

Presupposition, Aggregation, and Leibniz's Argument for a Plurality of Substances*

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Abstract

This paper consists in a study of Leibniz's argument for the infinite plurality of substances, versions of which recur throughout his mature corpus. It goes roughly as follows: since every body is actually divided into further bodies, it is therefore not a unity but an infinite aggregate; the reality of an aggregate, however, reduces to the reality of the unities it presupposes; the reality of body, therefore, entails an actual infinity of constituent unities everywhere in it. I argue that this depends on a generalized notion of *aggregation*, according to which a thing may be an aggregate of its constituents if every one of its actual parts *presupposes* such constituents, but is not composed from them. One of the premises of this argument is the reality of bodies. If this premise is denied, Leibniz's argument for the infinitude of substances, and even of their plurality, cannot go through.

Cum ubique Monades seu principia unitatis substantialis sint in materia, consequitur hinc quoque infinitum actu dari, nam nulla pars est aut pars partis quae non monades contineat.—to Des Bosses, Feb 14, 1706.

Introduction

At the heart of Leibniz's metaphysics, I argue, is an analytic argument for the infinite plurality of substances, that the reality of (secondary) matter requires that there should be real unities everywhere in it. In a nutshell, it goes like this: every body is actually divided into other bodies, and these into further bodies, without end; each of these bodies is therefore an infinite aggregate; the reality of an aggregate, however, reduces to the reality of the unities it presupposes; the reality of body, therefore, entails an actual infinity of constituent unities everywhere in it. Although there are precursors to this form of argument in his earlier work, it is first clearly articulated in the 1680s, especially in Leibniz's correspondence with Arnauld. It is often held that in this period Leibniz held the unities in question to be corporeal substances whose bodies are real unities consisting in subordinate substances united by a form, and that in his mature writings Leibniz abandoned this "corporeal substance" metaphysics for a "monadological" metaphysics where

the presupposed unities are monads, pure forms that alone are real, bodies being merely phenomenal and therefore not real. In opposition to this, I argue that Leibniz continues to give essentially the same analytic argument for an infinity of substances in matter right through his mature corpus, and that one of the premises of this argument is the reality of bodies. If this premise is denied, his argument for the infinitude of substances, and even of their plurality, cannot go through.

An adequate understanding of Leibniz's argument for the actual infinite plurality of substances, I argue, depends on appreciating his subtle views concerning aggregation and presupposition, and also his nominalism regarding collections. Building on the perceptive analysis of Don Rutherford, I argue that Leibniz has a generalized notion of *aggregation*, according to which a thing may be an aggregate of its constituents if every one of its actual parts *presupposes* such constituents, but is not composed from them. I maintain that this presupposition argument is, throughout Leibniz's mature philosophy, the basis of his argument for individual substances from the actually infinite division of matter. It is supported by a severe nominalism, according to which an aggregate has no more *reality* than its constituents, its *unity* being merely phenomenal. It is usually held that it is because of this lack of unity that forms are introduced to serve as a unifier transforming what would otherwise be discrete substances into the organic body of a corporeal substance. But on the reading I propose, the way the presupposed forms do their work is by giving a teleological and functional unity over time, a diachronic rather than a synchronic unity. Different constituents belong to the organic body of a substance at different moments, but at no given moment do they constitute a real unity, given Leibniz's nominalism.¹ There is thus no question, on this reading, of what would otherwise be a mere aggregate of substances being *transformed into a substantial unity* by a substantial form, nor of corporeal substance being *composed* of other substances in the "middle period"—nor, despite the misleading term "composites", of bodies being composed of monads, rather than simply presupposing them. It is from the reality of body and its infinity of actual parts that the constituent substances are inferred, and the aggregate of these substances is the body.

In presenting this argument I will be riding roughshod over several competing interpretations by contemporary scholars, for which I should apologize in advance. I shall try to indicate where I diverge from these well-argued positions in passing, but in large part I must defer a more adequate treatment of the subtle respects in which I disagree with them to a book-length exposition of my interpretation in preparation, *Ariadnean Threads*. Here the cogency of my overall interpretation of

Leibniz's theory of substance must rest largely on how well it allows us to understand his argument for the infinite plurality of substances.

1. The Leibnizian analysis of matter

Let us begin with Leibniz's analysis of matter. The first thing to note is his argument for the claim that there are actually infinitely many bodies. It rests on the claim that when a body is acted upon by other bodies in the plenum, this will cause differential motions in its interior. But according to Leibniz, any given body is individuated by its parts all having a motion in common.² That is, different actual parts of matter are distinguished by their differing motions.³ It follows that parts with differing motions will be actually divided from one another, as Descartes had in fact argued in his *Principles of Philosophy* (II, §34-35).

Now if every body is so acted upon by surrounding bodies, the division will proceed to infinity. Therefore matter is infinitely divided, and since what is divided is an aggregate of the parts into which it is divided, it will be an *infinite aggregate*. Leibniz spells this argument out explicitly on numerous occasions, a typical example being this passage in the *Specimen of Discoveries* from the late 1680s:

No body is so very small that it is not in turn actually divided into parts excited by different motions; and therefore in every body there are actually bodies infinite in number. (*A Specimen of Discoveries* (c. 1686-9; A VI iv 1626; Ar 323)

He had given the same argument in an unpublished paper written some eight to ten years earlier:

Created things are actually infinite. For any body whatever is actually divided into several parts, since any body whatever is acted upon by other bodies. And any part whatever of a body is a body by the very definition of body. So bodies are actually infinite, i.e. more bodies can be found than there are unities in any given number. (c. 1678-9; A VI iv 1393; Ar 235).

Notice that this passage makes explicit that the notion of actual infinity involved is precisely the *syncategorematic* notion of the infinite that Hidé Ishiguro (1990), Sam Levey (2008) and I (2008) have explained elsewhere: bodies are actually infinite in the sense that for any finite number, there are actually (not merely potentially) more bodies than this.⁴ There is, however, no infinite number or infinite collection, and infinite wholes are held to be fictions.

