

Sonderdruck aus:

M. Carrara, A. M. Nunziante, G. Tomasi

**Individuals,
Minds and Bodies:
Themes from Leibniz**

(Studia Leibnitiana Sonderheft 32)



Franz Steiner Verlag 2004

TABLE OF CONTENTS

M. Carrara, A.M. Nunziante, and G. Tomasi (University of Padova), <i>Individuals, Minds and Bodies: An Introduction</i>	7
--	---

Part One: Individuality

1. S. Di Bella (Scuola Normale Superiore di Pisa), <i>Multum interest inter terminos et res</i> <i>On Leibniz' Theory of Distinctions</i>	15
2. G. Rodriguez Pereyra (Hertford College Oxford), <i>Leibniz's Argument for the Identity of Indiscernibles</i> <i>in Primary Truths</i>	49
3. R. De Monticelli (University of Geneve and S. Raffaele University of Milan), <i>Essential Individuality</i>	61
4. W. Lenzen (University of Osnabrück), <i>Logical Criteria for Individual(concepts)</i>	87
5. M. Carrara (University of Padova) and F. Martinello (University of Torino), <i>What do Symmetrical Counterexamples</i> <i>to the Identity of Indiscernibles prove?</i>	109

Part Two: Minds, Bodies

6. N. Jolley (University of California, Irvine), <i>Leibniz and the Excellence of Minds</i>	125
7. H. Busche (University of Hagen), <i>Mind and Body in the Early Leibniz</i>	141
8. C. Calabi (University of Milano), <i>Are Monads Intentional Systems?</i>	159
9. A. Moretto (University of Verona), <i>Physics and Metaphysics</i> <i>in the Leibnizian Foundation of Mechanics</i>	173
10. A. Savile (King's College, London), <i>The Rainbow</i> <i>as a Guide to Leibniz's Understanding of Material Things</i>	193
11. A.M. Nunziante (University of Padova), " <i>Corpus vivens est</i> <i>Automaton sui perpetuativum ex naturae instituto</i> ". <i>Some Remarks on Leibniz's Distinction between</i> <i>"Machina naturalis" and "Organica artificialia"</i>	203

«CORPUS VIVENS EST AUTOMATON SUI PERPETUATIVUM EX NATURAE INSTITUTO». SOME REMARKS ON LEIBNIZ'S DISTINCTION BETWEEN «MACHINA NATURALIS» AND «ORGANICA ARTIFICIALIA» *

by
Antonio Nunziante
(Padua)

One of the most interesting aspects of Leibniz's philosophy is the distinction between "art" and "nature"; the core of this matter is the possibility (or even the impossibility) of distinguishing as clearly as possible between two ontological domains: on one hand the products of technique (such as "artificial machines"), on the other hand all the beings that can be defined as natural ("natural machines"). It is about this philosophical problem that scholars have often disagreed¹. The question is if it is possible to build ontological criteria which can be clear enough to distinguish between the products of nature and those of technique in the field of the "res" that they are. Apparently, Leibniz himself is sometimes ambiguous about this distinction, and this is the cause of the hermeneutic disagreement among scholars, though it also gives the chance to discuss about this subject widely, since this (only apparent) ambivalence seems to have become more and more intriguing.

The aim of my paper is to revise the problem of distinguishing between *natural* and *artificial* machines in Leibniz's thought: I will consider some of his own argumentations and analyse the results of the most recent studies in this matter. I found my essay on two presuppositions: one, based on theoretical ground is that we must start from the concept of *life* (and also those of *living being* and *organism*, which are strictly related to it) in the Leibnizian corpus; the other is that we can find very useful the use of the various texts in

* I would like to thank Dr. S. Pavan for his precious help in the translation of this paper.

1 Among the most recent studies, see M. Schneider: *Leibniz über Geist und Maschine, Philosophisches Jahrbuch* 92 (1985), pp. 335-352; A. Sutter: *Göttliche Maschinen. Die Automaten für Lebendiges bei Descartes, Leibniz, La Mettrie und Kant*, Frankfurt a.M. 1988; A. Ibrahim: *La machine naturelle: trame de la vie et chaîne des vivants, Studia Leibnitiana, Supplementa XXXIV* (1995), pp. 643-656; D. Schultess: *Machines finies et machines infinies chez Leibniz, Studia Leibnitiana, Supplementa XXXIV* (1995), pp. 633-642; E. Pasini: *Corpo e funzioni cognitive in Leibniz*, Milano 1996; W. Kogge: *Blinde Spiegel. Zur Konzeption der künstlichen Maschinen bei Leibniz*, in: *Akten des VII Internationaler Leibniz-Kongress, Berlin 10-14 September 2001*, Bd. II, pp. 628-635.

the edition of the Academy A VI 4 so that we can have a solid philologic ground from which we should start a fruitful discussion. I therefore use, at least at the beginning, quotations from not so well-known texts (most of which have been edited in the early eighties), so that I will be able to relate my studies to more recent texts (edited in the late nineties) with a new hermeneutic point of view.

