

ARTICLE

LEIBNIZ ON NESTED INDIVIDUALS

Ohad Nachtomy

INTRODUCTION

According to Leibniz, everything in the world – whether organic or inorganic – consists of individual substances and their properties. Each of these individuals is a causally self-sufficient and unique being whose identity remains unchanged over time. The causal self-sufficiency of individual substances implies that they are causally independent of one another. At the same time, individual substances are not independent in the sense that their activities, which are prescribed by their concepts, harmonize with one another.

A particularly intriguing feature in Leibniz's notion of individuality is the nested structure of Leibnizian individuals. For Leibniz, individuals not only contain other individuals as the body of an animal may contain worms or germs but also typically consist of other individuals who are organized in a hierarchical structure and are nested one within another to infinity.¹ I term this interesting and controversial feature 'nested individuality' and, in what follows, I will try to clarify what the term 'nested individuality' might imply in the context of Leibniz's metaphysics.² Tension arises between this feature of Leibniz's individuals and some of his suppositions noted above. This tension pertains to the very definition of Leibniz's notion of substance: is it simple or composed,

¹Since the distinction applies to the substance rather than the substance's body, it is supported by the homogeneity principle that the parts must be similar to the whole. I thank Pauline Phemister for this point.

²This feature is curious but not at all strange in its historical context. Spinoza, for example, apparently entertains a very similar view with the qualification that he admits only one individual substance. A very clear articulation of the notion of creatures within creatures is found in Pascal's *Pensées*. For the historical background of this notion in relation to life, see F. Duchesneau, *Les modèles du vivant de Descartes à Leibniz* (Paris: Vrin, 1998) (where the chapter on Malpighi is especially pertinent); A. Pyle, *Malebranche* (London and New York: Routledge, 2003) ch. 7; C. Wilson, *The Invisible World* (Princeton: Princeton University Press, 1995) ch. 4.

is it one or many? Leibniz's equivocations on these issues are notorious and have puzzled scholars in recent years.³ Cover and O'Leary-Hawthorne go as far as considering the expression 'corporeal substance' as 'a misleading shorthand for 'simple substances related thus and so'.⁴ Look has very aptly formulated this 'deep problem' in questioning 'the very possibility of composite substance within the Leibnizian monadology'.⁵ He concluded his study of the Des Bosses correspondence by observing that,

In the end, study of the Leibniz–Des Bosses correspondence leads to the inescapable conclusion that Leibniz, despite his sanguine claims in his best known works, cannot give us a consistent and convincing account of the unity and reality of composite substance.⁶

In formulating the question here in terms of nested individuality I attempt to address this difficult question in Leibniz's metaphysics.

Versions of Leibniz's notion of nested individuality appear in his earlier writings⁷ but they develop and mature in his later writings, especially following the New System of Nature (1695) in which the notion of a natural machine is introduced.⁸ The main features of his view of nestedness are articulated in the following passages:

³See, for example, A. Robinet, *Architectonique disjonctive, automates systémiques et idéalité transcendente dans l'Oeuvre de G. W. Leibniz* (Paris: Vrin, 1987), and R. M. Adams, *Leibniz: Determinist, Theist, Idealist* (New York: Oxford University Press, 1994).

⁴Cover, J. A. and J. O'Leary-Hawthorne, *Substance and Individuation in Leibniz* (Cambridge University Press, 1999) 54.

⁵Look, B. 'Leibniz's Correspondence with Des Bosses', in *Leibniz and his Correspondents*, edited by P. Lodge (New York: Cambridge University Press, 2004) 258.

⁶*Ibid.*, 259.

⁷In his Paris Notes, Leibniz writes: 'any part of matter, however small, contains an infinity of creatures, i.e., a world' (A 478–9; Pk 33). For Leibniz's early views on this point, see P. Beeley, 'Mathematics and Nature in Leibniz's Early Philosophy', in *The Young Leibniz and his Philosophy (1646–1676)*, edited by S. Brown (Dordrecht and Boston: Kluwer, 1999) 123–45; and Mercer, C. *Leibniz's Metaphysics Its Origin and Development* (Cambridge: Cambridge University Press, 2001) ch. 7. Mercer argues:

that during the winter of 1670–71 Leibniz invented panorganism, according to which the passive principle in a corporeal substance is constituted of a vast collection of corporeal substances, each of which is itself a corporeal substance whose passive principle is so constituted, and so in *infinitem*.

(Mercer, 2001, p. 256)

The main point in this formulation, which was later modified, has to do with the word 'collection'. Thus, in the model of the nested individual, the passive principle or the body of a corporeal substance is not a collection but an organized structure of corporeal substances which are both organized by the substance in which they are nested and which organize the corporeal substances nested in them. In this way, passivity becomes also a matter of degree, depending on the individual's place in the hierarchy.

⁸We 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 impossible to destroy them. A

I define an *organism* or a natural machine, as a machine each of whose parts is a machine, and consequently the subtlety of its artifice extends to infinity, nothing being so small as to be neglected, whereas the parts of our artificial machines are not machines. This is the essential difference between nature and art, which our moderns have not considered sufficiently.⁹

(Letter to Lady Masham (1704), GP III 356)

Thus we see that each living body has a dominant entelechy, which in the animal is the soul; but the limbs of this living body are full of other living beings, plants, animals, each of which also has its entelechy or its dominant soul.

(*Monadology*, 70, cited from AG)

According to a widely accepted interpretation, Leibniz's notion of nestedness applies to bodies at the physical level but not to individual substances at the metaphysical level.¹⁰ According to Duchesneau, the notion of *emboîtement* is to be understood in mechanistic terms,¹¹ so that it properly applies to bodies or machines. At the same time, in what follows, I will suggest that there is in Leibniz a metaphysical notion of nestedness which is not primarily mechanistic but which may be compatible with a mechanistic description at the level of bodies and well-founded phenomena. In particular, I will suggest that we find in Leibniz a metaphysical notion of nestedness that pertains to the relations of activation and domination in the sense of functionally organizing less active constituents of the same organic

natural machine still remains a machine in its least parts, and moreover, it always remains the same machine that it has been, being merely transformed through the different enfoldings it undergoes, sometimes extended, sometimes compressed and concentrated, as it were, when it is thought to have perished.' (GP IV, 482; AG 142)

For some later texts on the notion of nestedness, see: GP VI 544; L 589, GP III 340, 356, 565; GP VI 539; L 586. In his correspondence with Fardella we find this passage:

So in a fish pond there are many fishes and the liquid in each fish is, in turn, a certain kind of fish pond which contains, as it were, other fishes or animals of their own kinds, and so on to infinity.

