A TALE OF TWO THINKERS, ONE MEETING, AND THREE DEGREES OF INFINITY: LEIBNIZ AND SPINOZA (1675-1678) [1]

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INTRODUCTION

Leibniz and Spinoza met once. Their philosophical systems, however, have more encounters and meeting points. In their unique meeting in the Hague in 1676, Leibniz showed Spinoza his modified version of Anselm's proof for the existence of God. According to Anselm's proof, as revived by Descartes, the notion of the *Ens Perfectissimum* entails existence since it includes all perfections and existence is considered to be a perfection. Leibniz found this reasoning unsatisfactory on the following grounds: one needs to show not only that the conclusion follows from the premises but that the definition of the *Ens Perfectissimum* is consistent as well——a point that was taken for granted by all previous upholders of Anselm's proof. In other words, Leibniz argues that, in order to prove that the *Ens Perfectissimum* exists, one has to show first that the notion is self-consistent (A 6.3 572; Pk 91: A 6.3 583; Pk 105-07).[2]

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[1] Unless otherwise indicated translations of Spinoza's works are from *The Collected Works of Spinoza*, vol. 1, translated and edited by Edwin Curley, (Princeton: Princeton University Press, 1988). References to the letters not translated by Curley are to *Spinoza Opera*, vol. 4, edited by Carl Gebhardt, (Heidleberg: Carl Winter, 1925). References to Leibniz's works and translations are specified in the list of abbreviations at the end of the article.

In writing this paper I have greatly benefited from Mogens Laerke's recent book *Leibniz lecteur de Spinoza. La genése d'une opposition complexe*. I would like to thank Andreas Blank, Mogens Laerke, and Noa Shein for very helpful detailed comments and suggestions. I am also indebted to an anonymous referee for this journal whose detailed and critical report made me rethink and rewrite many points in this paper.

[2] Cf. a note from 1676 in which Leibniz writes: "In the chapter of St. Thomas' *Summa Contra Gentiles* which is entitled 'Whether the existence of God is known *per se*,' there is a reference to an elegant argument which some use to prove the existence of God. The argument is: God is that than which nothing greater can be thought. But that than which nothing greater can be thought cannot not exist. For then some other thing, which cannot not exist, would be greater than it. Therefore God cannot not exist. This argument comes to the same as one which has often been advanced by others: namely, that a most perfect being exists. St. Thomas offers a refutation of this argument, but I think that it is not to be refuted, but that it

I will not speculate here on Leibniz's reasons for presenting *this* particular argument to Spinoza. I will only note that whatever reasons Leibniz had, the issue Spinoza and Leibniz discussed in their unique meeting in the Hague is highly indicative of some of the remarkable affinities as well as some of the deep rifts between their views regarding the nature of infinite being, which is the focus of the present paper. Leibniz's approach implies that the existence of an infinite and most perfect being follows from his essence. Spinoza holds that infinity is the absolute affirmation of existence.[3] Likewise, Spinoza argues that one can adequately consider the uniqueness of being (i.e., of substance) with respect to its existence alone and not its essence. As Spinoza writes to Jarig Jelles:

> "… in an *Appendix to the Principles of Descartes, Geometrically Demonstrated* I established that God can be called one (*unum*) or unique (*uniqum*) only in a very inappropriate sense, I respond that a thing cannot be said one and unique with respect to essence but only with respect to existence. We conceive of things as existing in a certain number of exemplars only if they are brought under a common genus."[4]

I take this to imply that, according to Spinoza, one cannot *conceive* of the unique and infinite being in abstraction from its existence, as a pure essence.[5] In addition, one may talk about the unique existing thing in a numerical sense only in an inappropriate sense.

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needs supplementations. For it assumes that a being which cannot not exist, and also a greatest or most perfect being, is possible" (15 April, 1676; *On Truths, the Mind, God, and the Universe*; A 6.3 510-511, Pk 63).

[3] "Since to be finite is some negation and to be infinite is an absolute affirmation of the existence of some nature, it therefore follows from proposition 7 that any substance must necessarily exist" (EI8S).

[4] Ep. 50 to Jelles, Spinoza, *Spinoza Opera,* edited by Carl Gebhardt, (Heidelberg, 1925) vol. 4 p. 239 my translation).

[5] "God's essence and his existence are one and the same"(E1P20) [*Dei existentia eiusque essentia unum et idem sunt*]. Cf. *Short Treatise* I, i (I/15/17) – "God's existence is [his] essence", *Cogitata Metaphysica*, I, ii (I/238/28) – "…in God essence is not distinguished from existence", and II, i (I/252/7) – "God cannot be said to enjoy existence. For the existence of God is God himself, as his essence also". Consider also E1P11D:

> [W]hatever perfection substance has is not owed to any external cause. So its existence must follow from its nature alone; hence its existence is nothing but its essence [*nihil aliud est, quam eius essentia*].

For the category of number can only apply to things that can be "brought under a common genus," which obviously does not hold of a unique being.

I will argue below that Leibniz's view of numbers, as well as his (non-numerical) view of the infinite being is very similar to that of Spinoza. At the same time, I will point out a subtle difference between Spinoza and Leibniz: Leibniz insists that the notion of an infinite being has to be conceived as a pure concept in order to show that such a being is possible. This is expressed in Leibniz's demand to show that the concept of the most perfect being is possible[6] and in Spinoza's rejection of the notion of pure logical possibility (EI P33). In short, Leibniz demands a possibility proof, which Spinoza cannot accept since the notion of pure possibility requires abstraction from existence. This difference turns out to be crucial for the ways in which Leibniz and Spinoza conceive of the notion of an infinite substance.

In what follows I focus on Spinoza and Leibniz's characterizations of a substance as an infinite being, or, as Spinoza puts this in his definition of God, a being constituted by infinitely many attributes.[7] As we shall see, a comparison of their views on this question is instructive for both historical and conceptual reasons. The problem is set by the traditional characterization of a divine substance as an infinite (and most perfect) being in the contexts of Spinoza and Leibniz's metaphysics. Spinoza defines God as "a being absolutely infinite, that is, a substance consisting of an infinity of attributes" (EID6). As he also states clearly in his Ep. 12, "every substance can be understood only as infinite" (A 6.3 277; *Arthur* 105, Curley 202) and, "...[I]f we attend to it [substance] as

[6] "God is a being from whose possibility (or, from whose essence) his existence follows. If a God defined in this way is possible, it follows that he exists" (A 6.3 582; Pk 105).
[7] Spinoza's definition of God reads: *"Per Deum intelligo absolute infinitum, hoc est substantiam constanstem infinitis attributis, quorum unumquodque infinitam et aeternam essentiam exprimit"* (EI6D).

it is in the intellect, and perceive the thing as it is in itself... then we find it to be infinite, indivisible, and unique" (ibid, Curley 203). Leibniz holds that infinity, indivisibility, and uniqueness are essential characterizations of substance as well. However, as noted, according to Leibniz, such a being must be conceived as a pure logical possibility as a condition for proving its existence.

A more conspicuous difference in their metaphysical systems is that, for Spinoza, there is only a unique substance whereas Leibniz speaks of an infinity of such beings or an infinity of created substances. While Spinoza is a substance monist, Leibniz is a substance pluralist. This distinction captures a major difference between Spinoza and Leibniz's metaphysical systems. Yet a close analysis reveals some deep, if unexpected, agreement in their claims that any substance is infinite and unique. In particular, I will suggest that, when Leibniz and Spinoza say that the divine substance is infinite, in most contexts it is to be understood in non-numerical and non-quantitative terms. This is the main thesis I propose to advance in this paper.

The thesis of the non-numerical sense of infinity, as presented below, also provides a partial explanation why Leibniz was attracted to Spinoza's philosophy during his years in Paris (especially in 1675-76) and, at the same time, why he ultimately moved away from it as he was reading and commenting on Spinoza's *Ethics* in 1678. The paper thus tells a dual story, one conceptual and one historical. The first section is based on Leibniz's notes from 1675-76 and presents Leibniz's preoccupation with the difference between the notion of infinite number, which he regards as impossible, and that of the infinite being, which he regards as possible. I call the issue of accounting for the difference between the notion of infinite number and that of infinite being "Leibniz's

Problem." The second section examines Spinoza's solution to a similar problem that arises in the context of his philosophy, expounded in his letter on the infinite (Ep.12), which Leibniz read and annotated in April 1676. Crudely put, the gist of Spinoza's solution is to distinguish between various kinds of infinity and, in particular, between one that applies to substance, and one that applies to numbers, seen as auxiliaries of the imagination. In response to Spinoza's distinctions between different types of infinity (A 6.3, 282; *Arthur*, 114-115), Leibniz distinguishes three *degrees* of infinity: *omnia* (*absolute infinitum*), which applies to God alone; maximum or *omnia sui generis*; and *infinitum tantum* or the mere infinity, which applies to numbers (though in a syncategorematic sense).