1. The definition of "life" in the texts of the Eighties

In a text written approximately in the summer of 1685 and entitled by its editors *De totae cogitabilium varietatis uno obtutu complexione*, Leibniz gives an extremely interesting distinction of the "thoughtable" things of the universe. He divides every possible and imaginable thing in *Metaphysical*, *Mathematical*, and *Physical*. Under the domain of metaphysical thought he puts the *substantiae spirituales* such as God, Mind, Soul, Entelechy or Substantial Form; under the mathematical domain the concepts of *time*, *punctum*, *line*, *superficies*, *solid* and so on; under the domain of the "*Res Physicae*" are included the *corpora*, that can be divided into two big sub-categories: "*Materiae*" and "*compages*"².

This last distinction is particularly interesting also from a lexical point of view and must be analysed more attentively. Actually, further on Leibniz specifies more clearly his division by observing that *materiae* are all the things which look homogeneous to our perception. These can be *primariae* (fire, air, water and earth) or *secundariae* (i. e. the things that derive from the former, such as ash, dust, metals, fluids and so on). The *compages* are *structured aggregations of matter*, such as the whole world, in the sense of an aggregated union of sky, stars and earth, or *bodies* and the *worldly species*³.

It is important to consider these subtle distinctions which can be found in

- 2 «Res possis dividere in Metaphysicas, Mathematicas et Physicas. Metaphysicae sunt substantiae spirituales, ut Deus, Mens, Anima, Entelechia seu Forma substantialis. Mathematicae sunt Tempus (ut aeternitas, aevum, seculum, annus, dies, hora), Spatium, ut Punctum, Linea, Superficies, Solidum, varietate lineae, et figurae, et quae in his existere intelliguntur. [...] Res Physicae sunt Corpora, quae sunt Materiae et compages». See *De totae cogitabilium varietatis uno obtutu complexione*, A VI 4, A, pp. 596-597.
- 3 «Materias voco quae Homogenea nobis videntur; compages quae ex his struuntur. Materiae primariae sunt ignis aër, aqua, terra, secundarias vero ad has referimus, alia enim Homogenea sunt ignea ut flamma fulgur; qua occasione referri huc etiam possunt, quae ignea non sunt, attamen ignem comitantur; ut fumus (qui est aër quidam) fuligo et cinis (quae terrea sunt) [...] Sequuntur Compages nempe Mundus Mundanaeque corpora et species», cfr. *ivi*, p. 597. In other texts – always in the same years – Leibniz considered how non-structured elements (such as salts, stones, metals, fluids and so on) «ad sensum sunt similaria», see *Genera terminorum. Substantiae* (1683-1685), A VI 4, A, p. 567.

the texts of the first half of the eighties because they may give us the right key to understand the theoretical core of later conceptualization of beings of nature. In another text of the same period – *Genera terminorum substantiae* (edited between 1683 and 1685), Leibniz uses the same classificatory scheme, observing that "*corpora*" can be "*similaria*" or "*dissimilaria*", which means that either a) the result of a "*perfect*" mixture of materials *similar* to the senses (as in the primary elements), or b) the result of an "*imperfect*" mixture of more primary (or secondary) materials, which gives thus birth to "*Entia per aggregationem*", i. e. aggregations of heterogeneous or "*dissimilar*" elements⁴. With «*corpora similaria*» (a) we are to deal with beings which are always "*inanimate*", whereas with «*corpora dissimilaria*» (b), i. e. beings of aggregation, the analysis is more complex, since the latter can be distinguished into «*perturbata*» or «*organica seu machinam componentia*»⁵. In both cases we talk about beings of aggregation, although the specific aggregative modalities change and subsequently the specific result of their conformation. According to this text, the gathering of dissimilar elements can take place or in a *confused* and *disorderly* way (i. e. a jumble of wood) or in a *orderly disposition of the part*, which, in this case, constitutes the basic structure of that particular aggregative modality which Leibniz calls «*machina*»⁶. Or rather: a unity of distincted parts in which each element can be seen as an "*instrument*" (ὄργανον) related to the others to imply a specific function constitutes the essential structure of what Leibniz defines with generic terms as "*machina*": this is the reason why in his later books he will constantly call the living beings "*natural machines*".

Notwithstanding, this does not yet mean a valid criterion to distinguish what is "*living*" («dans toute la nature corporelle il n'y a que des machines» he writes in a letter to Arnauld)⁷, but to do so we must consider what the various *factors of organization* which are the basis of the formation of aggregative structures of each natural machine (both living and not living). The *organized* disposition of the elements in a specific being can take place or through a third element, by realizing a previous project leading to an *artificial construction* of a *compages* – the so-called «*organica artificialia*»; or it can take place *spontaneously* carrying out the double vital function of (i) *self-sustenance* and (ii) *reproduction*. Leibniz thinks that it is in this determination which the primary cell of *life* can be found. This is characterised by two

4 *Ibid.*

5 «Corpora inanima sunt vel imperfecte mixta de quibus manifeste constat esse Entia per aggregationem, vel sunt imperfecte mixta, quae fere ad sensum sunt similaria, ut Elementa, salia, lapides, metalla, terrae, liquores, olea, spiritus, aliaque id genus sive natura, sive artefacta. Possumus distinguere corpora in similaria et dissimilaria, et haec in perturbata et organica seu machinam componentia. Notatur autem omnia organica produci ex seminibus a simili decisis. His addenda organica artificia». See *ibid*

6 *Genera terminorum substantiae*, A VI 4, A, pp. 566-567.