(AG 105)

Note that here we still do not find the full thesis of a nested structure to infinity but only that each substance involves the infinity of others. For a very textually informed and illuminating presentation of the genealogy of Leibniz's thought about natural machines, see M Fichant, 'Leibniz et les machines de la nature', *Studia Leibnitiana* (2003) No. 35: 1–28.

⁹Je définis l'Organisme, ou la Machine naturelle, que c'est une machine dont chaque partie est machine, et par conséquent que la subtilité de son artifice va à l'infini, rien n'étant assez petit pour être négligé, au lieu que les parties de nos machines artificielles ne sont point des machines.' (letter to Lady Masham (1704), GP III, 356).

¹⁰See E. H. J. Smith, 'On the Fate of Composite Substances After 1704,' *Studia Leibnitiana*, 31 (1999) No. 1: 1–7, and 'Leibniz, Microscopy, and the Metaphysics of Composite Substance', doctoral dissertation (New York: Columbia University, 2000).

¹¹See also Duchesneau (1998) *Les models du vivant* 326–9, 339–43 and *La physiologie des Lumières. Empirisme, modèles et théories* (La Haye: Martinus Nijhoff (Kluwer), 1982) 76–8. Duchesneau cites (among others) the following passages: 'Et nihil aliud organismus viventium est quam divinius mechanismus in infinitum subtilitate procedens' (C 16, cited from Duchesneau 1998, 339), Leibniz's fifth letter to Clarke, ss 115 and 116; GP VII 417–18.

unity. This sense of nestedness is best captured in metaphysical terms and applies to the relations between individual substances.

It is well known that, for Leibniz, a mechanical account of nature (in terms of shock, impact and efficient causation among bodies) need not exclude a metaphysical account in terms of final causes, activation and domination. Thus, while, I fully accept the mechanistic account, I would like to stress that Leibniz's notion of nestedness is not fully captured in mechanistic terms alone.¹² It is also important to keep in mind that Leibniz's notion of nestedness does not apply to any physical body or to any machine but only to organic bodies and/or machines of nature. This is especially significant in light of the fact that Leibniz identifies natural machines with corporeal substances that are true units, as distinct from artificial machines. As Fichant has recently made clear:

Ce n'est donc pas n'importe quel corps qui peut être reconnu comme substance corporelle. Seuls valent pour des substances corporelles les animaux dont le corps organique – machine de la nature – est actualisé ou réalisé par une âme ou, mieux, par l'entéléchie primitive de la substance simple qui en est la monade dominante.

(‘Leibniz et les machines de la nature’, *Studia Leibnitiana*, 2003)¹³

This view differs from the view that the nesting relation holds only at the level of bodies, aggregates or phenomena and can be fully captured in mechanistic terms. At the same time, I should make clear that the texts are not conclusive on this point and, as scholars such as Robinet and Catherine Wilson have argued, it is likely that Leibniz is working with more than one model of substance in his later philosophy. Keeping this in mind, I formulate a model of nested individuals which seems to be consistent with the texts and which I find philosophically fascinating. Whether it was in fact Leibniz's view or not, I cannot make out on the basis of the textual evidence. The argument I offer in this paper is meant as a reconstruction of what might have been Leibniz's metaphysical view of nested individuals.

LEIBNIZ'S MODEL OF NESTED INDIVIDUALITY

In accordance with Leibniz's commitment to the intrinsic connection of being and unity, the structured ensemble of nested individuals must have

¹²I thank Justin Smith for a discussion of this point.

¹³*Je ne compte pour substances corporelles que les machines de la nature qui ont des âmes ou quelque chose d'analogique; autrement il n'y aura point de vraie unité* (to Jaquelot, March, 1703, GP III, 457).

substantial unity or else it would not differ from mere aggregates.¹⁴ This implies that an ensemble of nested individuals must be united as *one* single substance, as Leibniz states in a letter to De Volder:

Although I said that a substance, even though corporeal, contains an infinity of machines, at the same time, I think that we must add that a substance constitutes one machine composed of them, and furthermore, that it is activated by *one* entelechy, without which there would be no principle of true unity in it.

(AG 175, emphasis added)¹⁵

The source of true unity requires that a corporeal substance, which contains an infinity of machines, would be activated by one entelechy or one source of action.¹⁶ As opposed to artificial machines, natural machines consist of infinitely many such machines. Unlike aggregates, they form a single unit that possesses true unity by virtue of its unique source of activity. The very distinction between artificial machines and natural machines (GP III 356) suggests that Leibniz sees an intrinsic connection between possessing a natural, organic unity and possessing a nested structure to infinity. Non-organic machines do not have a nested structure that develops to infinity. Or, they have a different sort of nested structure in the sense that each of their constituents has a nested structure.¹⁷ For this reason, the question of how such a structure of infinitely many natural machines is considered by Leibniz to be a single unit, as distinct from an aggregate, cannot be ignored.¹⁸

¹⁴... since I am truly a single indivisible substance, unresolvable into any others, the permanent and constant subject of my actions and passions, it is necessary that there be a persisting individual substance over and above the organic body' (comments on Fardella, A VI 4, 1969, AG 103).

¹⁵See also GP II 252; GP VII 502 and C 13–14. It seems clear here that what is activated by a single entelechy must itself be a single substance and not a mere single body or a machine. Let me also quote Dumas who writes: 'A Leibnizian organism is first of all irreducible to Cartesian mechanism' (Dumas, M. N., *La Pensée de la vie chez Leibniz* (Paris: Vrin, 1976) 131).

¹⁶As Brandon Look recently noted, 'Insofar as I am an animal, or an individual corporeal substance, it is clear that I am unified by the action of my dominant monad, which, it seems, will be equivalent to my mind or soul' (Look, B. 'Leibniz's Correspondence with Des Bosses', in *Leibniz and his Correspondents*, edited by P. Lodge (New York: Cambridge University Press, 2004) 241).

