LEIBNIZ AND REDUCTIONISM OF SPATIAL RELATIONS

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Abstract

This paper discusses Leibniz's theory of space in the context of his metaphysical view that extrinsic properties are ultimately grounded on the intrinsic properties of substances. In particular, it shows that Leibniz's theory of the ideality of spatial relations sits unconfortably with his principle of identity, according to which there is no quantitative difference which is not also a qualitative one. The paper concludes that Leibniz's theory seems to lack the resources to save the following dilemma: either space has no parts, in which case his theory cannot explain how we acquire the representation of space; or, space has parts, which means that there may be differences that are merely quantitative.

Key words: *metaphysical reductionism; relationism; Leibniz's theory of space; extrinsic; intrinsic.*

Leibniz y el reduccionismo de las relaciones espaciales

Resumen

Este trabajo discute la teoría del espacio de Leibniz en el contexto de su concepción metafísica según la cual las propiedades extrínsecas de una substancia se fundamentan, en últimas, en sus propiedades intrínsecas. En particular, el artículo sostiene que la teoría leibnizeana de las relaciones espaciales se compagina difícilmente con su principio de identidad, según el cual no hay diferencia cuantitativa que no sea a las vez una diferencia cualitativa. La propuesta es que la teoría de Leibniz cae presa del siguiente dilema: o bien el espacio no tiene partes, en cuyo caso la teoría no puede explicar cómo nos hacemos de la representación de espacio; o bien el espacio tiene partes, lo cual significa que puede haber diferencias que son meramente cuantitativas.

Palabras clave: *reduccionismo metafísico; relacionismo; teoría leibnizeana del espacio; extrínseco; intrínseco.*

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Three theses have been traditionally ascribed to Leibniz´s metaphysics: the *presupposition* thesis, according to which things cannot sustain relations among themselves –or, they cannot have extrinsic properties–, unless they possess internal, or non relational, properties; the *individuation* thesis, namely, that individuation is based exclusively on the intrinsic properties of substances; and the *nominalism* thesis, according to which our notion of relation is an abstraction from the specific relational properties of substances.[1] Rather than questioning the historical accuracy of these theses, the overall ambition of this paper is to show that there is a tension among them; this is especially evident when considered in the context of Leibniz´s views of space. More specifically, the goal of this paper is to evaluate the thesis that spatial relations are reducible to the intrinsic properties of things, using mainly two Leibnizean sources, *Primary Truths* (1686?) and the *Correspondence with Clarke* (as is well know, posthumously published in 1717).

The first thesis subordinates the category of quantity to that of quality, in so far as it says that the having of relations can ocurr among things only if they have intrinsic properties. A clear source of this thesis is the short, but substantial, *Primary Truths*, although support for it can also be found in the *New Essays*. As we will see, the presupposition thesis may be seen as a form of metaphysical reductionism, where relations turn out to be non relational,

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[1] Only for introductory purposes, I borrow here Ishiguro´s terminology. See Ishiguro 1972.

or intrinsic, properties. The second thesis denies extrinsic properties any role in individuating things. The idea is, in continuity with the first thesis, that no matter how thinly spin is the web of relations of a thing, none of those relations, taken individually or as a whole, could give the identity of a thing –there will always be properties which are unrelated, and those properties are the ones which constitute its identity. On his own acount in *Primary Truths*, Leibniz generalizes Thomas Aquinas´s view about separate intelligences, namely, that they can never differ only in number (*Sum. theo*., i, q. 50, a.4). Hence, real difference –the difference that matters in terms of identity—is qualitative difference, which is equivalent to the better known formulation: no quantitative difference without qualitative difference. The individuation thesis may thus be seen as perfectly congruent with the strategy of subordinating the category of quality over that of quantity.[2]

Leibniz´s nominalism concerning relations, which finds clear expression in the *Correspondence with Clarke,* relies strongly on an argument from abstraction: just as the concept of color is an abstraction from colored things that we see, the concept of relation is an abstraction from the mutual connection of things we see. So relations, just like colors, are products of human abstraction and, in that sense, ideal entities, not constituents of the world in their own right. Spatial relations are no exception to this general view: they, too, are ideal, and reducible to the intrinsic properties of things. We come by the concept of space by abstracting from specific locations of coexisting things, but space itself as an homogeneous, mathematically analyzable entity is not part of the world, and is ideal in that sense.