7 GP II, p. 96.

basic functions guaranteeing respectively (i) *subsistence* of the being organized as an *individual* (through *nutrition*), and (ii) its *reproduction* as *species* (through the generation of a similar being): the «*living body*» has its first correct definition as

«Machina sese sustentans et sibi similem producens»⁸.

Life, in its primal manifestation, is seen by Leibniz as a *spontaneous activity with the purpose of self-preservation*, realized through the organization of its own constitutive elements in one orderly unity, in which each element is made functional to the fulfilment of that primary purpose which is preserving life itself. Since the matter in itself has no whatsoever unity, this spontaneous structuring of the material parts in one unity can take place only thanks to the activity of a *formal principle* which cannot be reduced to a material determination – the *entelechy* – and for this very reason it is able to *substantiate* a *compages* and to make it *one, spontaneously active* («*automata*») and therefore *self-organizing*⁹. The most appropriate definition of “*living body*”, given by Leibniz in the mid-eighties, is:

«*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*»¹⁰.

It is interesting to note that the essential aspect of a living being is the fact of being a «*sponte agens*», since – as he observes later on in the text – non-propagative “*natural machines*” could exist, but it is enough the presence of a substantial form to make «*automata*», i. e. *living*, the matter structured by that¹¹.

It is within this theoretical context that Leibniz uses for the first time, in a short fragment, written between April and October 1686, the term “*organism*”

8 *Ivi*, p. 568.

9 As Leibniz observes in his *Comunicata cum Fardella*, the unity of a corporal substance cannot be found in its material determinations, on the contrary «*necesse est dari praeter corpus Organicum substantiam individuum permanentem toto genere diversam a natura corporis*», see A VI 4, B, p. 1669. On the structural relation between “*organism*” and «*unum per se*», due to its peculiar “*biological indivisibility*” which characterises the former as “*living unity*”, see H. Ishiguro: *Is there a conflict between the logical and metaphysical notion of unity in Leibniz?* in: *Akten des VII Internationaler Leibniz-Kongress, Berlin 10-14 September 2001*, Bd. I, pp. 535-541.

10 This definition is taken from *Tabula notionum praeparanda*, edited by Leibniz between 1685 and 1686 to define the fundamental concepts to use in the elaboration of a *scientia generalis*, and therefore, as the editors say, we are talking about more accurate definitions compared to those which can be found in his various notes of the same period. See *Tabula notionum praeparanda*, A VI 4, A, p. 633.

11 Leibniz writes about the restriction of the field given in the last part of his own definition of *living*: «*Et haec malim nam quid prohibet esse machinas naturae sui non propagativas? Interim revera omnis substantia est automata, quia tamen hoc initio praevideri non potest, licebit sic definire*», see *ibid.*. Schneider observes how the element of spon-

which distinguishes in an essential way the spontaneous self-organization of *machinae naturales* and that extrinsic of *entia artificialia*¹². The organism is that *unum per se* which articulates itself in various functions, reciprocally related, in order to achieve that superior purpose, i. e. self-substantiation: from this point of view, although each part, even the smallest one, is *full of organisms*, (i. e. it is itself organized), still it remains «*one*», i. e. indivisible, albeit the continuous flux of changes of its material external components (which can hypothetically be mutilated or cut off without varying its unitarian structure)¹³.

2. The infinite structural replicability of organisms: a comparison between art and nature

It is worthwhile to analyse more thoroughly this distinction with more elements from other texts of the second half of the eighties and early nineties. If it is true that «*omne corpus utcumque exiguum habet partes actu infinitas; et in omni pulvisculo esse Mundum quendam innumerabilium creaturarum*»,

taneity in natural machines is a sort of physiological reflex of the soul's capacity of perceiving itself («*in seipsum agere*») and that this factor is the only criterion authentically discriminating compared to the products of the technique: see M. Schneider: *Leibniz über Geist und Maschine*, pp. 349-350. See also E. Pasini: *Corpo e funzioni cognitive in Leibniz*, pp. 200-204.

12 «*Le rapport general et exact de toutes choses entre elles, prouve que toutes les parties de la matiere sont pleines d'organisme. Car chaque partie de la matiere devant exprimer les autres et parmy les autres y ayant beaucoup d'organiques, il est manifeste qu'il faut qu'il y ait de l'organique dans ce qui represente l'organique*», see *Du rapport general de toutes choses*, A VI 4, B, p. 1615. It is between spring and autumn of 1686 that Leibniz uses for the first time the term «*organism*», although the editors are quite prudent and some do not exclude that this fragment might have been written few years later: in fact, the first date of the *Vorausedition* of A VI 4 indicates a larger period of time (from 1677 to 1695). What has been now acknowledged as certain is that the text published by Couturat, p. 16 of *Opuscules* (whose source is LH IV, 1, Bl. 15), where there was the word «*organismus*», and whose date of composition was thought to be 1676 (see L. Couturat: *Opuscules et fragments inédits de Leibniz, Extraits des manuscrits de la Bibliothèque royal de Hanovre*, par Louis Couturat, Paris 1903 (reprint Hildesheim 1961 and 1966, p. 16), has been postdated by the editors of the Academy to 1708 (I owe this information to Prof. Schepers). For a historic reconstruction of this matter, see A. Nunziante: *Organismo come Armonia. La genesi del concetto di organismo vivente in G.W. Leibniz*, Trento 2002, pp. 116-123.