¹⁷I thank Pauline Phemister for this point.

¹⁸Ishiguro argued that the notion of organic unity is primitive and immediate and in this sense need not be accounted for (see the Proceedings of the VII Leibniz International Congress, September, 2001). This may very well be the way that Leibniz viewed it. However, we would still need to see why he takes such a position. In a recent article, Levey has considered the matter in the context of the Leibniz–Arnauld correspondence as follows:

If, on the other hand, his view is that substances are not composite beings but instead are to be identified with their incorporeal souls, then no explanation of the true unity of the composite is necessary, since there is no composite with true

Yet the question of unity has to be considered in light of the interpretative constraints noted above, namely, the causal independence as well as the conceptual relations among *all* individual substances. At first it seems that these constraints render Leibniz's notion of nestedness even more puzzling. Though all nested individuals are causally independent of one another, they are all supposed to form one organic unit such as a fish or a human. In the passage cited above, Leibniz suggests that the unity of a composed substance derives from its single source of activity, i.e. its dominant entelechy. A single and dominating entelechy is said to activate and unify the whole hierarchy of causally independent individuals nested within it.

Look has recently stated this point in relation to the question of corporeal substance as follows:

The dominant monad makes the animal into one machine by serving as the 'nerve center', so to speak, of all the primitive active forces of the subordinate monads. In Leibniz's philosophy, of course, the primitive active force is associated with the substantial form and provides the source of activity of a substance. And, on the view I am suggesting here, the dominant monad will, insofar as it unifies the primitive active forces of its subordinates, become the source of the activity of a composite substance.

(Leibniz's Correspondence with Des Bosses', in Lodge 2004, 247)

Since Leibniz accounts for the notion of unity in terms of activity, another question arises: what could be meant by such activity in a Leibnizian world characterized by causal independence? I will suggest that this sort of activity should be understood primarily in terms of the functional organization of the nested individuals that constitute the organic body of an individual. I will also suggest that this organizing activity might be on Leibniz's mind when he speaks of the domination of one monad or entelechy over those subordinated to it. Organization and domination can be understood primarily in terms of functional hierarchy between nested individuals, which also helps to account for the differences between individual organic substances and inorganic aggregates.

Let me now present Leibniz's model of nested individuality in some more detail. This model includes (at least) the following suppositions:

1. An individual substance is a union of an active entelechy (or substantial form) which animates and organizes matter (AG 175).¹⁹

unity to be explained, and Leibniz's silence on this point is precisely what we should expect.

('On Unity: Leibniz-Arnald Revisited' in *Philosophical Topics*, 31, Nos 1 and 2: 269)

¹⁹For a substantiation of this claim, see Mercer and Sleight (1994) and Mercer (2001). While Leibniz's notion of form is Aristotelian, his notion of matter is, as I discuss in Section 3, more complex. One obvious difference is that matter, according to Leibniz, is not entirely passive.

2. An individual substance requires true unity – both of form and matter and of all its constituents. This is directly related to Leibniz’s fundamental commitment to the connection between unity and being.²⁰
3. Organic, complete living beings such as humans, animals and plants are among Leibniz’s paradigmatic examples of substantial unities²¹ and are conceptually distinct from aggregates, such as lakes, flocks and armies, which lack substantial unity.²²
4. While they are the paradigmatic examples of substantial unity, animals and plants are seen as individual substances that include other such animals (or organic unities) nested within them.²³
5. The animals nested within an individual substance are themselves complete individuals which have a similar nested structure; they are not mere ‘parts of the substance but are immediately required for it’.²⁴

²⁰See Letter 17 to Arnauld, 8 December 1686.

²¹Leibniz’s paradigmatic examples include, of course, God, the I, the Ego and the Soul, but I think he makes it clear enough that the entities denoted by these expressions are seen as the dominating, active aspects of organic beings and not detached or disembodied. As an example, see *Theodicy* §124.

²²‘je ne veux pas à la vérité qu’un morceau de pierre soit luy même une substance corporelle animée ou douée d’un principe d’unité et de vie; mais bien qu’il y en par tout de telles là dedans, et qu’il n’y a aucune pièce de la matière, ou il n’y ait ou animal ou plante, ou quelque autre corps organique vivant, quoique que nous n’en connoissons que les plantes et les animaux. De sorte que une masse de matière n’est pas proprement ce que j’appelle *une substance corporelle*, mais un amas et un résultat (aggregatum) d’une infinité de telles substances.’ ((GP VI 550) Letter to Arnauld (AG 80))

Cf. GP VI 553–4: ‘animals are never formed out of non-organic mass’. See also Wilson, C. ‘*De Ipsa Natura*, Sources of Leibniz’s Doctrines of Forces, Activity and Natural Law’, *Studia Leibnitiana*, 19 (1987) No. 2: 169.

²³E.g. ‘... the machines of nature being machines to the least of their parts are indestructible, due to the envelopment of a small machine in a larger one, to infinity’ (GP VI 543); *Monadology* 67–70 cited above.

I hold that it is enough for the machine of things to have been constructed with such wisdom that, through its very development, those very wonders come to pass, chiefly (as I believe) by means of organisms unfolding themselves through some predetermined plan.

(*On Nature Itself*, AG 156)

‘My view is that every substance whatsoever is a kingdom within kingdom, but one in precise harmony [conspirans] with anything else’ (Comments on Spinoza’s Philosophy AG 280, c.1706).

²⁴‘If you take mass (*massa*) to be an aggregate containing many substances, you can, however, conceive in it one substance that is preeminent, that is, one substance animate by a primary entelechy. Furthermore, along with the entelechy, I don’t put anything into the monad or the complete simple substance, but the primitive passive force, a force corresponding to [*relatus ad*] the whole mass [*massa*] of the organic body. The remaining subordinate monads placed in the organs don’t constitute a part of the substance, but yet they are immediately required for it, and they come together with the primary monad in a corporeal substance, *that is, in an animal or plant*. Therefore I distinguish: (1) the primitive entelechy or soul; (2) the matter, namely, the primary matter or primitive passive force; (3) the monad made up of these two things; (4) the Mass [*massa*] or secondary matter; and (5) *the animal, that is, the corporeal substance, which the dominating monad makes into one machine*.’ (Letters to de Volder, AG 177, emphasis added)

6. The structure of nested individual substances involves a hierarchy of dominating and dominated substances, which is not accidental but rather typifies the nature of living individuals.²⁵
7. Such a structure of nested individuals is one by virtue of the activity of a single and dominant entelechy.