Of course, here we are dealing with *bodies* that are the parts of other bodies. Leibniz does not claim that bodies are *substances*—in fact he denies this. In a piece

of the late 1670s or early 1680s whose title is “A Body is not a Substance, but only a mode of being or coherent appearance”,⁵ Leibniz argued that if ‘body’ is taken as pure extension or bulk, as opposed to “what the Scholastics compose out of matter and a certain intelligible form”, then it “is not a substance”, but rather “an accidental entity” that is in “perpetual flux”. By 1678/9 he had come to recognize that “unless there were a soul, i.e. a kind of form, a body would not be an entity, since no part of it can be assigned which would not again consist of further parts, and so nothing could be assigned in body which could be called *this something*, or *some one thing*” (A VI, 4 p. 1988; Ar 233-35). Without this form or “substantial unity”, a body is a mere phenomenon. He was adamant that although the reality of any phenomenal body is constituted by an infinite aggregate of substantial unities, these unities, having no extension, are not *parts* out of which any extended body can be composed. As he wrote to De Volder in 1704 in a typical passage,

But, accurately speaking, matter is not composed of constitutive unities, but results from them, since matter *ô*r⁶ extended mass is nothing but a phenomenon founded in things, like a rainbow or mock-sun, and all reality belongs only to unities ... Substantial unities, in fact, are not parts but foundations of phenomena. (to De Volder, 30th June, 1704: GP II 268)

These substances or “constitutive unities” are what Leibniz calls *monads*, a term he uses with increasing frequency over the last two decades of his life.

Nevertheless, even though monads are not parts of body, Leibniz insists that *bodies are aggregates of substances*. Here are some further statements of this thesis taken from different moments of his career:

Body is an aggregate of substances, and this is not properly speaking a substance. It must therefore follow that there are substances in bodies everywhere, substances which are indivisible, ungenerable, and incorruptible, and which have something corresponding to a soul. (to Arnauld, 23 March 1690; GP II 135; WFP 136; Russell 1900, 241)

By monad I understand a substance truly one, namely, one which is not an aggregate of substances. ... Secondary matter, or mass (*massa*) is not a substance, but substances; and so not the flock but the animal, not the fish pond but the fish, is one substance. ... But if there were no souls or something analogous to them, then there would be no I, no monads, no real unities, and therefore no substantial multitudes; indeed there would be nothing in body but phantasms. From this one can easily judge that there is no part of matter in which monads do not exist. (to Johann Bernoulli, September 1698; GM III 536-7)

Matter (that is, secondary matter), or a part of matter, exists in the same manner as a herd or a house, that is, as a being by aggregation. ... [T]hus from many monads there results secondary matter, together with derivative forces, actions and passions, which are only beings through aggregation, and thus semi-mental things ... (to Des Bosses, 11th March 1706; LDB 31, 35)

But the consistency with which Leibniz insists on this thesis that bodies are aggregates of substances or monads does not help us understand it. The “substances” referred to in the 1690 quotation could be corporeal substances, although in the latter two he is definitely referring to monads. But if monads are immaterial, how could a material body be an infinite aggregate of them? And, if bodies are only phenomena, why should they be aggregates of monads at all? Glenn Hartz has presented this dilemma very forcefully in his recent book (Hartz 2007). If, as an idealist interpretation would have it, bodies “are eliminatively reduced to phenomena in the representational content of monads’ perceptual states (Furth 1976)”, then the “aggregate thesis”, according to which a body is an aggregate of monads, must be denied (Hartz 2007, 28). On the other hand, if every body is an aggregate of real substances, then “bodies must in some sense be composed of or constituted by substances”, which seems “to require bodies to be mind-independent”, in contradiction to Leibniz’s claims (Hartz 2007, 29).

2. The reality of aggregates and Leibniz’s nominalism

In an earlier work I suggested that Leibniz’s claim that bodies are phenomena is explained in part by his doctrine of the actual infinite (Arthur 1989). For if a body is an infinite aggregate of its parts, it is an infinite whole; and, as mentioned above, he held infinite wholes to be fictions. Yet in the above passages, bodies are identified as infinite aggregates of *substances* (which elsewhere he denies are parts of bodies). And in any case, although it is true that Leibniz identified bodies as infinite aggregates, he also claimed that *all* aggregates are phenomenal, even finite ones, as Russell had already perceptively observed in 1900:

The world is only verbally a whole (GP II 305), and even a finite aggregate of monads is not a whole per se. The unity is mental or semi-mental. In most passages Leibniz only applies this doctrine against infinite aggregates, but it is evident that it must apply equally against all aggregates. This Leibniz seems to have known. (116)

Russell quotes several passages in support. Here are some representative ones from

the *Nouveaux essais* of 1704:

It may be that a *dozen* or a *score* are mere relations, and are constituted only by relation to the understanding. The units are separate and the understanding gathers them together, however scattered they might be. However, although relations are the work of the understanding, they are not baseless or ideal. (*New Essays*, §145)

This unity of the idea of an aggregate is a very genuine one; but at bottom it must be admitted that this unity that collections have is only a respect (*rapport*) or relation, whose foundation lies in what is found in each of the individual substances taken itself. So the only perfect unity these beings by aggregation have is a mental one; and consequently their being is also in some way mental or phenomenal, like that of the rainbow. (*New Essays*, §146)

A collection of substances does not really constitute a true substance. It is something resultant, which is given its final touch of unity by the soul's thought and perception. However, it can be said to be something substantial, in a way, namely as containing substances. (*New Essays*, §226).

Thus, as Russell insists, "The general principle that all aggregates are phenomenal must not be confounded with the principle, which Leibniz also held, that infinite aggregates have no number." (117, n. 1) The former principle derives from Leibniz's nominalism about aggregates. "Whatever is real about an aggregate is *only* the reality of its constituents taken one at a time; the unity of a collection is what Leibniz calls semi-mental (GP II 304), and therefore the collection is phenomenal although its constituents are all real." (115) As Leibniz explained to De Volder in his letter of 30th June, 1704,

Anything that can be divided into many (already actually existing) things is aggregated from many things, and a thing that is aggregated from many things is not one except in the mind, and has no reality except that which is borrowed from what it contains. From this I then I inferred that there are therefore indivisible unities in things, because otherwise there will be no true unity in things and no reality that is not borrowed, which is absurd. (GP II 267)

Russell, however, construes this doctrine of the phenomenality of collections as completely undermining Leibniz's position. He reasons that if "a collection, as such, acquires only a precarious and derived reality from simultaneous perception", then plurality only comes about by a kind of "synthetic unity of apperception" (116). Consequently, he claims, Leibniz is confronted with a dilemma. Either he must deny real plurality altogether, or he will have to allow infinite collections,

and thus infinite number:

