# *EPSILON* BETWEEN INTUITION AND CONCEPT IN KANT'S FIRST *CRITIQUE*

MARIAN VALENTIN POPESCU

**Abstract.** This paper revisits the distinction between concept and intuition in Kant's determination of space as pure a priori intuition, focusing on two levels of analysis. First, it examines Kant's criteria for intuition – singularity and immediacy – across the *Logic* and the *Critique of Pure Reason* (§1, B edition, B 34). Second, it reconstructs the argument from the Metaphysical Exposition of Space (§2 of the Transcendental Aesthetic) using an analytical operator, *epsilon*, to reinterpret these criteria. By addressing ambiguities highlighted by K.D. Willson regarding intuition and sensibility, the paper offers an alternative response that clarifies the relationship between the criteria of intuition and Kant's epistemological framework.

**Keywords**: epsilon, intuition, pure intuition, concept, space, pure a priori form, singularity, immediacy.

In this text, I will not provide a synthesis of the various perspectives on 'intuition' and 'pure intuition' in Kant, nor will I discuss the different meanings of the term, whether exegetical or disciplinary (psychology, philosophy of mind, epistemology, mathematics, etc.). Instead, I will analytically revisit an issue debated in the literature, perhaps less frequently addressed today: the distinction between concept and intuition in determining space as pure a priori intuition. This discussion will follow two levels: the first refers to the distinctions between intuition and concept as they appear in Kant's *Logic*[1] and in the *Critique of Pure Reason*[2] (&1 B *Critique* – B 34), as well as to the two criteria of intuition

Marian Valentin Popescu ✉
Mathematics and Computer Science Research Center, Technical University of Civil Engineering, Bucharest

[1] Imm. Kant, *The Jäsche Logic*, in *Lectures on Logic*, transl. and ed. by J. Michael Young, Cambridge, Cambridge University Press, 1992.

[2] I will use the standard notation of the A/B *Critique of Pure Reason* in the translation of N. Kemp Smith, London, Macmillan & Co., London.

Rev. Roum. Philosophie, **68**, *2*, p. 489–514, Bucureşti, 2024 DOI: 10.59277/RRP.2024.68.2.14

(singularity and immediacy); the second considers the argument in &2 of the Transcendental Aesthetic (The Metaphysical Exposition of the Concept of Space), where Kant demonstrates that space is not a concept but pure intuition. I will connect these two levels to provide a coherent explanation of the place and role of the two criteria of intuition and the distinctions between intuition and concept in the discussion about space as a pure a priori form. In this respect, I will refer to Kant's *Logic*, where intuition is simply defined in mere relation to singularity, and to his *Critique*, where intuition is described (Aesthetic &1) independently of any criteria, and also (A 320/B 377) dependently on both criteria (singularity and immediacy).

For the first level, I will critically analyze some elements discussed in an important text[3] on this topic by K.D. Willson. As for the second level, I aim to reconstruct the argument from the Metaphysical Exposition of Space, which establishes that space is a pure intuition and not a concept, by employing an analytical operator – *epsilon*. This step will allow me to reinterpret the criteria of intuition while attempting to formulate an alternative response to that developed by Willson in his research. The problem raised by Willson in his text concerns the relationship between intuition and sensibility within a broader discussion that includes: a) the absence of any criteria defining intuition at the beginning of the Aesthetic (&1 – A19/B33); b) the presence of a single criterion (singularity) in the *Logic* (&1); c) the presence of two criteria (singularity and immediacy) in the *Critique* (A 320/B 377). Although Kant employed both criteria in his *Critique*, the connection between them and intuition, the relationship between intuition and sensibility, as well as the general concept of 'intuition'[4] remain at least unclear[5]. In *Logic*, intuition is defined as a *singular* representation (*repraesentatio singularis*), meaning that only the criterion of singularity is present here, unlike in the *Critique* or the *Prolegomena*. Below is the relevant excerpt from *Logic*:

> All cognitions, that is, all representations related with consciousness to an object, are either *intuitions* or *concepts.* An intuition is a *singular* representation (*repraesentatio singularis*), a concept a universal (*repraesentatio per notas communes*) or *reflected* representation (*repraesentatio discursiva*). [6]

The reason why only one criterion is present in the *Logic* is that here Kant was not concerned with the "relation to the object", and thus not with the

[3] K. D. Willson, "Kant on Intuition", *The Philosophical Quarterly*, vol. 25, no. 100, pp. 247–265.

[4] After a thorough synthesis of the issue of intuition in his recent research, Dermot Moran concludes that the very concept of intuition is rather vague – see D. Moran, *Kant on Intuition*, in S. Băiaşu, A. Vanzo (eds.), *Kant and Continental Tradition. Sensibility, Nature and Religion*, New York & London, Routledge, 2020, pp. 52–53.

[5] K.D. Willson, "Kant on Intuition", p. 247.

[6] Imm. Kant, *The Jäsche Logic*, in *Lectures on Logic*, &1, 91, p. 589.

connection to sensibility. Since the criterion of "immediacy" requires a related object in relation to which intuition "presents itself" as the intuition *of something*, and here only the "logical form" of terms is of interest, rather than a relationship with the object (as phenomenon), the criterion of singularity is sufficient. Frege similarly notes that the reason why only one criterion is used in the *Logic* is that there is no reference to any connection between intuition and sensibility, as it is the case in the Transcendental Aesthetic[7].

At the beginning of the Aesthetic, there is no reference to any criterion, unlike in *Jäsche Logic*, where singularity is explicitly mentioned. However, within the *Critique*, Kant states that "This (cognitio) is either an intuition [Anschauung] or a concept [Begriff]. The former relates immediately to the object and is single."[8] Willson argues that the connection made in the B *Critique* between intuition and sensibility, understood merely as a consequence of mathematical construction, is unsatisfactory. A more thorough explanation of this relationship must also account for the two criteria of intuition: singularity and immediacy. Different positions in the literature are discussed, including those of Hintikka and Parsons. Hintikka recognizes only one criterion for intuition, claiming that immediacy is merely a reformulation of the criterion of singularity. Contrary to Hintikka Parsons argues that the two criteria are distinct: the criterion of singularity is broader than that of immediacy in characterizing representations as intuitive[9].