Taken together, these commitments suggest a fascinating model of individuality and of the organic world. As Ishiguro notes:

at every level there are organisms with unity, and we can still proceed another level down, *ad infinitum*. It is a claim about the chain of dominant or unity-giving substances at every level. It is this stratified structure, the successive embedding of organisms within each organism that is insightful.²⁶

It is no less insightful, though perhaps less perspicuous, that the unity of all these nested organisms is grounded in a certain notion of activity. To see this point, I would like to examine the sort of unity and nestedness this model of individuality presupposes.

In considering the unity of various components, we are inclined to think of material parts being held together as one cohesive spatio-temporal unit. As distinct from the aggregate model, in which unity is relational and external, we tend to seek something that will hold all the constituents together.²⁷ However compelling this picture may be, it is quite clear that it is *not* the kind of substantial unity Leibniz has in mind. He clearly states that the substances contained in an animal are not parts of the substance but are rather required components of the necessary structure of a composite substance. As we have seen in the passages cited above, the unity of a corporeal substance is a unity that relates to single entelechy animating and organizing the organic body it dominates. Since the organic body of a corporeal substance consists of the individual substances nested within it, this structure seems to imply a hierarchy of activating and activated individuals, nested one within the other. If the unity in question is not that of cohesiveness of parts but rather one of activation and organization, then Leibniz's stratified model of individuals requires the domination of an entelechy over the whole organic body and the activation of subordinate entelechies at every level. By definition, *each* substance has such a structure. As Leibniz writes:

²⁵it seems probable that animals ... and similarly plants ... are not composed of body alone, but also of soul, by which the animal or plant, the single indivisible substance, the permanent subject of its actions, is controlled' (Notes on some comments by M. A. Fardella, AG 104).

²⁶'Unity Without Simplicity', *The Monist*, Vol. 81, pp. 534-52, (1998) No. 4: 550.

²⁷We may be inclined to think, for example, of the model of a molecule in which the atoms are bound together by covalent relations.

Each monad, together with a particular body, makes up a living substance. Thus, there is not only life everywhere, joined to limbs or organs, but there are also infinite degrees of life in the monads, some dominating more or less over others.

(‘Principles of Nature and Grace, Based on Reason’, s. 4, AG 208)

What I call a complete monad or individual substance [*substantia singularis*] is not so much the soul as it is the animal itself, or something analogous to it, endowed with a soul or form and organic body.

(Letter to Bernoulli 20/30 September 1698 AG 167–8)²⁸

Let us now examine some implications of this model. Leibniz’s model of corporeal substance as a stratified structure of infinitely many substances signals a radical break from the traditional formula of ‘one body, one substance’. While Leibniz’s model seems to be in tension with some deeply rooted (both historically and philosophically) suppositions about individuality, it is strongly related to views of *emboîtement* endorsed by theorists such as Malebranche and illustrated by the microscope-based observations of Leeuwenhoek and Malpighi.²⁹ I will suggest that Leibniz’s employment of ‘nested’ does not only mean being literally and physically within another individual but also being activated and functionally organized by another dominating individual. For Leibniz, as for Aristotle, individual substances are hylomorphic units characterized by an inherent entelechy or principle of activity (the form) determining a principle of passivity (the matter). At the same time, Leibniz holds that each component of an organism, while included in its organic body and subordinated to the dominant entelechy of its substance, has its own entelechy (*Monadology*, 70). Thus, for Leibniz, as distinct from Aristotle, an entelechy does not activate merely passive matter but in some sense the many other entelechies nested within it as well.

The idea that an entelechy activates another entelechy seems initially surprising in the Leibnizian context since the other entelechies, beings sources of activity, need not be activated from without. Entelechies have their own active force and act spontaneously. Furthermore, a constituent of an organism and the organism in which it is nested are not only compatible with one another but are also *required* for their very individuality. For

²⁸As Adams has stressed, there are other passages in which appetite and perception figure as the essential features of simple substances, e.g. ‘there is nothing in things except simple substances, and in them perceptions and appetites’ (GP II, 270). While I cannot argue for this here, I think that Leibniz’s notion of a simple substance may not be incompatible with its having a nested structure. The crucial sense of simplicity here seems to be that of indivisibility; and it is clear that the structure of nested individuals is meant to be one and indivisible.

²⁹It seems to me that what Pyle says of Malebranche can also be said of Leibniz: ‘Experimental biology (Leeuwenhoek’s microorganisms, Malpighi’s chicks, Swammerdam’s butterflies) are used to illustrate the theory [of *emboîtement*] rather than to confirm it’ (Pyle, A. *Malebranche*, (London and New York: Routledge, 2003) 172).

example, an organ is not an accidental part of a human being; rather, it is a required constituent in the strong sense that it, and only it, completes the individuality of a certain human. Unlike some parasitic worms or viruses that can exist without a certain individual (and the individual without them), in the Leibnizian model we are considering, the nested structure is constitutive of individuals.³⁰

The hierarchical structure indicates that individuals are partly characterized through their place in the hierarchy of individuals. Since the nested hierarchy is not accidental but rather essential to the individuality of each individual, the relations each one has with the others are constitutive of it. This implies that the very individuality and uniqueness of a substance are partly determined through its place in the structure constituted by other individuals.³¹ This is what the term 'nested individuals' is meant to bring out.

Given the structure of nested individuals, the question I raise here is more nuanced than the one generally considered, namely, that an individual substance consists of many individuals. Instead, I emphasize the fact that an individual substance has an inherent nested structure which is constitutive of every individual within it. Taking into account the inherent and constitutive nested structure of individuals may seem to make the picture even more complex and puzzling but this way of presenting the question may open the way for a better understanding of Leibniz's notion of unity in this context. By presenting the question in this way, I stress the consequential role played by the nested and hierarchical structure (in addition to the mere plurality of substances) in the unity of organic beings.³²

THE ORGANIC BODY OF A NESTED INDIVIDUAL

If Leibniz believes in a notion of unity constituted by activity and organization, what are the implications for his notion of the organic body? We have seen that an organic body, together with the (dominating) entelechy or monad, constitutes a living substance. The question of the nature of corporeal substance has been at the centre of debate among

³⁰As Ishiguro recently put it: 'if x is a constituent of body y , then it is necessarily a constituent of y ', in *Nihil sine ratione. Mensch, Natur und Technik im Wirken von G. W. Leibniz. VII. Internationaler Leibniz-Kongreß*, edited by H. Poser, 3 vols. (Hannover: 2001) 540.

