes with the new name of "natural machines" have the primary feature of always exhibiting an identical form of organization, right down to their smallest details (such an organization is infinite in the sense that it constantly and identically repeats itself). As Deleuze pointed out, "organism" in this context means "machinery" in the sense of something that is perpetually "machined" and it is only these particular types of "natural" machine that will be marked as "living" from then on (Deleuze 1993, p. 8).

In this peculiar dimension *laws* and *norms* meet and merge together to some degree. The main feature, here again, is the organization, or the principle of manifest order in the arrangement of the bodily parts, which can therefore only be understood on the grounds of the laws governing corporeal physiology. This organization, however, differs from that of an artificial machine, which can stop at some point, when it ceases to be organized (when a cog in mechanical gearing breaks off and no longer fits its companion part). The living always remains organized because its organization is the expression of a different normativity that is more than just mechanical and more than physical, because it has to do with information codes that Leibniz sees at the root of an individual living being. The reference is to the world of monads, of primitive entelechies and of those particular types of monad that "dominate" the body-machine, making it "one" (Leibniz 1989, p. 177/GP II, p. 252). The reference here is to a metaphysical normativity that constitutes the generating principle of a "series". But, before coming to this point, it may be better to rewind the tape and analyze some of the general features of the nature-machine paradigm of the Cartesian age.

3 Cartesian Mechanical Embryology and Its Limits

The very concept of "nature" in early-Modern Western tradition is thus a mechanically conceived notion. It is not simply modeled on the pattern of artificial machines, since nature is the prototype of any good mechanical functioning: nature is the *real*, *well-functioning* machine.

The "nature-machine" paradigm is not without problems, however. It works well in describing the mechanical phenomena related to motion and the collision of bodies, but seems limited when applied to the broad array of biological phenomena. Animal physiology was explained in mechanical terms, but this approach was not always very successful and the field of medicine, for instance, provided an extraordinary terrain for comparing theoretical approaches and different practical solutions.

Generally speaking, the biological events relating to animal generation, self-regulation, growth, and deterioration, were those proving most resistant to a mechanical model of causal explanation (Duchesneau 1998, pp. 45–46). The methodological goal of the Cartesian program was actually quite clear: explaining a physical process means specifying the efficient causes that generated it, and this involved providing an adequate representation of the mechanism that, under such circumstances, prompts the occurrence of the physical event in question (Duchesneau 1998, p. 46).

This very idea of proof as a kind of a priori deduction starting from the general level of mechanical principles met with some unexpected difficulties, however, when it came to biological events. In the case of medicine, for example, practical solutions came first and a general theory was formulated afterwards; this meant that the theory was developed retrospectively rather than deductively.

The idea of a universal mechanism dominated the corporeal physiology of animals, as we can see from this meaningful passage from Descartes:

> [In conclusion], I would like you to reflect [...] on how all the functions that I have attributed to this machine, such as the digestion of food, the beating of the heart and arteries, the nutrition and growth of the members [...], how these functions follow completely naturally in this machine solely from the disposition of the organs, no more nor less than those of a clock or other automaton from its counterweights and wheels, then it is not necessary to conceive on this account any other vegetative soul, nor sensitive one, nor any other principle of motion and life, than its blood and animal spirits, agitated by the heat of the continually burning fire in the heart, and which is of the same nature as those fires found in inanimate bodies. (AT XI, *Le monde*, pp. 201–202)

The elements described in the above passage can be found in the human body, as in any other animal. We do indeed have a machine that works like a clock, and our movements can be explained as a kind of "automaton". Yet, all this does not seem to be enough because what is really difficult to explain in the corporeal machine is its self-movement (AT XI, p. 120), which is hard to deduce from anything else – unless such a machine has been made directly by the hands of God (AT XI, p. 120).

In short, the model was that of analogical deduction. A certain vital event was considered (such as digestion, breathing, or homeostasis), any kind of finality or intervention by the soul (as claimed in the previous Aristotelian tradition) was ruled out, and after that an analogy was sought with some known mechanical models. This is what Harvey did, for instance, when he described the blood circulation in the vessels as a closed hydraulic circuit:

> The heart, consequently, is the beginning of life; the sun of the microcosm, even as the sun in turn might well be designated the heart of the world; for it is the heart by whose virtue and pulse the blood is moved, perfected, and made nutrient, and is preserved from corruption and coagulation; it is the household divinity which, discharging its function, nourishes, cherishes, quickens the whole body, and is indeed the foundation of life, the source of all action. (Harvey 1928, ch. VIII, p. 42)

In this passage we have a dizzying transfusion of meanings: mechanical principles are continuously interwoven with metaphors and analogies – to such a degree that each term explains and is explained by the other. The heart is like the sun, which in turn is the heart of the world, and so on.