Willson's position, with which I will disagree on certain points, asserts that Kant's two criteria are intensionally distinct but extensionally identical. In other words, while each criterion identifies a different aspect of intuitive representations (different intensions), any representation that satisfies one criterion also satisfies the other (extensional identity). Willson argues against Hintikka that immediacy cannot be reduced to singularity and against Parsons that neither criterion is broader or more encompassing than the other[10]. His approach to overcoming Hintikka's and Parsons' interpretations relies on a different understanding of Kantian intuitions as singular terms, distinct from their treatment in predicate logic. Willson opposes this traditional interpretation and instead proposes a reconstruction of the singularity criterion using mereological primitives and the immediacy criterion through a suitable notion of isomorphism. His proposal will be critically examined below and furthermore contrasted with my own standpoint (the second level of the analysis).

[7] See K.D. Wilson, „Kant on Intuition", p. 247.
[8] Imm. Kant, *Critique*, p. 314 (A 320/B 377).
[9] For the entire argument, see K.D. Wilson, „Kant on Intuition", pp. 247–248.
[10] *Ibidem*, p. 248.

## WILSON'S MEREOLOGICAL APPROACH ON INTUITION

Although Kant does not allow a logical explanation of how intuitions can represent something by virtue of their singularity, Willson attempts to reconstruct the singularity of representations through logical mechanisms other than the contrast with the generality of concepts. More precisely, he seeks to derive one of the two criteria (singularity) as a distinction concerning the logical structure of a representation – singularity versus generality – in order to differentiate types of representations. Regarding immediacy versus mediacy as modes of representation, Willson notes that these appear distinctly in the critical period as two ways in which a representation is considered to represent its object. Kant identifies the object represented by intuition with the cause of the intuition, which straightforwardly establishes an *immediate* relationship between the intuition and its object.

As long as intuition is singular, it does not allow reduction, through common marks, to a generality that could be determined within predicate logic. Therefore, a different structure must underlie this quality of intuition[11]. I would like to make a brief comment on Willson's first assumption: I believe that intuition is singular and immediate primarily in the sense of temporal determinations, not because it resists determination of content through predicate logic. In the second part of this essay, I will explore how the restriction of categories can operate from the perspective of sensibility. For now, I will simply note that, occurring in time, intuition is singular in the sense of *unity* and *uniqueness*. From this standpoint, I will argue that Kant's explanation of how intuition can be determined by the intellect, or how intuition already functions to restrict categories via *schematism*, is only seemingly unclear. What is certain, however, is that intuition belongs quintessentially to the "receptivity" of sensation, that is, to sensibility.

As for the "intellectual representations", Willson argues that these are radically different, as they depend on the "inner activity of the mind" and therefore cannot have an immediate relationship with their objects. This idea is reflected in the *Critique* through the doctrine that concepts are predicates of possible judgments (A69/B94) and thus require an intermediary representation to relate to objects. According to this doctrine, all concepts contain other representations under them as mediating elements in their relationship with objects (A69/B93–4). Willson further maintains that, of the two criteria for classifying representations, one concerns the logical structure of a representation – singularity – and the other its relationship to its object – immediacy. The intensional difference between singularity and immediacy thus lies in the distinction between the logical and semantic aspects of a representation[12]. In this sense, since concepts (general representations) are associated with mediated representations in critical philosophy, it is natural, Willson argues, to assume that

[11] *Ibidem*, p. 249.
[12] *Ibidem*, p. 250.

singular representations are in an immediate relationship with their objects. From this, Willson concludes the extensional identity of the two criteria.

Willson resists identifying intuition with "definite descriptions", for this would equate intuitions with conceptual singularity. However, Parsons argues that the existence of definite descriptions demonstrates – contrary to Hintikka's reduction of immediacy to singularity – that there can be singular representations that are *non-immediate*. Consequently, the criterion of singularity is broader when identifying intuitive representations than the criterion of immediacy. Against Parsons, who claims that Kant never addresses the implications of the possibility of singular but non-immediate representations for the concept of intuition, Willson argues that such implications can indeed be found in Kant's critical philosophy, though not in the sense of intuitions as singular concepts, as Parsons suggests. Willson contends that Parsons' conclusion is supported by maintaining Hintikka's hypothesis that intuitions correspond to singular terms in modern logic[13]. Thus, for Parsons, there can exist singular representations (i.e., singular terms) that include mediated representations as components. Willson counters this by showing that no singular term in predicate calculus (such as demonstratives or proper names) aligns with Kant's use of "intuition". Specifically he argues that no singular term in predicate logic can correspond to Kant's criterion of singularity[14].

Willson develops his interpretation of the differentiation between intuitions and concepts by appealing to part-whole relations and divisibility, which express different types of belonging. The form of concepts entails generality or universality, a feature that must belong to the intellect. Generality is determined through "logical acts" (analytic judgments) of comparison, reflection, and abstraction, which amounts to subordinating multiple representations under one common concept. However, this subordination also has an inverse meaning: the subordination that produces a hierarchical order of concepts, whereby the subordinate concept from which the superior concept is derived is contained within the superior concept, also *allows the superior concept to be considered as contained within the subordinate concepts*. This generates a species-genus order for concepts[15]. Willson further argues that once subordinate concepts to a superior concept can be called the members of that concept's division, it follows that this generates a different theory of a part-whole relationship within the generality of concepts. According to this theory, *the parts of a whole are subordinated to the whole, while the whole is contained within the parts*. This paradoxical characteristic (the assertion that the whole can be contained

[13] *Ibidem*, p. 251.

[14] See *ibidem*, p. 252.

[15] Wilson's example here is from Kant's *Logic*: the concept Philosopher is subordinated *under* the concept Human which in turn is subordinated *under* Animal; conversely, the concept Human is contained *in* the concept Philosopher, which differs from the concept Human by some specific *differentia*, and Animal is contained *in* Human, which also contains the *differentia* Rational. (Imm. Kant, *Logic*, § 10, *apud.* D.K. Wilson, p. 252).

in the parts), Willson continues, can be resolved by observing that, by dividing a concept, the *extension* (*Umfang*) of that concept is also divided. Conversely, by specifying or adding parts in such relations, the more general concept is "enriched" qualitatively, I would say, not just quantitatively (multiplicatively). A key reference that is helpful to Willson in supporting and articulating his own position is the following passage from Kant's *Logic* (A110):

> To *take apart* a concept and to *divide* it are thus quite different things. In taking a concept apart I see what is contained *in* it (through analysis), in dividing it I consider what is contained *under* it. Here I divide the sphere of the concept, not the concept itself. Thus it is a great mistake to suppose that division is the taking apart of the concept; rather, the members of the division contain more in themselves than does the divided concept.[16]

This way of constructing a set, where the members of a logical division are obtained by applying specific differences to each concept-member, allows the logical division of concepts to be a *regressus in indefinitum*. This is because the process of identifying specific differences for a concept considered as a genus could, in principle, continue indefinitely. However, according to Kant, this regression is merely a regulative principle of reason (A 668/B 696), or, as Wilson puts it, merely a methodological procedure for investigating nature[17]. In other words, while the process of subdividing concepts might theoretically proceed without end, it is not actually the case, for it is a mere tool for guiding our investigation in understanding of the world – that is, the division is not meant to be indefinite in a literal sense, but rather serves as a conceptual and methodological guide to exploring the complexity of the phenomena.

