



Project
MUSE[®]

Today's Research. Tomorrow's Inspiration.

The Principle of Continuity and Leibniz's Theory of Consciousness

LARRY M. JORGENSEN

[L]es perceptions remarquables viennent par degrés de celles qui sont trop petites pour estre remarquées.¹

LEIBNIZ'S PRINCIPLE OF CONTINUITY, in slogan form, is the principle that "nature never makes leaps,"² or that "all natural change is produced by degrees."³ All natural connections, whether causal, spatiotemporal, or conceptual, are governed by this principle, allowing it, according to Leibniz, to serve "not only as a test . . . but also as a very fruitful principle of discovery." In this paper, I wish to use the principle of continuity as a test of a theory, much as Leibniz used it against the Cartesian physics of his day. I will begin by summarizing the principle of continuity

¹A VI.vi.56; *NE* 56. I will use the following abbreviations for the primary texts:

- A Gottfried Wilhelm Leibniz, *Sämtliche Schriften und Briefe*, ed. Deutsche Akademie der Wissenschaften (Darmstadt, Leipzig, Berlin: Akademie Verlag, 1923–). Cited by series, volume, page.
- G Gottfried Wilhelm Leibniz, *Die Philosophischen Schriften*, ed. C. I. Gerhardt, 7 vols. (Berlin: Weidmann, 1875–1890). Cited by volume and page.
- GM Gottfried Wilhelm Leibniz, *Leibnizens Mathematische Schriften*, ed. C. I. Gerhardt, 7 vols. (Berlin: A. Asher, 1849–1863). Cited by volume and page.
- L Gottfried Wilhelm Leibniz, *Philosophical Papers and Letters*, trans. Leroy E. Loemker, 2nd ed. (Dordrecht: D. Reidel, 1970).
- NE Gottfried Wilhelm Leibniz, *New Essays on Human Understanding*, trans. Peter Remnant and Jonathan Francis Bennett (Cambridge: Cambridge University Press, 1996).
- PG Gottfried Wilhelm Leibniz, "Extrait d'une Lettre de M. L. sur un Principe Général, utile à l'explication des loix de la nature, par la consideration de la Sagesse Divine; pour servir de réplique à la réponse du R. P. M.," *Nouvelles de la République des Lettres* (1687); also included in G III.51–55; L 351–54. Cited by the page number in the Loemker translation.

²A VI.vi.56; *NE* 56.

³*Monadology* [*M*], G VI.607–23 and L 643–53, at §13.

Larry M. Jorgensen is Assistant Professor of Philosophy at Valparaiso University.

Journal of the History of Philosophy, vol. 47, no. 2 (2009) 223–48

(in its various forms) and then by showing its usefulness against the Cartesian laws of motion. Once this groundwork is laid, I will turn my attention to the various interpretations of Leibniz's theory of consciousness. The principle of continuity, I believe, will provide a useful test for these interpretations and this, coupled with the textual evidence, will favor the view that consciousness, for Leibniz, reduces to first order features of a perception, viz. to some degree of perceptual distinctness. The currently standard account of Leibniz's theory of consciousness does not fare as well against the background of the principle of continuity, and, by first considering Leibniz's responses to Descartes's theory of motion, it will become clear why certain responses to this objection are not successful. I will take Leibniz's application of the principle of continuity to the theory of motion as a paradigm example for its application to consciousness.

I. THE PRINCIPLE OF CONTINUITY

The principle of continuity is a methodological principle for Leibniz. If the principle of continuity is true of the natural order, the range of plausible scientific theories is reduced, since the theories that violate continuity can be easily rejected. In this section I provide an account of Leibniz's principle of continuity and show how it serves as a methodological principle. However, I do not plan to defend the principle of continuity or to provide a thorough analysis of the concept of continuity in Leibniz—I refer the reader to the relevant literature for this.⁴ My aim is mainly to demonstrate *Leibniz's* commitment to the principle and to its usefulness as a means of evaluating a theory, taking this as a starting point to see what follows from it.

Leibniz published an explication of the principle of continuity in the 1687 *Nouvelles de la République des Lettres*, and it is this account of the principle that Leibniz himself refers back to throughout his life:

CONTINUITY OF CASES:⁵

(a) [The principle of continuity⁶] can be formulated as follows. [i.] *When the difference between two instances in a given series or that which is presupposed can be diminished until it becomes smaller than any given quantity whatever, the corresponding difference in what is sought or in their results must of necessity also be diminished or become less than any given quantity whatever.* Or to put it more commonly, [ii.] *when two instances or data approach*

⁴See references in note 33 below.

⁵The names of these formulations were first given by Bertrand Russell. His discussion of the principle of continuity in its various forms is helpful, although I am more optimistic than he is that the various forms can be reconciled. See Bertrand Russell, *A Critical Exposition of the Philosophy of Leibniz, with an Appendix of Leading Passages* (London: G. Allen & Unwin, 1937), 63. I am also indebted to Dionysios Anapolitanos' discussion of these formulations. See Dionysios A. Anapolitanos, *Leibniz: Representation, Continuity and the Spatiotemporal [Representation]* (Dordrecht: Kluwer Academic Publishers, 1998), 65–69.

⁶A terminological note: Leibniz does not refer to this general principle as the 'law' or 'principle of continuity' until sometime in the early 1690s (thus far, 1692 is the earliest date I have discovered: G IV.375; L 397). At this early stage, Leibniz is content to call it a 'general principle' or a 'principle of general order'. However, when his later texts refer to the "law of continuity," Leibniz sends his readers back to these earlier texts for the explanation, so I am taking it on Leibniz's word that the 'principle of general order' and the 'law of continuity' refer to the same thing. Cf. GM VI.249–50; L 447, and A VI.vi.56; NE 56. Thus, my editorial insertion, describing this passage as a formulation of the "principle of continuity" is not unwarranted. I take this to be the canonical formulation of the principle of continuity for Leibniz, a claim that is supported by the expositions of Russell and Anapolitanos cited in the previous note.

each other continuously, so that one at last passes over into the other; it is necessary for their consequences or results (or the unknown) to do so also. This depends on a more general principle: that, [iii.] as the data are ordered, so the unknowns are ordered also.⁷

The idea here is that of a continuous function, and the paradigm example of this for Leibniz is the transformation of one conic section into another (see Figure 1). In the geometric case, there is a continuous transformation from ellipse to parabola, and thus, by the principle stated above, the properties that are preserved in the transformation (e.g., the distance of the foci) will also be continuous.

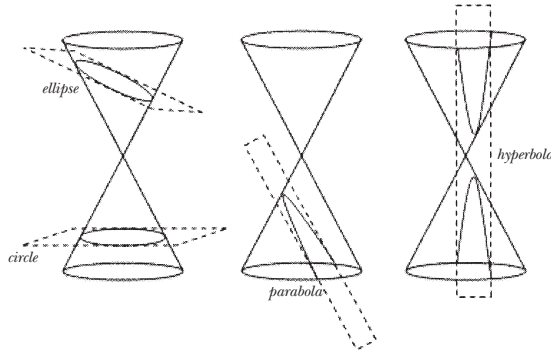


Figure 1. The Conic Sections

The proximity of the formulations (i) and (ii) in the quotation above provides some guidance on what Leibniz thought to be a requirement for continuity. “Two instances . . . approach each other continuously” if “the difference between [the] two instances . . . can be diminished until it becomes smaller than any given quantity whatever.” What I think is being suggested here, and made explicit later, is that density is a sufficient condition for continuity. In support of the sufficiency of density, Leibniz later says in a letter to Des Bosses, “if points are such that there are not two without an intermediate, then a continuous extension is given.”⁸

But density also serves as a *necessary* condition of continuity for Leibniz. As evidence of this, Leibniz argues in the *Specimen Dynamicum* that atoms would introduce discontinuities:

Assuming then, that there are atoms, that is, bodies of maximum hardness and therefore inflexible, change would obviously occur through a leap or in a moment.⁹

The reason for this, Leibniz says, is because in every collision between two atoms, the direction of motion will reverse itself (or the atoms will come to rest) instantaneously. As Leibniz says, it would contain “a change through a leap, namely, an instantaneous change from motion to rest without passing through intermediate degrees.”¹⁰ What is significant about this last claim is the identity Leibniz makes

⁷PG 351.

⁸G II.515, quoted in Timothy Crockett, “Continuity in Leibniz’s Mature Metaphysics” [“Continuity”], *Philosophical Studies* 94 (1999), 125. I follow Crockett here in defining continuity in terms of density. Cf. Ezio Vailati, *Leibniz & Clarke: A Study of Their Correspondence [Leibniz & Clarke]* (Oxford: Oxford University Press, 1997), 118–19.

⁹GM VI.248; L 446.

¹⁰Ibid.

between the failure of density (the passing through intermediate degrees) and the introduction of a discontinuity. In order to have continuity, one *must* have density. Leibniz generalizes this claim about motion, and says that changes in shape and location also must pass through all intermediate shapes and locations.¹¹ The absence of density entails a lack of continuity.

Thus, we can operate on the following condition: a series is continuous if and only if, for any two instances (or points in the series), there is an intermediate instance (or point in the series).¹² Further, according to the PG passage above, the density of the original series and the results will be equal. Call this the *density requirement*.

Although the continuity of cases is the main form of the principle of continuity presented by Leibniz, other formulations can be found in his texts, three of which I want to highlight. Each of these different forms of the principle highlights a different aspect of density (and, hence, continuity) in the natural order. Having each of these in mind will help us when we consider how continuity should apply to Leibniz's theory of consciousness.