This threefold distinction, I suggest, supports a distinction between a non-quantitative concept of infinity, ascribed to the divine substance, and a quantitative concept of infinity ascribed to numbers. On the basis of these distinctions, I suggest in the third section that Spinoza and Leibniz hold a similar non-numerical conception of the infinity of substance. I observe that this non-numerical conception of infinity surfaces in Leibniz's reading notes of Spinoza's *Ethics* in 1678. The application of this non-numerical view of infinity to the divine substance seems to me quite clear for both Spinoza and Leibniz. At the same time, I find the application of this view to Leibniz's notion of created substances suggestive but also problematic. In the last section I will suggest that applying the second degree of infinity (that of a maximum in its kind) to created substances is worth pursuing. Nonetheless, I will not have space to pursue this further here and will offer it as a suggestion for further research.

It is worth noting that the non-numerical view of infinity advanced in the paper echoes some traditional attitudes towards unity and infinity and the way in which they apply to God. Such attitudes are expressed by saying that one and infinity are not seen as numbers when applied to God (as e.g., in Ibn Gabirol, Maimonides, and Aquinas). While there is a marked tendency in recent scholarship to attend to the notion of infinity as developed by Cantor and to use the technical tools developed by Frege and Russell for its analysis,[8] my methodology here derives from the conviction that, if we aim at understanding Leibniz on his own terms, we ought to pay close attention to his writings and those of his contemporaries and predecessors. Thus, for the methodological purposes of this paper, I adapt the position Richard Arthur has succinctly expressed in his debate with Gregory Brown, as follows: "the urge to 'Cantorize' Leibniz should be resisted" (Arthur 2001, 114).

LEIBNIZ'S PROBLEM: INFINITE NUMBER AND INFINITE BEING

In notes and letters from 1675-76 Leibniz often contrasts the notion of an infinite number and that of an infinite being. While "a greatest or most perfect being, is possible" (A 6.3 510-511, Pk 63), "the number of all numbers is a contradiction" (e.g., A 6.3 463; Pk 7)—i.e., an impossible notion (A 6.3 477; Arthur 53).[9] Leibniz's reasoning on this point responds to Galileo's paradox. As he writes:

> There comes to mind a similar line of reasoning conspicuous in Galileo's writings. The number of all squares is less than the number of all numbers, since there are some numbers which are non square. On the other hand, the number of all squares is equal to the number of all numbers, which I show as follows: there is no number which does not have its own corresponding square, therefore the

[8] The dominant figure in this tradition is Russell in his influential book from 1900 (Bertrand Russell, *A Critical Exposition of the Philosophy of Leibniz*, 2nd ed. (London, 1937). Most Leibniz's scholars who wrote on these questions, such as N. Rescher, R. Arthur, G. Brown, and S. Levey have tended to follow Russell in this respect.
[9] See also A 6.3 98 and 168.

number of all numbers is not greater than the number of all squares; on the other hand, every square number has a number as its side: therefore, the number of squares is not greater than the number of all numbers. Therefore, the number of all numbers (square and non-square) will be neither greater than nor less than, but equal to the number of all squares: the whole will be equal to the part, which is absurd (A 6.3 550-51; Arthur, 177. See also A 6.3 11; Arthur 5).

Galileo has established a one-to-one correspondence between the series of natural numbers and their squares. Leibniz, however, argues that one cannot accept the result that the series of natural numbers is equal to the series of their squares; for, if this were permitted, the whole (the series of natural numbers) would not be greater than its part (the series of their squares). Thus, for example, the number 3 is included in the series of natural numbers but not in that of their squares. For this reason, the series of natural numbers seems to be larger than the series of squares. On the other hand, the one-to-one correspondence shows that the two series are equal, since to each natural number a square number is assigned. Given this paradox (that there are good reasons to think that the two series are both equal and unequal to one another), one might be inclined to infer that the assumption, which Leibniz sees as constitutive of the very science of quantity, viz., that the whole is greater than its parts, has to be given up with respect to infinity.[10] This, indeed, was Galileo's preference. Richard Arthur nicely presents Leibniz and Cantor's choices in the face of this dilemma, as follows:

> …[Leibniz] identifies two candidates for rejection: (W) that in the infinite the whole is greater than the part, and (C) that an infinite collection (such as the set of all numbers) is a whole or unity... Leibniz upholds W, and this leads him to reject C. Cantor upholds C, and this leads him to reject W... (Arthur 2001b, 103-104).

[10] "…just as the proposition 'the whole is greater than the part' is the basis of arithmetic and geometry, i.e., of the sciences of quantity, similarly, the proposition 'nothing exists without reason' is the foundation of physics and morality, i.e., the sciences of quality, or, what is the same (for quality is nothing but the power of acting and being acted on) the sciences of action, including thought and action" (*Confessio*, A 6.3 118; Sleigh edition, p. 35). See also Eberhardt Knobloch 'Galileo and Leibniz: Different Approaches to Infinity', *Archive for the History of the Exact Sciences*, 54 (1999): 94.

Leibniz concludes that the assumption (W) must be retained and that the notion of an infinite number, seen as a whole, is therefore deemed impossible.[11] Hence, according to Leibniz, there cannot be a number of all numbers.

Leibniz's reasoning on this point and the analogy between infinite being and infinite number is nicely brought together in a letter to Malebranche from 1679:

> It is not quite assured whether an infinitely perfect being does not imply a contradiction, like the most rapid movement, the largest number and other similar notions, which are undoubtedly impossible. In his response to article 2, M. Descartes agrees with the analogy between the most perfect being and the greatest Number, denying that such a number implies [a contradiction]. However, it is easy to demonstrate. For the greatest number is the same as the number of all unities. Now, the number of all unities is the same as the number of all the numbers (because any unit added to the preceding one always makes a new number). And the number of all numbers implies [a contraction], which I show thus: there is an even number corresponding to any number, which is its double. Thus the number of all the numbers is not larger than the number of even numbers, i.e. the whole is not larger than the part. It wouldn't do to respond here that our finite mind does not understand the infinite, because we can show something of what we do not understand. And here we understand at least the impossibility, unless one is willing to say that there is a whole (*tout*) that is not greater than its part. You will tell me that there is an idea of the perfect being, since we think of this being and, therefore, it is possible. But it will be answered

[11] Samuel Levey explains this in more detail as follows:

> "Leibniz construes cardinal numbers (other than 1 and 0) as aggregates of 'unities' or 'ones' (e.g., 6 = 1 + 1 + 1 + 1 + 1 + 1) and he views them as applying to aggregates of things taken as a whole rather than to uncollected things taken as so many individuals. Where the number 1 or unity applies to an individual thing, the number 5 applies to an aggregate 'whole' with five 'parts' (what we would probably consider to be a *set* with five *members*). So in his view, the infinite cardinal number is bound up with the concept of an infinite aggregate or whole in two ways. First, an infinite number itself would count as an infinite whole; and second, such a number would apply to infinite aggregates or wholes. Consequently, the concept of an infinite number is also doubly bound up with Galileo paradox: both the number and what it *numbers* would violate the part-whole axiom, if either were to exist" ('Leibniz on Mathematics and the Actually Infinite Division of Matter', *Philosophical Review* 107 (1998) No. 1 pp. 77-78).

See also pp. 60-61 and Samuel Levey 'Archimedes, Infinitesimals and the Law of Continuity: On Leibniz's Fictionalism' in Infinitesimal Differences, edited by U. Goldenbaum and D. Jesseph, (Berlin/New York: Walter de Gruyter, 2008) pp. 115-16, where the example Leibniz employs in a letter to Malebranche (GP I 338) is nicely used to illustrate the impossibility of infinite number. Gregory Brown also agrees with this formulation of the problem but rejects Arthur's conclusion that Leibniz's argument is sound. Brown writes: "The problem with treating infinite aggregates as wholes, as Leibniz saw it, arises in connection with what has come to be known as Galileo's paradox—i.e. the fact that an infinite set can be placed in one–one correspondence with a proper subset of itself" (Gregory Brown 'Leibniz's Mathematical Arguments Against the Soul of the World' *British Journal for the History of Philosophy*, 13 (2005) 3: p. 479). For Brown's critique of Arthur's conclusion, see pp. 479-86.