There was still something not quite right, however, and it was embryology that eventually brought researchers back to square one. In fact, the theoretical problem posed in the case of embryology sounded more or less like this: how can organization be produced from what is not at all organized (the bare extended matter deprived of inner qualities), and how can such a concept be justified by virtue of mechanical categories alone? The theoretical impasse was also partly due to the very notion of knowledge that, in the meantime, had become dominant. For a broad consensus, in fact, "knowing" was referred to as the ability to "re-produce" something, in the strict sense of manufacturing it (we know something insofar as we are capable of reproducing it with our own hands). As a consequence, scientists were driven towards anthropomorphic interpretations of vital apparatuses (what scholars call "technological anthropomorphism"), since they explained them (the functioning of the heart, the kidneys, or homeostasis) by drawing analogies on a horizon of concepts borrowed from a different field of application, namely from the human world of mechanics (Duchesneau 1998, p. 83).

Therefore, on the one hand, it was theoretically forbidden for modern science to explain natural phenomena by appealing to anthropomorphic or zoomorphic concepts, as the pre-Modern natural scientists had done, reducing nature to mere anthropic projections. But on the other hand, in ordinary practice, ample use was made of theoretical models based on such finalistic-mechanical models since the handicraft lexicon *is* an anthropic lexicon (Jonas 1966, p. 10; pp. 109 – 110).

The emergence of this so-called "handicraft-lexicon" had to tackle two further basic difficulties. First, there was the problem of the designer: if nature is essentially a machine, some entity – namely, God – must have designed it. Second, there is the teleological problem of the purposiveness of nature, since everything produced by a designer stems from an intentional plan, but the idea of attributing intentional goals to nature is highly problematic.

As Georges Canguilhem pointed out, a first assumption of the Cartesian theory of life was that, prior to nature, there was God, the great creator of life. A second assumption concerned the everlasting bond established between "life" and "functioning machines" (Canguilhem 1965, p. 112). The "nature-machine" theory implied the acceptance of a kind of axiomatic system of the sort: life exists because God has decided so in creating nature (first assumption); and it has an organized form of a mechanical type (second assumption). Taking this ontological-epistemological framework for granted, which involved accepting some profound theological as well as teleological suppositions, modern scientists attempted to produce theoretical models compliant with this framework.

As a result, the "nature-machine" model suffered from an internal stress that is extremely interesting to analyze. Admittedly, there is a sense in which the metaphor of nature as a universal clock was used to indicate that nature was autonomous in relation to God (clocks are a sort of self-propelled machine, and therefore relatively independent). This humanization of nature did not really remove God from the universe, however; it just made His presence consistent with an epistemology centered on the above-mentioned handicraft-lexicon (we only have true knowledge of what we are able to produce by ourselves). In fact, images of God as the "architect", "artisan" or "watchmaker" of the universe became very popular in the culture of the time. As Leibniz wrote in a brilliant passage of the *Discourse on Metaphysics* (1686):

> It is appropriate to make this remark in order to reconcile those who hope to explain mechanically the formation of the first tissue of an animal and the whole machinery of its parts, with those who account for this same structure using final causes. Both ways are good and both can be useful, not only for admiring the skill of the Great Worker, but also for discovering something useful in physics and in medicine. And the authors who follow these different routes should not malign each other [...] It would be best to join together both considerations, for if it is permitted to use a humble comparison, I recognize and praise the skill of a worker not only by showing his designs in making the parts of his machine, but also by explaining the instruments he used in making each part, especially when these instruments are simple and cleverly contrived. *And God is a skillful enough artisan* to produce a machine which is a thousand times more ingenious than that of our body, while using only some simple fluids explicitly concocted in such a way that only the ordinary laws of nature are required to arrange them in the right way to produce so admirable an

> effect; but it is also true that this would not happen at all unless God were the author of nature. (A VI 4 B, pp. 1564–65 – *italics in the text*)

In some ways, God was humanized, while the vocabulary of production was deified (Husserl, 1970, p. 66). All this posed a hard problem that would be revealed not so much in the Modern age, but after Darwin, because the legacy of a handicraft-lexicon semantically referring to the plan of a divine intentionality was bound to remain highly problematic, since it was unacceptable to the post-Darwinian naturalists. In the Early Modern Age notions like "life", "machine", "organism" were in fact all part of a same semantic set, which was basically consistent with the presence of a Great Craftsman of the universe. Such concepts were doomed to become controversial much later on when, along with the arrival of philosophical naturalism, there came the problem of a design without a designer, and of purposes without intentions (Kitcher 1993; Ayala 2007).

4 Leibnitian Organisms: Percpetive Super-Machines

Among the philosophers of early-Modern times, G.W. Leibniz (1646–1716) was perhaps the one who paid the greatest attention to the issue of a philosophical understanding of life. Leibniz was probably also the author who led the Cartesian mechanistic paradigm towards a new and unexpected normative turn. Although "organism" was not a core word in his philosophical vocabulary, his reflection on the "machines of nature" was destined to become prototypical of the semantic history of the term.