What Wilson points out here is that the subordination of the part to the whole can be expressed through the classical relation of membership to a class. This is attributed to Kant's awareness of the set-theoretic nature of the part-whole conceptual relationship, for in his lectures he often defined the extension of a concept as a set[18]. Wilson suggests some probability that, in order to avoid antinomies, Kant may have restricted his theory to *genus-species concepts* (*gelehrte Begriffe*), thereby excluding antinomic concepts. However, I disagree with Wilson here. This restriction cannot be applied to the regional delimitations of spaces in relation to the pure a priori intuition of space, as we will see later. In other words, while Wilson may argue that Kant's concern with antinomies led him to limit his concepts to those that avoid paradoxical or contradictory relationships (such as genus-species), this does not account for how Kant addresses the pure intuition of space and its a priori structuring in terms of spatial relations. The

[16] Imm. Kant, *The Jäsche Logic*, in *Lectures on Logic*, p. 146/p. 636, n.
[17] K.D. Wilson, "Kant on Intuition", p. 253.
[18] *Ibidem*, p. 254.

concept of space in Kant's philosophy, as we will explore, goes beyond the restrictions of genus-species concepts and encompasses a more complex understanding of the nature of intuition.

Wilson argues that, unlike concepts, intuitive representations are given along with their forms. To analyze these representations efficiently, he limits his discussion to space[19], which he identifies as the form of intuitions that represent things "outside" us. Since space defines intuitions as singular representations, the theory of singularity leads to a part-whole relationship that is the opposite of the one resulting from generality. For concepts, parts are subordinated to the whole, and the whole is contained in the parts. However, for intuitions, parts should be contained within the whole, and the whole should be greater than any individual part. This, Wilson suggests, reflects Kant's position, specifically in the third argument (from B) of the Metaphysical Exposition of Space (A25/B39). Wilson's position regarding this argument follows logically from the points made earlier and associates the part-whole relationship in singularity with a theory of division that differs from that involved in determining generality. If the division of concepts occurs by limiting a concept through differentiation, then in the Metaphysical Exposition of Space, Kant argues: "Space is essentially unitary; its plurality... depends entirely on the [introduction of] limitations" (A25/B39)[20]. These limitations are boundaries placed within the whole of space. Regarding space, the division of an intuition does not happen by observing specific differences between parts of space, but by placing limits within the same space. However, Wilson's analysis does not take into account a fundamental aspect of Kant's argument – the infinity of space. This is an important point, which I will revisit at the beginning of the second part of my essay. For now, I will simply note that this oversight is significant, as the infinity of space plays a crucial role in Kant's conception of how space is structured and how intuitions relate to it. The limitations that Kant refers to do not merely divide space into finite, definable parts; rather, they impose a structure on an infinite whole, which requires a different kind of analysis.

Wilson argues that, given that the part-whole *conceptual* relationship corresponds to a set-theoretical notion of membership, it would not be incorrect to suggest that the criterion of singularity determines the structure of a representation according to a mereological conception of the part-whole relationship. Wilson summarizes mereology as the "calculus of individuals", which is the study of formal relations where the parts of a *concrete* [my emphasis] whole or an individual relate to the whole itself. For example, events possess a mereological

[19] This is, I believe, one of Wilson's shortcomings: the involvement of time in the form of sensibility is necessary not only for its analysis but also for that of space. Anything given in time, including spatial intuitions, is subject to time. Any construction in pure intuition requires succession, which implies that any change occurs in time (Transcendental Aesthetic, B 48).

[20] Imm. Kant, *Prolegomena*, translation and revised edition by Gary Hatfield, 2004, Cambridge, Cambridge University Press, pp. 37–45 [4:286–4:294]. For the broader context of the debate, also see D.K. Wilson, "Kant on Intuition", p. 254.

structure: one event can be part of a larger event, or two events can overlap (as per Whitehead)[21]. Similarly, the parts of physical objects have a mereological relation to the whole physical object they constitute, such as a window being part of a house. While a concrete whole can be termed the mereological class of its parts, Wilson notes that this concept of "class" differs from the classical set theory notion of a set[22]. Mereology, as he explains, applies to the specific relation of parts to the whole in a concrete context – such as physical objects or events – whereas set theory deals with abstract collections of elements that are not necessarily concrete or spatially structured in the same way. The mereological concept is more concerned with the real, physical relationships between parts and wholes, while set theory involves more abstract, mathematical relations. This distinction is important for Wilson's argument about the singularity criterion. He sees the part-whole relationship in terms of mereology as providing a way to understand the structure of intuitive representations, particularly spatial intuitions, in a way that avoids the abstraction of generality that characterizes conceptual representations. By treating intuitions as singular and related to their objects in a mereological manner, Wilson proposes a framework that allows for a more concrete and structured interpretation of Kant's notions of space and intuitions. However, as noted earlier, this framework does not fully account for the infinity of space in Kant's philosophy, which I will return to in the second part of my paper.