If the plurality lies *only* in the percipient, there cannot be many percipients, and the whole doctrine of monads collapses. If the plurality lies *not* only in the percipient, then ... the assertion of infinite aggregates, with all its contradictions, becomes quite inevitable for Leibniz. The boasted solution of the difficulties of the continuum is thus resolved into smoke, and we are left with all the problems of matter unanswered. (1900, 116-117)

This, however, is a serious misunderstanding. It is not the plurality or aggregate that lies only in the percipient, but the perception of it *as a unity*. Russell notes Leibniz's axiom about the convertibility of unity and being, "whatever is not truly *one* being is not truly *one being*".⁷ He then takes this together with his claim that the unity of a plurality is furnished by perception, and infers that for Leibniz the plurality itself has no being outside of being perceived. But what is contributed by perception is the *unity* of the aggregate, the aggregate conceived as an entity *in addition to* its constituents. Therefore, since the unity of the aggregate is supplied by perception, it has no real (mind-independent) being *as an entity besides its constituents*. If there are four substances, then these all exist independently of anyone perceiving them. If they are conceived or perceived together as making up a quadruple, then, according to Leibniz's doctrine, it is the quadruple as distinct from its constituents whose existence consists in those constituents being conceived or perceived together. Thus there are finite aggregates, and number may be applied to them; but their existence as collections, and the number itself, are supplied by the collating activity of the mind.

Russell wrote his critique of Leibniz while still trying to differentiate Leibniz's monadism from Lotze's monism. He correctly ascribes to Leibniz the view that number cannot be predicated of what is not a whole, and sees that this entails for Leibniz "that infinite aggregates have no number". But he also thinks that wherever there is a plurality, there must be a collection, and therefore a number. So while he agrees with Leibniz that "infinite collections have no number that can be assigned", he insists that "infinite collections are undeniable, and it will be one of our main problems to free them from the contradictions" (Russell 1994, 33-4). Thus although in 1899-1900 Russell was yet to encounter Cantor's set theory,⁸ the ground was prepared in his thought for its reception. On Cantor's way of thinking, whenever one has a plurality, one automatically has a collection (i.e. a set with more than one member). So, conversely, if the collection or set is phenomenal, then so too must be the plurality.

Leibniz's nominalism, as I interpret it, stands in stark opposition to this. On his view, if you have two diamonds, you do not *also* have a set of two diamonds, as an entity distinct from its members, except insofar as it is perceived. Of course, if the two diamonds are together, you can perceive them as a unity, as a pair of diamonds. But this unity, Leibniz claims, is simply a perceived unity.⁹ He is no more impressed by the idea that two bodies could be welded into one, since the bond itself would still need to be explained in mechanical terms — co-moving fluids, and so forth — so that in the end it would reduce to a mere juxtaposition of parts, not a substantial union.¹⁰ Thus what Russell missed is the full scope of Leibniz's nominalism about collections: a flock of sheep is just the sheep, the individual sheep, together with the fact that they are perceived together.¹¹

This reading of Leibniz's nominalism, it seems to me, undermines the dichotomy that many interpreters have read into Leibniz's views of aggregates, so clearly articulated by Glenn Hartz in his (2007). For on the account of Leibniz's nominalism I am defending here, his holding to the mind-dependence of aggregates does not permit an inference to the mind-dependence of the constituents of such aggregates. Again, the mind-dependence of aggregates is not the same as their ideality; indeed, an aggregate of substances is said to be real for the very reason that it consists in a plurality of real constituents. This account also helps to explain many of Leibniz's otherwise somewhat puzzling locutions: he writes to Bernoulli, for example, that "secondary matter ... is not a substance, but substances",¹² precisely to draw attention to the idea that body is not (in itself) one thing, a unity formed by a collection of substances, but is simply those substances themselves taken severally.

This nominalist interpretation also helps to bring Leibniz's account of aggregates into line with his (admittedly, extremely complex) doctrine of relations. For the relations among the constituent substances that account for our perceiving it as one, such as their spatial proximity, are supplied by a perceiving mind. There is therefore a very deep-lying connection between Leibniz's doctrine of aggregates and his doctrine of relations, as indicated in the passages quoted from the *New Essays* above: the relations which result in our perceiving an aggregate as one thing are also supplied by a perceiving mind. Adams argues that since "the spatial positions of substances' bodies..., and therefore the aggregation of substances into bodies, depend on the apparent position of bodies as phenomena", this "will tend to infect the aggregates with mind-dependence and diminish their reality" (Adams 1994, 253, 255). This supposes, however, that being the work of the mind is the same as being ideal, thus ignoring Leibniz's rider quoted above that "although relations are

the work of the understanding, they are not baseless or ideal". (*New Essays*, §145). Clearly, Leibniz's theory of relations is too big a topic for casual treatment here, so I will refer readers to the authoritative account of Massimo Mugnai (2012), as well as to a forthcoming paper of mine on Leibniz's theory of space (Arthur 2012). Very briefly, space and time are orders, and, like number, exist in several subjects at once. Being therefore neither subjects nor attributes, they possess a kind of third status.¹³ They are nonetheless characterized by Leibniz as "real relations", founded in the divine understanding. Thus even though an aggregate of substances is perceived together because of the spatial locations of their bodies, and their being perceived together depends on a perceiver, the "reality [of these relations] does not depend on our understanding – they inhere without anyone being required to think them. Their reality comes from the divine understanding, without which nothing would be true."¹⁴

These remarks bring us to a consideration of phenomena in Leibniz's work. There is, as is well known, a crucial difference for Leibniz between bodies being *mere phenomena* and their being *real phenomena*.¹⁵ I take it that for Leibniz a phenomenon, in general, is an entity appearing to the senses that is not itself a substance. Thus bodies, according to Leibniz, since they appear to the senses but are not themselves substances, will be phenomena in this sense. Now a phenomenon will be a *real phenomenon* if there are things existing outside of us from which it results; otherwise it is a *mere* (or *pure*) phenomenon. A pure phenomenon, in fact, will correspond to what Wolff said the idealists understood by a phenomenon, namely "that which only appears to exist, but has no reality outside the mind" (Wolff 1737, §226).¹⁶ This is where Leibniz's argument for substances in bodies gets its traction. If there are no substances existing outside us whose aggregate constitutes the body, he argues, then the body will be just an appearance, a mere phenomenon. This is how Leibniz thinks bodies come out on Spinoza's philosophy, and in the end on Malebranche's too, where there are no substances of the right kind for bodies to be aggregated from.¹⁷ If, on the other hand, there are substances in body, these substances will constitute the reality of the body: the body will be a *real phenomenon*, with its reality deriving from that of its constituent unities.