Differences of location, however, seem to present a challenge to the presupposition thesis, and to the individuation thesis as well. The reason is that space relations themselves seem to have a sort of autonomy: their conditions of identity can be fixed without reference to the intrinsic properties of what is fixed, and, if so, quantitative differences in their case seem to be quite in order without qualitative ones. Does that mean that spatial relations cannot be *reduced* in the way suggested by the presupposition thesis? The critical proposal of the paper is that here Leibniz is faced with an unpleasant dilemma: either space has no parts, which would constitute an obstacle to explaining, on his own account, how we come by our notion of space; or, space has parts, which means that there is after all a merely quantitative, non qualitative difference –an obvious threat to the principle of individuation as found in the *Monadologie* # 9, among other places.

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[2] This, one could say, is Leibniz´s version of what Gareth Evans (1980, p. 102) called a "deep conceptual prejudice", namely, that a bearer of relational properties must have some sort of being that isn´t exhausted by its relational properties.

There are various ways in which the paper´s proposal might seem attractive. Historically, from within his own thought, it might illuminate Leibniz´s treatment of the concept of supervenience and its role in his version of metaphysical reductionism. The merits of his idealism about space may be seen with new eyes, in so far as Leibniz´s metaphysical commitments are put at stake precisely when discussing the nature of space. Furthermore, if the main proposal of the paper is correct, there is a good prospect for the view that so-called Kantian humility –our purported ignorance of things in themselves– is a reaction, perhaps an overreaction, to Leibniz´s reductionism of spatial relations. Indeed, one could argue that Kant´s much publicized Copernican Revolution is designed as a anti-reductionist metaphysics having Leibniz in mind, rather than a sort of epistemologic turn. Since we are epistemically receptive creatures –so would the reasoning go– and since we can never be receptive of the intrinsic properties of things, we can never cognize the intrinsic properties of things, only their relations.[3]

A Metaphysical Reduction

In his *Primary Truths*, Leibniz writes:

> "*there are no purely extrinsic denominations*, denominations which have absolutely no foundation in the very thing denominated. For the notion of the denominated subject must involve the notion of the predicate. This is why a variation in the thing itself must ocurr every time there is a change in the denomination of the thing"[4]

Although he does not provide an explicit characterization of the distinction between extrinsic and intrinsic denominations, Leibniz´s general idea may be captured as follows.

There are two ways in which an individual *I* may be described, or denominated: if the description *D* makes reference to individuals other than *I*, then *D* is an 'extrinsic denomination' of *I*. If the description *D* does not make reference to individuals other than *I*, then *D* is an 'intrinsic denomination' of *I*.[5] To use a classic example, 'the father of Solomon' would be an extrinsic denomination of the biblical character, David, since it refers to an individual, Solomon, other than David; while presumably 'human being' would be an example of an intrinsic denomination of David.

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[3] See Langton 2001.
[4] 'Primary Truths', in Ariew & Garber, p.32.
[5] See Mates, pp. 218-19.

Now according to most accounts, the principle that there are no purely extrinsic denominations is an expression of the view that extrinsic denominations are reduced to the ground properties of substances, the properties of the monad –where the ground properties are those that a things possesses no matter what.[6] So the principle of 'not *purely* extrinsic denominations' would stand for the thesis that all extrinsic denominations are indeed grounded on intrinsic ones.[7] To be grounded, or based, on something does not amount, however, to 'being reduced' to something. It may not be quite inappropriate here to gloss the principle that there are no purely extrinsic denominations as the general idea that relations cannot exhaust what a thing is. Suppose we abstract from a given thing every relation and relational property it may bear to other things. Call the properties that the thing retains after abstraction, *intrinsic*; and call relations together with the relational properties of a thing, its *extrinsic* properties. Now from the idea that the extrinsic properties of a thing do not exhaust all of its properties, it does not follow, at least not immediately, that the extrinsic properties may in any way be reducible to the intrinsic ones. How then is the reduction of extrinsic to intrinsic properties to be understood?