The advantage that mereology would bring over the traditional membership relation from set theory or the class relation to genus by specific difference is that the variables of such a (mereological) system of relations can have values in different orders of objects[23]; moreover, there are no antinomies in mereology. Another advantage compared to the classical membership relation to a class, and thus to the subordination relation used by Kant, is that the "proper part" relation is transitive, asymmetric, and non-reflexive. Wilson sees the advantage of a mereological view attached to Kant's position on space by indicating that intuitions are responsible for relations such as right/left, up/down, and back/front, or for the incongruencies of mirror images of hands, issues that Kant discuss in the *Prolegomena* (§ 13)[24]. This approach is considered reliable, and moreover, these relations could be defined by Kant through elements of "mereological primitives", thus mereology could form the basis for Kant's treatment in the *Prolegomena* of identical but non-congruent objects. Wilson considers that the difference between right and left is a

[21] *Ibidem.*

[22] *Ibidem.*

[23] In mereology, a member of a collective can, by transitivity, be part of a larger collective if the original collective to which it belongs is included in the larger one and also encompasses it. This is possible even if the respective member is different from other members of the larger collective. For example, a ladybug is part of the collective "garden", which includes all the individuals that constitute it (provided it is present there), but it is also part of the collective "property x of y", even though the members here might be of a different type, such as hardware, a house, etc.

[24] For the entire debate, see D.K. Wilson, "Kant on Intuition", pp. 255–256.

difference in the arrangement of the parts of a representation; therefore, it must be attributed to the structure of an intuitive representation rather than to concepts. Kantian intuitions, therefore, should not be compared to singular terms, but to models whose internal structures are expressed in terms of mereological relations in which space-time regions relate to each other.

Citing partially from the *Critique* B 160, Wilson states that, as forms of sensibility, space and time are themselves intuitions ["space and time are represented *a priori* not merely as *forms* of sensible intuition, but as themselves *intuitions*" – B 160]; and he continues "completing" Kant: "for they [the intuitions] possess within themselves the same mereological structure as do the representations of which they are the forms"[25]. However, Kant should be quoted in full here, as he continues by stating that intuitions present themselves along with the determination of the *unity* of this manifold, which belongs to them ["…and therefore are represented with the determination of the unity of this manifold" – B 160]. This is an important element that Wilson ignored and I will revisit in the second part of this essay. Wilson then argues that, according to Kant, scientific theory is generated through the synthesis of the manifold of pure, *a priori* intuitions (B 160). However, the manifold cannot be interpreted as containing only mereological relations, as Wilson believes, which would reduce them to those pertaining to the regions of space and time (A 41/B 58). Moreover, Kant says nothing here to justify introducing this clarification.

Since pure intuitions of space and time are the mediums in which mathematical construction occurs, Kant argues in the Axioms of Intuition that phenomena are connected to experience through the same synthesis by which space and time are determined in the first place. The synthesis of pure intuitions is accomplished through pure mathematics. Therefore, pure mathematics is constitutive for scientific knowledge. In other words, our intuitions must be articulated conceptually in terms of the structures of pure mathematics. Undoubtedly, the emergence of modern physics has provided ample verification of this Kantian thesis. Here, I agree with Wilson, although I consider that this position is not compatible with the support of mereology as the very schematism of intuition, as I will argue extensively below when I will revisit this issue.

Wilson interprets Kant's famous statement: "Thoughts without content are empty, intuitions without concepts are blind"[26] (A 51/B 75) in the sense that the *objectivity* of intuition must be assumed prior to the participation of the categories, because intuition would contain, logically and temporally, principles that determine the relationships of objects before any experience (A 26/B 42). The question Wilson poses is how intuitions can be "blind" without concepts and still be a type of objective representation. His answer is that an intuition is objective insofar as it presents the mereological structure of a phenomenon, but it is "blind" without a

[25] *Ibidem*, p. 256.
[26] Imm. Kant, *Critique*, p. 93.

subsequent synthesis that connects it to other phenomena within a unified knowledge. Wilson argues that intuition contains, logically and temporally, principles that determine the relationships of objects (A 26/B 42), and that these principles are in fact mereological. The insertion of mereology here is illicit because it still assumes a connection between the part and the whole; or this connection does not belong to the empirical realm in Kant's philosophy, but to the intellect. In B 42, Kant does not discuss the aspect of "objectivity," as I will elaborate in the second part of this paper, and mereology cannot be *a priori* in this context precisely because this structure would imply a *direct* relationship with elements of the empirical, which in fact are not *directly* reducible to the syntheses mentioned: the principles below cannot therefore be mereological.

> [...] the form of all appearances can be given prior to all actual perceptions, and so exist in the mind a priori, and how, as a pure intuition, in which all objects must be determined, it can contain, prior to all Experience, principles which determine the relations of these objects […][27] (A 26/B 72).

Wilson has considered the types of intuitions in the terms of the interpretation he gives for the criterion of singularity. We know that Kant asserts that sensations are included in intuitions to the extent that they admit to being ordered within a spatiotemporal system of relations (A 20/B 34). According to Wilson's interpretation, sensations are merely the medium through which the mereological structure of an object of empirical consciousness is represented. Intuitive representations indicate their object by representing its mereological structure, and, in the case of empirical intuitions, its empirical properties.

The pure intuitions are then considered, not in relation to empirical intuitions, but in themselves. For Kant, the pure intuitions of space and time are the mediums through which the construction of mathematical objects takes place (*Prolegomena* § 10). Wilson argues that pure schematism, rather than images, is the proper tool for mathematical construction (A 140–1/B 180). He suggests that a schematism is a model obtained by interpreting a mathematical concept within a mereological system. Here, Wilson connects mereology to the structure of intuition in Tarski's realization, which showed that mereology provides the logical foundations for the geometry of solids, a geometry that admits only figures for bodies. Wilson explicitly states that the geometry of solids would be the formal system underlying Kant's theory of pure schematism[28]. In turn, this system is grounded in human cognition as a form of sensibility through the transcendental exposition of space. Wilson further asserts that constructing a concept in intuition, i.e., providing a schematism for a mathematical concept, is a formal procedure through which the concept is modeled in a mereological system sufficient for the geometry of solids.

[27] *Ibidem*, p. 71.
[28] See D.K. Wilson, "Kant on Intuition", pp. 259–260.

When Kant states that "certain universal conditions of construction" determine the object of a mathematical concept (A 714–B 742), Wilson believes that the German philosopher would accept that these conditions are determined by the structure of space, but until space is understood in mereological terms, we do not have a clear conception of how these conditions are established. These conditions are none other than the axioms of mereology (e.g., the fact that the part-whole relation is transitive) and the special axioms required for the geometry of solids. Additionally, we can be certain that the axiomatic system of three-dimensional Euclidean geometry has a model in the geometry of solids – in Kant's terms, geometric concepts can be accompanied by schemata in the pure intuition of space[29]. Wilson concludes by saying, "unfortunately, there is ample evidence that Kant himself did not appreciate the wholly formal procedure for obtaining schemata for geometrical concepts in the pure intuition of space"[30].