> that by the same reason one could say that there is an idea of the greatest number and that one can think of it. We see, however, that it implies [a contradiction]. It is true that there are reasons to distinguish between these infinite impossibilities, like the [greatest] number and the [most rapid] movement and other similar things, and the supremely perfect being. But here one needs novel and rather profound reasoning to be assures of this [difference] (GP I 338, my translation).

In other earlier texts Leibniz also identifies the number of all number with the number of all unities. For example, in the *Pacidius* he writes:

> the number of all numbers is the same as the number of all unities (since a new unity added to the preceding ones always makes a new number), and the number of all unities is nothing other than the greatest number (*Pacidius to Philalethes*, A 6.3 552; Arthur 179).

From our current perspective, the notions of the number of all numbers, the number of all unities, and the greatest number are clearly not identical. Yet it seems clear here that they are very closely related in Leibniz's mind and that, for him, they are all implicated in the problem of infinite number.[12] While there are significant differences between these notions, I cannot treat this question here in any detail.[13] Most pertinent for my concerns here is the conclusion Leibniz draws from these considerations.

> Therefore we conclude finally that there is no infinite multiplicity, from which it will follow that there is not an infinity of things either. Or it must be said that an

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[12] While the notions of infinite number, infinite whole, largest number, maximal number, number of all numbers, etc. are certainly not equivalent, Leibniz's usage of them as interchangeable and his explicit statements (as the citation above shows as well as GP I 338) suggest that, in his eyes, each one of them would be impossible or could not be regarded as a whole. From a contemporary point of view, this need not be the case. Leibniz commentators have done some careful work on sorting out these concepts and I refer the reader to this literature. For the purposes of this article, I have to content myself with a rather less nuanced statement of the problem, as clearly stated in *Arthur* 2001 (see also other sources in note 9).

[13] Likewise, I cannot treat here in any detail the extensive scholarship on Leibniz's discussion of Galileo's paradox and its implications. As I made clear in the text, I accept Arthur's analysis of this paradox, which is stated clearly his reply to G. Brown, published in The *Leibniz Review* 11 (2001). It should be noted that this topic has been discussed by a number of scholars, notably, B. Russell (1900), J. A. Benardete (1964), P. Mancosu (1996), S. Levey (1998), Brown G., 'Leibniz on Wholes, Unities and Infinite Number Leibniz Review 10 (2000), 21-51; R. Arthur (2001) and his Introduction to *Arthur.* For a further critique of Arthur's position, see G. Brown 'Leibniz's Mathematical Arguments Against the Soul of the World' *British Journal for the History of Philosophy*, 13 (2005) 3: 449-489. I have also written on the contrast between the notions of infinite number and the infinite being and for sake of avoiding repetition, I am attempt to make the discussion here as brief as possible.

> infinity of things is not one whole, i.e. that there is no aggregate of them.[14]

I believe that Leibniz is not using here the notion of aggregate in the precise and technical sense he would ascribe to it some ten years later in his correspondence with Arnauld. In that correspondence, Leibniz contrasts the notion of "aggregate" with the notion of "unity *per se*," whereas here Leibniz's usage of the word aggregate seems to indicate that infinitely many things cannot constitute a whole. What is beyond doubt is that Leibniz is clearly committed to the point that "an infinity of things is not one whole."

At the same time, it is also clear that God, or the most perfect being, is held to be such an infinite being. In fact, it would be unthinkable for Leibniz, both on philosophical and theological grounds, to deny that God is an infinite whole. Leibniz's concern to prove that the greatest or the most perfect being is possible partly derives from his observation, noted above, that similar notions like infinite number, the most rapid motion, and the greatest shape, are suspect of entailing contradictions. For example, in a letter to Oldenburg from December 1675, Leibniz writes:

> Whatever the conclusions which the scholastics […] and others derived from the concept of that being whose essence is to exist, they remain weak as long as it is not established whether such being is possible, provided it can be thought. To assert such a thing is easy; to understand it is not so easy. Assuming that such a being is possible or that there is some idea corresponding to these words, it certainly follows that such a being exists. But we believe that we are thinking of many things (though confusedly) which nevertheless imply a contradiction; for example, the number of all numbers. We ought strongly to suspect the concepts of infinity, of maximum and minimum, of the most perfect, and of allness itself. Nor ought we believe in such concepts until they have been tested by that criterion which must, I believe, be credited to me, and which renders truth stable, visible and irresistible… (GM I 83-84; Loemker 257).

By "that criterion which must… be credited to me", Leibniz is referring here to his

[14] April 10, 1676, Infinite Numbers; A 6.3 503, Arthur 101.

demand of providing concepts with real definitions, that is, possibility proofs to problematic notions.[15] Indeed, Leibniz is often using the notion of infinite number as a paradigm for an impossible notion which he *contrasts* with the possibility of the most perfect or infinite being (A 6.3 572; Pk 91; A 6.3 320; A 6.3 325).[16] It need not be surprising that Leibniz is intrigued by this contrast. These concepts seem to have a similar structure (all numbers, all perfections) and both seem to imply an infinity or totality of simple elements—attributes or perfections in God and simple units in number. In a set of definitions from 1676 (A 6.3 482-84), and in reference to Euclid's definition of number as a multiplicity of units, Leibniz writes: "Number, if it is understood simply as integral and rational, is a whole consisting of units" (A 6.3; Pk 37-38).[17]

Indeed in these texts Leibniz's renderings of the notion of the most perfect being is expressed in terms that suggest maximal totality of units, such as "the subject of all perfections" (A 6.3 580; Pk 103), "one which contains all essence, or which has all qualities, or all affirmative attributes." In the same set of texts he also employs an analogy between God's essence and whole numbers. In this analogy, numbers consist of

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[15] See *A Specimen of Discoveries*, circa 1686, in Arthur, 2001, 305-07

[16] In a letter to Conring (1677) Leibniz writes: "Those that are more subtle opponents say that the most perfect being implies a contradiction just as the greatest number (*numerum maximum*) does." (A 6.3 325). Leibniz's possibility proof is given in the following passage: "I seem to have discovered a demonstration that a most perfect being – or one which contains all essence, or which has all qualities, or all affirmative attributes – is possible, or does not imply a contradiction. This will be evident if I show that all (positive) attributes are compatible with each other. But attributes are either analyzable or unanalyzable; if they are analyzable they will be aggregates of those into which they are analyzed. It will therefore be sufficient to have shown the compatibility of all primary or unanalyzable attributes, or, of those which are conceived through themselves. For if individual attributes are compatible, so are several attributes, and so therefore are composite attributes. It will therefore be sufficient to show only the intelligibility of a being which contains all primary attributes, or, to show that any two primary attributes are compatible with each other" (A 6.3 572; Pk, p. 91-93).

[17] For Leibniz's view of numbers see Grosholz E., and Yakira E., *Leibniz's Science of the Rational*, Studia Leibnitiana Sonderheft, 29, (Stuttgart, 1998), especially pp. 78-80, where Leibniz definition of an integer "Numerus integer est totum ex unitatibus collectum" is discussed. Leibniz's definitions are given in pages 89 and 99. See also the items mentioned in footnote 13.

units and God's essence consists of simple forms or perfections.[18] Since Leibniz defines a whole number as consisting of units, the greatest number would be seen as consisting of all units. Since Leibniz defines God as consisting of all essence or all perfections or all positive attributes, taken at face value, the greatest being is to be seen as consisting of all perfections, attributes or simple forms. Thus, just as the notion of infinite number implies infinitely many units, the notion of God seems to imply infinitely many perfections or attributes.

However, if this were the case, Leibniz would have to consider both notions to be equally problematic (or unproblematic). Yet, he clearly does not believe this to be the case. Rather, he considers the notion of an infinite being to be possible and he considers the notion of an infinite number to be impossible (not only does it not exist but it *cannot* exist). If the notions of infinite number, most rapid motion and the greatest shape are all contradictory, as Leibniz holds, he has to show that the notion of the infinite being is not.[19] This is what I call "Leibniz's Problem."