SPATIOTEMPORAL CONTINUITY:

(b) Any change from small to large, or *vice versa*, passes through something which is, in respect of degrees as well as of parts, in between.¹³

Spatiotemporal continuity says that any change in location or time is a continuous change. According to this principle, any change must be a continuous change. This applies not only to objects, but to their states as well. As Leibniz says in a letter to DeVolder, "I do not believe that any reason *a priori* can be given against a leap from place to place which is not also effective against a leap from state to state."¹⁴ And so any object *O* changing from state *P* to *P'* will occupy all intermediate states between *P* and *P'* in the transition. We may call this the requirement of *spatiotemporal density*.

CONTINUITY OF ACTUAL EXISTENTS:

(c) [W]hen the essential determinations of a being approach those of another so that likewise accordingly all the properties of the first must gradually approach those of the last, it is necessary that all the orders of natural beings form only one chain, in which the different classes, like so many links, connect so closely the one to the other, that it is impossible for the senses and the imagination to fix the precise point where any one begins or ends.¹⁵

The continuity of actual existents says that between any two existents all compossible intermediate beings also exist. The compossibility qualification is important, since Leibniz believes that not all possibles have been actualized. But, for any two

¹¹GM VI.249; L 447.

¹²This may be controversial, since Leibniz sometimes talks as if contiguity or cohesion (where the boundaries of two things are one) is sufficient for continuity, and it is not obvious what the relation between contiguity and density would be. But, from these passages in the *Specimen Dynamicum*, I am inclined to think that density has priority for Leibniz. For further discussion of these points, see Crockett, "Continuity," 127–28, and Samuel Levey, "Matter and Two Concepts of Continuity in Leibniz" ["Two Concepts of Continuity"], *Philosophical Studies* 94 (1999): 81–118, at §2.

¹³A VI.vi.56; NE 56.

¹⁴G II.169; L 516.

¹⁵Letter to Varignon, 1702, in Gottfried Wilhelm Leibniz, *New Essays Concerning Human Understanding* [Langley], trans. A. G. Langley, 2nd ed. (New York: Macmillan, 1896), 713–14. Cf. A VI.vi.307; NE 307, and A VI.vi.473; NE 473.

existents, and any two of their essential properties, Leibniz believed that there are beings that instantiate all possible grades of that property intermediate between the two existents.¹⁶ We may call this the requirement of *ontological density*.

What distinguishes ontological density from spatiotemporal density is this: ontological density is a claim about the creatures that exist at any given moment—the chain of all existing substances will be dense. Spatiotemporal density, in contrast, is a claim about changes in the states or properties of a thing—the changes will occur continuously in that the changing thing will occupy all possible intermediate state. This distinction will come up in our discussion of consciousness. Changes in *state*, from unconscious to conscious, will be continuous in a given mental substance. (I will sometimes call this *state consciousness*, when a given mental state is itself a conscious mental state.) But, additionally, there will be a continuum among *creatures* that are conscious and those that are not. (I will sometimes call this *creature consciousness*, when a given substance is conscious, by which I mean it has some conscious mental states.)

CONTINUITY OF EXISTENCE:

(d) [I]t follows that naturally, and speaking in metaphysical strictness, there is neither generation nor death, but only development and envelopment of the same animal. Otherwise there would be too much of a jump, and through inexplicable changes of essence nature would lose too much of its character of uniformity.¹⁷

The continuity of existence¹⁸ says that the beginning and end of existence is an unnatural change and introduces a gap in the natural order. This may be considered a consequence of the prior formulations since, given the requirements of density, either (a) existence will come in degrees (which Leibniz does not say, at least for substances), or (b) changes in existence will introduce gaps in the natural order. So a change in existence will not be a natural change.¹⁹

¹⁶One reviewer raised the worry that the principle of continuity will conflict with the principle of compossibility in the following way: "Ontological density is fulfilled in the realm of ideas in Leibniz, but cannot obtain in the created world without conflicting with the principle of compossibility." While it is true that certain possible worlds may entail violations of continuity, Leibniz believed that God's selection of the actual world from among the merely possible worlds was guided by a preference for continuity (I say more about this below). Failure to create a world in which continuity holds would presumably be a failure of the principle of sufficient reason—why would God create a world in which there are gaps when he *could* have filled the gaps? Of course, *some* beings were incompatible with those that were created, and so those remained merely possible beings. But the order of beings that were created is continuous. Leibniz is explicit about this in A VI.vi.307; NE 307: "The *Law of Continuity* states that nature leaves no gaps in the orderings which she follows, but not every form or species belongs to each ordering." An example of this, provided by Leibniz, may be helpful. "Birds," he says, "which are otherwise so different from man, approach him by virtue of their speech, but if monkeys could speak as parrots can, they would approach him even more closely" (ibid.). Note that this passage suggests that for some essential property, such as speech, there will be a chain of existents that instantiate the intermediate forms, but for some other essential property, such as musculoskeletal form, there will be a *different* chain of existents that instantiate the intermediate forms. Thus, while we can know *a priori* that there is such a continuous chain, this does not entail that we can know *a priori* which possible continuous chain was in fact created.

¹⁷Letter to Sophie Charlotte, 8 May 1704, G III.345; Gottfried Wilhelm Leibniz, *Leibniz's 'New System' and Associated Contemporary Texts* [NS], trans. Roger S. Woolhouse and Richard Francks (New York: Oxford University Press, 1997), 222.

¹⁸Cf. Anapolitanos, *Representation*, 65–67.

¹⁹This does raise interesting questions about the nature of existence for Leibniz, which will become important when we turn to the higher-order theory of consciousness. Since this issue may best be discussed with reference to the details of that view, I will merely flag it here for more thorough discussion later.

Finally, there will also be a *conceptual continuity*, since the created order had its origin in the mind of God whose knowledge of it was as well ordered as his activity on it in creation.²⁰ Thus, we have one additional formulation of the principle of continuity:

CONCEPTUAL CONTINUITY:

(e) *In any supposed transition, ending in any terminus, it is permissible to institute a general reasoning, in which the final terminus may also be included.*²¹

This is the big payoff for the principle of continuity—the continuity of cases results in there being a continuity of the *reasons* one applies to a case and its limits. This is so because the concepts involved in such reasoning are themselves continuous. For example, the continuity of the conic projections allows Leibniz to conclude that “all the geometric theorems which are proved for the ellipse in general can be applied to the parabola *by considering it as an ellipse* one of whose foci is infinitely far removed from the other, or (to avoid the term ‘infinite’) as a figure which differs from some ellipse by less than any given difference.”²²

Leibniz generalizes this conclusion and says that any case of continuous change will result in a simplification of the laws that apply to the cases, since the limits can be considered as merely special cases. So, for example, Leibniz says that rest is an infinitesimal motion, hardness is an “infinitely prompt elasticity,” and equality is an infinitely small inequality. The *conceptual connection* between natural kinds will ensure nomological simplicity while allowing for diversity of kinds (or states, properties, etc.). For example, Leibniz says that

rest can be considered as an infinitely small velocity or as an infinite slowness. Therefore whatever is true of velocity or slowness in general should be verifiable also of rest taken in this sense, so that the rule for resting bodies must be considered as a special case of the rule for motion. If this does not work, on the other hand, this will be a certain sign that the laws are wrongly formulated.²³

Because motion and rest can be *conceived through* one another, the laws that apply to the one must also apply to the other, conceived in the appropriate way. This, I think, is the basis of the other forms of the principle of continuity: there is a *conceptual density* in God’s mind in creating the natural order (because, as Leibniz says, God acts as the “perfect geometrician, observing a harmony to which nothing can be added”²⁴). That is to say, between any two concepts, there is an intermediate concept. Leibniz describes the ideas of God in this way:

²⁰See the Letter to Varignon, 1702, Langley 712, quoted below.

²¹Gottfried Wilhelm Leibniz, *The Early Mathematical Manuscripts of Leibniz*; translated from the Latin texts published by Carl Immanuel Gerhardt with critical and historical notes [Child], trans. J. M. Child (Chicago-London: Open Court, 1920), 147. Cf. Letter to Remond de Montmort, 1715, Gottfried Wilhelm Leibniz, *Leibniz Selections* [Wiener], trans. Philip P. Wiener (New York: Charles Scribner’s Sons, 1951), 188. Although this passage says nothing about continuity, it is in the context of a lengthy explanation and defense of the principle of continuity. Prior to this passage, Leibniz says this: “For I have, beside the mathematical infinitesimal calculus, a method also for use in Physics, of which an example was given in the *Nouvelles de la République des Lettres*; and both of these I include under the Law of Continuity.” The passage I quoted above is a consequence of this. (Unfortunately, though, Leibniz does not present it as an entailment. After referring to the principle of continuity, he says that he “take[s] for granted” this postulate, but it is clear from the context that the principle of continuity is what warrants his taking it for granted.)

²²PG 352.

²³Ibid.

²⁴Ibid, 351.

[A]ll the different classes of beings whose union forms the universe exist in the ideas of God only as so many ordinates of the same curve, the union of which does not allow the placing of others between them, because that would indicate disorder and imperfection.²⁵

This conceptual density allows for us to conceive of limiting cases as merely special instances, bringing them under the same general reasoning that applies to paradigm cases.