Consider the situation in which, say, Simmias is taller than Socrates (to use a recurring, Platonic example). Suppose, for purposes of illustration (for Leibniz would not grant it), that height is an intrinsic property, and that Simmias is six feet tall and Socrates is five feet tall. According to one suggestion, the Leibnizean reduction would be something like a logical equivalence: the relational fact that 'Simmias is taller than Socrates' is nothing over and above the attributive facts that 'Simmias is six feet tall' *and* that 'Socrates is five feet tall'. Hence, a relation is analyzable in terms of a conjunction of facts pertaining the *relata*. From here the idea arises that relations are <u>nothing but</u> the intrinsic properties of the *relata*.[8] Notice, however, that on this understanding of reduction the idea that one kind of properties grounds another kind gets no grip.

There is, however, an alternative way to understand Leibniz's reductionism. Indeed, as I will claim, there is evidence that this is the way

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[6] Louis Couturat (1901/1961) is an example of such reading. For a contrary view, see Ishiguro 1972; and, Plaisted 2002.

[7] Support for this line of reading is found in Leibniz's exchange with De Volder, April, 1702: "there is no denomination so extrinsic that it does not have an intrinsic denomination as its basis." AG, pp. 185.

[8] Two nouanced options are here presented: the Russellian version of Leibnizean reductionism –that relations are meaningless— and the version according to which relations, although meaningful, are logically unnecessary (Kneale 1962).

people such as Kant understood Leibniz at this juncture.[9] The idea is that the extrinsic properties of things –those that things have in virtue of their relations to other things– are ontologically derivative from their intrinsic properties –those that things have in virtue of the way they themselves are. So when things have certain extrinsic properties, they must also have certain intrinsic ones; and that things have certain intrinsic properties entails they will have certain extrinsic ones. In other words, for any relational property, that property is itself derived from facts concerning the *relata* independently from the relation*,* and those facts are themselves foundations or grounds for the relational property. Keeping to the example, briefly, the respective heights of Simmias and Socrates entail that Simmias is taller than Socrates, and that Socrates is smaller than Simmias; and any possible change in the heights of any or both of them will necessarily entail a change in the relational properties themselves. Hence, one set of properties, the heights of these persons, grounds another set of properties, the relational properties 'being taller than Socrates,' and 'being smaller than Simmias'. This sort of reduction between classes of properties has come to be known as *supervenience*.[10] So on this interpretation of reductionism, intrinsic properties are grounds for extrinsic ones in so far as the latter supervene on the former. This is the notion of unilaterla supervenience that appears at the end of the passage from *Primary Truths*, *viz*, that "a variation in the thing itself must ocurr every time there is a change in the denomination of the thing".

The above considerations illustrate the reduction of relational properties to monadic or intrinsic properties, but there is a related feature of Leibnizean metaphysics that needs elaboration, *viz*, the ideality of relations. Consider Leibniz's answer to Clarke in the fifth letter of their *Correspondence*:

> I shall allege another example, to show how the mind uses, upon occasion of accidents which are in subjects, to fancy to itself something answerable to those accidents, out of the subjects. The ratio or proportion between to li-nes *L* and *M*, may be conceived three several ways; as a ratio of the greater *L*, to the lesser *M*; as a ratio of the lesser *M*, to the greater *L*; and lastly, as something abstracted from both, that is, as the ratio between *L* and *M*, wit-hout considering which is the antecedent, or which the consequent; which the subject, and which the object. (...) In the first way of considering them,

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[9] See *KrV* A172/ B 217ff. See Langton, 2001.
[10] Here is a definition of (unilateral) supervenience: a class of properties A *supervenes* on a class of properties B, iff, necessarily, for every object *x* and every property F in A, if *x* has F, then there exists a property G in B such that x has G, and necessarily, for every object *y*, if *y* has G then y has F.