In effect, however, Leibniz's Problem consists of two problems. One problem—call it "the Consistency Problem"—raised in the introduction in the context of Leibniz's objection to the Cartesian version of Anselm's proof, is to show that the notion of an infinite being is consistent; the second problem—call it "the Analogy Problem"—is to show that the notion of an infinite being does not fall prey to the same difficulties as the notion of infinite number, i.e., that the notion of an infinite being is not a whole equal to

[18] A 6.3 518- 519: Pk, p. 77. For similar analogies, see also A 6.3 523; Pk, p. 83; A 6.3 512; Pk, p. 67 and A 6.3 521; Pk, p. 81. See also the *Confessio philosophi* of 1673 (A 6.3 115-149), where Leibniz explicitly attempts to exemplify the essence of God with his numerical analogy and also notes the limits of the analogy, as well as in A 6.3 139-140.

[19] For more details on this point, see Ohad Nachtomy 'Leibniz on the Greatest Number and the Greatest Being', *The Leibniz Review*, 15 (2005) pp. 49-66, on which parts of this section are based.

one of its parts.[20] It turns out that solving the second problem is easier than the first. Roughly stated, Leibniz's solution to the second problem, viz., that an infinite being is a whole and an infinite number is not, turns on the observation that an infinite being is not said to be infinite in a quantitative sense, rather, it is infinite in a non-quantitative sense. Such a being is not a whole composed of discrete parts, nor, strictly speaking, does it admit of parts at all; rather, it is said to be indivisible and immeasurable in the sense that its being is not something that can be quantified and divided.

SPINOZA'S SOLUTION: Ep. 12 AND LEIBNIZ'S ANNOTATIONS

Spinoza, as well, has to account for the difference between the infinity of magnitudes and the infinity associated with God. Recall that Spinoza defines God as "a being absolutely infinite, that is, a substance consisting of an infinity of attributes" (EID6).[21] Spinoza, however, approaches this problem by distinguishing between a kind of infinity that applies to the indivisible substance and a kind of infinity that applies to divisible quantities. This is made explicit in Ep. 12, which discusses the nature of the infinite. Leibniz read and annotated this letter in April 1676 – a couple of years before he read the *Ethics*.[22] While Spinoza's argumentation in this letter is of considerable complexity, one

[20] This problem is nicely expressed in this passages: "The number of all numbers is a contradiction, i.e., there is no idea of it; for otherwise it would follow that the whole is equal to the part, or that there are as many numbers as there are square numbers. The most rapid motion is an impossible concept… Since the number of all numbers is a contradiction, it is evident that all intelligible things cannot constitute a whole" (Dec. 1675; On Mind, the Universe, and God; A 6.3 463, Pk 7).

[21] The translation is significant here. It can also be translated "consisting of infinite attributes". This is important in identifying the kind of infinity that is at work here. In addition, this plays into the debate regarding the number of attributes that God is said to have. Those who translate it as "an infinity" tend to hold that there is a numeric infinity of attributes, while "infinite attributes" is related to the infinite nature of the attributes. I prefer the former but have opted to using Curely's translation throughout. I thank Noa Shein for this note.

[22] See Laerke (2008) pp. 423-24. This letter is not the only source Leibniz obtains regarding Spinoza's views at the time. He receives quite accurate information on the Ethics from Tschirnhaus, with whom he discusses Spinoza's metaphysics as well as questions of mathematics (see for example his letter of May

point is rather clear: he claims that the notion of infinity applicable to substance is non-numerical and non-quantitative. That is, God's infinity is not comparable to that of number because the application of numbers presupposes some limitation. According to Spinoza in this letter, the tendency to describe a substance with numerical infinity is misguided and generates apparent contradictions. The way out from the contradictions inflicting the infinite is to avoid the confusion between the quantitative sense of infinity that can adequately be ascribed to number and divisible quantities, and the sense of infinity that can be adequately ascribed to a unique and indivisible substance.

It is interesting to observe that Leibniz begins his annotations on this letter by stating that "He [Spinoza] demonstrates that every substance is infinite, indivisible, and unique" (A 6.3 275; Arthur 101). Next Leibniz copies (almost precisely though with some significant modifications) Spinoza's definition (EID3) of substance and his definition of God (in EID6). This certainly tells us something about the interest Leibniz takes in reading this letter. Particularly indicative here is Leibniz's addition to Spinoza's definition of God.

> "*He defines God as follows:* that which is an *absolutely* infinite being, i.e. a substance consisting of infinite attributes, each of which expresses an infinite and eternal essence and is thus immense [*immensum*]" (Arthur 103).[23]

The clause "*adeoque immensum est*" is nowhere to be found in Spinoza's definition and is added by Leibniz. This is very telling. First, *immensum* is not a term used by Spinoza. More importantly, in his annotations to this letter (A 6.3 282 L24; Arthur 115) Leibniz states: "I have always distinguished the *Immensum* from the *Interminato*, i.e., that which

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1678, GM IV, 451-63; Lomeker 294-99).

[23] « *Deum sic definit*. Quod sit Ens *absolute* infinitum, hoc est substantia constans infinitis attributis, quorum unumquodque infinitam et aeternam essentiam exprimit adeoque immensum est » (A 6.3, 276).

has no bound (*seu terminum non habente*).” In addition, Leibniz is also using *Immensum* in his writings from this period as a noun—the *Immensum*—designating God as something beyond measure. He is also using the *Immensum* as what he calls the “basis of Space” or that which persists during continuous change in space … and is one and indivisible (A 6.3 519, see *Arthur* 450). The notion of *Immensum* is complex and Leibniz is obviously using it in more than one sense. It is, however, clear that, unlike the current English connotations of the word immense, *immensum* does not serve Leibniz here to indicate great or large or immense *in magnitude or number* but rather to indicate something which has no measure or is beyond measure.

Both recent English translators, Parkinson and Arthur, have emphasized this point (see Pk 122, n. 92 and *Arthur* 450). To avoid the current English connotations of immense, Parkinson has rendered *immensum* as ‘immeasurable’, so that the Latin negation of measure (*mensura*) would remain conspicuous in the translation. As Arthur notes in the Glossary to his edition, “*Immensum* can be synonymous with ‘infinite’ or ‘beyond measure’, as at Aiii4: 95; and at Aiii60: 475 Leibniz distinguishes this species of the infinite from the unbounded” (*Arthur*, Latin-English Glossary, 450). Thus, when Leibniz adds his gloss to Spinoza’s definition of God, the absolutely infinite being, as *immensum,* it suggests one of his own notions of infinity, viz., that which is beyond measure. In this sense, *immensum* is distinguished from the unbounded. The unbounded infinite designates a measurable quantity but *immensum* seems to designate something that cannot be measured. Thus, Leibniz’s point in using this term seems to be emphasizing that God is something beyond any measure—something not to be described in quantitative or measurable terms.

Note that this sense of *immensum*, of being beyond any measure, applies to Leibniz's usage of *immensum* as "the basis of space" as well. While Leibniz is not using Spinoza's terminology, his gloss of Spinoza's notion of God seems to capture Spinoza's intention quite well. The main point here is that the infinity of the divine substance cannot be quantified or measured but rather belongs to a different category all together.[24]

Leibniz subsequently adds a very interesting note on a being conceived through itself (*per se concipi*):

> ..something is *understood through itself* only if we conceive all its requisites without having conceived another thing i.e., only if it is the reason for its own existence. For we commonly say that we *understand* things when we can *conceive* their generation, i.e., the way in which they are produced. Hence we understand through itself only that which is its own cause, i.e., that which is necessary, i.e., is a being in itself. And so it can be concluded from this that if we understood a necessary being, we would understand it through itself. But it can be doubted whether we do understand a necessary being, or, indeed, whether it could be understood [*intelligatur*] even if it were known or recognized [*cognosci*] (A 6.3 275; *Arthur* 101).

In reading Spinoza's letter, Leibniz recalls here his own difficulty in showing that the notion of a necessary being can be understood, that is, showing that it is intelligible or self-consistent. Thus, it is clear that, in reading Spinoza's letter, Leibniz is still preoccupied with his own problem as well.

Given Leibniz's preoccupation with the tension between the possibility of the infinite being and the impossibility of infinite number, his interest in the way in which Spinoza connects the definitions of substance, God, and infinity is not surprising. Leibniz agrees with Spinoza that any substance "is infinite, indivisible, and unique." Yet, according to him, the possibility of such a being needs to be demonstrated. While he maintains his demand to prove the *possibility* of the most Perfect Being, Leibniz does not

[24] For a slightly different emphasis of Leibniz's addition of the word *immensum* see Laerke (2008), pp. 469-477 and pp. 424-25.

restate (but only mentions) his proof after 1676.[25] We have already seen in the first section that he demonstrates that an infinite collection of discrete units is impossible and cannot be regarded as one whole. At the same time, Leibniz clearly regards God as an infinite whole. He calls God the one-all (*unus omnia,* A 6.3 385) and maintains that such a being is possible.