The continuity of concepts allows for the sort of methodological principle that Leibniz desired: if, according to a given theory, limit cases *cannot* be subsumed under the reasoning that applies to paradigm cases, then one can confidently reject that theory. As Leibniz says, the principle of continuity serves as “a test or criterion by which to reveal the error of an ill-conceived opinion at once and from the outside, even before beginning an internal examination.”²⁶ In the following section I will demonstrate how Leibniz used this method to reject the Cartesian laws of motion, and then, in section 3, I will show that this will have telling results against certain interpretations of Leibniz's theory of consciousness as well.

2. AN EXAMPLE FROM CARTESIAN PHYSICS

Descartes's laws of motion, as presented in the *Principles of Philosophy*, are analyzed by Leibniz in terms of the principle of continuity. Leibniz showed that these rules were inconsistent with the principle of continuity and, by implication, that Descartes's principle of the conservation of the quantity of motion is false.

A quick summary of Leibniz's argument will demonstrate his methodology. Take two of Descartes's rules of motions:

Rule 1: If two equal bodies *B* and *C*, with equal velocities, collide directly, both will be deflected with the velocities of their approach.

Rule 3: If *B* and *C* are equal and collide with unequal and opposite motions, then the more rapid body [*C*] carries with itself the slower body [*B*], and half the difference of their velocities subtracted from the velocity of [*C*] is added to the velocity of [*B*], so that they move together with equal velocities.²⁷

Leibniz puts these rules to the test. Assume a case in which *B* and *C* are of equal mass and are moving in opposite directions, *B* slower than *C*. Then imagine the series of cases in which the velocity of *C* is continuously diminished until it is equal to *B*. There will be a point at which an infinitesimal difference makes a very large result.

The disproportion of the difference in cause and effect violates the principle of continuity, and the two laws cannot be simplified. This is enough to show that Descartes's principles are wrong, and the result can be confirmed by experiment. As Leibniz says, “Descartes acknowledges that it is difficult to use his rules, because, namely, he sees that they completely conflict with experience. But in the true rules of motion there is a remarkable agreement between reason and experience”²⁸

²⁵Letter to Varignon, 1702, Langley 712.

²⁶G III.52; L 351.

²⁷G IV.376; L 398. I have modified this slightly, only switching which of the bodies has a greater velocity, in order to present the continuous case with rule 6 below.

²⁸G IV.381; L 402. Descartes's exact words, in the French edition of the *Principles of Philosophy* §52, are these: “And the demonstrations of this are so certain that, even if experience were to appear to show

These rules, as stated by Descartes, are not entirely perspicuous. In order to make them easier to understand, I have charted the various results for some sample cases. Below is the chart listing the initial velocities (V_{bi} and V_{ci}) and the final velocities (V_{bf} and V_{cf}), using Descartes's rules of motion:

V_{bi}	V_{ci}	V_{bf}	V_{cf}	Descartes's Rule
-4	-4	-4	-4	No impact
-4	-3	-3.5	-3.5	Rule 7
-4	-2	-3	-3	Rule 7
-4	-1	-2.5	-2.5	Rule 7
-4	0	3	-1	Rule 6
-4	1	-2.5	-2.5	Rule 3 ($ V_{bi} > V_{ci} $)
-4	2	-3	-3	Rule 3 ($ V_{bi} > V_{ci} $)
-4	3	-3.5	-3.5	Rule 3 ($ V_{bi} > V_{ci} $)
-4	4	4	-4	Rule 1
-4	6	5	5	Rule 3 ($ V_{ci} > V_{bi} $)
-4	8	6	6	Rule 3 ($ V_{ci} > V_{bi} $)

If we plot these results, charting the final velocity of *B* against the initial velocity of *C*, we get the following graph:

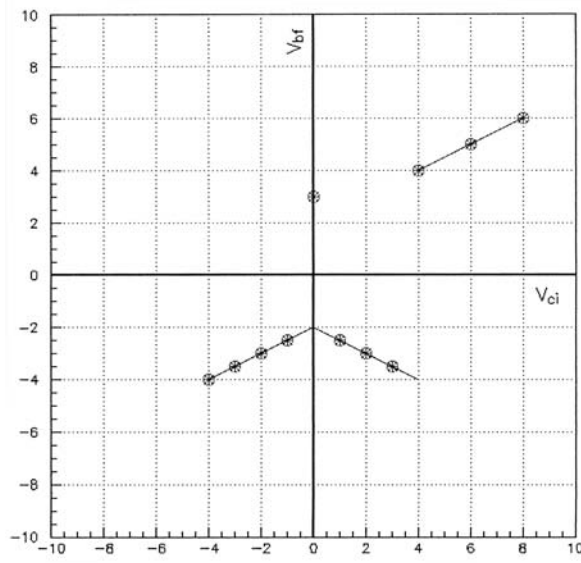


Figure 2. Graph of Descartes's Laws of Motion

us the opposite, we would nevertheless be obliged to place more trust in our reason than our senses.” He then immediately follows this up in §53 with the statement that, “Indeed, experience often seems to contradict the rules I have just explained.” His defense is that the rules apply to ideal conditions. The calculation of momentum becomes much more difficult once we bring in considerations of relative elasticity and the effect of other bodies on the action of the bodies involved in the impact.

As one can see, the graph has three very obvious leaps. As the initial velocity of *C* approaches 0 (in either direction), the trend lines are continuous. But at 0, there is a jump in the results. Similarly, when *C* is moving opposite to *B*, but slower than *B*—when the initial velocity of *C* approaches the initial velocity of *B*, the graph represents a continuous line. But as soon as the velocity of *C* is equal to the velocity of *B*, there is a jump in the results. An infinitesimal change in the data makes a very large difference in the results.

Leibniz's own graph, drawing on the rules for elastic collisions developed by Huygens and Wren,²⁹ is much more elegant. According to these rules, based on the principle of the conservation of force (or, as it is today, kinetic energy), rather than the Cartesian principle of the conservation of motion, the initial velocities of *B* and *C* simply swap values after the collision. So, $V_{bf} = V_{ci}$. Here is the graph:

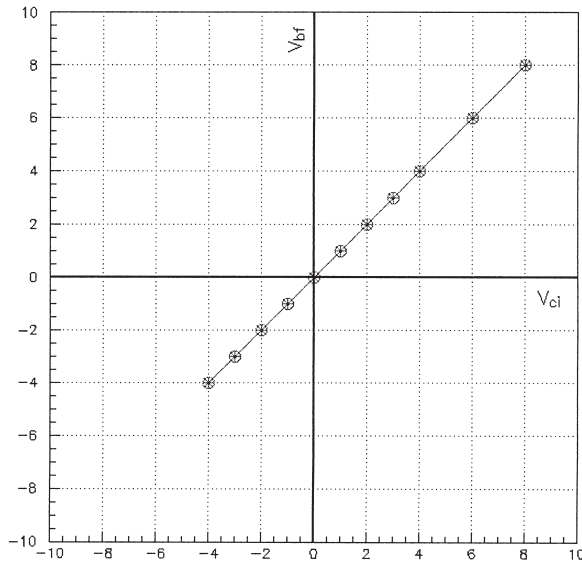


Figure 3. Graph of Leibniz's Laws of Motion

Leibniz's graph represents a continuous change through all the cases. Infinitesimal changes in the data produce infinitesimal changes in the results.³⁰

²⁹Leibniz says nothing of Huygens and Wren in the immediate context of this graph but acknowledges their contribution after the fact in a letter to Varignon of 1702 (Wiener 186). In point of fact, Leibniz's critique of Descartes was actually motivated by Leibniz's study of Huygens and Wren—the critique from the principle of continuity came afterwards. But the fact that the Huygens/Wren graph represents a continuous function, whereas Descartes's cannot, is decisive against Descartes.

³⁰These graphs are simplifications of a graph that Leibniz himself produced. Cf. G IV.382; L 412. Leibniz's notation and graphing methods are somewhat counterintuitive. I have simply tried to update his graphs. These texts are also discussed briefly in Daniel Garber, "Leibniz: Physics and Philosophy," in *The Cambridge Companion to Leibniz*, ed. Nicholas Jolley (New York: Cambridge University Press, 1994), 314–16. As Garber notes, the graph in Loemker contains some mistakes; consult the Gerhardt text for accuracy. I am indebted to Evan Finch in the Yale Physics Department for discussion of elastic collisions and help with these graphs.

I have made use of this example to show the critical use of the principle of continuity. Leibniz's criticisms against the Cartesian laws of motion uncovered a discontinuity, and this discontinuity was enough to cast the Cartesian physics into doubt. The application of the principle of continuity to Leibniz's theory of consciousness will, I think, produce similar results against certain interpretations.

Indeed, the predictive capability of theories that respect the principle of continuity is regarded by Leibniz as a powerful tool, making the principle of continuity not only a negative test but also a positive tool for establishing projects for science. As Leibniz said in a letter to Lady Masham:

As I am all for the principle of uniformity that I believe nature observes in its fundamentals . . . my whole theory comes down to recognizing in substances beyond our sight and observation something parallel to what we see in those which are within our range.³¹

Since limit cases can be regarded as special cases of a genus, we can infer from what is observed within a genus to what is unobserved (or unobservable) at its limits. This will be of particular interest for a theory of consciousness, since the unconscious perceptions are those that are by definition unobserved. Thus, whatever we can conclude about conscious mental states will apply to unconscious mental states as a special limiting case. "This," Leibniz says, "is the advantage of the continuous."³² There is clear textual evidence that Leibniz thought the principle of continuity to apply to changes in perceptions, which is problematic for certain interpretations of Leibniz's theory of consciousness.³³

3. CONTINUITY AND CONSCIOUSNESS

I now want to suggest that the principle of continuity raises a particular puzzle for Leibniz's theory of consciousness. In this section, I will present the puzzle and consider the various solutions. Along the way, it will become clear that the currently standard interpretations of Leibniz's theory of consciousness face real problems because they have not sufficiently accounted for the principle of continuity. I will suggest an alternative that I think fares better, although it is not without its own problems.