L the greater; in the second, *M* the lesser, is the subject of that accident, which philosophers call relation. But, which of them will be the subject, in the third way of considering them? It cannot be said that both of them, *L* and *M* together, are the subject of such accident; for if so, we should have an accident in two subjects, with one leg in one, and the other in the other; which is contrary to the notion of accidents. Therefore we must say, that this relation, in this third way of considering it, is indeed out of the subjects; but being neither a substance, nor an accident, it must be a mere ideal thing, the consideration of which is nevertheless useful. (Leibniz's Fifth Paper, # 47, p. 71)

In this passage we find Leibniz maneuvering to get a sharp distinction between relations, on the one hand, and relational properties, on the other, so as to argue that the former are merely ideal. The fact that he is struggling with this line of thought seems to be a tacit recognition that relations cannot be easily captured as substances or as properties of a substance. The argument here seems to proceed as a *reductio*: since, for Leibniz, all that exists is either a substance or the property (or accident) of a substance, and since relations are neither substances nor accidents or properties thereof, it follows, according to this passage, that relations cannot be real existences, so they must be ideal. One might want to say that 'the ratio between M and L' is equivalent to the conjunction of 'M *is greater than L*' and 'L *is lesser than M*', where the italicized parts are each meant to be the relational properties of substances M and L. But even granting, for the sake of the argument, that there is such an equivalance, this looks to be a circumvoluted way of saying that between M and L there holds a certain relation. Hence, the rationale for that move seems to be an antecedent motivation to rule out relations from the fundamental ontology, for the logical equivalence could just as easily lead to the view that relations constitute an ontological category of their own.[11]

The ideality of spatial relations

However that may be, what matters for the purposes of this essay is that while both relational properties and relations reduce to, or supervene on, the intrinsic properties of substances, only relations, and not relational properties, are deemed by Leibniz to be merely ideal. This feature of Leibniz's metaphysics is especially relevant for spatial relations, for, as I hope it will become apparent, Leibniz's reductionism of relations puts pressure on his theory of space, even though his theory of space seems to

[11] See Russell 1900; Basile 2009.

reinforce his reductionist view of relations in general.[12] In the remaining of this paper I will examine Leibniz's mature conception of space and spatial relations, drawing for the most part on materials from the *Correspondence*.[13]

So why are spatial relations ideal for Leibniz? Or, to ask the same question in a slightly different fashion, why is the nature of relations *simpliciter* not enough to explain the ideality of spatial relations? Indeed, given the peculiar metaphysical slant we described earlier, why would Leibniz's reductionism of relations not suffice to explain the ideality of *spatial* relations? This suggests that spaciality merits for Leibniz some peculiar epistemological and metaphysical commitments which are lacking in his consideration of relations in general.

A widespread view takes it that Leibniz conceived of space as "a purely abstract relational structure".[14] To the extent that this view may be interpretively correct, it is important to examine what supports it. In a somewhat cryptic passage from the *Correspondence*, Leibniz offers an analogy between the nature of space and that of the genealogical tree of a family:

> ...as the mind can fancy to itself an order made up of genealogical lines, whose bigness would consist only in the number of generation, wherein every person would have its place: and if to this one should add the fiction of a *metempsychosis*, and bring in the same human souls again; the persons in those lines might change place; he who was a father, or a grandfather, might become a son, or a grandson, etc. And yet those genealogical places, lines, and spaces, though they should express real truth, would only be ideal things. (L-C v, # 47, p. 70-71)

The overall point of the analogy is not difficult to capture. Just as the place of a given person in a given genealogical tree is fixed by his or her specific relationships with other persons in the family –the relatives–, similarly, the place of a material substance is fixed by its specific relations with other material substances. The genealogical tree as a whole provides a common frame of reference in relation to which each member of the

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[12] Again, not everybody agrees on the view that Leibniz is a reduccionist about relations, see Plaisted 2002, pp. 43ff.

[13] This is where Kant's diverging views may become all the more relevant. There is evidence showing that Kant read Leibniz on spatial relations as a supervenience reductionist (Langton 2001); this is why Kant's own thesis of the unknowability of things in themselves must be read as springing from his denial of the reducibility of spatial relations to monadic properties. This is, however, the topic of another paper. See my: *Kantian Humilty and Idealism of Space* (MS).