In light of this, it is reasonable to suppose that Leibniz would seek support for his dual line of argumentation regarding the possibility of an infinite being and the impossibility of an infinite number in Spinoza's letter on the infinite. Such support may indeed be found in this letter. In the beginning of his letter Spinoza notes that:

> …everyone has always found the problem of the Infinite very difficult. Indeed insoluble. This is because they have not distinguished between what is infinite as a consequence of its own nature, or by the force of its definition, and what has no bounds, not indeed by the force of its essence, but by the force of its cause. And also because they have not distinguished between what is called infinite because it has no limits and that whose parts we cannot explain or equate with any number, though we know its maximum and minimum. Finally, they have not distinguished between what we can only understand, but not imagine, and what we can also imagine. (Curley 201, Arthur 103).

In addition,

> If they have attended to these distinctions, I maintain that they would never have been overwhelmed by such a great crowd of difficulties. For then they would have understood clearly what kind of Infinite cannot be divided into any parts, or cannot have any parts, and what kind of Infinite can, on the other hand, be divided into parts without contradiction. They would also have understood what kind of Infinite can be conceived to be greater than another Infinite, without any contradiction, and what kind cannot be so conceived (Arthur 103-105, Curley 202).

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[25] In his *Leibniz: Determinist, Theist, Idealist* (New York, 1994), Adams has argued convincingly that the a priori proof for the possibility of the notion of the *Ens Perfectissimum* is given place to a presumption in favor of its possibility (in case it is not refuted). See Chapter 8, and A 2.1, 436 for an explicit text endorsing the presumption of possibility. In his *Leibniz lecteur de Spinoza* (Paris, 2008), Laerke notes that, after 1677, Leibniz only mentions his *a priori* proof but it never appears in his later writings. I am not sure what conclusion should be drawn from this. It is obvious that Leibniz maintains that the *Ens Perfectissimum* is possible. However, it is not obvious on what grounds. From the fact that he does not repeat the argument it cannot be concluded that he abandoned it, as Laerke seems to hold. Leibniz might still presuppose it and he might not. The presumption of possibility might be an addition rather than a replacement to the *a priori* argument. As far as I can see, we simply cannot tell.

According to Spinoza, there are different types of infinity that correspond to different types of things (Substance, attributes, and modes).[26] By means of these distinctions, Spinoza qualifies and restricts the way in which infinity can be ascribed to substance. Note that Spinoza's distinctions offer an attractive resolution to Leibniz's problem. According to Spinoza, one kind of infinity (the one pertaining to infinite being) "cannot be divided into any parts, or cannot have any parts", and the other kind of infinity (the one pertaining to modes) "can... be so divided into parts without contradiction."

According to Spinoza, the kind of infinity that we can ascribe to substance is non-divisible and non-numerical, that is, one which "we cannot explain or equate with any number". For this reason, the ascription of this kind of infinity would not involve the contradictions that infect things whose enumeration requires comparison and abstraction by the imagination. For Spinoza, enumeration involves abstraction and comparison (under a common genus) by the imagination (see EIP15, Ep. 34, Ep. 50, and the next section for more details). For Spinoza, therefore, the notion of infinity applicable to a substance is non-numerical. This can clearly be seen in Ep. 12 where he summarizes EIP15S:

> ...we conceive quantity in two ways: either abstractly, *or* superficially, as we have it in the imagination with the aid of the senses; or as substance, which is done by the intellect alone. So if we attend to quantity as it is in the imagination, which is what we do most often and most easily, we find it to be divisible, finite, composed of parts, and one of many. But if we attend to it as it is in the intellect, and perceive the thing as it is in itself, which is very difficult, then we find it to be infinite, indivisible and unique, as I have already demonstrated sufficiently to you before now. (A 6.3 278; Arthur 107, Curley 202-203)[27]

[26] Duration, number, and motion are seen as mere axillaries of the imagination, which serve as measures of divisible magnitudes.

[27] Cf : "If therefore we consider quantity as it is in the imagination, that which is the most ordinary, we find that it is finite, divisible and composed of parts; if, on the contrary, we consider it as it is in the understanding and we conceive it insofar as it is substance, then, as we sufficiently demonstrated, we will

Leibniz refers to this last point in the first line of his annotations. Conceived in contrast to the inconsistency Leibniz sees in infinite quantity, this point in Spinoza's view of infinity could serve Leibniz's purposes. On the basis of Spinoza-like distinctions, Leibniz would be able to distinguish between "beings" and "non-beings," explaining how each requires a different type of infinity, and thus showing how an infinite being is possible while an infinite number is not.

Spinoza's most pertinent point for Leibniz's purposes can be paraphrased (if somewhat crudely) as follows: (a) any number is limited, and, by contrast, (b) God's infinity cannot be quantified, measured, or numbered precisely because doing so would imply limiting it, and (c) it would imply seeing God as a divisible and discrete entity, which is absurd. This implies that "infinity" is used differently when it is ascribed to a numerical (or more generally to divisible and/or discrete quantity or feature) of modes and abstractions and when it is ascribed to the unique substance or God. A substance is said to be infinite in the sense of completeness and absolute perfection, which is indivisible and admits of no parts. Seen under this type of infinity, it makes no sense to say that a substance can be divided, enumerated or limited.

Given the context presented in the first section, it is now clear why Leibniz would be attracted to such a view. Indeed, Leibniz seems to agree with Spinoza's analysis. Yet, as typical of him, he reformulates Spinoza's distinctions in his own terms and appropriates them for his purposes.[28] In his annotations he writes:

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find it to be infinite, unique and indivisible" (EIP15S).

[28] I hope it is clear that I do not argue here for a direct influence in the sense that Spinoza's letter is the exclusive or even the main source for Leibniz's views on infinity. Rather, I claim that Leibniz's attraction to Spinoza's view is evident in his annotations and that his response to Spinoza's views is revealing of and

> I set in order of degree: *Omnia*; *Maximum*; *Infinitum.* Whatever contains *everything* is maximum in entity; just as a space unbounded in every direction is maximum in extension. Likewise, that which contains everything is most infinite (*infinitissimum*), as I am accustomed to call it, or the absolutely infinite. The *Maximum* is everything of its kind, i.e., that to which nothing can be added, for instance, a line unbounded on both sides, which is obviously also infinite; for it contains every length. Finally those things are *infinite in the lowest degree* whose magnitude is greater than we can expound by an assignable ratio to sensible things, even though there exists something greater than these things…. For a maximum does not apply in the case of numbers (A 6.3 282; Arthur 114-15).[29]

As Laerke notes,

> If one compares this classification with the one proposed in Spinoza's letter 12, one is struck by their similarity. First, the distinction between *maximum* and *omnia* evokes the distinction between the attributes, which are infinite 'in their kind' in EId4 and the 'absolutely infinite' substance in EID6 – which is exactly the definition reproduced at the beginning of the *Communicata ex literis domini Schulleri*. [Likewise] there is a strong resemblance between that which Leibniz calls '*immensum'* and that which Spinoza calls 'infinite by nature'" (Laerke 2008, 433, my translation).

The similarity between *immensum* and "infinite by nature" is especially remarkable. As Laerke also notes, "that which is infinite by nature or by virtue of its definition, is the substance" (ibid 430). We have already seen that Leibniz adds to Spinoza's definition of God "that which is *immensum".*

There are, however, significant differences between Leibniz and Spinoza here. The most conspicuous difference is that Leibniz formulates Spinoza's distinctions in terms of degrees. Of, *Omnia*, he says: "and this is the highest degree, [it] is everything, and this kind of infinite is God, since he is all one; for in him are contained the requisites for existing of all the other" (A 6.3 385; Arthur 2001, 43). Elsewhere, and later in his career, Leibniz is also very clear that the highest or "absolutely infinite" applies to God alone. For example, in a letter to Des Bosses, 11 March, 1706, he notes that, "only indivisible

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serves him to articulate and rethink his own views.