³¹Letter to Lady Masham, May 1704, G III.338; NS 204.

³²GM VII.25; L 671.

³³See *M* §§10, 13, and A VI.vi.56–57; *NE* 56–57. There are very interesting avenues of inquiry that one might pursue on the basis of this general discussion of the principle of continuity. In particular, there are questions about the relations of the concepts of continuity, contiguity, density, and possibility, and the consistency of Leibniz's usage of these terms. Connected to this is the problem of Leibniz's denial of continuity (in some sense) to the metaphysical ground level—continuity, Leibniz says, is merely ideal and is indeterminate, whereas reality is fully determinate and discrete (cf. letter to Sophie, 31 Oct 1705, G VII.558–65). I will not pursue these inquiries in this context, since it will take us too far afield and into an acknowledged labyrinth. The resolution of these issues does not bear directly on the present argument. As I said, there is clear evidence that Leibniz applies the principle of continuity to changes in perception. For full discussion of these and related issues, see Anapolitanos, *Representation*, ch. 2; Crockett, "Continuity"; Levey, "Two Concepts of Continuity"; and Richard T. W. Arthur, "Russell's Conundrum: On the Relation of Leibniz's Monads to the Continuum," in *An Intimate Relation: Studies in the History and Philosophy of Science*, ed. James Robert Brown and Jürgen Mittelstrass (Dordrecht: Kluwer Academic Publishers, 1986), 171–201.

3.1. *The Problem of Consciousness*

We may state the problem of consciousness in terms of the constraints that the principle of continuity (in its various forms) places on a theory of consciousness. Firstly, given spatiotemporal continuity, any transition from a non-conscious state to a conscious state must occupy all intermediate states in the transition.

- (1) If there is a transition in a perceptual state p from unconsciousness to consciousness, it must occupy all possible intermediate states in the transition. (I.e., state consciousness must be continuous.)
- (2) If there is a transition among substances from those that are conscious to those that are not conscious, there must be a continuous chain of intermediate substances occupying all possible intermediate grades of consciousness. (I.e., creature consciousness must be continuous.)

Neither of these entails that there *are* intermediate degrees of consciousness, given the modal clause. It may not be *possible* for there to be intermediate states or intermediate grades of consciousness, and thus these constraints do not require consciousness itself to come in degrees. Consider, for example, the parabola. It arises in the transition between the ellipse and the hyperbola at a determinate point, viz. at the point at which the intersecting plane is parallel to the opposite side of the cone. Parabolas themselves do not admit of degrees (i.e., a curve is not more or less a parabola; it either is or is not a parabola). However, between any given ellipse and a parabola, there *are* an infinite number of intermediate figures—in this case, an infinite number of ellipses with increasingly distant foci. Thus, while parabolas do not admit of degrees, the principle of continuity is nonetheless not violated.

Given this example, we may conceive consciousness in the same way. Consciousness itself may or may not admit of degrees, but transitions in consciousness must nonetheless be continuous. The difficulty, of course, is coming up with the analogous “figures” that approach consciousness continuously, as ellipses do a parabola.

Until we have such a proposal, drawing the analogy between the geometric case and transitions in consciousness, we can restate the minimal requirements of the above two conditions in terms of the density requirements specified above:

- (1) For any transition from a conscious mental state p_1 to an unconscious mental state p_2 of a given substance s , there will be a third perceptual state occupying the middle ground between them. (This will be a case of internal density, satisfying the spatiotemporal density requirement.)
- (2) For any two substances s_1 and s_2 , s_1 being wholly unconscious and s_2 not, there is a third substance occupying the middle ground between them. (This will be a case of external density, satisfying the ontological density requirement.)

We can see how this works in the case of the transition from an ellipse to a parabola. Although a parabola does not admit of degrees, we can say that for any two figures in the transition, one being a parabola, the other being an ellipse, there is a third figure that is intermediate between them. And this is true of any two figures in the transition—and thus the transition meets the density requirement.

Thus, if transitions in consciousness (whether intra- or inter-substantial) are to be continuous, they must also meet the density requirement.

But then there is a *prima facie* problem with consciousness—the experience of consciousness is rich, abounding in sudden jumps in intensity and direction. Additionally, it seems that there are sudden changes in creature consciousness, as when one suddenly awakens from a deep and dreamless sleep or when one faints (to use a couple of Leibniz’s favorite examples).³⁴ These wide variations might suggest that consciousness is all-or-nothing, that our account of consciousness must allow for sudden and discontinuous changes in state.

But despite the naturalness of these intuitions, they are problematic when considered against the background of the principle of continuity. To put it briefly, the principle of continuity requires that there be no gaps in the natural order, but consciousness and unconsciousness, understood as all-or-nothing phenomena, introduce just these kinds of gaps. To see why this is so, consider the requirement of density. Take any two perceptual states, one conscious, the other not. There is no third intermediate state, and thus the requirement of density is violated. We need an analysis of consciousness that will fill in the gaps.

So, despite the apparent leaps and gaps in conscious experience, a satisfactory theory of consciousness must resolve these appearances to some continuous reality that underlies them. But it is not obvious what that would be, or how such an account would provide for the richness (and apparent discontinuity) of conscious experience while at the same time analyzing consciousness as the limit of some continuous transition. This is the problem of consciousness.

3.2. *Solution One: Consciousness All the Way Down*

One way to respond to this problem is to allow that consciousness comes in degrees, and that consciousness goes all the way down. That is to say, all substances are conscious to some degree or another, and all perceptions of a substance are conscious to some degree or another. If this is true of Leibniz’s theory of consciousness, then there would be no problem with the principle of continuity, since all intermediate states in a given substance would be conscious states, and all intermediate substances between any two substances would be conscious substances, to the appropriate degree.

Montgomery Furth presents one version of this view in his article, “Monadology.”³⁵ I will not say much about this position here, since I think there is sufficient textual evidence to rule it out. For example:

[I]t is well to make a distinction between perception, which is the inner state of the monad representing external things, and *apperception*, which is consciousness or the reflective knowledge of this inner state itself and *which is not given to all souls or to any soul all the time*.³⁶

In the last clause, Leibniz denies that all substances are conscious and that any given substance is conscious all the time—this view, Furth’s view, would require both.

³⁴See, for example, *M* §20; A VI.vi.113; *NE* 113.

³⁵Montgomery Furth, “Monadology,” *Philosophical Review* 76 (1967): 169–200.

³⁶*Principles of Nature and Grace [PNG]* §13, G VI.598–606; L 636–42; emphasis added.

And this passage is not alone—Leibniz frequently denied these two claims. For example, Leibniz says,

We are never without perceptions, but necessarily we are often without *awareness* [*apperception*], namely when none of our perceptions stand out.³⁷

The moments “when none of our perceptions stand out” are moments akin to a deep, dreamless sleep, or a fainting spell, and Leibniz suggests that these states are analogous to the states of the simple monads and of animal souls after they have died.

For we experience within ourselves a state in which we remember nothing and have no distinct perception; this is similar to when we faint or when we are overwhelmed by a deep, dreamless sleep. In this state the soul does not differ sensibly from a simple monad; but since this state does not last, and since the soul emerges from it, our soul is something more.³⁸

Elsewhere, in a passage making a similar point, Leibniz goes on to clarify what characterizes the state in which “we remember nothing and have no distinct perception”:

It is that a large number of small perceptions which are equal and balanced among themselves, with nothing to give them relief or distinguish them from one another, *are not noticed at all* and cannot be remembered.³⁹

Here, as elsewhere, Leibniz refers to a state in which none of the perceptions are distinguished against the larger perceptual field—this is a state in which the perceptions “are not noticed at all.”

So, despite the appeal of this account of consciousness as a solution to problems with continuity, it cannot be attributed to Leibniz. Leibniz's commitment to wholly unconscious substances and, in a given substance, perceptions that are not conscious at all rules it out. It may be interesting to consider why Leibniz did not consider this option seriously, since it presents a nice example of continuity, and I will have more to say about this later. But as an interpretation of Leibniz, it seems safe to move on to other interpretations.⁴⁰

³⁷A VI.vi.162; NE 162.

³⁸M §20.

³⁹G VI.534; L 557; emphasis mine. Cf. A VI.iv.1584; PNG §4; G III.521; and G VI.515. Contrast this with Malebranche's description of the same phenomenon (Nicolas Malebranche, *Oeuvres Complètes de Malebranche*, ed. André Robinet [Paris: J. Vrin, 1958–1984], vol. I, 390–91).