Wilson interprets the criterion of singularity of intuition in association (which he considers natural in his interpretation) with mereology, because mental images contain mereological relations just like empirical intuitions, which the imagination must use to produce an image. Moreover, from this interpretation of singularity, a corresponding interpretation of the criterion of immediacy follows. I believe that this model can be valid, but it is not exclusive and represents a construction separate from the one in the *Critique*. Mereology represents only one of the models. The schematism of imagination is not generated by the image(s), which are exclusively empirical, but is *guided* by them within a particular model, and the *schema* is nothing more than a method; it is transcendental and it belongs to thinking; in itself it is not otherwise determined. As I will show later, the schema determines empirical intuitions under a certain instantiation, depending on the special conditions of construction.

I will now focus on the end of Wilson's interpretation, where he defines immediacy in relation to *singularity*, rather than to empirical intuitions. He suggests that "if a representation is *isomorphically* identical with an empirical object, it must be singular in Kant's mereological sense of singularity"[31]. I will not dwell on the explanations, which, if they were to imply a logical interpretation of an *extensional* isomorphism between intuition and its object, would return to the circularity that an intuition is isomorphic to an intuition. Wilson's solution involves attempting to obtain a definition of immediacy from the doctrines of the Aesthetic (transcendental idealism, which assumes the thesis that phenomena, the objects of

[29] Here, Wilson's view is that Euclidean geometry served as the foundation for determining the concept of space and for geometry as the pure science of space in the *Critique*. This standpoint is closely related to that established particularly by Michael Friedman in his famous book *Kant and the Exact Sciences* (1992). Friedman argues that the sciences of Kant's time (Newtonian physics and Euclidean geometry) were the disciplines underpinning the pure sciences in the *Critique* and the *Prolegomena*, a standpoint that continues to enjoy broad support among Kantian scholars today.

[30] D.K. Wilson, "Kant on Intuition", p. 260.

[31] *Ibidem*, p. 265.

empirical intuitions, are merely representations in the mind – A 369; A 490–1/B 518–9, A 492–B 520)[32]. The implication of transcendental idealism is that we must identify the phenomenon as the object of intuition with the intuition itself. Thus, we can define immediacy as an isomorphic identity between an intuition and its object. The object of intuition, therefore, is only intuition viewed as the object. The distinctions we make regarding what in intuition belongs to the object and what belongs only to the subjective relation of sensibility are merely empirical distinctions and do not reveal any object in itself "outside" intuition. Wilson concludes that what objectively belongs to intuitions is their mereological structure[33].

Finally, Wilson argues that since an intuition possesses a mereological structure, Kant could assert that an intuition is isomorphic to its object. Wilson needed intuition to have a mereological structure capable of avoiding issues of isomorphism with the object it refers to or represents, so that through this isomorphism, the intuition could be determined from two different intentional perspectives, but with an identity in their extensions: an intuition is singular based on a mereological structure, which is, through this, isomorphic to the object it immediately represents. Therefore, intuition is singular but distinct from immediacy obtained through isomorphism; however, the extensions of the two – singularity and immediacy – are identical, meaning that if an intuition is singular, it is also immediate, and if an intuition is immediate, it is also singular (not mediated). In Wilson's words, it remains the relatively simple task of showing that the criteria for singularity and immediacy are extensionally identical. This identity follows from the fact that (i) if a representation is singular in the defined sense, it is isomorphic with an empirical object, and (ii) if a representation is isomorphically identical with an empirical object, it must be singular in Kant's mereological sense of singularity. In this way, Wilson believes he has provided an answer to both the problem of the two criteria and the interaction between intuition and sensibility.

## EPSILON AND THE DETERMINATION OF TIME AS PURE A PRIORI INTUITION

In the following, I will revisit some responses that complemented the critique of Wilson's perspective in the context of offering an alternative answer distinct from the one he provided. I believe that, first and foremost, it is necessary to establish the "source" and nature of the argument determining the two fundamental components of sensibility – space and time – as *pure* a priori intuitions and not concepts. This is the point from which Wilson started his argument, considering that because space defines intuitions as singular representations, the theory of singularity will lead to a part-whole relationship in which the parts of an intuition

[32] For a better understanding of Wilson's view, see the whole debate in *ibidem*, pp. 263–265.
[33] D.K. Wilson, "Kant on Intuition", p. 265.

are contained within its whole, and the whole is greater than any individual part that the whole contains in a mereological relationship. This would even be the Kantian view from the third argument (from B) of the Metaphysical Exposition of Space[34]. Wilson's conclusion was that an intuition is a representation whose parts are contained within its whole, and the idea that intuitions are singular and immediate must be supported by appealing to the mereological part-whole model.

In this sense, I will briefly present Wilson's synthesis regarding the determination of space as pure a priori form: (1) Sensibility is the only possible way through which human beings can acquire intuitions. (2) Pure intuitions contain the form of intuition. (3) Therefore, pure intuitions are only possible if the form they contain is the form of human sensibility (*Prolegomena* § 9; also B 41). Given that mathematics and mechanics are the a priori disciplines in which humans investigate the structure of pure intuition, space and time are a priori forms of sensibility (*Prolegomena* § 10, cf. B 48-9). This exposition of pure intuition is *transcendental* (A 56/B 80-1) and, therefore, does not affect the actual realization of mathematics in any way. With the transcendental exposition, we establish certain fundamental conditions. Wilson says that with the transcendental exposition, we establish an aspect regarding the ontological status of space, namely that it "is in the mind" (because sensibility refers to what is in the mind); however, this status is not of interest to the mathematician, who continues his constructions regardless of whether space is 'in the mind' or a thing in itself[35].

Wilson argues that the third argument of the metaphysical exposition, in which Kant shows that space is an intuition and not a concept, supports the idea that the mereological "part-whole" model would form the basis for considering space as a whole and spatial limitations as parts of it. As for the "transcendental" character, Wilson also criticizes Kant for *not using the principles of mereology or those from the mechanics of solids, for not involving Euclidean geometry*[36]. However, Wilson believes that Kant should have shown that the use of imagination as means to obtain pure intuitions is "insufficient". I will attempt to show below that Wilson failed to understand that this "insufficiency" is, in fact, a necessary indeterminacy at the level of the transcendental construction of the Kantian program, at the level of the transcendental theory, with separate models of category application determining distinct systems for structuring empirical intuition (among them, mereology itself).