[29] Compare with A 6.3 385; Arthur 43, where Leibniz articulates the same threefold distinction in slightly different words.

and absolute infinite has true unity: it is God" (G II 305). In the *New Essays*, 2.17.1 he writes that, "rigorously speaking, the true infinite is only in the absolute, which is anterior to any composition and is not formed by the addition of parts" (GP V 144, my translation).[30] This notion of absolute infinity (in the sense of *omnia* or the highest degree) is non-numerical in the sense that God or the most perfect Being cannot be compared with any number because it is a non-divisible unity, not admitting of parts; it is non-quantitative in the sense that it cannot be compared to any quantity. In this sense, it cannot be measured and therefore this notion of infinity is aptly called the Immeasurable or *Immensum*. This notion of infinity involves absolute perfection, completeness and, most important to my concerns here, inherent unity and indivisibility.

This articulation of a non-numerical conception of the infinite could help Leibniz to approach his initial problem. For such a non-numerical notion of infinity could avoid the difficulty facing the notions of infinite number, line, speed, and shape. Simply stated, on such a conception of infinity, numerical categories are inapplicable to true beings.[31] Therefore, if infinity is be ascribed to a substance not in a numerical sense but only in the sense of *omnia,* the notion of infinite substance or being, qualified in this way, would avoid the contradiction of infinite number and other infinite magnitudes.

It is significant that Leibniz reserves the notion of the absolutely infinite for God or the most perfect being. While the numerical infinite does not constitute a whole, infinity in the sense of *omnia* does. Early in 1672 Leibniz observed that, "[t]here is no maximum in things, or what is the same, the infinite number of all unities is not one whole, but is

[30] "Le vrai infini a la rigueur n'est que dans l'absolu, qui est antérieur a toute composition, et n'est point formé par l'addition des parties" (GP V 144; NE 2.17.1)
[31] This is at least true in the case of God. The case of created substances is much more delicate, as I will briefly discuss in the sequel.

comparable to nothing" (A 6.3 98; Arthur 13). Leibniz also articulates this point in terms of the difference in unity between infinite magnitude and infinite perfection. In the years between 1683 and 1685 he writes: "…it has previously been demonstrated that the infinite in number and magnitude is neither one nor whole; but that only the infinite in perfection is one and whole" (*Deum non esse mundi animam,* A 6.4 1492). In addition, in the context of discussing God's nature, Leibniz notes: "an infinite whole is one" (A 6.3 474; Arthur 49).

The connection between infinity and unity is crucial for Leibniz's understating of the divine substance, just as it is for Spinoza, even though their views about the divine substance are otherwise quite different. Indeed, Leibniz and Spinoza share in this regard the following: substance is the only thing of which one can say that it is infinite and a unique being. Note, however, that this conception involves a non-numerical or, more generally, a non-quantitative understanding of the infinity (and, possibly, the uniqueness) of substance. The extent to which Leibniz and Spinoza share this non-numerical conception of substance will presently be examined.

THE INFINITY OF BEING: A NON-NUMERICAL VIEW

Leibniz read (and commented on) Spinoza's *Ethics* in 1678. Of particular interest to our purposes is his comment on proposition eight of Part One. In the second scholium to this proposition, Spinoza writes:

> I. …the true definition of each thing involves nothing and expresses nothing but the nature of the thing defined.
> From which it follows,
> II. that no definition involves or expresses any certain number of individuals,
> since it expresses nothing else than the nature of the thing defined. For example, the definition of a triangle expresses nothing else than the simple nature of a triangle,

but not any certain number of triangles.

It is to be noted,

III. that there must be, for each existing thing, a certain cause on account of which it exists.

Finally, it is to be noted,

IV. that this cause, on account of which a thing exists, either must be contained in the very nature and definition of the existing thing (*viz., that it pertains to its nature to exist*), or must be outside it.

From these propositions it follows that if, in Nature, a certain number of individuals exists, there must be a cause why those individuals, and why neither more nor fewer, exist.

For example, if twenty men exist in Nature (…), it will not be enough (…) to show the cause of human nature in general; but it will be necessary in addition to show why not more and not fewer than twenty exist. For (by III) there must necessarily be a cause why each [NS: particular man] exists. But this cause (by II and III) cannot be contained in human nature itself, since the true definition of man does not involve the number 20. So (by IV) the cause why these twenty men exist, and consequently, why each of them exists, must necessarily by outside each of them.

For that reason it is to be inferred absolutely that whatever is so of such a nature that there can be many individuals [of that nature] must, to exist, have an external cause to exist. (Curley, pp. 414-15).[32]

Spinoza argues here that a substance cannot have its reason or cause from any external thing but must constitute its own reason or cause, for "it pertains to its nature to exist." If all numerical determinations must have an external cause, numerical ascriptions do not

[32] Alan Gabbey makes a very interesting and pertinent observation concerning Spinoza's use of the term 'infinite':

In his *Lexicon philosophicum* (1613), Goclenius pairs the grammatical *infinitum*, meaning "undetermined" or "indefinite" (*incertum seu indefinitum*), with its opposite *finitum*, meaning "definite" (*certum*)[..]. Referring to J. C. Scaliger's *De Causis Linguae Latinae* (lib. 4, cap. 78), Goclenius writes:

"that which is individual [*proprium*] is single in number. It is finite, that is, determined [*certum*], because when we say 'a man' or 'the man' [*cum dicimus Homo*], we know how many men there are. On the other hand, the infinite is plural, not because it lacks a limit [*finis*], for nothing in nature is ἄπειρον, infinite, but because it is undetermined, ἀόριστις [also 'indefinite']. For if you say 'men', you do not know how many there are, so [if determinateness is at issue] something prescriptive [*aliquid praescribens*] is added, such as 'ten', or 'twenty'" (Goclenius 1964, p. 236, translation by Gabbey, in "Spinoza, Infinite Modes and the Infinitive Mood", forthcoming in Studia Spinozana).

Gabbey supposes that "it is just a coincidence that in the alternative proof of E1P5 that appears in E1P8S2, Spinoza takes the example of twenty men to show that the cause of their existence, *qua* twenty, necessarily lies outside each of them" (ibid). I find it hard to believe though that it is just a coincidence. It seems more likely that this example was commonly used to illustrate the point. See also Leibniz's later example below.

apply to the unique substance as well. If so, a substance cannot be enumerated. Thus, a according to Spinoza, number is a purely extrinsic denominator that cannot apply to substance as part of its definition or essence. (EIP15S; Ep. 34)

While Leibniz's attitude in his comments on Spinoza *Ethics* in 1678 is highly critical, he finds this argument elegant (A 6.4 p. 1770). As Laerke remarks, when Leibniz says of an argument that it is elegant it is usually because it resembles his own (Laerke 2008, 673). This is no exception. Indeed, Leibniz's view regarding the status of numbers as abstractions from individual things closely resembles Spinoza's. For example, Leibniz writes:

> When I perceive a horse and an ox, I note that the ox is not *the same*, but *different*. But since they combine in something there will be *many* things, to wit, animals or beings. But that which can be substituted for another without altering the truth is *the same* (A 6.4 561; Arthur 267, 1683).

According to Leibniz here, the judgment that there are *many* things stems from observing differences and similarities: the horse and the ox are the same insofar as they are animals but differ in the kind of animal they are. The judgment that there are many things is based on regarding different things under the same aspect, in our example, *qua* animals. Leibniz goes on:

> But if A is D, and B is D, and C is D, and A, B, and C are the same, D will be *one* thing. If, on the other hand, A, B, and C are each different from the other, they will be *many*, whence numbers (A 6.4 561; Arthur 267, 1683).[33]

The point I would like to stress here is that numerical ascriptions derive from observing a multiplicity of different things. According to Leibniz, numbers, like modes, and relations, are not entities in their own right (A 6.3 463; Pk 7).[34] Rather, numbers depend on mental

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[33] For additional references to Leibniz's later view on the ideal nature of number, on a par with relations and possibilities, see, GP II 268-69; 276-79; 282; GP IV 568.

[34] This is in line with Leibniz's well-known quasi nominalist approach to abstract concepts, *possibilia* and

abstractions; they are products of making comparisons among particular things. When Leibniz says in the passage above, “whence numbers”, he is saying that numbers arise from observing similarities and differences among particulars. Compare this view with Spinoza’s point in his Ep. 50 to Jarig Jelles:

> We do not conceive things as existing in a certain number, unless we have reduced them to a common genus. For example, one who holds in his hand a penny and a crown will not think of the number two, unless he can call both the penny and the crown piece by one and the same name, to wit, coins or pieces of money. In the latter case he can say that he holds two coins or pieces of money, inasmuch as he calls the crown as well as the penny, a coin, or a piece of money (Ep. 50, *Spinoza Opera* Vol. 4 pp. 239-40).