Leibniz makes his case for this conclusion in the early 1680s and in his correspondence with Arnauld from 1686 on. He contends that if all there is to body is "pure bulk [*moles*]" or *partes extra partes*, as the Cartesians understand body, then every part of a body will also be an aggregate. But if every constituent of the aggregate is itself an aggregate, there will be nothing real for it to be aggregated

from:

I believe that where there are only beings by aggregation, there will not in fact be any real beings; for every being by aggregation presupposes beings endowed with a true unity, because it derives its reality only from that of its constituents. It will therefore have no reality at all if each constituent being is still a being by aggregation, or it will be necessary to find some other foundation for its reality, for which we will have to go on searching in the same way, and will never find. (to Arnauld, 30th April 1687; GP II 96; WFP 123)

Now Leibniz does not believe that bodies are unreal—that is the view of the Skeptics that he is contesting.¹⁸ Thus, accepting the reality of bodies, and rejecting atoms and composition from points, we must accept also that there are real unities in body out of which they are aggregated:

[I]f there are aggregates there must also be some true substances from which all those aggregates result. So we must necessarily end up either with the mathematical points from which some authors compose extension; or with the atoms of Epicurus and M. Cordemoy—which you, like me, have already rejected; or we will have to say there is no reality in bodies; or, finally, we will have to acknowledge some substances in them which possess a genuine unity. (to Arnauld, 30 April 1687; GP II 96; WFP 123)

Thus every body is an aggregate of the unities it contains: it is this aggregate of substances, together with the unity resulting from their being perceived together. But every part of matter is such an aggregate of presupposed unities. Therefore there are infinitely many monads contained in any part of matter whatsoever:

Since monads or principles of substantial unity are everywhere in matter, it follows from this that there is also an actual infinity, since there is no part, or part of a part, which does not contain monads. (to Des Bosses, 14 Feb 1706; GP II 301; LDB 25; Russell 1900, 129)

This is Leibniz's *presupposition argument*, which I quoted in its original Latin at the head of this paper: because every part of matter, insofar as it is a real phenomenon and not a mere appearance, presupposes real unities, and because matter is infinitely subdivided, there are infinitely many presupposed unities. Thus bodies are phenomena because they are aggregates, but they are only real phenomena if real unities are presupposed. Nothing purely material can constitute a real unity, however, because it is infinitely divided in such a way that there is no last division. Therefore the unities presupposed must be non-material unities, i.e. substances, or monads. Thus every actual phenomenal body presupposes an infinite aggregate

of monads:

In actuals, there is nothing but discrete quantity, namely the multiplicity of monads or simple substances, which is greater than any number whatever in any aggregate whatever that corresponds to phenomena. (to De Volder, 19th January, 1706; GP II 282)

Here is it very important to appreciate the conclusion of Leibniz's presupposition argument. It is not that *some bodies are real unities*: for that would require that there is really more to an aggregate than its constituents, contrary to Leibniz's nominalist principle, together with the claim that the material part of any substance cannot be what provides unity. (In actual fact, Leibniz was not so dogmatic as never to countenance abandoning his nominalist principle: this, I propose, is what he is exploring in his correspondence with the Jesuit Des Bosses: whether it is possible after all for the constituents of a body to be united into a real unity by some substantial bond.¹⁹) Leibniz's conclusion here is rather that "there are in bodies substances which possess a genuine unity". That is, substances possessing unity "*are in*" bodies; they are *presupposed* in every part, they are the *constituents* from which the aggregate derives its reality. For it is substance that possesses unity, since it is only substance that is a principle of unity, something able to act while staying the same thing through time.

Thus, even at the time of his correspondence with Arnauld, Leibniz did not maintain that his rehabilitated substantial forms united the constituents of bodies existing at any given time into a real unity or real whole. On the contrary, he asserts that "we can never find anything systematic [*de réglé*] which will make a true substance out of beings by aggregation" (to Arnauld, 30 April 1687; GP 101; WFP 127). So "we have to allow that there is in bodies something which is truly a single being, since matter or extended mass in itself is only ever *plura entia*, as St. Augustine, following Plato, rightly pointed out." (to Arnauld, 9 October 1687; GP II 118; WFP 130-31)²⁰

Nevertheless, it is equally the case that Leibniz's reason for introducing real unities is that they should perform some of the same explanatory function that substantial forms played in scholastic philosophy. As Dan Garber has noted, the whole point of substantial forms is that they are supposed to be forms *of* bodies. Leibniz is not only adamant about the fact that substances²¹ *are in* bodies everywhere, but also about the fact that they are united to such of the bodies as are organic, as he forcefully insists to Arnauld in one of their last exchanges in 1690:

Body is an aggregate of substances, and this is not properly speaking a sub-

stance. It must therefore follow that there are substances in bodies everywhere, substances which are indivisible, ungenerable, and incorruptible, and which have something corresponding to a soul; and that all these substances have always been and will always be united to organic bodies which are transformable in various ways. (to Arnauld, 23 March 1690; GP II 135-6; WFP 136; Russell 1900, 241)

Garber, however, interprets the role of substantial forms in the middle period to be that of uniting what would otherwise be discrete bodies into a genuine unity, so that the form together with the organic body that is united by it form a genuine unity, the corporeal substance. He writes: “while bodies must contain something mental or analogous to the mental, a form that will unite discrete bodies and create genuine unity, it is these unities, these corporeal substances, that constitute the basic building blocks that ground bodies” (Garber 2009, 79); and “by adding form to an organic body, we transform it into a genuine unity” (143). Similarly Sam Levey, building on an unpublished article of mine, characterizes a corporeal substance as consisting in a form uniting an infinite plurality of further substances (Levey 2007, 77). On his reading, like Garber’s, the real unities that are the constituents of organic bodies are further corporeal substances, whose bodies are composed of still further corporeal substances, “bugs in bugs to infinity”, in Garber’s memorable phrase (347, 387). Here “there is no bottom level of substances in the world” (316). In what Garber sees as the new “monadological metaphysics” of Leibniz’s later years, by contrast, “monads are not composed of anything more basic: they are the ultimate bottom level of things” (317), and everything is reduced to monads and their perceptions. Similarly, on Levey’s recursive analysis in his (2007), because corporeal substances are “in the end” resolved into immaterial forms, Leibniz subsequently identifies forms as simple substances and drops corporeal substances.