Generally speaking, it could be said that Leibniz saw the notions of "order" and "organization" as coming prior to the concept of machine, intending the former approximately as a "mutual relationship of the parts" (A VI 4 B, p. 1320). In a natural universe with machines scattered all around, there are two basic types of organization: a *finite* one, typical of the machines that, from now on, will be called "artificial machines"; and an *infinite* one, belonging to the so-called "machines of nature", which will be denoted as belonging to living substances. A "finite" organization is unable to replicate itself, as in the case of the parts in the mechanisms of a clock, whereas the capacity to perpetually replicate their internal order is peculiar to living substances.

> We must then know that the machines of nature have a truly infinite number of organs, and are so well supplied and so resistant to all accidents that it is not possible to destroy them. A natural machine still remains a machine in its least parts, and moreover, it always re-

> mains the same machine that it has been, being merely transformed through the different enfolding it undergoes, sometimes extended, sometimes compressed and concentrated, as it were, when it is thought to have perished. (GP IV, p. 482, p. 142)

If we replace "machine" in the above text with "organization", the quoted passage works even better: there is a natural organization that remains organized even in its smallest ingredients. This is the infinite dimension of nature we were referring to: an organization remains steadfastly organized, and persists in preserving the form of its relational identity.

As a consequence, the machines of nature display a greater degree of complexity than artificial ones, as the latter are only supported by a mechanical type of organization. Paradoxical as it may seem, the problem of this latter kind of machine is that, under certain circumstances, the arrangement of its components ceases to be "mechanical" (i. e., functionally organized), and so Leibniz writes in the § 64 of the *Monadology:*

> A machine constructed by man's art is not a machine in each of its parts. For example, the tooth of a brass wheel has parts or fragments which, for us, are no longer artificial things, and no longer have any marks to indicate the machine for whose use the wheel was intended. But natural machines, that is, living bodies, are still machines in their least parts, to infinity. That is the difference between divine art and our art. (Leibniz 1989, p. 221)

Leibniz's unspoken target is the notion of "self-organization" because this marks the dividing line between natural and artificial, and it is highly relevant that such a concept represents an internal development of mechanical categories, to such a degree that he stretched the very program of Modern mechanics beyond its epistemological limits. In fact, the concept of organization exhibits two different levels. On the one hand, it simply indicates something that is already "organized" (in the sense of something that *has been designed* by someone else). In other words, it is a process that in some respects has already been accomplished by an external designer, and it is no longer capable of renewing itself. On the other hand, organization indicates a self-arranging capacity, in the sense of a process directed towards self-preservation through a perpetual re-arrangement of its own structure.

This last remark leads us to clarify another key feature of the living substance: "Corpus viventis est machina sese sustentans et sibi similem producens." (A VI 4 A, p. 568)

The living body is a self-governed system that aims to assure the self-preservation of its own internal organization, and is eventually able to produce new replicating systems. The phenomenon of life accordingly entails a tendency towards self-preservation. In this regard, it is important to emphasize that what

is properly maintained in living beings is the form of their organization, a kind of relational identity, that comes before the atomistic model comprising the system as the sum of (already formed) different parts. In the case of living systems, in fact, it is the relationship of the parts to the whole that remains unchanged, and that is therefore ontologically primary.

This also explains why, technically speaking, the concept of order represents a "simple primitive term" that cannot be further broken down into more basic elements, nor can it be deduced from something else. Using Leibniz's own terminology, the concept of order is a "purely integral" term (*terminus integralis* – A VI 4 A, p. 741): it enjoys a logical-ontological priority because it depends neither on the properties of the parts, nor on the physical properties of matter. It mainly concerns an internal system of relationships, which has the advantage of keeping itself invariant with respect to the shifting of the parts.

In a brief fragment entitled *De machina animata,* Leibniz writes: "By no-one can a body that is perfectly similar to the human body be produced, unless someone is able to preserve the order of the division to infinity." (A VI 4 B, p. 1801) We need to focus on the words he uses here: a living body can be produced only by preserving the order of the division to infinity. It is characteristic of Leibniz's philosophy to connect the mathematical notion of *infinity* to the logical one of *identity*, as well as to the metaphysical notion of *individual*. A notion is infinite, Leibniz says, when "the same reason always exists" (A VI 6, p. 154). The "true infinite" (A VI 6, p. 158), he adds, is the absolute "which is anterior to all composition, and is not formed by the additions of parts" (A VI 6, p. 154).[12] So we can paraphrase the above text from *De machina animata* in the following sense: to produce a living body it is necessary to produce an ongoing self-replicating order that keeps itself steadily identical, and it is only if this strong requirement is fulfilled that the resulting body will be identical to a living one.