⁴⁰There is one other commentator that I am aware of that supports this view. Martine de Gaudemar says that, *Chez Leibniz, la conscience ne s'oppose pas à quelque inconscient, puisqu'ils sont corrélatifs comme l'agir et le pâtir: toute activité de l'âme est toujours plus ou moins consciente, et plus ou moins inconsciente* (Martine de Gaudemar, “Leibniz: La Notion de Conscience,” in *L'Expérience et la Conscience* [Arles: Actes Sud, 2004], 208). However, I am still puzzled about how to fit this view with the texts, such as those quoted above, that deny that all mental states are conscious. The connection between consciousness and action and passion is not very clear. It is true that, according to Leibniz, no substance is without activity, but it is not clear that this entails that no substance is without consciousness. As I will discuss below, this does entail that no substance is without some degree of perceptual distinctness, but not all distinct perceptions are conscious perceptions. Given de Gaudemar's claim that consciousness and unconsciousness are correlative notions, the force of the passages above is weakened. There are mental states (and substances) that are *relatively* unconscious, but none that are unconscious (full stop). For reasons that I do not have space to develop fully here, I think this implication fails to preserve part of what Leibniz thought to be important about the principle of continuity, viz. the

3.3. *Solution Two: Higher-Order Theory of Consciousness*

The currently standard view of Leibniz's theory of consciousness is that it is a higher-order thought (HOT) theory of consciousness. Interpretations of this sort have been endorsed by Mark Kulstad, Rocco Gennaro, and Alison Simmons.⁴¹ According to the higher-order theory of consciousness,

the best explanation for what makes a mental state conscious is that it is accompanied by a thought (or awareness) that one is in that state.⁴²

I believe that there is sufficient textual evidence to cast this interpretation into doubt in favor of the view that consciousness reduces to some degree of perceptual distinctness (which I present as option three below). I will not rehearse all the textual evidence here—rather I want to consider the view in light of the demands placed on it by the principle of continuity.⁴³

3.3.1. *HOT and the Threat of Discontinuity*

The main problem with the higher-order interpretation, as it has been presented in the literature, is that it introduces a discontinuity into Leibniz's system. What best accounts for a mental state being a conscious state, as the thesis above states, is the presence of a higher-order perception that one is in that state. As will become clear, according to this view consciousness does not come in degrees—the explanation of consciousness is the (sudden) appearance of a higher-order perception.

Alison Simmons, in defending a higher-order interpretation of Leibniz's theory of consciousness, has addressed the demands of continuity directly. She argues that the principle of continuity is satisfied as long as a discontinuous change is *grounded* in a continuous change. I will argue here that this grounding thesis is not to be found in Leibniz's texts, and, if it were, it would provide an obvious response for the Cartesians to Leibniz's criticisms. If this grounding thesis is false,

preservation of real natural distinctions. I know of no place where Leibniz says that consciousness and unconsciousness are correlative, and that all perceptions are conscious to some degree. In fact, it seems that the textual evidence is against this interpretation. Leibniz's arguments for insensible perceptions are stated categorically. One might expect him to be more exact on this point, particularly given its usefulness in his arguments against Locke and the Cartesians, who claimed that there was nothing in the soul of which it is unaware. Given de Gaudemar's conclusion that all perceptions are conscious to some degree, Leibniz's denial of this latter point would, strictly speaking, be false.

⁴¹Cf. Mark A. Kulstad, *Leibniz on Apperception, Consciousness and Reflection* (Munich: Philosophia, 1990); Rocco J. Gennaro, "Leibniz on Consciousness and Self-Consciousness" ["Consciousness and Self-Consciousness"], in *New Essays on the Rationalists*, ed. Rocco J. Gennaro and Charles Huenemann (New York: Oxford University Press, 1999) 353–72; and Alison Simmons, "Changing the Cartesian Mind: Leibniz on Sensation, Representation and Consciousness" ["Changing the Cartesian Mind"], *Philosophical Review* 101 (2001): 31–75.

⁴²Gennaro, "Consciousness and Self-Consciousness," 353.

⁴³The texts most often appealed to in favor of the higher-order interpretation are those that talk of consciousness as a perception that is apperceived (*PNG* §4; *M* §14; and *A VI.vi.134*; *NE* 134). But there are other passages that appear to commit Leibniz to the view that memory and/or reflection is constitutive of consciousness (*PNG* §4; *A VI.vi.118*; *NE* 118; and *A VI.vi.53*; *NE* 53). I have argued elsewhere that these passages do not provide sufficient evidence to attribute a higher-order theory of consciousness to Leibniz since each of these passages is open to an alternative reading that is consistent with the third option I present below in section 3.4. But, again, I will not rehearse all of these interpretive questions here since my main interest is whether the principle of continuity itself would or should incline Leibniz towards a particular theory of consciousness.

then Simmons' attempt to ground a discontinuous change from non-conscious to conscious perceptions on the continuous change in perceptual distinctness will fail. The higher-order interpretation depends on a discontinuous transition that Leibniz could not accept.

At question here is the relation of apparent discontinuity to the continuous changes that are supposed to underlie it. Specifically, what, according to the higher-order interpretation, legitimates the discontinuous change from non-conscious to conscious perception? Simmons has an answer to this question:

The point of the principle of continuity is not that all change is continuous, but that all change is *grounded in or occurs through* some continuous change.⁴⁴

So, Simmons is proposing that discontinuity is legitimate as long as it is grounded in something continuous. Call this the Grounding Thesis (GT). In appealing to a grounding thesis, Simmons is saying that the principle of continuity does not require continuity at all levels. There are genuine cases of discontinuity (and, according to Simmons, consciousness is one of them), but these are permitted as long as there is a grounding relation to something continuous.

The Grounding Thesis can be formulated in the following way:

(GT) Any change, *C*, either (a) is continuous itself, or (b) is grounded in some continuous change, *C'*.

The first half of the thesis is clear enough, and indeed we find Leibniz saying just this: "all natural change is produced by degrees."⁴⁵ The second half, however, requires some defense—what is the grounding relation that allows a discontinuous change to be regarded as legitimate?

For the higher-order theory of consciousness, the change is strongly discontinuous—one moment there is no relevant higher order perception, the next moment there is.⁴⁶ According to this view, consciousness does not come in degrees—it is either all or nothing. So, in order for this, on Simmons' view, to meet the standards of the principle of continuity, consciousness must bear some grounding relation to a continuous change. As Simmons puts it,

I now want to suggest that the discontinuous change from unconscious to conscious perception is grounded in a continuous change in perceptual distinctness . . . [A]t a certain point perceptions are distinct enough that they attract a second-order perception and thereby become conscious perceptions.⁴⁷

I should pause for a moment to say something about perceptual distinctness, since it is important to both Simmons' account and my own. For the purposes of this paper, I shall consider a perception distinct insofar as it stands out in relief from other perceptions—it is, as Simmons says, "*distinctive*."⁴⁸ Leibniz several times explicitly equates the distinctness of a perception with its standing out, as in *M*§24, where he says that if "in our perceptions, we had nothing distinct or, so to speak,

⁴⁴Simmons, "Changing the Cartesian Mind," 45.

⁴⁵[*T*]out changement naturel se faisant par degrés (*M*§13).

⁴⁶As Simmons says, "a perception cannot be more or less conscious: it is either attended by a second-order perception or it is not" (Simmons, "Changing the Cartesian Mind," 57).

⁴⁷Ibid.

⁴⁸Ibid.

in relief and stronger in flavor, we would always be in a stupor.”⁴⁹ And now, on Simmons’ view, what is the grounding relation that consciousness bears to perceptual distinctness? It is the relation of *attraction*, or, as Simmons says later, the lower order perceptions stand out enough to *capture* a second order perception.

It is critical that more be said about this grounding relation in order to avoid some obvious objections. For example, (GT) as it stands can be used by the Cartesians to respond to Leibniz’s criticisms of Descartes’s laws of motion. The Cartesians could reply by saying that the Cartesian laws of motion are not problematic, since, although there is a genuine discontinuity as Leibniz points out, it is a discontinuity that is *grounded in* a continuous change. Consider the case where bodies *B* and *C* are of equal mass but unequal velocity, *C* having greater velocity than *B*. Then gradually and continuously change the velocity of *C* until it is equal to that of *B*. At the point of equality, *C* changes suddenly from having a progressive motion to a regressive motion, and this is the discontinuity that Leibniz finds disturbing. But, the Cartesians could say, Leibniz need not be disturbed by this, since he allows for (GT). The continuous change in velocity is what grounds the discontinuous change, since it approaches continuously until it results in a regressive motion.

But now apply the same principle to the higher-order interpretation of Leibniz’s theory of consciousness. According to this interpretation, an infinitesimal change could result in a very large difference, viz. the transition from a non-conscious to a conscious perception. Since consciousness does not admit of degrees, according to this interpretation, and since it is supposed to be grounded in continuous changes in perceptual distinctness, there will be some point in the distinctness continuum at which a higher-order thought is attracted. Make an infinitesimally small change in distinctness and the higher-order thought is no longer attracted. The effect does not correspond with the cause and, were we to graph the results of this transition, the graph would include gaps similar to the graph of the Cartesian laws of motion.

Thus, if Leibniz is committed to a higher-order theory of consciousness, as it has been defended in the literature, the Cartesians have a ready response. In order to account for the discontinuity, Leibniz would have to appeal to (GT). However, if Leibniz can appeal to (GT), then so can the Cartesians. Leibniz must either give up his criticism of the Cartesians or give up (GT). He is not going to give up his criticisms of the Cartesian laws of motion, so, it seems, (GT) has to go. Additionally, the Grounding Thesis seems to go against one aspect of the density requirement introduced in section 1. The way Leibniz formulated the continuity of cases made clear that the density of the original series and the density of the results would be equal. The Grounding Thesis denies this. The textual evidence seems very clear that, for Leibniz, all change is continuous change and there *are* no actual discontinuities in the natural world.