What I am proposing here is subtly different. I propose that Leibniz’s substances may be immaterial insofar as they are substances, but they are always united to organic bodies, both in his earlier work and in his mature metaphysics. Now, one can, and Leibniz does, call a substance together with its associated organic body a corporeal substance, and in that case there are indeed corporeal substances within the body of a corporeal substance, and so on all the way down. (This, I believe, explains Leibniz’s favourable references to corporeal substances throughout this period, outside the context of the substantial bond.) But the unities are substances, things which act, and their unity consists in their remaining self-same while they continue to act. So, although an organic body manifests itself as the body of an

individual substance by certain (inconclusive) indications, such as the teleological behaviour it exhibits,²² the body itself is not “made into a unity” by having form added to it, as Garber’s wordings suggest. Indeed, the organic body associated with a given form changes from one instant to another: it does not remain precisely the same body for longer than a moment, so that strictly speaking there is no enduring body that could be united *by* such a form. At any instant, the form informs an organic body, but the latter is continually changing: it is not precisely the same aggregate of substances from one time to another (although it will usually *appear* so, of course).²³ When Arnauld objects to Leibniz that “when the soul is joined to matter it does not make it into a being which is truly one, because matter is not truly one being in itself, and the soul, as you see it, gives it only an extrinsic denomination”, Leibniz *concedes* this, replying: “it is the animated substance to which this matter belongs that is truly one being, and the matter taken as mass in itself is only a pure phenomenon.” (to Arnauld, 9 October 1687; GP II 118; WFP 131) In a word, bodies are real, but they are not unities; rather they *contain* unities. Leibniz’s *per se* unities are not entities that would have remained *entia per aggregationem* had they not been united by a form; they are the forms or entelechies themselves, each of which is an enduring substance that has, at every instant, a body through which its actions are expressed.

Thus on this reading—and in agreement with Leibniz’s many statements to this effect—there is no composition of substances. The organic bodies of corporeal substances are not discrete bodies that are united into a genuine unity by a form. If they were, there would be aggregates whose unity did not consist in the constituents being perceived together, contrary to Leibniz’s argument—or, at least, we should expect him to have noted explicitly that certain bodies have a real unity, in addition to the phenomenal or nominal unity supplied by their being perceived or conceived together. The same holds for Leibniz’s allegedly different mature theory: infinite aggregates of subordinate substances could not compose an organic body, both because immaterial substances could not compose a material thing, and because an infinite aggregate, insofar as it is distinct from its constituents, is purely phenomenal. But this hardly supports the idealist/phenomenalist reading that Robert Adams and others have proposed. For if bodies are, ultimately, phenomena in the sense of mental phenomena of perceivers, this undercuts the argument given here for positing monads in the first place. The presupposition argument described above would simply collapse, and with it the argument for the infinite multiplicity of monads. Indeed, the argument for any plurality of substances would be under-

mined, since the division into parts of a merely perceived extension is insufficient to support the inference to a real plurality: the system would fall into the very solipsism Russell imputed to it. Leibniz conceived his argument as the only way to avoid the phenomenalism he decried in Malebranche and Spinoza, and there is no evidence that he ever changed his mind about this. He certainly never abandoned his doctrine that created substances are always embodied, and that the monad is the soul or entelechy of the organic body belonging to it, both of which are repeated in the *Monadology*,²⁴ as is the doctrine that the actually infinite division of matter entails that there is an infinity of creatures in the smallest part of matter (§65-67).

3. *Inesse, presupposition and Leibniz-aggregates*

I have argued that substances possessing unity “*are in*” bodies; they are *presupposed* in every part, they are the *constituents* from which the aggregate derives its reality. They are not, however, parts of bodies. These are subtle theses, and should benefit from further elaboration.

The importance of the notion of *inesse*, or “being in”, has long been recognized in Leibniz’s logic, as when he maintains that every predicate pertaining to an individual substance *is in* its complete individual concept. But as Don Rutherford has argued, the term has a much wider connotation, and is a term of art in his metaphysics that the logical writings are intended to clarify.²⁵ He quotes Leibniz from a logical paper, “A Study in the Calculus of Real Addition”, dated by Parkinson as after 1690:

We say that the concept of the genus is in [*inesse*] the concept of the species, the individuals of the species are in the individuals of the genus; a part in the whole, and the indivisible in the continuum—for example, as a point is in a line, even though a point is not a part of a line. Thus the concept of an affection or predicate is in the concept of the subject. In general, this consideration extends very widely. (GP VII 244-45; PL 141; Rutherford 1990, 541)

The notion of *being in*, in turn, is equivalent to *being an ingredient of*, *being presupposed by*, or *being an immediate requisite of*. If *A* is in *B*, this means that once *B* is posited, *A* is immediately posited too: *A* is presupposed by *B*. Rutherford quotes the following passage from the *Initia rerum mathematicarum metaphysica* [April 1715] in support:

We say that an entity is in [*inesse*] or is an ingredient of something, if, when we posit the latter, we must also be understood, by this very fact and immediately, without the necessity of any inference, to have posited the former as

well. (*Initia rerum math. metaphys.*; GM VII 19; L 667) .

Applying these considerations to the case of constitutive unities being in matter, we may say that the members *A* of an aggregate *B* are in *B*. If the reality of the aggregate consists in the reality of its members, then as soon as we posit *B* then we have, “by this very fact and immediately”, also posited its members *A*. This seems to be supported by the following Leibnizian fragment from the 1680s quoted by Rutherford, and also by Mugnai (2010, 8, 12):

A is in B, if every thing which is immediately required for *A* is also immediately required for *B*. But that which is immediately required for something in such a way that nothing further is immediately, nor therefore mediately, required for it, may be called [its] *reality*. (A VI, 4, p. 990)