Turning to another extremely meaningful passage:

> Corpus vivens est Automaton sui perpetuativum ex naturae instituto, itaque includit nutritionem et facultatem propagativam, sed generaliter vivens est Automaton (seu sponte agens) cum principio unitatis, seu substantia automata. (A VI 4 A, p. 633)

12 Here is another meaningful passage: "Let us take a straight line and prolong it until it is double the length of the first. Now it is clear that the second line, being perfectly similar to the first, may itself be doubled in order to have a third, which is still similar to the preceding; and the same ratio still holding, it is never possible to stop the process; thus the line may be prolonged to infinity, so that the consideration of the infinite arises from that of similarity or from the same ratio, and its origin is the same of that of universal and necessary truths" (A VI 6, p. 158).

A possible translation runs more or less as follows: the living body is a self-moving (*automaton*) and self-preserving machine organized by nature, which thus includes nutrition and the capacity to spread itself. In more general terms, a living being is a self-moving machine that is such by virtue of a principle of unity: the living being is an automatic substance. Perhaps the sense of what we said at the beginning of our analysis has now become more perspicuous: Leibniz seems to bring the mechanism of an entire era to its extreme consequences, because it is as though he were aiming to expand the notion of machine indefinitely, letting the concept of order spring from the very inside of an infinite mechanical logic.

Now here is the point to develop. So far, a kind of phenomenological description of natural machines has been produced, since we have just referred to the observable macroscopic features of continuously self-replicating organic structures. But the question could also be posed more rigorously in the following terms: by virtue of which internal property is the living body actually able to maintain itself? What makes the self-preservation of an organism possible? Such questions bring out another key feature of Leibniz's biological thought, which refers to the Aristotelian tradition of forms and to that "principle of unity" encountered in a previous quotation. Living substances are spontaneously self-organizing machines because they do indeed have an internal principle of unity that effectively makes them "substantial" (i. e., the dominant monad). To come straight to the point, living beings are *perceptive kinds of units*. "Perceptionis gratia sunt organa sensuum; procurandae perceptionis sive actionis gratia sunt organa Motus." (Leibniz 1996, p. 212) The translation here could be read as follows: sensory organs are finalized to perceptions, whereas the aim of organs of movement is to attain new perceptions, in the sense that their purpose is to let corporeal machines exhibit new perceptions (perception and appetite being the peculiar kinds of action performed by living substances).

This passage is important and deserves some further supporting comments. In a somewhat parallel passage, Leibniz observes that "we use the external senses as a blind man uses his stick" (GP VI, p. 499), by which he means that only perceptions enable the animal to orient itself in the world. Though it might seem just a technicality, it is important to emphasize that Leibniz is setting up a conceptual distinction between "motion" and "action".[13] The *motion* of the animal's body has to do with the proper functioning of its organs and the neurophysiology of its corporeal status. It therefore concerns the proper functioning of its heart, muscles, tendons, and everything that can be described in terms of me-

13 The distinction was first made by Leibniz in the dialogue *Pacidius Philaleti* (1676). See A VI 3, pp. 528 – 571 and particularly p. 571.

chanical events (according to the Cartesian tradition). The *action* of the animal, on the other hand, has to do with a completely different lexicon referring to the world of forms contained in the substantial core of the animal's individuality, namely with a lexicon inherited from the Aristotelian tradition.

Although these two distinct levels of explanation work simultaneously and in parallel (bodily motions are explained by bodily motions, and actions by actions), Leibniz nonetheless seems to establish a hierarchy. In a sense, he says that what really matters to the animal's self-preservation primarily concerns its capacity to impress the shape of a representation on the surrounding environment, so he bestows metaphysical priority on the representative dimension of perceptions.

> Now, it is not conceivable how a perception can begin naturally, no more than matter: because whatever kind of machine one can imagine, one will conceive in it nothing but collision of bodies, size, shapes, motions and things which we understand to be very different from perception – which therefore cannot start naturally and neither will have an end. (GP III, p. 344–45).[14]

So there we have it, the distinction between "motions" and "perceptions" (or actions). The mechanism of the animal body's physiology produces shocks, balancing movements, calibrations and adjustments, but perception involves more than just a physical collision. Indeed, in accordance with certain movements of the body some specific perceptions will also be tracked, but it is not epistemologically correct, in Leibniz's view at least, to explain such events by connecting them in a causal way.

Consider the case of the relationship between mind and brain. To us, today, it seems like an old-fashioned metaphysical thinking, but Leibniz's argument is that no-one can hope to exhibit perceptions (in the sense of experiencing them, as from a first-person perspective) simply by recording different neurophysiological tracks.