[14] See, e.g., Cover and Hartz pp. 295-316.

family has a place; and so does, analogously, the representation of space for the location of bodies. Now just as a genealogical tree is nothing but an abstract representation of the specific relationships between the members of a family, space is for Leibniz nothing over and above the actual and possible relations among bodies.

While these generalities concerning the analogy may give some content to the claim that Leibniz thought of space as a purely abstract relational structure, the picture is further complicated by the hypothetical introduction of the capacity for metempsychosis by the family members in the genealogical tree. Strange as it is, this hypothesis is clearly meant to give the analogy a deeper argumentative force. It does so by endowing the members of the relational system of a family-tree with the possibility of exchanging 'spiritual places' in the system –a father might take the place of a son or a daughter, an aunt that of a niece or nephew, and so on. Clearly, this hypothesis illustrates a further feature of the spatial frame of reference– namely, that physical bodies are able to exchange their locations. This matters to Leibniz, for it is by way of determining what is place, or rather, by fixing what is *sameness of place*, that he defines space itself –so as to give the promised explanation of "how men come to form themselves the notion of space". Hence, in perceiving bodies, without regard for the specific "relations of situation" that each of them actually has –*e.g.,* distance and orientation– we perceive an order among them, the order of coexistence:

> ...when many things are seen together, one perceives that order of things amongst themselves. (L-C III, #4)

Furthermore, given a set of co-existents *A, C, D, E,* whose elements sustain certain relations among themselves at time$_1$; when, at time$_2$, *A* changes its relation of situation vis-a-vis *C, D,* and *E,* and another object, *B,* comes to take the place of *A,* then it may be said of *B* (and presumably also of *A*) that it has been the subject of motion. This suggests that the primary elements of the order of coexistences are not bodies *per se*, nor mere points in space, but situations, or *relations of situation*.[15] Now given some group of fixed existents, the positions of changing coexistents are always determinable, for the relations within the system may be preserved even when all of its

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[15] Accordingly, Leibniz found utterly unintelligible the Newtonian idea of absolute motion, namely, the motion of an object which is not also a change in an object's position relative to other objects.

elements move and change their places within or outside the system.[16] Notice that those fixed existents need not be absolutely fixed, but only stable to the extent that they may be used as reference points to establish that one body has occupied the place of another.

On the other hand, although this does not appear as clear in the *Correspondence*, the order of coexistence is instantaneous, or synchronic, *i.e.*, the ordering of coexistents does not require the passing of time, and does not need to endure as such through time (Leibniz, *Initia rerum mathematicarum metaphysica* [April 1715]; GM vii 17; L 665, quoted by Arthur, 2012, p.5). Think, to recurr in the analogy, of a snapshot in a family album, where each family member is located according to his or her relations to others. Thus we arrive to what it is for a body to occupy the *same place* as another one –and so we get our notion of phenomenal space by perceptually attending the order of situations, the relations between a body and other bodies coexisting together. When we abstract from the given order of situations we perceive, and conceive of those relations without the bodies that actually hold them, we get our notion of absolute or mathematical space: "...that which comprehends all places –writes Leibniz– is called *space*."

In the analogy, the genealogical tree is that which comprehends all the relationships among the members of a family. Space and the genealogical tree may each be seen as a set of lines connecting the elements of a system, bodies in one case, relatives in the other. While the elements may swap places among them, the overall network of relations remains the same. The idea then is that no matter how many times a given element is replaced by another one, it will always be possible to superimpose, like in a drawing, the lines connecting the new elements on the lines connecting the old ones. The line of fatherhood, for instance, would remain the same even if –on Leibniz's hypothesis of *metempsychosis*– this father and that son exchanged places; similarly, the line of adjacency would remain, even if what is adjacent to what were to change continuously over time. By now it should be clear that these lines, as well as the overall structure they give rise to, are generated by abstracting the specific elements from the web of relations. This is one of the reasons why Leibniz says that spatial relations, and space itself, are the products of our minds –and, in this sense, ideal. Abstraction does it.

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[16] This makes of Leibniz a peculiar relationist, for, in contrast to other relationists, old and new, he does not think that spatial relations are established once bodies occupy their places: it is not bodies, but the situations of bodies which fix the reference frame for change and sameness of place. See Arthur, p.1.