13 In the afore-mentioned letter to lady Masham of May 1704, Leibniz observes that «*ny le fer ny le feu, ny toutes les autres violences de la nature, quelque ravage qu'elles fassent dans le corps d'un animal, ne sauroient empêcher l'ame de garder un certain corps organique, d'autant que l'Organisme c'est à dire l'ordre et l'artifice, est quelque chose d'essentiel à la matiere produite et arrangée par la sagesse souveraine, la production devant toujours garder les traces de son auteur*», see GP III, p. 340.

we must understand what this means if we want to distinguish the different organizational modalities of a natural machine compared to that of any artificial being¹⁴.

The idea that, given a «*divisionem rerum in infinitum*», it is possible to consider any speck «*instar sylvae aut piscinae*» where there are «*ingentes animalium greges*», might represent one of the oldest and most solid theses of the Leibnizian thought (it can be found in *Hypothesis physica nova*, too). On the other hand it is one of the most problematic because of its reference to the *infinite*¹⁵. If to an «external» observer (who does not know whether an automaton has a soul) the difference between «natural» and «artificial» lies primarily on the external recognition of the different aggregative modalities that structure macroscopically the whole form of a machine, he will be led to think (because of the infinitesimal structure of the matter) that it is impossible to recognize the limits of the material organization of a living being, unlike those of any other artificial machine¹⁶. The texts help us to dissolve the ghost of the labyrinth of *continuum* related to the problems raised by the micro-structural composition of organisms. In the epistolary with Arnauld it is Leibniz himself to raise the problem: taken for granted that the aggregates do not possess a solid individual consistence (which is due to «the pressure of close bodies»), and that their particular conformation is due to a pure juxtaposition of various material elements, if the latter have no substantial root and are divisible to infinity, it could be easily thought that the whole physical world runs the risk of collapsing into a bunch of sand «*sine calce*»¹⁷. However, the answer is negative, in the sense that, even if we assume that «dans toute la nature corporelle il n'y a que des machines», it is necessary according to Leibniz that «s'il y a des agrégés des

14 *Specimen inventorum de admirandis naturae generalis*, A VI 4, B, p. 1623.

15 *De firmitate, vi elastica, explosione, attractione*, 1690, A VI 4 C, p. 2082; e A VI 2, p. 241. The image of material cells containing infinite worlds of creatures can be found in several texts. See *De mundo praesenti*, A VI 4, B, p. 1510; *De corpore et substantia vere una*, A VI 4 B, p. 1672; *Principia logico-metaphysica*, A VI 4, B, p. 1648; *Considerations sur les Principes de Vie, et sur les Natures Plastiques* (1702), GP VI, pp. 539-540; *Monad.*, §§ 65-66, GP VI, p. 618.

16 F. Duchesneau: *Les modèles du vivant de Descartes à Leibniz*, Paris 1998, p. 329-330.

17 «Les corps fermes n'ont peutêtre leur parties unies que par la pression des corps environnans et d'eux mêmes, et en leur substance ils n'ont pas plus union qu'un monceau de sable, *arena sine calce*», see *Leibniz an Arnauld*, 30 april 1687, GP II, p. 101. About the problem of physical consistence, as well as that ontological of the aggregates, see H. Burkhardt: *Aggregate, Studia Leibnitiana, Supplementa XXXIV* (1995), pp. 307-319; and the analyses of R.M. Adams: *Leibniz: Determinist, Theist, Idealist*, New York - Oxford 1994, pp. 241-261; see also Rutherford: *Leibniz and the Problem of Monadic Aggregation*, in: *Archiv für Geschichte der Philosophie* 76 (1994), pp. 65-90; Chr. Schneider: *Bodies as Aggregates and Bodies ad Phenomena - Towards a Coherent Story*, in: *Akten des VII Internationaler Leibniz-Kongress, Berlin 10-14 September 2001*, Bd. III, pp. 1130-1137; M. Mugnai, *Introduzione alla filosofia di Leibniz*, Torino 2001, pp. 127-163.

substances» there must be at the same time «*veritables substances dont tous les agrégés resultent*», which means that every aggregated being «*suppose des estres doués d'une veritable unité*»¹⁸. This affirmation is so true that can be seen as an «axiom» which Leibniz formulates thus: «ce qui n'est pas véritablement un estre, n'est pas non plus véritablement un estre»¹⁹.

The first consequence of this is that, although the whole unity of the aggregates seems to lead to an only mental perception (which makes the subject think that the object is as *one*, though it does not have a unity *in se*), yet the minimal structures of the composition is strictly related to a *substantial fundament* which makes them subsistent as vital core with their own autonomy. The matter thus shows itself as a complex of minimal aggregations, each subject to further division, not according to ideal lines of mathematic «continuity» (which would take us into the labyrinth of continuum) but along the real veins of a *physical contiguity* since the matter «est divisée actuellement d'une maniere déterminée»²⁰. From this point of view the division of material elements of an aggregate must not be seen as an indetermined *pulverization* generating a homogeneous infinity of non-extended puncta, but rather a curling of the matter into folds smaller and smaller, each of which keeps its own physical consistency together with specific qualities²¹.