³¹This view has an interesting corollary to Leibniz's notion of individuation through the complete concept of an individual. To be complete, the concept of an individual must include relations to other concepts.

³²The structure of nested individuals to infinity fits with the definition of possible individuals through their rules of production and the essential role the order of predicates within a structure plays in their individuality (see Nachatomy, O. 'Leibniz on Possible Individuals', *Studia Leibnitiana*, 34 (2002) No. 1: 31–58.

Leibniz scholars for some time. In brief, the debate revolves around the question of whether Leibniz was an idealist or a realist. The debate is complicated by a variety of issues and nuances which I shall ignore here. What I wish to point out is that the idea that nested individuals make up the organic body of a living substance suggests a way of reconciling these two seemingly incompatible views.

In fact, Phemister has suggested an ingenious way of reconciling these views. She writes that:

Leibniz considered bodies to be rather more than the results of the aggregation of unextended and indivisible monads: that he regarded them also as aggregates of corporeal substances. Corporeal substances are living creatures, having both a soul (or something similar) and an extended organic body.³³

This conciliatory view is consistent with the model of nested individuality presented above in which the organic body of a nested individual consists, in effect, of the other individuals nested in it.

As Phemister clarified, the Aristotelian concept of the union of active form and receptive matter remains intact:

A soul or a substantial form which is an entelechy is not a potentially disembodied being. Its very essence is tied to the organic body it animates and with which it forms one unit. The entelechy cannot fulfill its function as the actualizer and life-force of the body if there is not matter for it to shape and inform. So tied is the entelechy to the real existence of the body that Leibniz frequently stresses that ‘entelechy is never found without organs’ (to J. Bernoulli, 13/23 Jan. 1699, CE 430/AG 171) and that ‘no entelechy ever lacks an organic body’ (to De Volder, 20 June 1703, GP. II. 251/AG 176) which it naturally activates.

(‘Leibniz and the Elements of Compound Bodies’, 74–5)

Yet the organic body is no longer seen as some mere passive extended matter which receives its form from the active substantial form; rather, it has a structure similar to that of the dominating individual, except that it is activated and dominated by an entelechy of a higher order. At the same time, the dominant entelechy also activates the entelechies that form its own organic body.

Phemister characterizes three (possible) types of monad: Type (1): a soul or soul-like immaterial entity; Type (2): a soul or substantial form (also described as an entelechy or primitive active force); and Type (3): a

³³‘Leibniz and the Elements of Compound Bodies’, *British Journal for the History of Philosophy*, 7 (1999) No. 1: 57.

corporeal substance (72). Using the above definitions, she summarizes her position as follows:

I have argued that prime matter is modified as extended through the creation of other substances which are 'placed next to one another'. These further created monadic units, themselves also of type (2) monads, are subordinate to the first. Of course, with the prime matter of these subordinate monads, the same process is repeated on this lower level. These, then, together with their own organic bodies, are the corporeal substances which are aggregated as the body belonging to the initial, or dominant, type (2) monad. Since every entelechy-monad has prime matter and its prime matter is modified in the way described, Leibniz is able to claim that every monad has a spatially extended, organic body which belongs to it in such a way as together to form a new unity, namely, a new corporeal substance or monad of type (3).

(Ibid., 77)

It seems clear that Phemister's position is consistent with the model of nested individuals presented above. However, Phemister's proposal is not equally applicable in the case of bodies which are essentially aggregates (such as rocks) and the organic bodies of living or true substances. This distinction is subtle but it is clear and fundamental for Leibniz. Both aggregates and organic bodies are extended, but in different ways. In the case of organic bodies, the advantage of the nested individuals model is that it does not view the body of a living substance as a mere aggregate; rather, the organic body consists of other individuals that essentially belong to it and have a definite place in its hierarchy.

A possible source of confusion lies in the fact that aggregates of non-living things are also aggregates of corporeal substances. However, aggregates do not have the structure of nested individuals *ad infinitum*, which typifies living substances or natural machines. The unity of aggregates is both external (involving a mind perceiving relation) and may vary overtime. By contrast, in a living substance, every constituent, which is itself an individual, is constitutive of the individual within which it is nested. Yet, as Phemister points out, not every individual found within the body of another need be a constituent of it. In correspondence with Clarke, Leibniz distinguishes the matter that truly belongs to the substance from matter that is present, but extraneous to it. As we shall see in the next section, this point speaks in favour of my reconstruction of nestedness for it implies that an individual may be in another (in the physical sense) but not nested in it, if it is not an essential constituent of the other individual. Thus, a worm may be physically in me without being metaphysically nested in me (for the worm's activity may not be functionally organized by my substantial form).

My emphasis on the nested structure of living substances may also help to explain the modification of prime matter into extended matter through a plurality of substances that are 'placed next to one another' ('Leibniz and the Elements of Compound Bodies', 77). As pointed out earlier, the

substances in organic unities are not just ‘placed next to one another’ or aggregated, but also possess an internal structure to infinity as well as unity. This accounts for the distinction between bodies of mere aggregates and the organic bodies of individuals.

While Phemister’s view adequately characterizes aggregates, the notion of nestedness is required in the case of living things in order to account for their organic body. The body of individual substances is best described in terms of the structure of dominated individuals nested within it. In the nested individuality model, the organic body is not entirely passive; rather, it is less active (or more passive) than the entelechy that dominates and activates it, and it is more active than the entelechies nested in it.³⁴ Thus, activity and passivity become matters of degree, corresponding to the entelechy’s place in the hierarchy.