> Moreover, we must confess that *perception*, and what depends upon it, is *inexplicable in terms of mechanical reasons*, that is through shapes, size, and motions. If we imagine a machine whose structure makes it think, sense, and have perceptions, we could conceive it enlarged, keeping the same proportions, so that we could enter into it, as one enters a mill. Assuming that, when inspecting its interior, we will find only parts that push one another, and we will never find anything to explain a perception. (Leibniz 1989, p. 215 – Monad. § 17)

14 See also GP III, pp. 340–41 for a rather similar passage.

Whether we like it or not, this is the path Leibniz takes and, coming back to the main point, it follows that the animal's self-preservation can be described both in mechanical terms, by referring to the functioning of its corporeal physiology (using the lexicon of motions governed by rules), or by appealing to the internal dimension of its perceptions (using the normative, finalistic-oriented lexicon of actions). In both cases, we are speaking of perfectly well-suited considerations, taking for granted the general harmony of the universe and the consequent validity of the pre-established psycho-physical parallelism.

According to Leibniz, however, the most enigmatic and decisive factor for the preservation of life is represented by the very nature of perception, because here the question becomes: where does the source of the capacity to transform a disrupted multiplicity into a well-connected unity lie? It is precisely in this key unifying element that the secret of the representing act lies, and this explains why perceptions cannot be explained by mere mechanical reasons, and why – at the same time – they are decisive for the nature of living beings. Perception makes living substances capable of homogeneous, unified behavioral responses, since it is always the whole animal machine that reacts to any single environmental stimulus. According to Leibniz, this happens because it is only the perceptual dimension that actually makes the animal body "one". So what kind of properties do perceptions have? What makes them so essential to animal so much so that Leibniz, in several passages, feels the need to say that wherever there is life, there is also perception, and vice versa?

To answer these questions, we need to switch our lexicon, abandoning the mechanical framework of causal explanations. Perception belongs to the realm of actions and Leibniz sees it as the simplest of our cognitive activities, shared by every sort of living being.[15] Perception essentially has to do with an organizing and ordering capacity because, if "order" means "mutual relationship of the parts", then perceptions represent the most basic units of order since they turn the manifold environmental inputs into a single representative output. The most straightforward definition of perception is therefore: "The passing state which involves and represents a multitude in the unity or in the simple substance is nothing other than what one calls *perception*." (Leibniz 1989, p. 214 – Monad. § 14)

The keyword here is "multitude in the unity": a multiplicity of sensory impressions is expressed by the unity of a single passing perceptual representation,

15 As we said, Leibniz establishes a difference between motions and actions. Concerning the latter, and following the Aristotelian tradition, he further distinguishes between acts and actions. See Piro 2002, pp. 55–66; Nunziante 2011, pp. 179–185.

the order coming not from the outside, but from within the simple nature of a substance. By virtue of that, the animal gains a propensity to accomplish an action, since due to the representative content conveyed by the perception (i. e., the specific degree of information displayed by it) it begins to move and to orientate itself in the world. Perception thus gives unitary form to what would otherwise remain a confused background noise. In other words, it transforms the world outside of the animal into a well-ordered environment of viable interactions. The muscles, the heart, and all the necessary motions we mentioned before are concomitant elements of this process, but without such a perceptual implementation the environment would remain silent and the outside of the animal would simply remain an un-decoded wall.

The most extraordinary element of this representational process therefore lies in its formal structure, which does not causally depend on the physiological structure of the animal (within this Aristotelian lexicon, "form" and "matter" are not mutually reducible terms). Leibniz carefully distinguishes the representational content (what is *represented*) from the representative act in itself (i. e., the *representing* act of giving shape to a certain content). He is not very generous with details in this regard, but we can imagine the act of perception as establishing a system of relations that enables the acquisition of every minimal environmental input by ordering it within a framework of differences and comparisons. The core idea is that such a system of relations stands for the identity of the perceived item by substituting the tokened occurrence of the input with an analogical framework of symbolic references made available by the perceiving substance. Going along with this line of reasoning, and using Leibniz's technical lexicon, perceiving thus means *expressing* something with something else. Animal machines do not have any immediate access to the world, but their representation of it denotes the use of a symbolic resource.

Perception therefore contains within itself something of an "ideal" nature, since it already involves a kind of symbolic activity, by means of which every incoming token is displayed as an environmental type. Simply put, the primary skill of what we call "living" lies, to Leibniz's mind, in a kind of categorizing capacity. Living substances transform single tokens of experience into general patterns of representation, and this is only possible by virtue of an innate expressive aptitude:

> That is said to express a thing in which there are relations [*habitudines*] which correspond to the relations of the things expressed. But there are various kinds of expression; for example, the model of a machine expresses the machine itself, the projective delineation on a plane expresses a solid, speech expresses thoughts and truths, characters express numbers, and an algebraic equation expresses a circle or some other figure. What is common to all these expressions is that we can pass from a consideration of the relations in the ex-

> pression to a knowledge of the corresponding properties of the thing expressed. Hence it is clearly not necessary for that which expresses to be similar to the thing expressed, if only a certain analogy is maintained between the relations. (A VI 4 B, p. 1370).[16]

The concept of expression refers to an analogical processing device: certain "occurrences" (*habitudines*) are placed in relation to other occurrences. It indicates a symbolic capacity of putting something in the place of something else ("characters express numbers", in the above quotation) and, in a sense, it is representative as well as innate because, from the mere consideration of that which expresses, we can come to know the corresponding properties of that which is expressed. In their representations, living beings are therefore not dealing directly with things in themselves, but with a system of normatively related symbols. Environmental inputs are placed in an expressive relationship with the established content of a corresponding representation, and this happens according to an internal rule-governed code: "Series est multitudo cum ordinis regula" (A VI 4, p. 1426).