Another interesting consequence about the theme of inorganic structure of aggregates is this: «*etsi non omnia corpora sint organica, tamen in omnibus etiam inorganicis latere organica*»²², which expresses an old idea of Leibniz

18 *Leibniz an Arnauld*, 30 April 1687, GP II, p. 96.

19 *Ivi*, p. 97.

20 In a letter of October 1705 to princess Sophie, Leibniz explains clearly this matter: «Or quant à la difficulté, je répons qu'il est vray que cela n'empêche point la matiere d'estre composé de substances simples et indivisibles, puisque la multitude de ces substances ou de ces Unités est infinie. Cependant il n'est pas de même du corps Mathématique ou de l'espace qui est quelque chose d'ideal, et qui n'est point composé de points [...] C'est que la matiere, que le decours des choses, qu'enfin tout composé actuel est une quantité discrete, mais que l'espace, le temps, le mouvement mathématique, l'intension [...], enfin tout ce qui donne une estime qui va jusqu'aux possibilités, est une quantité continuée et indéterminée en elle-même, ou indifférente aux parties qu'on y peut prendre, et qui s'y preneent actuellement dans la nature. La Masse des corps est divisée actuellement d'une maniere déterminée, et rien n'y est exactement continué; mais l'espace ou la continuité parfaite qui est dans l'idée, ne marque qu'une possibilité indéterminée de diviser comme l'on voudra», GP VII, p. 562.

21 We know that, in order to make this process easier, Leibniz uses in *Pacidio Filalete* (October-November 1676), the image of folds which can be found in a gown, see A VI 3, p. 555. «Etsi enim concedam, nullam esse portionem materiae, quae non actu sit secta, non tamen ideo devenitur ad elementa insecabilia, aut ad minimas portiones, imo nec ad infinite parva, sed tantum ad minores perpetuo, et tamen ordinarias», see GM 3, p. 524.

22 See *Antibarbarus Physicus pro Philosophia Reali contra renovationes qualitatum scholasticarum et intelligentiarum chimaericarum*, GP VII, p. 344.

from his period in Paris. This means that the difference between the organicity of natural machines and the inorganicity of *entia artificialia* does not affect the material elements forming its composition, but rather the various relational functions which exist among the infinite organic microstructure of organic (as well as inorganic) bodies. With inorganic aggregates, such as stones, we can find minimal organic structures *coexisting independently one from another*, without an emerging substantial form, which creates a functional relation («organic») between the parts on its basic perceptive unity. Their «conformation» is reducible only to the physical «contact» due to their spatial contiguity and excludes any form of reciprocal activity, so that these remain «irrelated» from one another. This is the very reason that leads Leibniz, in a letter to Arnauld, to put the question in these terms:

«Je tiens donc qu'un quarré de marbre n'est pas une seule substance accomplie, non plus que le seroit l'eau d'un estang avec tous les poissons y compris, quand mêmes toute l'eau avec tous ces poissons se trouveroit glacée; ou bien un troupeau de moutons, quand mêmes ces moutons seroient tellement liés qu'ils ne pussent marcher que d'un pas egal et que l'un ne pût estre touché, sans que tous les autres criassent»²³.

In the organisms, as we have seen, the fundamental element of their vitality is their reciprocal correlation, which takes place in various organic components, and which is the expression of the activity of the soul. In other words, it is this very *formal* capacity of the latter that makes it possible to *activate* the multiple organic functionalities of the parts and to *relate them into one dominant expressive unity, which subordinates the role of the infinite organic «folds» of the matter to the superior point of view of life within the whole organism and therefore of its self-sustenance*. Since the days of his epistolary with Arnauld, Leibniz seems to understand the complexity of the relation between the vital centres of the organism, especially when he warns his readers from considering the soul of the whole organism, «form du tout», as if it were «composée des ames ou formes des parties», and not as an expression of a superior activity not deducible from a subordinate organicity of its material parts:

«J'avoue que les corps à part, sans l'ame, n'a qu'une unité d'aggregation, mais la réalité qui luy reste provient des parties qui le composent et qui retiennent leur unité substantiel-

23 GP II, p. 76. In *Considerations sur les Principes de Vie, et sur les Natures Plastiques* (1702), Leibniz, explaining the consequences of his argumentation, observes: «Il est vray (selon mon Systeme) qu'il n'y a point de portion de la matiere, où il n'y ait une infinité de corps organiques et animés; sous lesquels je comprends non seulement les animaux et les plantes, mais encor d'autres sortes peutestre, qui nous sont entierement inconnues. Mais il ne faut point dire pour cela, que chaque portion de matiere est animée, c'est comme nous ne disons pas qu'un étang plein de poissons est un corps animé, quoyque le poisson le soit», see GP VI, pp. 539-540. Similarly, in his epistolary to Stahl, he observes that a waterpool «animalibus abundare potest, ipsa animal non est», as well as in a stone there are living or organic beings, but as a whole the stone cannot be considered a living being, see *Animadversiones Circa Affectiones aliquas Theoriae Medicae verae Clar. Stahlii*, D II 2, p. 134.

le à cause des corps vivans qui y sont enveloppés sans nombre. Cependant quoyqu'il se puisse qu'une ame ait un corps composé de parties animées par d'ames à part, l'ame ou form du tout n'est pas pour cela composée des ames ou formes des parties»²⁴.