Rutherford, however, gives this a different interpretation. From the fact the unities are said by Leibniz to *be in* matter, he concludes that we should no more conclude that they are *spatially contained* in matter than that the concept of the predicate is *spatially contained* in the concept of the subject. What is meant by an aggregate presupposing constitutive unities, Rutherford argues, “is just to say that the latter derives its reality, or the possibility of its existence, from the former by virtue of a relation of essence” (548): “unless these prior *entia* should exist, it is conceptually impossible that the *entia* which they ‘are in’ should exist” (544). Thus, he feels entitled to conclude, “When we say with Leibniz that a body is an aggregate of monads, we assert that its appearance is grounded in some specific plurality of monads.” (549) The monads are related to one another in such a way as to produce in another monad the appearance of a body, whose reality is constituted by the fact that “any veridical perception of a body is necessarily the perception of a plurality of monads” (551).²⁶

When we examine all the quotations from Leibniz given above, however, about how monads are presupposed in any part of matter however small, there is no mention of the appearance or veridical perception of bodies, and no hint that ‘being in’ should not be taken in a spatial sense. On the contrary, all the spatial claims are unqualified and seem to be intended literally: “there are substances in bodies everywhere”, “there are in bodies substances which possess a genuine unity”, “monads or principles of substantial unity are everywhere in matter”. Indeed, this is what we should expect. A monad is an *entelechy*, and it is crucial that the entelechy is in the part of matter it actuates. For it is what makes for the actuality of the parts of matter. If the entelechy were merely presupposed by the part in the weaker sense proposed by Rutherford, where the matter of this part derived the mere possibility

of its existence from some presupposed entelechies, then all one would be entitled to conclude from the supposition of the reality of bodies would be that there are some entelechies. But then parts of matter at different instants would not thereby be distinguishable. The point of an entelechy, however, is to make that part of matter *actual*.

This makes for an interesting connection with Leibniz's dynamics, for as we have seen the actual parts of matter are individuated by a motion in common, that is, the conatus or instantaneous tendency to motion shared by all the constituents of that part. In Leibniz's mature dynamics, as he explains in *De Ipsa Natura* (1698), the *first entelechy* is the subject of the activity of substances, which "in interactions between bodies is modified in various ways through conatus or impetus." (GP IV 511; WFP 217). The conatus that individuates a given part of matter, is, like the dead forces, a modification of the entelechy; what makes a given part actual, therefore, presupposes the entelechy of which that conatus is a modification.²⁷ Consequently these entelechies or principles of motion are presupposed in every actual part of matter:

Since, therefore, primitive entelechies are dispersed everywhere throughout matter—which can easily be shown from the fact that principles of motion are dispersed throughout matter—the consequence is that souls also are dispersed everywhere throughout matter. (GP VII 320; Russell 1900, 258)

If there were no divisions in nature, there would not be any diverse things, or rather there would be nothing but the mere possibility of things; but the actual division in masses makes distinct the things that appear, and presupposes (*supponit*) simple substances. (unsent draft to De Volder, 1704-5; GP II 276)

Of course, there is a difference between the way in which a soul or entelechy "is in" a part of matter, and the way a point "is in" a line: the point exists as a modification of a line segment, as its endpoint, whereas an entelechy is the principle that informs or makes actual that part of matter. The soul does not exist at a point inside the part, but is nevertheless "contained" in that volume in the sense that it is where the activity resulting from it takes effect: I am, for example, where I am seeing things from. A monad or entelechy pertains to the organic body whose entelechy it is; thus a monad is, in this derivative sense, where the organic body is, even though it is the organic body that has a spatial location.

What must be granted, of course, is that monads are not *parts* of matter, since they are of a different kind, and not homogeneous with it. As Leibniz is reported to have told Fardella:

Although the aggregate of these substances constitutes body, they do not constitute it as parts, just as points are not parts of lines, since a part is always homogeneous with the whole. However, the organic bodies of substances included in any mass of matter are parts of that mass. ... And therefore there are substances everywhere in matter, just as points are everywhere in a line. And just as there is no portion of a line in which there are not infinitely many points, there is no portion of matter which does not contain an infinity of substances. But just as a point is not a part of a line, but a line in which there is a point is such a part, so also a soul is not a part of matter, but a body in which there is a soul is such a part of matter. (A VI, 4, p. 1673)

So we may make a distinction: A body is the mereological sum of the actual parts into which it is divided, and from which it may be aggregated, in the normal sense of a part-whole relation. Thus a horse's body is the aggregate of its trunk, its legs, its head, etc. But this is not the sense in which a body is an aggregate of substances. The parts of a body do not constitute its reality, in that they are always further resolvable: each of them has material parts, and each of these parts, insofar as it is actual, presupposes entelechies that make them actual as well as further parts. What seem to be the immediate requisites "such that nothing more is immediately required"—what according to the above quotation, must therefore constitute the body's reality—are the presupposed unities. These we may therefore agree to call its *constitutive principles*, which we may define as follows:

Constitutive principles: B is a constitutive principle of A iff an entity of this kind is an immediate requisite of every part of *A*, and is not itself resolvable into further immediate requisites.

Thus the parts of a line segment are portions of the line segment which are themselves line segments. But each such segment is extended, and therefore presupposes points. The points however, do not presuppose anything more basic. Since points are presupposed in every part of the line and are not further resolvable into immediate requisites—there is nothing in them—they are constitutive principles of the line. Similarly, what are in every part of matter but not themselves resolvable into further immediate requisites, are what Leibniz calls *simple substances*. They are simple, I propose, because they have no immediate requisites. As Leibniz explains to Fardella:

There are infinite simple substances or created things in any particle of matter; and matter is composed from these, not as from parts, but as from constitutive principles ôr immediate requisites, just as points enter into the essence of a

continuum and yet not as parts, for nothing is a part unless it is homogeneous with a whole, but substance is not homogeneous with matter or body any more than a point is with a line. (A VI, 4, p. 1673)

So when Leibniz says that a body is an aggregate of substances, he does not mean this in the mereological sense that the substances are parts of the body, but that they are presupposed by it. As we have seen, *inesse* or 'being in' is taken in a very general sense by Leibniz; correlatively, its inverse, aggregation, is also very general, encompassing not only the normal mereological sum, but any elements that are presupposed by the aggregate. But what are particularly dear to Leibniz are aggregates of constitutive principles. Let us call these *Leibniz-aggregates*:

A is a *Leibniz-aggregate* of entities *B* iff the *B* are the *constitutive principles* of *A*.

Equivalently,

A is a *Leibniz-aggregate* of entities *B* iff the *B* are presupposed in every part of *A*, and do not themselves presuppose anything further.