MODELS OF NESTEDNESS

We have seen that the organic body of an individual substance can be viewed as a stratified structure governed by dominating substances and ‘populated’ by dominated ones. It is time to examine more carefully this notion of nestedness. Given the terms ‘nested in’ or ‘*emboîté dans*’, we tend to think primarily of spatial nestedness as analogous to the way a set of Russian babushkas fit together. In fact, Leibniz himself invites this interpretation when he uses the imagery of Harlequin. Let me call this the physical model of nestedness. For x to be nested in y in this model, spatial relations must exist between them such that x is smaller than y and is spatially within y . In this model, the relation of ‘nested in’ is clearly asymmetrical. A different model of nestedness can be suggested by stressing a logical interpretation of the nested relation. For x to be nested in y in this model, x must be logically entailed by y . In this model, spatial relations need not play any role. A variant of this model would stress semantic implications rather than strictly deductive relations. For example, we could say that the notion of a street is semantically included in the notion of a town, houses in that of a street, walls in that of a house, etc. The question whether this relation is symmetrical is not easy to decide. It seems to depend on the examples we consider. For example, while it is arguable that the notion of a street implies that of a town, it is clear that the notion of houses does not

³⁴In commenting on this, Phemister remarks:

I think that the existence of the organic body comes about through the completion of the dominant monad (as entelechy and primary matter and that together with this, the monad and organic body comprise the corporeal substance. I see the mere aggregate as an aggregate of corporeal substances but with no overall dominant force – so I do agree that there is a distinction between the organic body (that has an dominant entelechy) and a mere aggregate that does not, but I still regard the organic body as an aggregate (just not as a mere aggregate).

imply that of a street. For Leibniz, the relation between organism and its organs clearly works both ways.

In addition, we should consider the expression and representation model, which is clearly present in Leibniz's texts.³⁵ A version of this model has been articulated (in correspondence) by Duchesneau as follows:

The organic bodies are presented as machines of nature, developed to infinity; but these bodies form composed substances only to the extent that they imply a monad of which they constitute the expression in the order of phenomena. Certainly, the dominant monad of an animal envelopes in its expression the specific expressions of many other monads.

While it is clear that the expression relation plays an important role in Leibniz's notion of corporeal substance, it is too weak for my purposes. While I do not deny that nested individuals express or represent one another, the expression relation is not sufficient to account for the unity of nested individuals. Relations of expression hold between the constituents of aggregates as well as between those of individuals. Similarly, I do not deny that the model of physical nestedness plays a role. Rather, I argue that these models do not fully capture the notion of nestedness in the metaphysical context of living individuals. Evidently, the claim that 'one individual is *in* another' may have several interpretations. I would like to emphasize a metaphysical meaning of nestedness that involves degrees of activity versus passivity, corresponding to the functional hierarchy and organization typical of living beings. In this model, the degree of activity (and domination) corresponds to the place and functional role in the hierarchy.

We can illustrate this point as follows: A substance (S') is nested in another (S) if it is activated (or dominated) by it; that is, if it is functionally organized by it. Perhaps a better way to put it would be that S' is nested in S if its activity plays a role in (or if it contributes a function to) S's programme of action. I suggest that this is the primary sense in which S' is said to be nested in S and S' is a constituent or requirement of S. Since a substance is defined by having its own source of activity, S' is also active in the sense that it will activate another substance, call it S'', nested within it. In its turn, S'' will activate S''' which will activate S'''' and so on to infinity.³⁶ There is a sense in which this relation is symmetrical and a sense in which it is not. The

³⁵E.g. GP II, 251. See also R. M. Adams, *Leibniz: Determinist, Theist, Idealist* (New York: Oxford University Press, 1994) 285–91.

³⁶Pfemister pointed out (in correspondence) that:

there has to be a sense in which the active force of the dominant entelechy is matched by or is even identical with the combined active forces of the subordinate entelechies. Thus, if the dominant entelechy is taken as being a force '1', the subordinate ones in the body will have to collectively add up to '1', e.g., as $1/2 + 1/4 + 1/8 + 1/16 + \dots$ ad infinitum, or something similar.

relation between S and S' (S is a nesting individual and S' is a nested individual) is symmetrical in so far as they are mutually required for the individuation of one another. But, in so far as S is activating S' (in the sense of including S' in its programme of action) and S' is activated by S, the relation between them is asymmetrical. If S' is nested in S, then S is nesting S', but S' is not nesting S. For there is a hierarchical structure here, starting from the one dominating individual and going down to less and less dominating ones.

ACTIVATION AS DOMINATION AND FUNCTIONAL ORGANIZATION

This point brings us back to Leibniz's (non-causal) notion of activity. Let us recall a constraint on the conclusion we reached above, namely that each dominating substance activates all the other individuals which constitute its organic body. If Leibnizian individuals are causally independent of one another, the notion of activation has to be explained in non-causal terms (that is, at least not in terms of efficient causation). This point should clearly apply to the domination/subordination relation. I believe that a key concept in understanding this notion of activation is functional organization. The notion of functional organization is nicely exemplified in organisms, which would partly explain why Leibniz often refers to organic units as the paradigmatic examples of true beings or individual substances (e.g. GP VI 543).

Let me then try to clarify Leibniz's sense of nestedness by reflecting on why, according to him, living beings are the paradigmatic examples of individual substances and why the nested structure, *ad infinitum*, is the distinguishing feature of natural machines, which are considered to be true substances, from artificial ones which, like aggregates, are not considered to be true substances. Animals and plants vividly exemplify a functional hierarchy, which is particularly evident in the Aristotelian notion of final causality ascribed to their activities and endorsed by Leibniz. It is also consistent with Aristotle's notion of a hierarchy of ends. For example, an acorn develops into a mature oak through the activation of matter by its entelechy in accordance with the acorn's final form. In such organic examples, the various functions of the constituents comprising the animal or plant may be seen as serving the *telos* and executing its natural development. In turn, the *telos* of an individual can be viewed as a programme of action consisting of numerous subprogrammes of action. All the substructures that make up an oak tree – branches, leaves, cells, subcellular constituents, etc. – are organized by a single program and directed towards a single end, which gives the tree its unity. At the same time, each constituent is fully organized (and in turn organizes its substructures) towards the fulfillment of its function. A leaf is a unit whose

function is to produce sugar which provides energy for the tree's growth. The leaf itself may be seen as a fully organized unit whose constituents are organized and activated in order to perform their functions (e.g. one of chlorophyll's functions is to provide colour) and thereby to contribute to the function of the leaf. In turn, their constituents, such as cells, are themselves entirely organized towards performing their function in the overall programme of the leaf, which in turn is organized towards performing its function in the programme of the oak.