⁴⁹Cf. A VI.vi.112; NE 112. There are some difficulties raised with this notion of distinctness, in particular how it is related to the notion of distinctness presented in the “Meditations on Knowledge, Truth, and Ideas” (A VI.iv.586–87; L 292). I will not take up this issue here. For helpful discussion of this, see Robert B. Brandom, “Leibniz and Degrees of Perception,” *Journal of the History of Philosophy* 19 (1981): 447–79; and Margaret Dauler Wilson, “Confused vs. Distinct Perception in Leibniz: Consciousness, Representation and God’s Mind,” in *Ideas and Mechanism* (Princeton: Princeton University Press, 1999), 336–52.

Continuity among the transitions of perceptions is supported by Leibniz's statements about the continuity of natural changes. In *M* §§10 and 13, Leibniz says that all the natural internal changes of a substance must be continuous changes, which, he says, is to say that they proceed by degrees—"something changes and something remains." Similarly, in the *New Essays* preface, Leibniz says that the law of continuity implies that

any change from small to large, or *vice versa*, passes through something which is, in respect of degrees as well as of parts, in between . . . [This] supports the judgment that noticeable perceptions arise by degrees from ones which are too minute to be noticed. To think otherwise is to be ignorant of the immeasurable fineness of things, which always and everywhere involves an actual infinity.⁵⁰

Leibniz is here endorsing the science of *pneumatology*, or a science of the mind, that will proceed in a way similar to the physics of motion. In the context of this passage, Leibniz explicitly raises the example of the Cartesian laws of motion as an example of the application of the law of continuity, and he proposes an analogy with the science of the mind. Just as "no motion ever springs immediately from a state of rest," so also no noticeable perception ever springs immediately from obscurity.

These are problematic texts for the higher-order interpretation, since they propose a more direct application of the law of continuity to transitions in perceptions. If consciousness is thought to be explained by a higher-order perception, one needs to say more about how these higher-order perceptions arise by degrees. It seems that consciousness, and higher-order perception, is an all-or-nothing matter; either a lower order perception has an accompanying higher-order perception or it does not. There does not appear to be any mediation of degrees or parts.

3.3.2. *Fixing Up HOT*

However, there are ways in which one might fix-up the higher-order interpretation so that it does not violate the principle of continuity. The main thrust of my objection in the section above is this: to the extent that the higher-order theory depends on the sudden existence of a higher-order perception, the theory would entail a discontinuity.

We can appeal to a continuity of existence as a particular application of the spatiotemporal density requirement, as introduced in section 1: if changes in existence do not admit of degrees, then coming into existence and going out of existence are not natural changes. Thus, if the sudden existence of a higher-order perception does not admit of degrees, then it also is not a natural change.

Leibniz often talks about existence in this way. In particular, Leibniz says that it follows that naturally, and speaking in metaphysical strictness, there is neither generation nor death, but only development and envelopment of the same animal. Otherwise there would be too much of a jump, and through inexplicable changes of essence nature would lose too much of its character of uniformity.⁵¹

⁵⁰A VI.vi.56; NE 56: *Elle porte qu'on passe toujours du petit au grand et à rebours par le mediocre, dans les degres comme dans les parties. . . Et tout cela fait bien juger que les perceptions remarquables viennent par degres de celles qui sont trop petites pour estre remarquées. En juger autrement, c'est peu connoitre l'immense subtilité des choses, qui enveloppe toujours et partout un infini actuel.*

⁵¹Letter to Sophie Charlotte, 8 May 1704, G III.345; NS 222.

Given the simplicity of an individual substance, no substance can come into or go out of existence naturally—all substances are naturally eternal (although, importantly, not all retain their identity eternally).⁵² We might wonder whether this is something that holds generally about existence for Leibniz—that existence simply does not come in degrees. If so, any theory that depends on a change in existence (as in the existence of a higher-order thought) will be unnatural.

However, there is reason to believe that this is *not* a general feature of existence for Leibniz. Bodies, armies, and rainbows can come into existence naturally. Generally, any object that is constitutively an aggregate will be able to come into existence by degrees.⁵³ Similarly, on the phenomenal level, it seems that perceptions can come into existence naturally, as well. Leibniz offers the example of the cog-wheel, which, when at rest, is perceived as a wheel with spaces between the spokes. But, when turning, the perception is of a single, continuous, transparent circle. It seems plausible to say that this is a *new* perception that we did not have prior to the turning of the wheel. And this perception goes away once the wheel stops turning. Similarly, the perception of green, Leibniz says, is a confused perception of blue and yellow. But simply perceiving blue and yellow separately will not yield a perception of green—the green perception arises naturally when the blue and yellow perceptions are run together.⁵⁴

Thus, to say that a higher-order perception arises and is attracted by a lower-order perception poses no *prima facie* problem. However, the higher-order theorist owes us an explanation for how this perception might arise by degrees. Is it a perceptual confusion, as in the case of the spinning wheel or the color green? If so, what are its constitutive elements?

As I have understood the defense of this view, the nature of the higher-order thought is not considered to be confused in the same sense as the perception of green is confused. In fact, it seems that it is often described as simple in nature, taking as its object a single lower-order perception (which itself may be complex and confused). As such, it seems that the better analogy is with substances, which are simple and cannot come into existence naturally—any change in existence would be a sudden change. That, at least, is the sense I get from the description of consciousness as an all-or-nothing phenomenon. The higher-order thought does not arise by degrees, and so its arrival on the scene is a sudden, and thus a non-natural, occurrence.

There are ways to resolve this discontinuity problem and still preserve some essential characteristics of the higher-order interpretation. One possibility is that the higher-order perceptions are always present in conscious substances, taking dif-

⁵²Cf. *M* §2.1; and A VI.vi.236–37; *NE* 236–37.

⁵³This also seems to allow for it to be vague whether something of a particular kind (e.g., a body of a certain sort) exists, since there may not be a natural boundary dividing it from bordering kinds. Leibniz says this of baldness in A VI.vi.302; *NE* 302, and it seems he may equally say it of other things that depend on the aggregation of simpler things, like bodies and armies.

⁵⁴These examples are given at A VI.vi.403; *NE* 403. Robert Adams has pointed out to me that there are problems that are not fully addressed in this brief account. In particular, we need to know more about what constitutes the transtemporal identity of perceptions, and it seems that this should be strongly related to the transtemporal identity of what they represent. But I think we can make do with this rough account for present purposes. Since it seems entirely plausible to say that composite objects can come into existence naturally, one's perceptions of those objects can come into existence naturally as well.

ferent lower-order perceptions as their object. In this case, there is no need for the higher-order perceptions to suddenly arise from nothing—there is merely a shift in the object of the higher-order perceptions, which could occur continuously.

While this may seem an attractive possibility for the higher-order interpretation, it does not resolve the problems of continuity. Or, to be more precise, it resolves the problems of continuity of state consciousness, but it retains a discontinuity in creature consciousness. The difference between conscious and non-conscious monads will be due to the presence of higher-order perceptions in the former and their absence in the latter, which will introduce a gap in the series.

One might then adjust the account. Suppose the higher-order thought(s) were ubiquitous in the above way, and were present in all substances, including wholly non-conscious substances. The details of this view could vary, but one main possibility comes to mind: one could maintain that consciousness is the limit of some continuous change in the relevant higher-order thoughts that are already present. For example, one might suppose that certain higher-order thoughts *themselves* become more or less distinct, and that consciousness arises only when the higher-order perception itself becomes sufficiently distinct. This would resolve the discontinuity of the existence predication while preserving the basic thought that a conscious mental state is partially constituted by a higher-order perception of a lower-order mental state.

While this would avoid the problem of discontinuity, the interpretation would also lose any advantage it had over other interpretations. If consciousness is explained by appealing to variations in perceptual distinctness at the higher-order, why not explain consciousness by variations in perceptual distinctness at the first-order level instead? This modification of the higher-order interpretation would simply repeat the problems of the first-order, resulting in a loss of simplicity.⁵⁵

3.4. *Solution Three: A First-Order Theory of Consciousness*

As I have already mentioned, a third alternative interpretation is that the lower-order perceptions *themselves* account for consciousness. Considerations of continuity have led us to consider whether Leibniz had (or could have had) a first-order theory of consciousness. On such a view, consciousness would come in degrees and would reduce to some degree of perceptual distinctness. This fits very nicely with Leibniz's claim that "noticeable perceptions arise by degrees from ones which are too minute to be noticed,"⁵⁶ allowing for continuity between conscious and unconscious mental states.

I believe that Leibniz had something like the following in mind: we have several different kinds of mental activity—unconscious perception, conscious perception, and intellection—but the difference between these is simply a matter of degree

⁵⁵There is an additional modification to the higher-order interpretation that might be considered, although in the end it collapses into the first alternative proposed in section 3.2: The necessary higher-order perception(s) are continuously present, and, as such, all perceptions are conscious to some degree or other (and all substances are conscious substances). Once again we would need some way to allow for degrees of consciousness, and the primary candidate would be perceptual distinctness. This would result in a higher-order version of Furth's original suggestion.

⁵⁶A VI.vi.56; NE 57.

(as, again, we should expect given the principle of continuity). I will focus on the first two here, unconscious perception and conscious perception; reflection and intellection will be set aside for the purposes of this paper.