Thus the substances constituting body are not its parts, but are nevertheless contained in (presupposed by) each of its parts. The material body is not a mereological sum of monads; it is a Leibniz-aggregate of them. Since the constitutive principles of body are those things presupposed in every part that do not presuppose further immediate requisites, in a real body these constitutive principles are the simple substances. And since there is nothing more to any aggregate than the things aggregated, there is nothing more to a Leibniz-aggregate than its constitutive principles. Therefore the body, insofar as it is a real phenomenon, is simply those substances.

On this reading, Leibniz does not deny the reality of body. For this is not incompatible with his holding that there are only simple substances *ad infinitum* constituting the reality of each body. The reality of body reduces to the reality of the simple substances that are its constitutive principles: "in them are the sources of all things and of the modifications that come to things".²⁸

Of course, this is strictly an analytic argument. Leibniz still owes an explanation, which he will try to offer elsewhere, of what exactly these constitutive principles consist in, and how they result in the phenomena of extended bodies, motions and derivative forces. He will argue that substances consist in force, and that the appearance of bodies as continuously extended is, like their unity, something added in perception. For a monad or substance is a *primitive force*, which is a temporal continuant, whereas the derivative forces are modifications that change from one instant to another:

The forces which arise from mass and velocity are derivative and pertain to aggregates or phenomena. ... And really, derivative forces are nothing but modifications or results of primitive ones. (to De Volder, June 1703; GP II 251)
[A]ccidental or changeable active forces, and motions themselves, are certain modifications of some substantial thing, but forces and actions cannot be modifications of a merely passive thing, such as matter is. It is therefore a consequence that there be a primitive active or substantial thing, which is modified by the added disposition of matter, or what is passive. (to De Volder, 3 April 1699; GP II 171)

The derivative forces and motions, as transient modifications, cannot confer any lasting unity on bodies. But instantaneous motions are sufficient for individuating the parts into which matter is actually divided, and it is in this sense that the substance can serve as an entelechy for the constantly changing infinite aggregates of subordinate substances constituting its body.

Clearly there is much more to be said under this head, especially about Leibniz's characterization of force as appetite, the endeavour to change perceptions, and the interpretation of perceptions as representations of the whole rest of the universe. But such synthetic arguments are built on the framework established by this presupposition argument, which establishes that there are actually infinitely many constitutive unities in any body, however small, and that such unities cannot be purely material. As I have argued here, this is Leibniz's argument for his claim that there are in any body actually infinitely many monads, where the infinite is understood syncategorematically. But this argument depends for its success on the reality of body, and on its being actually divided. Granting that there really are bodies, even if their unity is supplied by a perceiver, "the multiplicity of monads or simple substances is greater than any [finite] number whatever."

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Notes

* I read versions of this paper to audiences at a workshop on interrelationships between mathematics and philosophy in the thought of Leibniz in Paris, March 2010, and at the Fifth International in San Diego in June 2011. I am indebted to my audiences there for insightful comments, to Paul Lodge for making available his translations of the Leibniz-De Volder correspondence, and also to the journal's anonymous referee for helpful and judicious suggestions. For stimulating exchanges in conversation and e-mail on the matters discussed here, I am also indebted to Don Rutherford, Pauline Phemister, Peter Loptson, Sam Levey, and Ohad Nachtomy, and most especially to Massimo Mugnai, for sharing his ever-

deepening understanding of Leibniz's theories of relations and aggregates with me during twelve years of dialogue.

¹ For this wording I am indebted to the helpful suggestions of the journal's referee.

² For sources and a detailed exposition of these claims, see Arthur 1989 and Levey 1998.

³ As Leibniz writes to De Volder in June, 1704 "But in real things, that is, bodies, the parts are not indefinite (as they are in space, a mental thing), but are actually assigned in a certain way, as nature actually institutes the divisions and subdivisions according to the varieties of motion, and ... these divisions proceed to infinity...". (GP II 282)

⁴ The same argument is repeated in the *Monadology* (1714): "every portion of matter is not only divisible to infinity, as the ancients realized, but is actually subdivided without end, every part into smaller parts, each one of which has its own motion." (*Monadology*, §65; WFP 277).

⁵ A VI iv 1637; LoC 258-261. The Akademie editors date this piece as from Leibniz's Italian journey on the grounds that it has the same watermark as another fragment deriving the phenomenality of bodies from the considerations about the labyrinth of the continuum. I give my reasons for dissenting from this dating in LoC 416, although it certainly could be later than 1679-80. Incidentally, Dan Garber misrepresents me as wishing it to be earlier because I think Leibniz "gave up his so-called phenomenalism by 1679, when he adopted substantial forms" (2009, 288 n61). On the contrary, in LoC I give evidence that Leibniz had adopted substantial forms in 1678-9, which this piece takes for granted. What are classified as "coherent appearances" in this piece are bodies in the sense of mere bulk, which (consistently after 1678) Leibniz insisted would be mere phenomena.

⁶ I use 'ôr' with a circumflex over the 'o' to denote the "or of equivalence", translating Leibniz's Latin *seu* or *sive*. All translations given here are my own

⁷ "I hold as an axiom this proposition of identity, which varies only in the placing of the emphasis: whatever is not truly *one* being is not truly *one being*. It has always been held that *one* and *being* are reciprocal things." (to Arnauld, 30 April, 1687; GP II 97; WFP 124)

⁸ Here I am indebted to the perceptive comments on a previous draft by Jolen Galagher, who pointed out that my conjecture that Russell was influenced here by his knowledge of Cantor's set theory would not fly chronologically. I am also indebted to her for the relevant quotations from Russell's early writings in philosophy of mathematics.

⁹“For suppose there were two stones, for example the diamond of the Grand Duke and that of the Great Mogul. We could use a single collective noun to do service for both of them, and say that they are a pair of diamonds, although they are a long way apart from one another; but we would not say that the two diamonds constitute a substance. . . . if we mounted them in a single ring, the whole thing would make up only what is called a *unum per accidens*.” (to Arnauld, 28 November/8 December 1686; GP II 76; WFP 117-18).

¹⁰ “I have already said in another letter that the composite which is made up of the diamond of the Grand Duke and that of the Great Mogul can be called a pair of diamonds; but that is only a being of reason, and if they were brought together, that would be a being of imagination or perception, that is to say, a phenomenon; for contact, shared motion, co-operating in a single design, do not change anything in regard to substantial unity.” (to Arnauld, 30 April 1687; GP II 96; WFP 123).