This model of a functional hierarchy with a complete individual's programme-informing an unending series of constituents exemplifies Leibniz's notion of nested structure. In this description of the oak tree, the primary sense of nestedness is functional and it cannot be fully captured in material/physical terms, which is why it is applicable to the domain of the living and adequately described in metaphysical terms.

The idea of a stratified structure of organisms is intrinsically connected to another feature of Leibniz's notion of individuality. The inherent hierarchy of nested individuals is ordered by degrees of complexity that correspond to varying levels of activity and individuality.³⁷ Although individuals are nested, and hence dominated by other individuals, they are nevertheless complete individuals, rather than mere parts of individuals. The notion of level of individuality does not imply that a certain individual is more or less of an individual. The question whether x is an individual or not is decided by considering whether x has its own source of activity (which is also its source of unity and identity over time) as well as a complete concept. The notion of 'levels of individuality' indicates that an individual may be more or less active and, correspondingly, more or less passive (that is, more or less dominating in the hierarchy). In other words, the degree of activity corresponds to the place the individual occupies in the hierarchy of nested individuals, which may also correspond to degrees of domination and perfection. Since an individual is defined by means of an inner source of activity, it can be nested within a more active individual (i.e. dominated by such an individual) without eliminating its own individuality, unity and identity. In turn, it may also dominate other individuals nested within it. Thus, the notion of levels of individuality is to be primarily understood in terms of degrees of activity (or domination and organization) as opposed to degrees of passivity. Note that the expression 'degrees of activity' is only shorthand for the relative proportions of activity and passivity or the relation between active and passive forces.

The essential role of activity in individuals in general, and that of a programme of action in particular, is compatible with this interpretation of

³⁷This is discussed in more detail in O. Nachatomy, 'The Individual's Place in the Logical Space: Leibniz on Possible Individuals and their Relations', *Studia Leibnitiana*, 30 (1998) No. 2: 161–77.

nestedness. The notion of activation as functional organization helps us to see why Leibniz held that the structure of nested individuals, which is based on activity, proceeds to infinity. Furthermore, we can also see why Leibniz thinks that artificial machines, being devoid of internal activity, do not also possess a nested structure.

A nested individual is a unique and complete being whose unique 'place' plays a constitutive role in the program of the nesting individual. It is *in* the nesting individual but not necessarily in the physical sense. There is a metaphysical sense of nestedness, which has to do with functional relations rather than with physical and efficient causal ones. The interpretation of nestedness I suggest here is opposed to the attempt to describe Leibniz's notion of nestedness in purely mechanistic terms. According to this interpretation, there is an intrinsic relation between nestedness to infinity and the other characteristics of Leibnizian individuals such as being, unity, indestructibility and life.³⁸ Let us not forget that, according to Leibniz, it is the nested structure to infinity that distinguishes natural machines from artificial ones, which is strongly related to the infinite nature of the complete concept of an individual. Unfortunately, I cannot explore these interesting connections here.

CONCLUSION

Let us briefly return to our first question, namely, the unity of nested individuals. Following a remark by Ishiguro, I have suggested that the unity of an ensemble of nested individuals is the result of a uniting activity. This uniting activity is the organizing activity of the constituents in a functional and teleological order, so that the activity of each constituent contributes to the end of the dominating entelechy. It is primarily the single end of the dominating entelechy that unifies a structure of nested individuals, not causal influence between them (which, as we know, Leibniz denies). A significant sense of nestedness therefore is the functional organization of an individual whose constituents play an active and constitutive role in realizing the nesting individual's end. I have suggested that the unity-giving notion of activation corresponds to Leibniz's famous, if little-investigated, notion of domination.³⁹

³⁸Leibniz makes such explicit connections in GP VI 543.

³⁹In a recent work, 'On Monadic Domination in Leibniz's Metaphysics', *British Journal for the History of Philosophy*, 10 (2002) No. 3: 379–99), Look has investigated the notion of domination and suggested several criteria for characterizing the domination/subordination relations. In a different work, he succinctly summarized his position:

I believe that there are several distinct criteria that must be met in order to say that one monad dominates some group of monads: first, the dominant monad must bear an ordered and regular relation to those that occur in its body; second, it must bear some kind of quasi-causal role in the functioning of the monads that constitute the entire

I have tried to illustrate the following claims in this paper: (1) An individual substance has a nested structure; (2) The unity of such a structure is seen through its single (dominating) source of activity; (3) Both the notion of nestedness and that of unity can be understood according to the metaphysical model of active functional organization in addition to the physical model as well as the other models noted in section 3;⁴⁰ (4) The relevant notions of activation and domination are to be interpreted in terms of functional organization, which is explicitly related to the notion of final causation; (5) The notion of organizing and uniting activity is closely related to the notions of being and life, such that aggregates and mere possibilities are neither alive nor fully exist. This is consistent with the essential role Leibniz ascribes both to passivity and to activity. Possibilities are organized but are not active while aggregates are not organized according to a single internal principle and therefore are not internally united. Thus, aggregates are considered to be well-founded phenomena since they are not essentially one.

I have attempted to address a formidable difficulty in Leibniz's metaphysics: on the one hand, a substance is said to be one and indivisible; on the other, it is said to consist of infinitely many other substances. I have attempted to sketch a picture in which a hierarchy of functionally organized individual substances is one in the sense that it belongs to a single end and program. This picture, however, can only serve as a preliminary sketch of Leibniz's notion of nested individuality.⁴¹ Whether this picture can be

composite substance; third, it must be more perfect than the other monads, that is, it must have clearer perceptions than the others and contain the 'reasons' for what happens in the other monads.

(*Nihil sine ratione. Mensch, Natur und Technik im Wirken von G. W. Leibniz*, edited by H. Poser et al., 738).

If we can interpret the quasi-causal role in the functioning of the monads as final causation (appropriated by Leibniz for the domain of substances), and hence as consistent with the other criterion that explains what happens in the dominated monad, then Look's criteria are consistent with the model of nested individuals outlined above.