The way in which space and time are determined (since Wilson referred only to space, I will do the same) is important because this mode also establishes the relationship that any geometry may have with the fundamental concept to which it refers – space as pure a priori intuition. From what has been shown, it results that the only geometry model tolerated by Wilson is that of Euclid and/or that of solids,

[34] Imm. Kant, *Critique*, pp. 68–69 (A 25/B 39).
[35] D.K. Wilson, "Kant on Intuition", pp. 261–262.
[36] See also note 29.

and this would be compatible with the classical mereological model. To argue against this assumption, I will analyze excerpts from the arguments 3 and 4 in §2 of the Transcendental Aesthetic – the "metaphysical exposition" of space. Here they are:

> 3. Space is not a discursive or, as we say, general concept of relations of things in general, but a pure intuition. For, in the A 25 first place, we can represent to ourselves only one space; and if we speak of diverse spaces, we mean thereby only parts of one and the same unique space. Secondly, these parts cannot precede the one all-embracing space, as being, as it were, constituents out of which it can be composed; on the contrary, they can be thought only as in it. Space is essentially one; the manifold in it, and therefore the general concept of spaces, depends solely on [the introduction of] limitations. Hence it follows that an *a priori*, and not an empirical, intuition underlies all concepts of space. For kindred reasons, geometrical propositions, that, for instance, in a triangle two sides together are greater than the third, can never be derived from the general concepts of line and triangle, but only from intuition, and this indeed a priori, with apodeictic certainty.
> 4. Space is represented as an infinite given magnitude. Now every concept must be thought as a representation B 40 which is contained in an infinite number of different possible representations (as their common character), and which therefore contains these *under* itself; but no concept, as such, can be thought as containing an infinite number of representations *within* itself. It is in this latter way, however, that space is thought; for all the parts of space coexist *ad infinitum*. Consequently, the original representation of space is an *a priori intuition*, not *a concept*.[37] (B 40)

These two paragraphs must be taken "together" to illustrate what I want to argue, namely that the type of argument Kant uses to support the idea that space is a pure intuition and not a concept is not consonant with the mereological model, but rather resembles the type of reasoning used in the description of the set of all sets (infinite) while *still* avoiding Russell's paradox[38]. Kant refers to space as an "infinitely given" set, implicitly using a mathematical argument by *reductio ad absurdum* built on a structure that excludes the paradox (the antinomies) of the set theory. Here is how it can be reformulated: Kant says in B 40 that space is an infinitely *given* magnitude. But for the infinite space defined this way, all its parts are simultaneous – *in infinity*. In B 39, we have that space can only be represented as a *unique* space; any parts of it can only be parts of that one and the same unique

[37] Imm. Kant, *Critique*, pp. 69–70 (A 26/B 40). The reason for using Kemp Smith's translation is that he keeps intact the fragments corresponding to the B edition of the *Critique*.

[38] For a complete view on the paradox, see *One Hundred Years of Russell's Paradox*, Godehard Link (ed.), Berlin, New York, Walter de Gruyter, 2004 (particularly Gerhard Jäger, Dieter Probst, "Iterating Σ Operations in Admissible Set Theory without Foundation: A Further Aspect of Metapredicative Mahlo", pp. 119–134).

space, and they cannot be prior to the all-encompassing unique space (and, very important, *they cannot be constituent parts from which the infinite and unique space has been formed by their composition*); rather, these parts can only be thought of [as being] in it. Being essentially unique, the manifold within it as well as the general universal concept of space are based solely on limitations.

We can argue that the above corresponds to the fact that space is presented in the coordinates of the "spatial infinity" (SPI). In Kantian terms, when we think of any concept of space, we must think of it as a representation that is contained within an infinite set of different possible representations as their common note, because as a concept, this concept encompasses them (these different possible infinite representations) *under itself*, as Kant states. As for the hypothetical *concept of infinite (given) space*, as a *concept*, it should be able to encompass *under itself* as a common note the representations of the infinite set of possible infinite spaces (which imply this common note of their members – *the infinity*) – which is not possible due to the fact that this unique and infinite space cannot be constituted by the composition of different possible infinite spaces – as in the assumption above.

The interdiction above is similar to Russell's paradox: if the concept of infinite space, like any concept, were a representation contained within an infinite set of different possible representations of infinite spaces[39] (which, according to Kant, would appear as "their common note"), this concept should contain these representations *under itself* (because we have said it is a concept); but this is not possible because this unique and infinite space would be *identical* either to the infinite set of different possible representations of spaces (but that would mean it is the result of a composition, which cannot be the case either in itself or according to Kant's statement), or with infinite spaces as elements of an infinite set of infinite spaces, and therefore, it would no longer represent that "unique", "all-encompassing" space (similar to the concept of "set of all sets"); otherwise, this concept of space would have to be under a more general concept, that of a "more" infinite, "more" unique space that would contain this one and others like it as "their common note", and so on. But then we would never reach the "unique" space that encompasses ("all-encompassing") all others *under itself*, and its uniqueness and all-encompassing nature would contradict themselves – that is, that space is "an infinite magnitude given, essentially unique and all-encompassing", which "*cannot be constituted by parts added previously*".

Similarly, *as a concept*, space cannot be thought of in such a way that it contains **in itself** an infinite set of representations ("as parts of space that are simultaneous *in infinity*" – infinite space is *given* all at once, simultaneously),

[39] In the 3rd argument, "infinite spaces" is not explicitly mentioned, but it is implied insofar as the "common note" of the concept of infinite space necessarily presupposes *under itself* infinite spaces as representations of an infinite set of such representations. Therefore, we have the "infinite set of infinite spaces", since it is not possible to derive a single, infinite space from an infinity of finite spaces.

because, *as a concept*, it must contain them *under itself* – which is impossible, as shown above. But, Kant states, this still happens, in the sense that the infinite space is *only thought*, but *not as a concept* (we have established that it cannot be determined as a concept, that is, as containing the infinite representations *under itself*), but rather as containing *within itself* (not under itself) those representations. Therefore, it cannot be thought of as a concept, but *only as a pure a priori intuition*.