In fact, it is from the second half of the nineties that, analysing more attentively these results, Leibniz writes in his own new philosophical lexicon the hierarchic relation between the vital components of the organism in the terms of a harmonic relation between a «dominant monad» (or «central») and «infinite subordinate monads»²⁵. What is most interesting about it is not a revision of the new theoretical co-implications that have followed the notion of monad in the conceptual redefinition of substance (which Leibniz did in the last two decades of his philosophical activity and which is the subject of several studies)²⁶, but rather the specific theme of the difference between organized substances and inorganic bodies, in order to put in evidence the functional link to other argumentations in the texts here analysed and the theoretical distinction between «Nature» e «Art», which dates back to the second half of the nineties, more precisely to the publication of *Systeme nouveau* in «Journal des sçavans» in June 1695.

It is in this last essay that Leibniz writes how the distinction between «natural machines» and «artificial machine» must be considered, as a difference that «ne consistant pas seulement dans le degré, mais dans le genre même». This is a very famous essay, but it may be useful to quote entirely one of the central part where he develops his thoughts with polemic reference to his contemporaries:

«Je suis le mieux disposé du monde, à rendre justice aux modernes; cependant je trouve qu'ils ont porté la reforme trop loin, entre autres en confondant les choses naturelles

24 GP II, p. 100.

25 See the letter, often quoted by scholars, to De Volder 20 June 1703, GP 2, p. 252. See also GP VI, p. 599.

26 See D. Garber: *Leibniz and the Foundations of Physics. The Middle Years*, in: *The Natural Philosophy of Leibniz*, edited by K. Okruhlik and J.R. Brown, Dordrecht 1985, pp. 27-129; and D. Garber: *Leibniz: Physics and Philosophy*, in: *The Cambridge Companion to Leibniz*, edited by N. Jolley, Cambridge 1995, pp. 270-352; A. Robinet: *Architectonique disjonctive, automates systémiques et idéalité transcendentale dans l'œuvre de G.W. Leibniz*, Paris 1986; N. Jolley: *Leibniz and Phenomenalism*, in: *Studia Leibnitiana* 18 (1986), pp. 38-51; C. Wilson: *Leibniz's Metaphysics: A Historical and Comparative Study*, Princeton 1989; G. A. Hartz: *Leibniz's Phenomenalisms*, in: *Philosophical Review* 101 (1992), pp. 511-549; R.M. Adams: *Leibniz: Determinist, Theist, Idealist*, New York - Oxford 1994; D. Rutherford: *Leibniz and the Rational Order of Nature*, Cambridge 1995; R.T.W. Arthur: *Infinite, Aggregates and Phenomenal Wholes: Leibniz's Theory of Substance as a Solution*, in: *Leibniz Society Review* 8 (1998), pp. 25-45; J.E. Smith: *On the Fate of Composite Substances After 1704*, in: *Studia Leibnitiana* 30 (1998), Heft 2, pp. 204-210; P. Phemister: *Leibniz and the Elements of Compound Bodies*, in: *British Journal for the History of Philosophy* 7 (1999), pp. 57-78; B. Look: *Leibniz and the "Vinculum Substantiale"*, in: *Studia Leibnitiana, Sonderheft* 30 (1999); M. Mugnai: *Introduzione alla filosofia di Leibniz*, Torino 2001.

avec les artificielles, pour n'avoir pas eu assez grandes Idées de la majesté de la nature. Ils conçoivent que la différence qu'il y a entre ses machines et les nôtres, n'est que du grand au petit. Ce qui a fait dire depuis peu à un très habile homme [Bernard Le Bovier de Fontenelle, A.N.], qu'en regardant la nature de près, on la trouve moins admirable qu'on n'avoit crû, n'estant que comme la boutique d'un ouvrier. Je crois que ce n'est pas en donner une idée assez juste ny assez digne d'elle, et il n'y a que nostre système qui fasse connoître enfin la véritable et immense distance qu'il y a entre les moindres productions et mécanismes de la sagesse divine, et entre les plus grands chefs d'œuvre de l'art d'un esprit borné; cette différence ne consistant pas seulement dans le degré, mais dans le genre même. Il faut donc sçavoir que les Machines de la nature ont un nombre d'organes véritablement infini, et sont si bien munies et à l'épreuve de tous les accidens, qu'il n'est pas possible de les détruire. Une machine naturelle demeure encore machine dans ses moindres parties, et qui plus est, elle demeure toujours cette même machine qu'elle a été, n'estant que transformée par des différens plis qu'elle reçoit, et tantost étendue, tantost resserrée et comme concentrée lorsqu'on croit qu'elle est perdue»²⁷.

At first sight this passage seems to give two different theses, the first that (i) a natural machine possesses an «infinite» number of organs, unlike an artificial machine; the second that (ii) the parts of a natural organism remain «machines» even in the infinite «folds» of their material components, while in the artificial beings this does not happen²⁸. Yet, in this case, the distinction between Art and Nature would be demoted to a simple matter of *complexity of degree*, which is exactly what Leibniz excludes when he refers polemically to the position of his contemporaries. According to the text the difference existing between natural and artificial organisms is rather of «genre» and in order to get fundamental meaning of this distinction we must try to grasp the essential link which relates his two theses (i and ii)²⁹.