Consider the following illustration from the *New Essays* preface:

This is how we become so accustomed to the motion of a mill or a waterfall, after living beside it for a while, that we pay no heed to it. Not that this motion ceases to strike on our sense-organs, or that something corresponding to it does not still occur in the soul because of the harmony between the soul and the body; but these impressions in the soul and body, lacking the appeal of novelty, *are not forceful enough* to attract our attention and our memory.⁵⁷

Leibniz is here suggesting that there is some sufficient level of force that would be enough to attract attention and memory. In the example, it is the loss of force that explains why the perceptions are no longer conscious perceptions. Similarly, Leibniz elsewhere says that “there are always disturbances in the stomach, but they do not cause hunger unless they *become strong enough*.”⁵⁸

Now, for a perception to be strong or forceful is just to say that it tends to a greater level of activity, and activity is explained in terms of the distinctness of the perceptions.⁵⁹ So, to say that a perception is forceful or to say that it is strong is just to say that it is sufficiently distinct, relative to other perceptions. I would argue that the increase in activity reduces to an increase in perceptual distinctness, and when a perception becomes distinct enough it will be conscious.

There is no reason to suppose some extra component is needed for consciousness. In these passages, it is the variation in distinctness alone that resulted in a difference in awareness—there is no need to appeal to some extra perceptual component as with the higher-order theory. Of course, one might object, the mill example might be taken to suggest this additional perceptual component, since it says that the impressions are not forceful enough to “attract our attention and memory.” However, there is no reason to prefer the higher-order theory on this basis alone. Attention and memory could *result from* a conscious awareness of some event rather than being *constitutive of* the conscious mental state. Indeed, I believe that is the best reading of these passages.

But the fact that consciousness just is some sufficient level of distinctness is confirmed by other passages. In the *Monadology*, Leibniz argues that consciousness arises with sensation. In *M*§23, Leibniz says that “on being awakened from a stupor, we *apperceive* our perceptions,”⁶⁰ apperception being identified with consciousness in §14. “From this,” Leibniz continues, “we see that if, in our perceptions, we had

⁵⁷*NE* 53–54; emphasis mine.

⁵⁸*NE* 118; emphasis mine.

⁵⁹The defense of the claims of this sentence would take us into much deeper waters than I have space for here. Allow me simply to allude to Leibniz’s account of an active power, which he summarizes in the following passage:

[I]f we take ‘action’ to be an endeavor towards perfection, and ‘passion’ to be the opposite, then genuine substances are active only when their perceptions . . . are becoming better developed and more distinct, just as they are passive only when their perceptions are becoming more confused. (A VI.vi.210; *NE* 210)

⁶⁰. . . *éveillé de l’étourdissement, on s’apperçoit de ses perceptions* (G VI.610).

nothing distinct or, so to speak, in relief and stronger in flavor, we would always be in a stupor. And this is the state of the bare monads."⁶¹ This inference brings together several of the threads we have been considering. The concept of distinctness in play is made clear: it is that which stands out or is, in a sense, the stronger perception. Without this, a substance would always be in a stupor, just as the bare monads are, since none of its perceptions would be conscious perceptions. But Leibniz immediately goes on to identify what brings it about that certain perceptions are more distinct in this sense:

We also see that nature has given heightened perceptions to animals, from the care she has taken to furnish them organs that collect several rays of light or several waves of air, in order to make them more effectual by their union . . . I will soon explain how what occurs in the soul represents what occurs in the organs.⁶²

This collection and union of features of the world, making certain perceptions more effectual (and hence more active), is a function of the sense organs of animals. And it is this unifying function of the sense organs that produces the stronger perceptions that Leibniz has just described as the perceptions that are apperceived. The clear implication of this text is that consciousness arises in animals along with the function of the sense organs. Without the sense organs, animals would be in a perpetual state of stupor. But, given the sense organs, certain perceptions are heightened and more effectual, and these are the conscious perceptions.

The implication of this is that the unifying function of the sense organs will be important to an account of consciousness—the activity of the body in sensation corresponds to a level of activity in the mind. That is not to say that only sense perceptions are conscious perceptions (since there are also conscious imaginings, reflections, and volitions), but consciousness arises in substances along with sense perceptions. What is clear is that consciousness arises when the body acts on the impressions it receives from the surrounding objects. A mental activity corresponds to this bodily activity, which is to say, in the mind there is an increase in the distinctness of perceptions and this alone is sufficient for consciousness.⁶³

⁶¹*L'on voit par là, que si nous n'avions rien de distingué et pour ainsi dire de relevé, et d'un plus haut goût dans nos perceptions, nous serions toujours dans l'étourdissement. Et c'est l'état des Monades toutes nues* (G VI.611; M §24). (N.B., in this passage Leibniz uses the term *distingué* instead of *distinct*. There are similar uses of *revelée*. However, there are passages that parallel these that use the term *distinct*, and PNG §13 brings *revelée* and *distinct* together, identifying heightened perceptions with distinct perceptions [cf. G VII.330]. The secondary literature treats these as equivalent as well [cf. Brandom, "Leibniz and Degrees of Perception," 452].)

⁶²*Aussi voyons nous que la Nature a donné des perceptions relevées aux animaux par les soins, qu'elle a pris de leur fournir des organes, qui ramassent plusieurs rayons de lumière ou plusieurs undulations de l'air pour les faire avoir plus d'efficace par leur union. . . . Et j'expliqueray tantost, comment ce qui passe dans l'Ame représente ce qui se fait dans les organes* (M §25; G VI.611). This last clause is a reference to M §§61–63.

⁶³One objection that has been raised at this point is that the first-order theory does not allow for the "perceiving or apperceiving ego," the implication being that the higher-order theory does. However, it is not clear to me how a higher-order perception would better capture the apperceiving ego, since, presumably, some ego must *have* the higher-order perception—this perception certainly would not *constitute* the apperceiving ego. Just as there is a perceiving subject for any first-order perception (the subject *has* a perception of *x*), so also there is an apperceiving subject for any conscious perception (the subject *has* a sufficiently distinct perception of *x*). There may be additional considerations for *self*-consciousness, but that is another topic.

Given the standard formula for sensation, Leibniz will then be committed to a certain threshold of distinctness to account for both consciousness and sensation.⁶⁴ The unifying function of the sense organs provides a contrast to certain perceptions, increasing their relative strength against the background of the perceptual field. These strong perceptions simply are conscious sensations.

This, admittedly, is a somewhat sketchy account of a first-order theory of consciousness. However, I do believe Leibniz had the resources for just such a theory of consciousness, and—one upshot of this paper—considerations of continuity have led naturally to such a view.

However, one might argue, if consciousness comes in degrees, there is nothing preventing it from extending to all perceptions, to some degree or other. This objection is raised briefly in Simmons' article. Commenting on the *New Essays* passage mentioned above, where Leibniz says that conscious perceptions must arise "by degrees from [perceptions] that are too minute to be noticed," Simmons says this:

A word of caution is in order here. Leibniz is not arguing that consciousness comes in degrees, that is, that more conscious perceptions come from less conscious ones. If that were the case, then all perceptions would turn out to be conscious to some degree, which is precisely what Leibniz is denying.⁶⁵

There is a valid objection here, which must be taken seriously. If (1) the transition from non-conscious to conscious states is continuous, as I have been arguing it is, and (2) if this transition is to be analyzed in terms of perceptual distinctness, and (3) if all mental states have some degree of perceptual distinctness, then it follows that (4) all perceptions are conscious perceptions. This would clearly be an un-Leibnizian result as we concluded above, since in the context of the texts we are discussing, Leibniz's main point is that there are an infinite number of perceptions in the mind that go unnoticed. For him to then introduce the continuity thesis, understood in the way I have been suggesting, would be fatal to his argument, and his theory of consciousness would not be as distinct from Descartes's and Locke's as he had thought. With this motivation, one can understand the desire to introduce some sort of grounding relation to allow Leibniz to maintain both his theses about continuity and unconscious perceptions.

However, I deny premise (2), that the transition from unconsciousness to consciousness is to be analyzed in terms of perceptual distinctness (full stop). In what follows I will argue that the transition from non-conscious to conscious perceptions is not to be analyzed in terms of perceptual distinctness *simpliciter*, in a way that would make all perceptions conscious to some degree. Rather, I think there is a threshold at which point there is a transition in kind, just as there is a transition in kind in the transformation of an ellipse to a parabola, and this transition occurs by degrees.

Thus, this view preserves what is desirable from both of the prior solutions. Like Furth's solution and unlike the higher-order interpretation, consciousness

⁶⁴Cf. *PNG* §4: "[W]hen a monad has organs that are adjusted in such a way that, through them, there is contrast and distinction in the perceptions that represent them . . . then this may amount to *sensation*."

⁶⁵Simmons, "Changing the Cartesian Mind," 45.

does come in degrees and any change in consciousness would be a continuous change in consciousness. But, unlike Furth's solution and like the higher-order interpretation, there are perceptions that are not conscious at all, and there are wholly unconscious substances.

3.4.1. *Transformations and Continuous Transitions*

I will now present some reasons to believe that Leibniz could endorse both (a) the continuity of consciousness and (b) the existence of wholly unconscious perceptions. By continuity of consciousness I mean that the transition from non-conscious perception to conscious perception is one that is continuous and proceeds by degrees. As a result, consciousness itself will be a matter of degree. However, what I will argue here is that this does not itself entail that consciousness extends to all perceptions.