Here is the normative-metaphysical source of the aforementioned "multitude in the unity". The formation of an organic representing individuality is closely related both to the physiological laws governing the corporeal machine ("organism" as uncountable) and to the presence of an internal *regula ordinis*, i.e., a principle of activity capable of generating norm-governed patterns of representations. The code for the order coincides with the metaphysical role of the dominant monad: it is only when the organism dimension (i.e., the corporeal arrangement of the parts) is combined with the unity dimension of the "actuating monad" that the organic aggregate is actually living. In this case, instead of a body mass imbued with decentralized forms of organization, we have a "corporeal substance, which the dominant monad in the machine makes one" (Leibniz 1989, p. 177/GP II, p. 252).

These considerations bring us back to the root of the word organism mentioned at the beginning of our analysis. As we recall, in the Early Modern period, "organism" did not denote a single entity, but rather a form of organization. This organization had a mechanical-phenomenological side consisting of an infinite replication of structures (the natural machine that steadily replicates its same mechanical order), but this process of mechanical replications governed by laws has also revealed a more internal normative-metaphysical dimension: the *regula ordinis* instantiated by the dominant monad, capable of generating sequences of perceptions governed by rules, thereby bestowing a representing individual form on the corporeal machine.

---

16 Other interesting definitions of "expression" can be found in A VI 6, p. 131 and GP II, p. 112.

Something like an environment can only appear to an already well-ordered representing individual substance. Living beings are "mirror of the universe", Leibniz says, in the sense that they can represent the mechanical order of the universe by virtue of their exhibiting the internal *regula ordinis* of their dominant monad. The laws of bodily movement and the activities of the soul are intrinsically coordinated in such a way that "the soul is configured as the essential representative element of the body, and the body as the essential instrument of the soul" (*Animadversiones*, p. 32). Accordingly, "*harmonia*" has the last word in his system because it summarizes the mutual relationship between the mechanical order of the efficient causes (that can be grasped with the aid of mathematical principles) and the formal order of the final causes (that are "bound to metaphysical rules"). The concepts of "organism" and of "life" respectively summarize this state of affairs. By itself, the organism is not alive, it denotes a lifeless disposition of parts. The dominant monad brings life to an aggregate, but can never figure as a disincarnate ingredient of the world ("omnem mentem est organicam" – A VI 3, p. 394).[17] Life is an activity that can only be expressed mechanically (as action in motion), since it is a metaphysical principle of order that presupposes the complementary and integrated presence of a further mechanical dimension. That is why the word *harmonia* is so important to our understanding of the form of Leibniz's philosophical system: it indicates the necessary coexistence of two different and yet mutually integrating orders of legality. The self-normativity of individuals is part and parcel of the rational (mechanical) lawfulness of things.

5 Conclusions

The word organism enshrines different traditions, as it merges together the late-Aristotelian legacy and the lexicon of modern mechanics. Reference to Leibniz has shown us that this was not a mere juxtaposition of different epistemic-ontological models as might be inferred from Sellars's distinction between the event-law lexicon and the thing-nature framework. It entails their profound integration – even if the dominant model was that of mechanical epistemology, at least initially. This is an absolutely pivotal point: for Leibniz, the right approach to the topic of physical legality was that of modern mechanics. In some respects, Leibniz unreservedly embraces the primacy of the "scientific image of the world", and his cosmological conception is radically mechanistic in every re-

17 Cf. Nunziante 2002, pp. 84–85.

spect. The "normative turn" of his thought comes about from within this mechanical paradigm, and can in no way be configured as an external addition to it.[18] Leibniz retrieves the lexicon of substantial forms, deepening his studies on dynamics and discovering the invisible world of forces. It is from this perspective that, little by little, he arrives at the conviction that the principles of mechanics alone are not enough to explain the complex phenomena of bodily organization.

All the analyses conducted to date have done nothing but gravitate around the very concept of "organization", since the great merit of Leibniz lies in his addressing the distinction between "organization" and "self-organization". It is precisely around this distinction that the fusion between the lexicon of the Modern philosophers and the late-Aristotelian tradition eventually came about. "Organization" has to do with the domains of law, of events, of macroscopic and microscopic physics. The idea that there are "bodies within bodies to infinity" (A VI 2, p. 241) is one of Leibniz's earliest beliefs, and stems from researches that were conducted using the microscope.[19] Organization is therefore an uncountable noun that brings out the mathematical dimension of bodies like fractal structures that replicate themselves to infinity.