This reconstructed argument, although compact, hopefully clarifies to a large extent Kant's argumentative strategy on this point. One initial observation is that, although it seems like a circular argument, since it appears to demonstrate what would initially be presumed – that space is an infinite *given* magnitude, essential and unique, and that its parts are simultaneous *in infinity*, thus preserving the regime of intuitions by definition (as *immediate* and *unique*) – still, without my interpretation, which involves an analogy with the strategy used in the construction of the "set of all sets" with the avoidance of paradoxes (the Zermelo-Fraenkel version), which I consider valid here, the interpretation of Kant's argument would have been weaker. For the reasoning by *reductio ad absurdum* used here by Kant not only avoids contradiction but also makes the conclusion plausible. However, this means that Kant avoided the paradox of set theory that would have inevitably arisen if he had considered infinite space as a concept.

For the purposes of this essay, I will retain from the above what Wilson argues regarding intuitions, singularity (here, the *uniqueness* of infinite space), and immediacy (here, the fact that it is *given*). From this perspective, the two are associated with the expression *in itself*, as opposed to *under itself* (elements emphasized by Kant himself in his text), where "under itself" is associated with obtaining concepts through composition from several representations as a common note – mediated. I argue that space being infinitely *given* as a pure a priori form is similar to immediacy in Wilson's sense, but only in *this case* of grounding space as pure a priori intuition; in the case of determining regional spaces through the construction in pure intuition from mathematics, Parsons' concept is valid, as it admits in the immediacy of intuition non-immediate parts – for this case of "intuition" (empirical intuition) represents only an isolated and particular case.

Based on what I stated above, I will summarize my argument as follows: according to the metaphysical exposition, the two so-called criteria (singularity as uniqueness and immediacy as being *given*) are assumed by Kant in an exemplary manner for distinguishing space as a pure *a priori* intuition from considering it as a concept. From this perspective, the all-encompassing uniqueness of space (singularity), as well as the simultaneity of the parts of space in the infinity (the fact that it is an infinitely *given* magnitude), are foundational for accepting space as an intuition and not as a concept: "hence, it follows that an *a priori*, and not an empirical, intuition underlies all concepts of space"[40] (B 40).

[40] Imm. Kant, *Critique*, p. 69.

What I want to emphasize here is that all spatial determinations or parts of space as representations are related as "limitations" to this infinitely given, essentially unique, and all-encompassing space, and therefore, they are related to it as pure a priori intuition, not as a concept. In this case, all concepts of space are also related "as limitations". Wilson's argument that mereology could explain Kant's 3rd argument in the Metaphysical Exposition, beyond what has been shown, is not valid because Wilson does not consider the relation to space as an *infinite* whole (an infinitely *given* magnitude). This aspect is essential for Kant because he was *precisely* concerned with showing that space, *in its infinity*, cannot be thought of as a concept, but only as a pure a priori intuition. Mereology, however, does not address the relationship of parts to the infinite whole; mereology excludes the whole as infinite and accepts the composition of the whole from its parts (the "principle of composition"). Kant did not avoid the antinomies by excluding the infinity of space; rather, he relied on it to formulate the argument for space as a pure a priori intuition (since space cannot be conceptually defined *in itself* as infinite – the infinitely given space cannot be positively determined without contradictions). Furthermore, the infinite space cannot be composed of particular infinite spaces as their common feature ("through composition").

To illustrate a valid alternative to mereology, which I consider as a way of explaining the 3rd argument in the metaphysical exposition of the concept of space, and at the same time to indicate a coherent understanding of the criteria of intuition in relation to concepts, I will proceed to the introduction of what I mentioned at the beginning of this essay, that is the *epsilon* operator from analysis. I propose it as an analogy from mathematics both to complete the reconstruction of Kant's argument regarding the determination of space as a pure intuition (and not a concept), and to subsequently clarify the status and nature of the schematism as a mediator between intellect and sensibility.

I will now proceed to formulate the $\varepsilon$ definition of the limit of a sequence of real numbers: A sequence of real numbers $(a_n)_{n\in\mathbb{N}^*}$ is said to converge to a real number *l* if, for every $\varepsilon > 0$, there exists a natural number $n_\varepsilon$ such that, for every $n \geq n_\varepsilon$, we have:

$$|a_n - l| < \varepsilon.$$

Intuitively, this means that the terms of the sequence get arbitrarily close to *l* as *n* becomes sufficiently large. More concretely, we can note the following:

- $\varepsilon$ represents the interval around the limit *l*; expressed as *l-Epsilon, l + Epsilon*;
- $n_\varepsilon$ represents a treshold beyond which all terms of the sequence $(a_n)_{n\in\mathbb{N}^*}$ lie within a distance less than $\varepsilon$ from $l$.

Thus, any term of the sequence with an index *n* sufficiently large is close to $l$ in the sense that their difference is less than a given $\varepsilon$, but greater than 0 ($\varepsilon > 0$ as per the definition). In this case, the sequence never actually reaches the limit $l$. This tool ($\varepsilon$) is fundamental in mathematical analysis, not only for determining the convergence or divergence of sequences/series but also for illustrating the limits of figures in relation to an infinite extension, such as Kant's spatial delimitations with respect to the infinity of space. If we consider a limited space in the shape of a circle and infinite space as the space containing this limited space, it is straightforward to show that, regardless of how large a chosen circle is (i.e., an interval of distance from a point), there will always exist a point or an interval not included within that circle. We can use the same $\varepsilon$, along with the concept of **neighbourhood**, to apply reasoning based on **the limit at infinity**. Concretely, we demonstrate that, even if we take increasingly larger circles around a point, there will always be a point outside of them; or, no matter how far from the initial point we imagine another point forming the radius of a circle (or a sphere), it will always be possible to assume a point or a geometric locus outside of the circle (or sphere).

Let's consider a point *p* in a space (for example, in a metric space such as R). A circle of radius $\varepsilon$ around the point *p* will determine the interval $(p-\varepsilon, p+\varepsilon)$ for $\varepsilon>0$. Therefore, the circle of radius $\varepsilon$ includes all points *x* such that $|x-p|<\varepsilon$. However, no matter how large we choose $\varepsilon$ around the point *p*, there will always be a point outside this circle. For example, if we take $\varepsilon$ large enough to include a certain interval around *p*, there are points outside this interval (i.e., points farther from *p* than any *x* within the interval) that are not included in the circle.