The main proposal I wish to make is this: the principle of continuity does not prevent transitions in kind; rather it merely requires that any transitions in kind be continuous transitions. If my understanding of the principle of continuity is correct, then when applied to Leibniz's theory of consciousness, it entails only that the transition between non-conscious and conscious perceptions be a continuous one. This is precisely what the higher-order interpretation does not hold, and so for that reason we must reject it.

Consider again Leibniz's objections to the Cartesian laws of impact. Leibniz there argues that a transition in kind, from rest to motion, is to be analyzed in a continuous way—the motion arises by degrees. The principle grounding this claim says that a slight change in the cause should result in a like change in the effect. Applying this principle to the mental, we must conclude that slight changes in perceptual distinctness will result in slight changes in consciousness. A surprising result, to say the least, since it entails that, for Leibniz, consciousness comes in degrees.

Although this is a non-standard interpretation of Leibniz's theory of consciousness, it does not immediately entail that all perceptions are conscious perceptions any more than the requirement that the transition from rest to motion be continuous entails that all bodies are in motion (or, perhaps better, that the transition from ellipse to parabola be continuous entails that all curves are ellipses). All that is required by the principle of continuity is that the transition be continuous. Thus, what the principle of continuity requires of a theory of consciousness is a principled way of analyzing the transition from unconsciousness to consciousness. *Wherever* the transition occurs, it must be a continuous transition.

That said, there still seems to be a pressing question for my interpretation of Leibniz's theory of consciousness. If consciousness comes in degrees, and if Leibniz believes the natural order to be a continuous one, why did he not opt for a uniform and smooth transition all the way down? Certainly all perceptions have some power; why is it not also the case that they all have some consciousness?

In response to these questions, we can gain some insight from what Leibniz says in other apparently discontinuous cases. We have already mentioned a couple of examples. In his discussions of continuity in other domains, Leibniz refers to a shift in kind as the terminus of a continuous transformation. For example, the

transformation from an ellipse to a parabola, being a continuous transformation, allows Leibniz to call the parabola the terminus of the transformation, which makes it possible for him to treat parabolas simply as special cases of ellipses. A parabola is an ellipse with infinitely distant foci. Similarly, Leibniz says that rest is an infinitesimal motion, equality an infinitesimal inequality, and so on.

These claims help us see what is at stake if we were to deny the principle of continuity. Why would it be helpful, for example, to consider a parabola a special kind of ellipse? Well, in that case all the properties that are preserved in the transformation of the ellipse would then apply to the parabola, and, as is sometimes the case, it may be easier to prove a theorem about an ellipse than it is to prove the corollary of the parabola. If we can prove also that the two are continuous and merely special cases of the other, then the theorems that apply to the one will apply to the other, conceived in the appropriate way. Intelligibility, proof, and simplicity of properties and laws result from the principle of continuity. Remember what Leibniz said about rest and velocity:

[R]est can be considered as an infinitely small velocity. . . . Therefore, whatever is true of velocity or slowness in general should be verifiable also of rest taken in this sense, so that the rule for resting bodies must be considered as a special case of the rule for motion. If this does not work, on the other hand, this will be a certain sign that the laws are wrongly formulated.⁶⁶

We can state very clearly the methodological and architectonic principle that Leibniz is here proposing:

(M1) For any change in kind, from K_1 to K_2 , that results from a continuous transformation, any laws that apply to K_1 must also be true of K_2 , *qua* a special case of K_1 .

(M1) asserts that for any changes in kind that result from continuous transformation (and, according to Leibniz, *all* natural changes in kind result from continuous transformations), instances of the terminus kind must be regarded as special cases of the original kind. (So, in the case of rest and motion, rest must be regarded as a special case of motion, and the laws that apply to motion will also apply to rest, conceived in this way.)

The immediate payoff of this methodological principle is that the multiplicity of kinds of things, states, or relations does not result in a similar multiplicity of laws regulating those things, states, and relations. There is a nomological simplicity to the natural order. Indeed, this very pairing of plenitude (not only of things, but also of kinds of things and their states and relations) and nomological simplicity is what characterizes the best of all possible worlds for Leibniz. Violations of the law of continuity in the natural order are also violations of the principle of the best.

Thus, the principle of continuity has three important results for Leibniz's theory of consciousness:

(1) The principle of continuity does not by itself provide reasons to think that all perceptual states are conscious states. Indeed, if we bring in considerations of plenitude, we may think that there is a benefit to variety in the mental domain, just as there is in the domain of body.

⁶⁶PG 352.

(2) If we consider the transition among mental states on analogy with the transition among geometric figures (e.g., from ellipse to parabola), then we can consider non-conscious states as a special case of conscious states. So, perhaps we can *conceive* of all perceptions as having some degree of consciousness, but not in a strict sense. Strictly speaking, these perceptions are unconscious, just as a parabola is not truly an ellipse. But, at the same time we can observe a conceptual connection between unconscious and conscious perceptions and remain faithful to the law of continuity.

This, of course, raises the question of which is the true analysis—our common way of understanding the state or the conceptually continuous characterization? For example, it may be that, strictly speaking, rest is an infinitely small degree of velocity, although we can commonly refer to it as rest. Or it may be the other way around, rest not truly being a special case of motion. The following text persuades me that our conceptions based on the principle of continuity are mere abstractions, and not strictly true:

Although it is not rigorously true that rest is a kind of motion or that equality is a kind of inequality, any more than it is true that a circle is a kind of regular polygon, it can be said, nevertheless, that rest, equality, and the circle terminate the motions, the inequalities, and the regular polygons which arrive at them by a continuous change and vanish in them. And although these terminations are excluded, that is, are not included in any rigorous sense in the variables which they limit, they nevertheless have the same properties as if they were included in the series, in accordance with the language of infinites and infinitesimals, which takes the circle, for example, as a regular polygon with an infinite number of sides. Otherwise the law of continuity would be violated, namely, that since we can move from polygons to a circle by a continuous change and without making a leap, it is also necessary not to make a leap in passing from the properties of polygons to those of a circle.⁶⁷

Finally, (3) in terms of developing a science of the mind, it is only conscious perceptions that are accessible to us. However, given the methodological principle specified above, the psychological laws that we discover to apply to the conscious mental states must also apply to non-conscious mental states. So, although there are an infinite number of mental states that are, by definition, inaccessible, Leibniz opens the door to a psychological science, and he remains optimistic that such a scientific project could be carried out.

Indeed, I think this suggests a crucial difference between Leibniz and those who think consciousness goes all the way down. Leibniz's examples are intended to show that we have some perceptions of which we are not aware. For example, if we grant the case of the sound of the waves, then there are *petites perceptions* that we cannot in principle observe—they are indistinguishable from the single large sensation one has of the sound of the ocean. Leibniz says that conscious perceptions are to unconscious perceptions as observables are to unobservables in physics.⁶⁸ To say that the unconscious perceptions *are* conscious (even to a small degree) is to strain the use of the term. They are unobservable. And yet, given the principle of continuity, a science of the mind remains possible.

⁶⁷GM IV.106; L 546. Cf. Child 148–49.

⁶⁸A VI.vi.56; NE 56.

Based on the above considerations, a change in kind among mental states is not *inconsistent* with Leibniz's philosophical system. That is to say, in answer to the question, "Why are not all perceptions conscious perceptions?", we may reply that the principle of continuity does not have this kind of theoretical force in Leibniz's system—it does not require him to raise the question.⁶⁹ In fact when considered along with the kind of plenitude that is characteristic of the best world, one would *expect* a plurality of kinds of mental states in the natural order, as long as the transformation from one kind to another can be regarded as continuous.

In the *New Essays*, Leibniz argues for the existence of unconscious perceptions *from* the principle of continuity. He says,

All of which [i.e., his explanation of the principle of continuity] supports the judgment that noticeable perceptions arise by degrees from ones which are too minute to be noticed. To think otherwise is to be ignorant of the immeasurable fineness of things, which always and everywhere involves an actual infinity.⁷⁰

The intent of this passage is to press the reader to grant the existence of *unnoticeable* perceptions. The presence of conscious perceptions is taken for granted, and yet, Leibniz argues, conscious perceptions do not spring up from nowhere. There must be a number of unnoticeable perceptions from which the noticeable ones arise.

This continuity is not to be understood in terms of a *grounding* relation—rather, there is some way in which both conscious and non-conscious perceptions are continuous with each other. And for Leibniz, this continuity reduces to a continuity of perceptual distinctness. All perceptions have some level of distinctness, but, when some perceptions are sufficiently distinct, they have their effect. This effect in the mental world is a noticing—the perceptions, at some level of distinctness (relative to the relevant contextual matters), become conscious. If this is right, then consciousness is not reducible to perceptual distinctness *simpliciter*, but to some sufficient level of perceptual distinctness. In this way, there is a true transformation in kind, although the transformation is a continuous one and proceeds by degrees.⁷¹

⁶⁹In fact, I do think Leibniz has something to say about this, in terms of the teleological benefit to the substance; cf. A VI.vi.165; *NE* 165.

⁷⁰A VI.vi.56–57; *NE* 56–57.

⁷¹I would like to acknowledge several people for their help in improving this paper. In particular, I would like to thank Michael Della Rocca, Robert Adams, Alison Simmons, Troy Cross, George Bealer, and participants in the Yale "Work In Progress" seminar. Thanks also to Mark Kulstad and the participants of the Houston Circle for a very helpful discussion of these ideas, and to the anonymous referees of this journal who provided a number of constructive suggestions.