⁴⁰In my view, Leibniz's notion of simplicity (as well as that of indivisibility) can also be understood in terms of activity rather than extension. Thus, a substance is indivisible and simple because it is active, and since its activity derives from one source, it cannot conceptually be divided or broken down. This view has a surprising consequence, namely that simple substances may contain others and therefore the distinction between simple and composite substances need not be seen as mutually exclusive. In other words, if the notion of simplicity is grounded in activity, a substance may be seen as both simple and composite. This may shed some new light on what is usually taken as an exclusive classification of substances as either simple or complex in texts such as the opening paragraphs of the *Monadology* and *The Principles of Nature and Grace*.

⁴¹I pursue this line of argument within a broader context of Leibniz's metaphysics in Nachtomy, O. *Possibility Agency and Individuality in Leibniz's Metaphysics*, Springer, The New Synthese Historical Library, 2007.

substantiated, made more precise, and reconciled with other texts, remains of course to be decided by future research.⁴²

Princeton and Bar-Ilan Universities

ABBREVIATIONS

- A Leibniz, G. W. *Sämtliche Schriften und Briefe*, Darmstadt/Leipzig/Berlin: Edition of the German Academy of Sciences 1923–. Cited by series volume and page.
- AG Leibniz, G. W. *Philosophical Essays*, edited and translated by R. Ariew and D. Garber (Indianapolis: Hackett, 1989).
- GP *Die Philosophischen Schriften von Leibniz*, edited by C. I. Gerhardt, 7 vols (Berlin: Weidmann, 1875–90; reprinted Hildesheim: Olms, 1978).
- Pk Leibniz, G. W.: *De Summa Rerum: Metaphysical Papers 1675–1676*, edited and translated by G. H. R. Parkinson (New Haven and London: Yale University Press, 1992).

BIBLIOGRAPHY

- Adams, R. M., *Leibniz: Determinist, Theist, Idealist* (New York: Oxford University Press, 1994).
- Beeley, P. 'Mathematics and Nature in Leibniz's Early Philosophy', in *The Young Leibniz and his Philosophy (1646–1676)*, edited by S. Brown (Dordrecht and Boston: Kluwer, 1999) 123–45.
- Brown, S. (ed.) *The Young Leibniz and his Philosophy (1646–1676)* (Dordrecht and Boston: Kluwer, 1999).
- Cover, J. A. and O'Leary-Hawthorne, J. *Substance and Individuation in Leibniz* (Cambridge University Press, 1999).
- Duchesneau, F. *Les modèles du vivant de Descartes à Leibniz* (Paris: Vrin, 1998).
- Duchesneau, F. *La physiologie des Lumières. Empirisme, modèles et théories* (La Haye: Martinus Nijhoff (Kluwer), 1982).
- Dumas, M. N. *La Pensée de la vie chez Leibniz* (Paris: Vrin, 1976).
- Fichant, M. 'Leibniz et les machines de la nature', *Studia Leibnitiana* (2003) No. 35: 1–28.
- Ishiguro, H. 'Unity Without Simplicity', *The Monist*, vol. 81 (1998) No. 4: 534–52.

⁴²I am grateful to Andreas Blank, Brandon Look, Francois Duchesneau, Emily Grosholz, Pauline Phemister, Justin Smith, Roslyn Weiss, and two referees for this journal for very useful comments on early versions of this paper.

- Ishiguro, H. 'Is there a conflict between the logical and the metaphysical notion of unity in Leibniz', in H. Poser *et al.* (eds) *Nihil sine ratione. Mensch, Natur und Technik im Wirken von G. W. Leibniz. VII. Internationaler Leibniz-Kongreß*, 3 vols (Hannover: 2001) 535–41.
- Levey, S. 'On Unity: Leibniz-Arnould Revisited', *Philosophical Topics* vol. 31 (2003) Nos 1 and 2: 245–75.
- Lodge, P. (ed.) *Leibniz and his Correspondents* (New York: Cambridge University Press, 2004).
- Look, B. 'Leibniz's Correspondence with Des Bosses', in *Leibniz and his Correspondents*, edited by P. Lodge (New York: Cambridge University Press, 2004).
- Look, B. 'On Monadic Domination in Leibniz's Metaphysics', *British Journal for the History of Philosophy* (2002) 10: 379–99.
- Mercer, C. and Sleight, R. C. 'Metaphysics: The Early Period to the *Discourse on Metaphysics*', in *The Cambridge Companion to Leibniz*, edited by N. Jolley (Cambridge: Cambridge University Press, 1995) 67–124.
- Mercer, C. *Leibniz's Metaphysics Its Origin and Development* (Cambridge: Cambridge University Press, 2001).
- Nachtomy, O. 'The Individual's Place in the Logical Space: Leibniz on Possible Individuals and their Relations', *Studia Leibnitiana*, 30 (1998) No. 2: 161–77.
- Nachtomy, O. 'Leibniz on Possible Individuals', *Studia Leibnitiana*, 34 (2002) No. 1: 31–58.
- Phemister, P. 'Leibniz and the Elements of Compound Bodies', *British Journal for the History of Philosophy*, 7 (1999): 57–78.
- Poser, H. *et al.* (eds) *Nihil sine ratione. Mensch, Natur und Technik im Wirken von G. W. Leibniz. VII. Internationaler Leibniz-Kongreß*, 3 vols, (Hannover: 2001).
- Pyle, A. *Malebranche* (London and New York: Routledge, 2003).
- Robinet, A. *Architectonique disjonctive, automates systématiques et idéalité transcendantale dans l'Oeuvre de G. W. Leibniz* (Paris: Vrin, 1987).
- Smith, E. H. J. 'On the Fate of Composite Substances After 1704', *Studia Leibnitiana*, 31 (1999) No. 1: 1–7.
- Smith, E. H. J. *Leibniz, Microscopy, and the Metaphysics of Composite Substance*, doctoral dissertation (New York: Columbia University, 2000).
- Wilson, C. 'De Ipsa Natura, Sources of Leibniz's Doctrines of Forces, Activity and Natural Law', *Studia Leibnitiana*, 19 (1987) No. 2: 148–72.
- Wilson, C. *The Invisible World* (Princeton: Princeton University Press, 1995).

Copyright of British Journal for the History of Philosophy is the property of Routledge and its content may not be copied or emailed to multiple sites or posted to a listserv without the copyright holder's express written permission. However, users may print, download, or email articles for individual use.