In a letter to Sophie from 1700 Leibniz restates this point by quoting the Duke of Bourgogne in a passage echoing Spinoza’s example from the scholium to EIP15:

> [...] when one attentively considers the existence of beings [...] one understands very clearly that existence belongs to unities, and not to numbers (or multitudes). Twenty men only exist because each man exists.
> Number is nothing but the repetition of the unities to which existence only belongs [...].

Leibniz comments on this: “I have read all this with admiration, and I find that my ideas concerning unities are being expressed wonderfully” (GP VII, 560). What Leibniz finds here so wonderfully expressed seems to be the following: unities exist and numbers are “nothing but the repetition of the unities.” These, in turn, arise from comparing and considering particular things under common aspects. (Cf. A 6.3 399; Pk 115).

Let me note in passing that the status of “one” in such a conception of numbers is very interesting. Cleary, the number “one” cannot be formed by grouping individual entities or by a comparing such entities to any other particular thing. For such operations presuppose a multiplicity of entities. It seems, therefore, that “one” should be regarded as a limit case, or as a unit constituting numbers (the element of number) rather than itself a

relations.

number. Leibniz's view on numbers, as abstraction from individual things, presupposes basic units or individual things. This is in agreement with the tradition according to which "one" is not considered as a number. For this reason, I suspect that, when Leibniz, like Spinoza, says of a substance that it is one, he is not necessarily making a numerical claim; for it may well be that he is rather pointing to the basic unity and/or to the uniqueness of a substance.[35]

With this view of numerical ascription in mind, let us now return to Leibniz's comment on Spinoza's Ethics I, proposition 8. Leibniz reformulates Spinoza's argument, as follows:

> Given several individuals, there has to be a reason in nature for this number [of individuals] rather than another. The same reason which explains why there are such a number of them must also explain why this or that individual exist. But this reason is not anymore in the one [individual] than in the other. Hence, it is external to all of them (A 6.4 1770 my translation).[36]

As far as I can see, this is a precise reformulation of Spinoza's point. After reformulating Spinoza's point, Leibniz raises an objection. He writes: "One could object by saying that their number is undetermined (*interminatum*), or null (*nullum*), or exceeds any number" (A 6.4 1770). Leibniz's objection indicates that he considers the question of the status of numbers here in a radical way. He notes three alternatives: (1) The number of individuals might be undetermined (or indefinite); (2) it might be null, that is, admit of no numerical

[35] When it is said that "X is one," at least three distinct things might be meant: X is a unit; X is unique; X is one in number, comparable to 2, 3, 4, etc. I would think (though cannot argue for it here) that a non-numerical definition of substance applies in the two interesting (limit) cases of "one" and "infinity," which, for Leibniz as well as for Spinoza, are important characteristics of a substance. Both uniqueness and infinity, I suggest, are often used non-numerically in qualifying a substance- in many contexts what is meant is that a substance is a unit and it is unique. This does not rule out, of course, the possibility of saying that there are so many substances or even counting them in certain contexts, as Leibniz's comment on Spinoza EIP8 indicates. The question of unity and uniqueness falls outside the scope of the present paper and will be examined elsewhere.

[36] "*…quia ponantur esse plura individua, ideo debet esse ratio in natura cur sint tot non plura. Eadem cum faciat cur sint tot, faciat cur sit hoc et hoc. Ergo et cur sit hoc. Ea ratio autem non est in uno horum potius quam in altero. Ergo extra omnia"* (A 6.4 1770).

value at all[37]; and (3) it might exceed any number (which suggests that it is to be read syncategorematically or as a variable in Leibniz's sense since 1676).[38] This gives us a sense of what Leibniz regards as the range of options with respect to the enumeration of individuals. While the objection is very instructive in exposing the way Leibniz thinks about this question, he does not take it as a refutation of the argument raised by Spinoza (and endorsed by Leibniz). As Leibniz observes, "one can take several among them [the individuals] and consider why *they* exist; or consider several which have something in common such as to exist in a certain time or place" (A 6.4 1770). Thus, once again, Leibniz endorses here the idea that a numerical ascription is grounded in a common denominator of any (definite of indefinite) multiplicity of things and is not part of the essence of these individual things.

If a numerical ascription is not part of the essence of things but derives from observing some of their common properties, and, if infinity and uniqueness are essential features of substance, then it would follow that the characterization of substance as infinite should not be seen as a numerical qualification of substance. This suggests that

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[37] It seems to me that part of Leibniz's point in calling "infinite magnitudes" nothing (null or nihil) is to stress that they are not to be seen as very small or very large but as admitting of no measure at all – only finite measures would make sense. As Leibniz puts this point in his piece "Infinite Numbers": "But to say all numbers is to say nothing" (A 6.3 502; Arthur 99).

[38] I rely here on Arthur who develops Ishiguro's (1990) suggestion regarding the status of infinitesimals. Arthur writes that "Leibniz's interpretation is (to use the medieval term) *syncategorematic*: Infinitesimals are fictions in the sense that the terms designating them can be treated *as if* they refer to entities incomparably smaller than finite quantities, but really stand for variable finite quantities that can be taken as small as desired. As I have argued elsewhere [2009], this interpretation is no late stratagem, but in place already by 1676". 'Leibniz's Syncategorematic Infinitesimals, Smooth Infinitesimal Analysis, and Newton's Proposition 6' forthcoming in *Infinitesimals*, edited by William Harper and Wayne C. Myrvold, and Craig Fraser. For more discussion regarding this reading see Bassler, O. B. 'Leibniz on Infinite as Indefinite', The Review of Metaphysics, 51 (June 1998): 849-879; Levey, S. 'Archimedes, Infinitesimals and the Law of Continuity: On Leibniz's Fictionalism' in *Infinitesimal Differences*, edited by U. Goldenbaum and D. Jesseph, (Berlin/New York, 2008): 107-134; and Arthur R. T. W. Leery Bedfellows: Newton and Leibniz on the Status of Infinitesimals, in Infinitesimal Differences, edited by U. Goldenbaum and D. Jesseph, (Berlin/New York, 2008): 7-30.

the infinity ascribed to God in saying that he is infinite in perfection, power and knowledge are to be seen as qualitative rather than quantitative features.

THREE DEGREES OF INFINITY

Although Spinoza is clear about the non-numerical characterization of substance as infinite in his Ep. 12, the matter is not as clear in Leibniz's view of substance. Much of the difference between Leibniz and Spinoza on this point stems from the fact that Spinoza's metaphysics recognizes a unique individual substance while Leibniz's metaphysics recognizes an infinity of created substances. Leibniz's view regarding the infinity of created substances raises at least two difficult questions: (1) in what sense of infinity does he say that there is an infinity of created substances; and (2) in what sense of infinity is each created substance considered to be itself infinite. Leibniz's position regarding the infinity of divine substance seems quite clear and similar to Spinoza's position. But his position regarding the infinity of created substances is not clear at all. In light of our discussion thus far, I will offer here a suggestion regarding the second part of this question. We have noted that there is no room in Spinoza's ontology for created substances. This is why, in his response to Spinoza's letter, Leibniz is using a middle degree between the highest degree of infinity, applicable to God only, and the lowest degree, applicable to numbers and other *entia rationes*. As it turns out, this category is of the same kind of infinity Spinoza ascribes to the attributes of God, namely, things that are infinite in their kind. I suggest that this is the sense that Leibniz uses when applying infinity to created substances.

To see this point, let us revisit Leibniz's three degrees of infinity. I would like to suggest that, for Leibniz, as for Spinoza, these three degrees of infinity correspond to three ontological levels or three kinds of things, divine substance, created substances, and numbers, and that to each of these, Leibniz ascribes its proper type of infinity.