"Self-organization", on the other hand, is a term that Leibniz does not use directly because it rather designates a conceptual framework that came to be defined by his original reflection on the issue of organized bodies. Self-organization refers to the realm of a finalistic-oriented normativity. It is a dimension, the core element of which is what we might be tempted to call biological individuality – as opposed to physical legality – were it not for the fact that the term "biology" is totally inappropriate in this context because there was still no properly deployed "science of life" in Leibniz's time. But it is by this route that organism will later become a countable noun.

The appeal to substantial forms was motivated by Leibniz having identified the need to find a principle of unity that could explain that vast array of phenomena that today we would define as biological, and that in his time were called "vital". Leibniz is aware of the fact that this principle of unity (the dominant monad that gives form to individuality) must be introduced as a primitive (metaphysical) concept to account for the manifest features of those things that we call living, be they plants, animals or human beings. The passages in which

18 I take up the expression "normative turn" from O'Shea 2007, so as to underscore the peculiar characteristic of Sellars's thinking. *Mutatis mutandis*, I think something similar can be applied to Leibniz too.

19 On the importance of the invention of the microscope in early-Modern philosophy, see Wilson 1995.

Leibniz explains that perceptions and representations "cannot start naturally" (GP III, pp. 340 – 41; 344 – 45) are very relevant: in this context, the word "nature" and the adjective "natural" are declined in an eminently mechanical sense, according to the Modern dimension of the event-law lexicon. Yet, although they are not compatible with the mechanical model, the metaphysical principles of unity, endowed with representative form, must be included as a supplementary integration of such model, just as the lexicon of "persons", according to Sellars, must integrate the conceptual resources of the scientific image of the world.

The concept of life, which is therefore different from the concept of organization, holds together – it has indeed been construed to hold together – the two poles of organization and self-organization: the "organism dimension" and the "unity dimension". It is a concept built on the integration of the two poles, representing their perfect fusion – in Leibniz's intentions, at least.

But this fusion was short-lived because – with the weakening of the Aristotelian legacy in the centuries that followed, and with the eruption of Darwinian evolutionary theories on the scene – the balance was disrupted, and the semantics of life and organisms was renewed by cutting away parts of the material with which it had been built. And the topic of normative factors that "do not begin naturally" became part of the so-called "placement problem" typical of every form of naturalism (De Caro and Macarthur 2010, pp. 1 – 17; Price 2011, pp. 187 – 189).

Abbreviations

AT	Descartes, René (1897 – 1913): Oeuvres, Publiées par Charles Adam & Paul Tannery, Paris: Léopold Cerf Imprimeur Éditeur. seconda edizione a cura di B. Rochot – P. Costabel – J. Beaude – A. Gabbey, 11 voll., Paris 1964 – 74.
A	Leibniz, Gottfried Wilhelm (1923-): Sämtliche Schriften und Briefe, hrsg. von der Deutschen Akademie der Wissenschaften, Darmstadt. [Followed by the number of the series, the volume (and possibly tome), the page number].
GP	Leibniz, Gottfried Wilhelm (1875 – 90): Die philosophischen Schriften von Gottfried Wilhelm Leibniz, VII Bde, hrsg. von C.I. Gerhardt, Berlin, Weidmann (unveränd. Nachdruck Hildesheim, Olms 1960 – 61).
Animadversiones	Leibniz, Gottfried Wilhelm (2011): Animadversiones in G.E. Stahlii Theoriam Medicam. In: Antonio-M. Nunziante (Ed.): Gottfried Wilhelm Leibniz. Obiezioni contro la teoria medica di Georg Ernst Stahl. Sui concetti di vita, anima, organismo. Macerata: Quodlibet, pp. 23 – 121.

References

Ayala, Francisco J. (2007): "Darwin's Greatest Discovery: Design Without Designer". In: John C. Avise, Francisco J. (Eds.): *In the Light of Evolution: Volume I: Adaptation and Complex Design*. Washington (DC): National Academies Press (US); Available from: https://www.ncbi.nlm.nih.gov/books/NBK254313/

Canguilhem, Georges (1965): *La connaissance de la vie. Deuxième édition revue et augmentée*. Paris: Librairie philosophique J. Vrin.

Cheung, Tobias (2006): "From the organism of a body to the body of an organism: occurrence and meaning of the word 'organism' from the seventeenth to the nineteenth centuries". In *The British Journal for the History of Science* 39(3), pp. 319 – 339.

Clericuzio, Antonio (2000): *Elements, Principles and Corpuscles. A Study of Atomism and Chemistry in the Seventeenth Century*. Dordrecht-Boston-London: Kluwer.