Spatial differences and individuation

Let us now note a peculiar feature of Leibniz' theory of space, namely, the difference between *place* and *relation of situations*.

> And here it may not be amiss to consider the difference between place, and the relation of situation, which is in the body that fills up the place. For, the place of A and B, is the same; whereas the relations of A to fixed bodies, is not precisely and individually the same, as the relation which B (that comes into its place) will have to the same fixed bodies; but these relations agree only. For, two different subjects, as A and B, cannot have precisely the same individual affection; it being impossible that the same individual accident should be in two subjects, or pass from one subject to another. But the mind not contented with an agreement, looks for an identity, for something that should be truly the same; and conceives it as being extrinsic to the subjects: and this is what we call *place* and *space*. But this can only be an ideal thing; containing a certain order, wherein the mind conceives the application of relations. (L-C v #47, 71)

Leibniz characterized place as "that, which is the same in different moments to different existent things, when their relations of co-existence with certain other existents, which are supposed to continue fixed from one of those moments to the other, *agree entirely* together."[17] Here we can clearly see that a relation of situation is thought of by Leibniz as a specific, individual accident of a body; hence, any relation of situation is specific to an actual, particular body in its relations to other bodies. Accordingly, although there is agreement, no identity of situations arises. As noted, once we represent these relations of situation as a network of lines, we have abstracted from the individual accidents and represented these lines as if they had an existence of their own and as if they were external to particular bodies, i.e., as *places*. Space is then an order of these places, the "order which renders bodies capable of being situated."

4. Unlike relations of situation, however, places admit identity, not mere agreement. Insofar as places may be thought of as proper parts of space, Leibniz's theory of space is bound to reveal inner tensions. Let us call the difference between two parts of space a mereological spatial difference. What accounts for it according to Leibniz, and how can we discern parts of space? Here is a Leibnizean response: since relations of situation are specific to each individual material substance, no two parts of space can be abstractions from the same relation of situations, for otherwise they would

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[17] Perfect agreement may in this case be understood as *congruence*, See Arthur 2012, p.28.

be the same part. So in order to be different parts, they must be abstractions from different relations of situation. Hence, we are able to distinguish parts of space by discerning the corresponding relations of situation of which they are abstractions. In short, Leibniz suggests that mereological spatial differences are possible only because situations, *qua* individual accidents, are different; so in the absence of bodies occupying spatial parts, there are no mereological spatial differences for us to discern.[18] This seems to be what Leibniz has in mind when, in response to Clarke he writes that

> space being uniform, there can be neither any external nor internal reason, by which to distinguish its parts, and to make any choice among them. For, any external reason to discern between them, can be grounded upon some internal one. Otherwise we should discern what is indiscernible, or choose without discerning. (L-C iv #18, 39]

And also that

> the parts of time or place, considered in themselves, are ideal things; and therefore they perfectly resemble one another like two abstract units. But it is not so with two concrete ones, or with two real times, or two spaces filled up, that is, truly actual. [L-C v #27, 63]

What is the problem with this theory? Leibniz seems to face a dilemma: either abstract space as such has no parts, and then the theory is not entitled to the notion of *same place,* and will accordingly be unable to explain how we come by the notion of space; or abstract space has parts, and then there is a difference that is merely numerical and not qualitative –an obvious threat to his principle of individuation as expressed, among other places, in *Monadology* #9.

As for the first horn, it is plain from what has been said in the precedent paragraphs that mereological differences depend on the relations of situation of different material substances. Therefore, taken in abstraction from a given relation of situation, one place is not distinguishable from any other –this is indeed what it means, according to Leibniz, that space is homogeneous or "absolutely uniform"; but if abstract space is homogeneous in this sense, then the notion of sameness of place gets no grip. Apart from the mere resemblance between specific relations of situations of two different substances through time, no notion of place is available, and *a fortriori*, no notion of sameness of place can be generated. This line of thought may be

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[18] *Cfr*: Kant, *KrV* A 24=B 39.

summarized in a *modus tollens*: If there is identity (or sameness) of place, then there must be spatial mereological differences that do not depend on relations of situation. But there are no such spatial mereological differences. Therefore, there is no identity of place.