¹¹ As a result of this identification of plurality on the one hand with a collection on the other, Russell also missed the full consistency of Leibniz’s account of the infinite. It is precisely because a plurality is distinct from a collection that Leibniz can assert the infinite plurality of monads in an aggregate, yet deny that there is infinite number. An infinite aggregate of monads is, for Leibniz, an infinite plurality, but not an infinite collection: there is a syncategorematic infinity of monads in any part of matter, but there is no collection of them, and consequently no number of them.

¹² “Secondary matter, or mass (*massa*) is not a substance, but substances; and so not the flock but the animal, not the fish pond but the fish, is one substance” (to Johann Bernoulli, September 1698; GM III 536-7).

¹³ “Isn’t there a third option?”, Leibniz asks, apart from a thing’s being a subject or attribute: “Thus time and place, for instance, are neither subsistent things nor attributes. It is the same thing with number and order. Thus ‘ten’ is not an attribute of anything. In fact one cannot predicate ‘ten’ of an aggregate or of individual things.” (LH IV, 7c, Bl. 75-78 ; a text from some time after 1700; quoted from Mugnai 2011)

¹⁴ Quoted from Mugnai 2012: “et habent realitatem, citra intelligentiam nostram, vere enim insunt nemine cogitante. Accipiunt tamen eam ab intellectu divino; sine quo nihil esset verum.”

¹⁵ I argued for this distinction between “mere phenomena” and the sense in which Leibniz thought bodies were phenomenal, as beings by aggregation, in my 1998 (29-30); see also Loptson and Arthur 2006. A similar view is argued in Nachtomy 2006, p. 201: “Thus the extent of Leibniz’s phenomenalism does not entail an anti-realist view. Rather, it is a realistic view according to which active and perceiving

substances constitute the metaphysical foundation of reality.”

¹⁶ Robert Adams interprets Leibniz as an idealist of the kind I claim he is not. For despite acknowledging the distinction in Leibniz between a real phenomenon and a pure phenomenon, for Adams the reality of bodies ultimately reduces to the *appearance* of the substances as spatially grouped together, which grouping “involves the positions the bodies have in a coherent system of phenomena that is represented by all or most of the perceptions of all perceivers” (1994, 261). More recently he has characterized Leibniz as a “modern metaphysical idealist” like Berkeley, for whom “reality in general, and facts about bodies in particular, are constituted metaphysically by facts about ideas or about thinkers and thoughts of which the ideas are internal objects” (Adams 2010, 53).

¹⁷ With respect to Spinoza, I argue this in detail in Loftson and Arthur 2006, p. 32. Leibniz says that if Spinoza were right that there is only one substance, “then everything except God would be transitory, and would sink into mere accidents and modifications, since there would not be in things the basis of substances, which consists in the existence of monads.” (Letter to Bourguet, December 1714; G. iii. 575; Russell, 261). Regarding Malebranche, Leibniz has Philarète say “Shall we say then, with a certain innovator who is but too well known, that God is the only substance, of whom creatures are mere modifications?” (GP IV 582; Russell 213)

¹⁸ For an extended defence of Leibniz’s realism about bodies, see the arguments of Peter Loftson and myself in our joint paper (Loftson and Arthur 2006).

¹⁹ The topic of substantial bonds continues to be an unresolved problem in Leibniz scholarship, as evidenced by the very different interpretations given, for example, in Adams 1994, Phemister 2005, Look and Rutherford 2007 (Introduction), and Garber 2009.

²⁰ For a stimulating analysis of the interplay between Platonic and Aristotelian themes sounded by Leibniz in his correspondence with Arnauld, see Bolton 2004.

²¹ Here I am tacitly equating forms with substances, as does Leibniz in the passage following. I cannot offer a full defence of this claim here, but obviously I dissent from the view that Leibniz changed from an ontology where the basic ingredients are corporeal substances to one where they are forms alone. See Levey 2007 for an eloquent defence of the latter position. Briefly, I hold that a substantial form for Leibniz is what makes something substantial: this is primitive force; but Leibniz also equates primitive force with substance. Thus he can write of a substance (conceived as corporeal) as *having* an entelechy, form or soul; and also of a substance (conceived as the substantial principle in things) as *being* an entelechy, form or

soul (much as does Aristotle), without our having to regard this as a change of position. For a contrary view, where Leibniz is regarded as changing his position, see Garber's discussion of the dating of the use of 'monad' and 'simple' as technical terms (Garber 2009,).

²² Here my interpretation coincides with that of Ohad Nachtomy in his (2006), to whose discussion I can refer the reader for further argument: "Following a remark by Ishiguro, I suggest that the unity in question is not the cohesiveness of parts or (primarily) that of spatio-temporal unity but rather the unity of agency. It is a unity deriving from activation in the sense of functional organization that gives unity to the substance. Thus, a living being is united by virtue of a single principle of functional organization that also orders its activity in accordance with a certain end." (8)

²³ Here I do not mean to suggest that Garber believes that there is any single collection of constituents that remains the same through time. But if we agree that there is an organic body belonging to a substance that is distinct from the differing aggregates of secondary substance constituting it from one moment to another, I do not know what the unity of this organic body could consist in for Leibniz unless this is spelled out in terms of its performing the functions that correspond to the designs and perceptions of the substance whose body it is.

²⁴ "There are also no *souls* which are completely detached from matter, and no *spirits* without bodies. Only God is completely removed from matter." (*Monadology*, §72; WFP 278); "The body belonging to a monad, which is either its entelechy or soul, makes up together with an entelechy what we call a *living thing*, and together with a soul what we call an *animal*. Now that body of a living thing or animal is always organic ..." (*Monadology*, §72; WFP 278)

²⁵ Rutherford 1990. See also Massimo Mugnai's illuminating analysis of *inesse* in Mugnai 2010.

²⁶ In his 2008 Rutherford has since argued that Leibniz, despite being a substance idealist, was a realist about matter. But this realism still does not countenance monads being really mutually situated through their bodies.

²⁷ I argued in (Arthur 1994) that when Leibniz wrote of what is real in motion being force, it was this monadic conatus that he was referring to. I am grateful to Tamar Levanon for amplifying on and endorsing this view against much criticism in her (2010). As she concludes, "the idea of striving, *conatus*, has a special role in bridging physics and metaphysics."

²⁸ "Metaphysical Consequences of the Principle of Reason" (c. 1712), C 11-16, quoted from Parkinson 1995, 175.