27 *Système nouveau de la nature et de la communication des substances, aussi bien que de l'union qu'il y a entre l'âme et le corps*, GP IV, pp. 481-482. Other passages can be found in various later texts. Among them, see *De ipsa natura*, GP IV, pp. 503-504; *Considerations sur les Principes de Vie, et sur les Natures Plastiques*, GP VI, p. 544; and *Monad.*, § 64, p. 110.

28 On conceptual characterization of the «natural machines» compared to the «artificial machines», see A. Ibrahim: *La machine naturelle*, pp. 643-656; D. Schultess: *Machines finies et machines infinies*, pp. 633-642; W. Kogge: *Blinde Spiegel*, pp. 628-635.

29 D. Schultess sees in these two ideas of Leibniz two couples of theses and antitheses reciprocally distinguished and independent from one another: I. «the parts of the organic machines are other machines» (and its correspondent negation, in the case of artificial machines); II. «in the organic machines there are parts unendingly folded» (and, again, its negation with artificial machines). See D. Schultess: *Machines finies et machines infinies*, pp. 635. Since Leibniz, in the text previously quoted, does not create a rigid separation between the two theses, I do not find it necessary to do so: on the contrary, I believe that between the two couples of theses and antitheses there is a fundamental link, which derives from the specific way adopted by Leibniz to define the infinity of «folds» in natural machines.

First of all, we must remember that the «infinity» of organisms in natural machines cannot be thought as a *mathematic continuity* (valid only for ideal beings), so that the difference between a natural being and an artificial being would be an infinite divisibility of the material components of the former, because there is no matter in the universe which does not contain (either this is divisible or not) an infinite multiplicity of organic elements. More precisely, Leibniz writes that there is an *infinite replicability of structure* (in the natural machines), in the sense that in every fold of an organism there is *the same relation of order between the parts*, which is not reducible to a *determined concatenation* of material factors, but to a relation of reciprocal co-implication in an organic body between the body as a whole (dominant monad) and its organs. This is the *qualitative* element that the *mechanism* is «incapable de produire ne nouveau»³⁰, and it cannot be found in an artificial being, since each of its parts has organic material structure, and furthermore this being is relatively independent, in the singularity of its structure, from the project in which it is extrinsically put: between the whole and its parts there is a relation of order put from the external, which is not (because of this very reason) intimately (or «spontaneously») self-articulating³¹.

Moreover, the relation of non-identification found by Leibniz between the vital organisation and the material conformation of the parts explains the infinite replicability of the relations of order (in living organisms), and also the «indestructibility» of the latter, since they cannot be damaged or annihilated.

30 In *De machina animata* (1685), Leibniz writes: «a nemine posse fabricari corpus humano perfecte simile, nisi qui possit servare Ordinem dividendo in infinitum. Itaque nulli angelo possibile est hominem vel ullum animal verum formare, nisi ex semine, ubi jam aliquo modo praexistit. Facere posset machinam, quae forte externa specie non satis examinanti hominem mentiretur, revera homo vel animal non esset», A VI 4 B, p. 1801. But see also GP VI, p. 544. Schneider observes that the limit decided by Leibniz about the possibility of reproducing artificially a living organism is a «factual», but not a «theoretical» limitation: artificial machines, he writes, are made of a number of elements which is *finite* only «to us», in the sense that their finity is actually due to «our» limitation as finite beings, but does not have the value of a «principle», and therefore it is possible to say that the distinction between technique and nature lies also on a different complexity of degree. See M. Schneider: *Leibniz über Geist und Maschine*, p. 346.

31 See D. Schultess: *Machines finies et machines infinies*, p. 639. An interesting consequence is, from this point of view, that we could think of building and substituting an organ (as surgeons have already done) but not of creating an organic functionality from an inorganic body, and therefore not «ontologically structured» to fulfil this function (for instance a stone). About the qualitative distinction between machine and organism see H. Burkhardt: *Aggregate*, p. 314; Duchesneau, *Les modèles du vivant*, pp. 327-330; W. Kogge, *Blinde Spiegel*, pp. 630-631.

ated as if we took a stone from a chunk³². Leibniz thinks that the harmonic relation (created by God) between a dominant monad and its organic body continues even in the ultimate disgregation, i. e. death: in this case the soul folds in itself together with all its organs in a minimal particle as small as a «*point physique*» and it is ready to enter in new aggregations of organic matter making them a new animal. He writes in *Systeme nouveau*:

«Il est donc naturel que l'animal ayant toujours esté vivant et organisé (comme des personnes de grande penetration commencent à le reconnoistre) il le demeure aussi toujours. Et puisqu'ainsi il n'y a point de premiere naissance ny de generation entiere nouvelle de l'animal, il s'ensuit qu'il n'y en aura point d'extinction finale, ny de mort entiere prise à la rigueur metaphysique; et que par consequent au lieu de la transmiration des ames, il n'y a qu'une transformation d'une même animal, selon que les organes sont pliés differemment, et plus ou moins developpés»³³.