As for the second horn, if we allow that mereological differences in absolute space not depend on relations of situation, then space has indeed proper parts, however abstract they may be. In such a case, though, since space remains homogeneous, hence lacking in qualitative changes introduced by matter in movement, the differences between spatial parts cannot be qualitative and are purely quantitative –in direct clash with Leibniz's indiscernibility principle.

It is plain that Leibniz did not seriously consider the second horn of the dilemma.[19] Concerning the first horn, his strategy might have been to downgrade the identity claims regarding places and spatial proper parts. Suffice it to say that he seems to be willing to tolerate 'perfect resemblance', without opening the door for mereological difference. The reason is relatively simple: stripped away from their qualitative differences, any two items are perfectly alike and (aside from location) there is no way of telling one from another. Perfect resemblance, though, is not real identity, for real identity is established by the indiscernibility of qualitative properties. Where there are no qualitative properties, therefore, there is no real identity, only perfect resemblance.[20]

Conclusions

What do we learn then from Leibniz's theory of space concerning ideality of spatial relations and reductionism? The ideality of spatial relations may be seen as a special case of the general reducibility fo relations. Given Leibniz's conviction that there cannot be other than one-place predicates, we should expect him to construe relations not as two (or n-) place predicates but as one-place predicates in disguise. It is not forcing his thought here to say that a two-place predicate, e.g., the ratio of L and M, is logically equivalent to the conjunction of two one-place predicates. So one might be tempted to say there are two differentiated kinds of reduction at play: one is the logical reduction of relations to properties (one-place predicates), another is the supervenience reduction of relational to intrinsic properties. Relations, in any case, are ultimately reducible to intrinsic properties.

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[19] Nor, as far as I can see, have his contemporary interpreters. See, e.g: Arthur 2012, p.34.
[20] Leibniz's doctrine of congruence in his *Analisis Situ* may be invoked to refine this kind of reaction. See Arthur 2012, p.5.

Even if it were an apt account of Leibniz's overall view of relations and relational properties –which I suspect it is not–, this does not explain why spatial relations are ideal. What we learn from Leibniz's theory of space is that the difference between *relation of situations* and *place* is not just a particular case of a general distinction between relations and relational properties –it rather shows an important feature of the ideality of space. The primary target of ideality for Leibniz is place, and places are ideal because they are abstractions from the relations of situation of material substances. Being abstractions, places can be seen as occupied by different bodies at different times and are thus able to play the role of fixing the order of coexistence for material substances; relations of situation, being accidents or properties of concrete individual substances, cannot play this role, for they cannot "migrate or pass on to" other substances. Similarly, given an order of relations of situation, places need not be only actual, *i.e.*, they do not need to be the places occupied by determinate bodies at a certain time, but can also be possible –the places that given bodies could eventually occupy in that order. The notion of abstract space, as we saw above, is formed by representing the set of all places, actual and possible. It is part of the tensions in Leibniz´s thought at this point, however, that space can only play the role of fixing the actual and possible order of coexistence among substances because it is not itself a substance –not part of the furniture of the world–, but an ideal structure of relations.

Hence, even if from the point of view of a purely monadic world, such structure would disappear (as an effect of the metaphysical reduction of relational properties to the properties of monads), the ideal nature of spatial relations, and of space, shows something important about how finite minds perceive the material world, that is, as an order of posible coexistence of actual bodies. As noted above, for Leibniz, in the absence of bodies occupying spatial parts, there are no mereological spatial differences to discern. Hence, mereological spatial differences remain ideal, not to be adscribed to determinate bodies. But this idea is not sacrosanct, and here one might just find the limits of the Leibnizean strategy of categorical subordination.[21]

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[21] For very helpful crticisms and observations on previous versions of this paper I must thank audiences at the History of Philosophy sessions at the XVII Congress of the Asociación Filosófica de México, in Morelia, México, and at the I Coloquio Leibniz: a 300 años de la Monadología, IIF,UNAM, Ciudad de México. Thanks are also due to the anonimous referees of *Praxis Filosofica.*

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