> I have always distinguished the *Immensum* from the Unbounded, i.e. that which has no bound. And that to which nothing can be added from that which exceeds an assignable number. Briefly, I set in order of degree: *Omnia*; *Maximum*; *Infinitum*. Whatever contains *everything* is maximum in entity; just as a space unbounded in every direction is maximum in extension. Likewise, that which contains everything is most infinite, as I am accustomed to call it, or the absolutely infinite. The *maximum* is *everything* of its kind (*omnia suis generis*) i.e., that to which nothing can be added, for instance, a line unbounded on both sides, which is also obviously infinite for it contains every length. Finally those things are *infinite in the lowest degree* whose magnitude is greater than we can expound by an assignable ratio to sensible things, even though there exists something greater than these things. In just this way, there is the infinite space comprised between Apollonius' Hyperbola and its asymptote, which is one of the most moderate of infinities, to which there somehow corresponds in numbers the sum of this space: 1/1 + 1/2 + 1/3 + 1/4 + ..., which is 1/0. Only let us understand this 0, or naught, or rather instead a quantity infinitely or unassignably small, to be greater or smaller according as we have assumed the last denominator of this infinite series of fractions, which is itself also infinite, smaller or greater. For a maximum does not apply in the case of numbers. (A 6.3, 282; Arthur, 114-115)

I believe that Leibniz's application of the highest degree of infinity to God is quite clear and becomes even clearer in his later writings (such as the *Nouveaux essais*, and the letters to Des Bosses and Varignon). I have tried to show that this kind of infinity should be understood in a non-quantitative sense. Richard Arthur has argued convincingly that Leibniz's syncategorematic reading of infinity appears as the third degree of infinity, which Leibniz reserves for numbers and quantifiable things.[39] I call this type of infinity numerical, as it is applicable to numbers and more generally (though with some qualifications) to quantities and magnitudes. The use and reference to the second degree

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[39] See Arthur R. T. W., 'Actual Infinitesimals in Leibniz's Early Thought' in The Philosophy of the Young Leibniz, *Studia Leibnitiana* Sonderheft, edited by Mark Kulstad, Mogens Laerke and David Snyder, (Stuttgart: 2009) pp. 11-28, and his 'Leibniz's Syncategorematic Infinitesimals, Smooth Infinitesimal Analysis, and Newton's Proposition 6', forthcoming in *Infinitesimals*, edited by William Harper, Wayne C. Myrvold, and Craig Fraser.

of infinity, however, is not spelled out. Yet I believe that it has a natural place and an important role to play in Leibniz's metaphysics, namely one that addresses the status of created substances. Created substances are infinite but they cannot be infinite in the same sense as God. Unlike God, created substances are infinite only in some respects. As an example, consider this passage: "A substance is either perfect, i.e. absolute, namely *God*, or limited, in which case it is called *created substance*… It is also unique…" (A 6.4 1506; *Arthur* 285). Since created substances are seen as true beings and true units, they cannot have the same degree of infinity as numbers and quantities, which are not true beings at all. Since each created being is a unique being, it can be seen, or so I suggest, as maximal in its (unique) kind, which interestingly corresponds to Spinoza's characterization of an attribute as infinite in its kind. For Leibniz, the infinity applicable to created substances can also be partly explicated along the lines of maximal consistency, so that its concept would be maximally consistent and unique.[40] At the same time, I must observe that this suggestion involves the difficulty that Leibniz's example for it in the text above—an unbounded line—can be taken to apply to beings only by analogy. As I noted earlier, here I can only offer this as a suggestion to be developed by further research elsewhere.

CONCLUSION

A close study of Leibniz's texts before and after his meeting with Spinoza between 1675-79—first through a mediator, then face to face, and then in reading the Ethics in 1678—

[40] The idea of maximal consistency of Leibniz's complete concept is developed in Ohad Nachtomy *Possibility, Agency, and* Individuality *in Leibniz's Metaphysics,* (Dordrecht: Springer, The New Synthese Historical Library), 2007, chapter 2.
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reveals some points of close similarity in their treatment of the infinity of substance. At the same time, these texts also reveal some deep gaps in their philosophical systems. As we have seen, in the texts from 1675-6, Leibniz's view concerning the infinity of substance is very close to that of Spinoza. Moreover, Spinoza's view on infinity offers an attractive way to approach Leibniz's problem and clarify his approach regarding the way in which a substance may be said to be infinite.

I have argued above that, for both Leibniz and Spinoza, the infinity of divine substance is non-quantitative. I have also suggested (but have not argued for the case of uniqueness) that a substance is said to be infinite and unique in a non-quantitative sense. Instead, a substance is said to be unique and infinite in a qualitative sense of being a complete and perfect unit or whole.

For both philosophers, this notion of perfection has to do with a notion of irreducible activity and inherent power of action. Both philosophers perceive enumeration (and more broadly of quantification) as means to compare and classify different aspects of particular things. I have also suggested that Leibniz's view of the infinity of created substance is characterized through the second degree of infinity, which falls between the non-quantitative and absolute infinity of the divine substance and that of the mere (syncategorematic) infinity, applicable to series and quantities. Created substances are limited beings. For this reason, created substances are infinite but not in the highest degree; rather, they can be seen as maximal in their kind. It is very interesting to note that this is the kind of infinity Spinoza ascribes to the attributes.

EPILOGUE

Let me briefly raise the question whether the solution Spinoza articulates can indeed solve Leibniz's problem. I think that, in order for Spinoza's solution to work in Leibniz's system, Leibniz would have to give up his demand for an *a priori* proof that the most perfect being is possible, which would also imply giving up on the priority of possibility and essence over existence. More precisely, it seems that Spinoza's approach can resolve the Analogy Problem (by virtue of the distinction between different kinds of infinity) but not the Consistency Problem. To solve the Consistency Problem in a Spinoza-like fashion would force Leibniz to give up his demand to prove the possibility of God in terms of pure logical consistency. Leibniz's refusal to make this move points to the direction his philosophy takes after 1678, namely, instead of giving up his demand for possibility proofs, he is developing and enriching the role possibility plays in his metaphysics. Leibniz is thus diverging from Spinoza's philosophy in an attempt to provide a metaphysical alternative that avoids the great dangers he sees in Spinoza's system.[41]

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[41] Here is one example that illustrates Leibniz's grave concerns about such consequences. He writes: "If everything emanates from the divine nature with a sort of necessity, and all possibles exist, then good and evil will be treated as equally bad and moral philosophy will be ruined" (A 6.3 p. 365). In *De Libertate*,1689, Leibniz notes that he was saved from the danger of Spinoza's necessitarianism by considering those possibiles that do not exist, will not exist, and did not exist (A 6.4 p. 1653). In *Essais de théodicée* of 1710, he says that, as opposed to the Spinozists, his own view is based on the nature of possibilities, that is, those things that do not imply a contradiction (§ 173).

ABBREVIATIONS

A	*G. W. Leibniz: Sämtliche Schriften und Briefe,* Darmstadt/Leipzig/Berlin, Edition of the German Academy of Sciences 1923- , Cited by series, volume, and page. If not otherwise indicated, the reference is to series 6, volume 3.
AG	*G. W. Leibniz: Philosophical Essays*, edited and translated by Daniel Garber and Roger Ariew (Indianapolis: Hackett, 1989).
Arthur	G. W. Leibniz, *The Labyrinth of the Continuum. Writings on the Continuum Problem, 1672-1686*, edited and translated by Richard Arthur, (New Haven and London: Yale University Press, 2001).
Confessio	*Confessio philosophi*, *Papers Concerning the Problem of Evil, 1671–1678*, edited and translated by Sleigh, R. C., JR., (New Haven: Yale University Press, 2005).
Curley	*Spinoza*, B. de: Collected Works, vol. 1, edited and translated by Edwin Curley, (Princeton: Princeton University Press, 1988).
GP	*Die Philosophischen Schriften von Leibniz*, edited by C. I. Gerhardt, 7 vols. (Berlin: Weidmann, 1875-90; reprinted Hildesheim: Olms, 1978).
GM	*Die mathematischen Schriften von G. W. Leibniz*, edited by C. I. Gerhardt, (Berlin: Winter, 1860-1875).
Loemker	G. W. Leibniz, *Philosophical Papers and Letters*, edited and translated by L. E. Loemker, 2nd edition, (Dordrecht: Kluwer, 1969).
NE	G. W. Leibniz, *Nouveaux essais sur l'entendement humain*, cited by book chapter and section, edited and translated by P. Remnant and J. Bennett, (Cambridge: Cambridge University Press, 1981).
Pk	*G. W. Leibniz: De Summa Rerum: Metaphysical Papers 1675-1676,* edited and translated by G. H. R. Parkinson, (New Haven and London: Yale University Press, 1992).
Theodicy	G. W. Leibniz*: Essays on the Goodness of God the Freedom of Man and the Origin Evil*, translated by E. M. Huggard, (La Salle: Illinois, Open Court, 1993), first published (London: Routledge & Kegan Paul, 1951).

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