3. Conclusions

After this short analysis of leibnizian texts, I think it is possible to reconsider our initial question: is it possible to make an ontological distinction between the two domains of «*machinae naturales*» and «*organica artificialia*», starting from the *internal coherence* of the theories of Leibniz? First we must get rid of any possible misunderstanding: a case for ambiguity could be the use of the term «*machina*», since Leibniz uses it both for natural beings and products of technique (some thought that «*die Maschinalität des Leibes*» represents an «*ontological presupposition*» of his thought)³⁴. In fact, if we might agree with this affirmation (especially because of historical influences), we would then run the risk of assuming the concept of «*machina*» as a primal notion, whereas it is the result of a more complex theoretical definition which contains various functional factors. As we have seen, in the notion of «*machine*» there is a relation of «*means/purposes*», i. e. a relation of order between elements (organic or not organic) in which the essential element is the *functionality* of the interconnective relations between the parts and the ultimate *purpose* of the whole machine³⁵. For instance, a jumble of wood or an army are

32 In a letter to Rudolf Christian Wagner in June 1710, Leibniz writes: «Habet igitur hoc omnis naturae machina, ut nunquam sit plane destruibilis, cum crasso tegumento ut cunque dissipato, semper machinula nondum destructa subsit, instar vestium Arlequini comici, cui post multas tunicas exutas, semper adhuc nova supererat. Quod eo minus mirari debemus, quia natura ubique organica est et a sapientissimo autore ad certos fines ordinata, nihilque in natura incultum censi debet, etsi interdum non nisi rudis massa nostris sensibus appareat». See GP VII, p. 530.

33 GP IV, p. 481. For the expression «*point physique*», see *ivi*, p. 483.

34 A. Sutter: *Göttliche Maschinen*, p. 89.

35 D. Schultess: *Machines finies et machines infinies*, pp. 437-438.

not machines to Leibniz, but merely beings of aggregation («*corpora dissimilata perturbata*» if we adopt the scheme of the initial quotations), unlike an electronic (or mechanic) calculator or a watermill³⁶.

In sum, the difference between natural and artificial organisms cannot be found in the presence of generically «*mechanic*» factors³⁷. It cannot depend on degrees of complexity, either. If we do not consider the question of «*finité*» of our technical ability, the idea of Leibniz seems to be plausible because it is based on *qualitative* categories (the infinite replicability of organic structures in natural machines) and not *quantitative* (the mechanic addition of elements *ad infinitum*) and therefore it is not linked to *material* factors. The different capacity of organization of living organism compared to that of artificial automata has to do with an essentially *formal* problem, i. e. the ontological structure of the *agere* itself. The organisms are those beings which grow on themselves from a simple action capable of *starting by itself* («*sponte*») and of *reflecting on itself*, i. e. of *keeping itself as purpose*, which is expressed, in the leibnizian ontology, by the notion of substantial form and entelchial structures.

The problem of artificial reproduction of this elementar vital structure (and consequently the exceeding or the annihilation of the distinction between art and nature) is strictly related to a formal problem: it is not about being able to produce semi-moving automata (which Leibniz thinks as possible in numerous passages)³⁸, whose actions can be considered as an *effect* of an intelligence so as to mislead any observer, but more precisely it is a matter of replicating an *ontological structure*, of giving «*form*» to an *agere in se ipsum*, which should become subsequently able to reproduce and to sustain itself.

36 «Interim concedimus, magnum esse discrimen inter machinas et aggregata massaque, quod machinae fines et effectus habent vi suae structurae, at aggregatorum fines et effectus oriuntur ex serie rerum concurrentium, atque adeo ex diversarum machinarum occursu, qui etsi etiam sequantur divinam destinationem, plus tamen minusque manifestae coordinationis habet». Thus Leibniz in *Animadversiones Circa Assertiones aliquas Theoriae Medicae verae*, of G. E. Stahl, see Dutens, II, 2, p. 144. But see also GP I, p. 58.

37 «Nihil in corpus fieri quod non mechanicis, ide est intelligibilibus rationibus constet»; and «organismum nihil aliud esse formaliter, quam mechanismus, etsi exquisitiorem et diviniorem, quia omnia in natura fieri debent mechanicè» See Dutens, II, 2, p. 136 and p. 146.

38 «Itaque si per impossibile tellerentur Mentis, et manerent leges naturae, eadem fierent ac si essent mentes, et libri etiam scriberentur legerenturque a machinis humanis nihil intelligentibus»; see *Anima quomodo agat in corpus*, A VI, 4 B, p. 1367; see also «Les hommes mêmes sont capables de faire des machines dont les effets semblent demander une intelligence», GP IV, p. 584.

Is this really possible? If we are to play with the argumentations of Leibniz and with his texts, we could even say that this is not a contradictory hypothesis and therefore possible (although I have doubts about it). Yet, willing to believe this as we might be, i. e. that we can create the afore-mentioned formal structure, I fear that – even in this case – the distinction between art and nature would remain intact. If we could really create this, we would have *eo ipso* gone beyond the line between technique and nature, since what we would have could not *any longer* considered as artificial, but *simpliciter* natural.

PART THREE: MINDS AND BODIES