De Caro, Mario and Macarthur David (Eds.) (2010): *Naturalism and Normativity*. New York: Columbia University Press.

Deleuze, Gilles (1993): *The Fold. Leibniz and the Baroque*. Trans. by Tom Conley, London: The Atholone Press.

Duchesneau, François (1998): *Les modèles du vivant de Descartes à Leibniz*. Paris: Vrin.

Grmek, Mirko Drazen (1990): *La première révolution biologique. Réflexions sur la physiologie et la médecine du XVIIe siècle*. Paris: Éditions Payot.

Hampe, Michael (2010). "Science, Philosophy, and the History of Knowledge: Husserl's Conception of a Life-World and Sellars's Manifest and Scientific Images". In: David Hyder/Hans-Jörg Rheinberger (Eds.): *Science and the Life-World*. Stanford (CA): Stanford University Press, pp. 150 – 163.

Harvey, William (1928): *Exercitatio anatomica de motu cordis et sanguinis in animalibus*. With an English translation and annotations by Chauncey D. Leake. Springfield, Baltimore: Charles C. Thomas.

Heidegger, Martin (1976): "Vom Wesen und Begriff der *physis*. Aristoteles, Physik B, 1". In: Martin Heidegger, *Gesamtausgabe*, Band 9, *Wegmarken*, Frankfurt am Main: Vittorio Klostermann, pp. 239 – 301.

Husserl, Edmund (1970): *The Crisis of European Sciences and Transcendental Phenomenology*. Evanston: Northwestern University Press.

Jonas, Hans (1966): *The Phenomenon of Life. Toward a Philosophical Biology*. New York: Harper & Row.

Kitcher, Philip (1993): "Function and Design". In: "Midwest Studies in Philosophy" 18(1), pp. 379 – 397.

Leibniz, Gottfried Wilhelm (1989): *Philosophical Essays*. Ed. and trans. by Roger Ariew/Daniel Garber. Indianapolis, Cambridge: Hackett Publishing Company.

Leibniz, Gottfried Wilhelm (1996): *De scribendis novis medicinae elementis*. Enrico Pasini (ed.). In: E. Pasini, *Corpo e funzioni cognitive in Leibniz*. Milano: Franco Angeli, pp. 212 – 217.

McDowell, John (1996): *Mind and World: with a new introduction*. Cambridge, London: Harvard University Press.

Nunziante, Antonio-M. (2002): *Organismo come Armonia. La genesi del concetto di organismo vivente in G.W. Leibniz*. Trento: Pubblicazioni di Verifiche.

Nunziante, Antonio-M. (2011): "Vita e organismo tra filosofia e medicina: le ragioni di una polemica". In: *Gottfried Wilhelm Leibniz. Obiezioni contro la teoria medica di Georg Ernst Stahl. Sui concetti di anima, vita, organismo.* Macerata: Quodlibet, pp. 125–186.

O'Shea James R. (2007): *Wilfrid Sellars. Naturalism with a Normative Turn*. Cambridge (UK), Malden (USA): Polity.

Pasini, Enrico (2011): "Both Mechanistic and Teleological. The Genesis of Leibniz's Concept of Organism, with Special Regard to his 'Du rapport general de toutes choses'. In: Hubertus Busche (Ed.): *Departure for Modern Europe. A Handbook of Early Modern Philosophy (1400–1700)*. Hamburg: Felix Meiner Verlag, pp. 1216–1235.

Piro, Francesco (2002): *Spontaneità e ragion sufficiente. Determinismo e filosofia dell'azione in Leibniz*. Roma: Edizioni di storia e letteratura.

Price, Huw (2011): *Naturalism Without Mirrors*. Oxford, New York: Oxford University Press.

Sellars, Wilfrid (1949): "Aristotelian Philosophies of Mind". In: Roy Wood Sellars/V.J. McGill/Marvin Farber (Eds.): *Philosophy for the Future. The Quest of Modern Materialism*. New York: The MacMillan Company, pp. 544–570.

Sellars, Wilfrid (1959). "Meditations Leibnitziennes". In. Wilfrid Sellars (Ed.): *Philosophical Perspectives*. Springfield, Illinois: Charles Thomas Publisher, pp. 153–181.

Sellars, Wilfrid (1963). "Philosophy and the Scientific Image of Man". In: Wilfrid Sellars (Ed.): *Science, Perception and Reality*. London, New York: Routledge & Kegan Paul, pp. 1–40.

Stahl, Georg Ernst (1708). *Theoria medica vera. Physiologiam et pathologiam tanquam doctrinae mediace partes vere contemplativas, e naturae et artis veris fundamentis, Intaminata ratione, et inconcussa Experientia sistens*. Halae: litteris et impensis Orphanotrophei.

Wilson, Catherine (1995): *The Invisible World. Early Modern Philosophy and the Invention of the Microscope*. Princeton: Princeton University Press.