Consider a point $p \in$ R and a circle of radius $\varepsilon$ around it. At each step, we will prove that no matter how large $\varepsilon$ is, there exists a point outside the circle that is not included in it.

We choose an arbitrary value $\varepsilon$, defining a circle of radius $\epsilon$ around the point *p*, i.e., the interval $(p-\varepsilon, p+\varepsilon)$. For any $\varepsilon$, the circle includes the points x such that $|x-p|<\varepsilon$. If we consider a circle of radius $\varepsilon$, we can choose any point *x* that is not inside this circle, i.e., $|x-p|\geq\varepsilon$. Such a point does not lie within the interval $(p-\varepsilon, p+\varepsilon)$, and it is evident that there always exist such points. If we take a larger $\varepsilon$ (i.e., choose a larger circle around *p*), the circle becomes wider. Even for very large circles, we can still find points outside the circle, at greater distances from *p* that will not be included within it.

These illustrations from elementary analysis suggest, by analogy, an alternative or complementary approach to the reconstruction of the 3rd and 4th arguments in the B edition of the *Critique* regarding the "metaphysical exposition" of space, as outlined above, concerning the determination of space as pure intuition rather than as a concept. By analogy, the delimitation of particular spaces within pure intuition is similar to the separation of particular neighbourhoods ($\varepsilon$ - approximations) within an infinite space. This delimitation preserves the continuity and the infinity of Kantian space and highlights the non-conceptual character of the infinite space and/or the impossibility of conceptually determining the infinite (without reaching contradictions, as demonstrated in the reconstruction of the argument from the "metaphysical exposition" above). In other words, $\varepsilon$ provides a mathematical model that respects this infinite nature without reducing space to discrete elements.

The definition of the limit using $\varepsilon$ illustrates how a concept can incorporate both the discrete and continuous aspects of mathematics: $\varepsilon$ enables the infinite divisibility of an interval by defining the neighbourhood of each point. This directly reflects the infinite divisibility of space, as mentioned by Kant, where all parts are "simultaneous in infinity". In other words, $\varepsilon$ provides a mathematical model that respects this infinite nature without confining space to discrete elements. The continuum is maintained, regardless of the chosen $\varepsilon$, for there is always a threshold $n_\varepsilon$ beyond which all terms remain within the neighbourhood of the limit. This corresponds to the continuity of space in pure intuition and facilitates mathematical constructions such as lines, surfaces, or volumes.

On the other hand, $\varepsilon$, as understood above, is sufficient for general mathematization because it respects the continuity of space and allows for infinite divisibility without contradicting the infinite simultaneity of its parts, as Kant requires. In this context, we can use $\varepsilon$ as a conceptual tool to show how the mathematization of space is possible and how $\varepsilon$ enables this processing without restricting the transcendental a priori level of schematism, in contrast to Wilson's view, as I will subsequently demonstrate. Finally, $\varepsilon$ allows for the construction of *extension* and *figure*, elements of pure intuition that form the basis of empirical intuition (they are the elements that remain after removing everything from the empirical intuition that belongs to sensation) (A21/B35).

Furthermore, Kant states that all geometric principles, for example, that in a triangle the sum of two sides is greater than the third, are never deduced from the general concepts of line and triangle, but from intuition, that is a priori, with apodictic certainty. Here, we deal with the construction within pure intuition, which I have illustrated through the analogy above. From this perspective, I think I have opened the possibility of showing that the discussed immediacy of intuitions may be more correctly and coherently understood in relation to an immediacy that accepts non-immediate parts (Parsons).

As for the supposed advantage of the mereological model to the subordination relationship used by Kant, presented synthetically in the first part, Wilson emphasized that the mereological part-whole relationship is transitive, asymmetric, and non-reflexive. The advantage would thus lie in the fact that through this model it is determined that intuitions make intelligible relationships such as right/left, up/down, and back/front, or the incongruence of mirror images of hands, issues discussed by Kant in the *Prolegomena* (§ 13). Kant could have defined such relationships through "mereological primitives"; therefore, mereology could form the basis of his treatment in *Prolegomena* of identical but non-congruent objects. Wilson argues that the difference between right and left is a difference in the arrangement of parts within a representation; therefore, it must be attributed to the structure of an intuitive representation, rather than to concepts. Kant's intuitions, therefore, should not be compared to singular terms, but to models whose internal structures are expressed in terms of mereological relationships, where space-time regions relate to one another. Kant highlights the relational nature of intuitions in a final section of the Transcendental Aesthetic added in B: "everything in our knowledge which belongs to intuition feeling of pleasure and pain, and the will, not being knowledge, are excluded contains nothing but mere relations; namely, of locations in an intuition (extension), of change of location (motion), and of laws according to which this change is determined (moving forces)"[41] (B 66-7). Wilson considers these types of relations to pertain to mereological ones.

My comment here refers to the fact that, although mereology seems to be more suitable than the relation through membership in classes, it actually doesn't offer much benefit in the case of incongruences: for example, it can only point, *but only a posteriori*, to the source of these incongruences (that is, to the empirical), as Kant himself stated. Moreover, as a model for the "part-whole" relation, mereology does not imply an a priori structure, since incongruence is empirically observed and refers to the fact that intuitions about objects in space communicate a certain orientation of these objects.

Regarding mereology as the structuring model at the level of (the singularity of) intuitions, as well as the importance of the syntheses involved in determining sensibility, I return here to the discussion announced in the first part of my paper, with Kant's completion, according to which intuitions are presented along with the determination of the *unity* of their manifold, a completion that Wilson did not retain in his text. This is an important element, ignored by Wilson. For, as conditions of possibility that presuppose *unity*, pure a priori intuitions cannot have *only* a mereological structure behind them, since even the *synthesis of apprehension* and *perception* presuppose this *unity* (B 161)[42] – the influence of the intellect on sensibility. Here, a major role is played by schematism, which, as we have already seen in the first part, Wilson says can be substituted by the mereological structure of a geometry of solids. Although more than the synthesis of *manifold* is not needed for a mereological structure, reducing schematism to the latter is an error. Furthermore, this is not possible, since, if we reduce the claim that intuition can *only* be singular in the sense of mereology, the fact is not supported by what Kant actually states at B 160–B162.

[41] *Ibidem*, p. 87.

[42] "Thus *unity of the synthesis* of the manifold, without or within us, and consequently also a *combination* to which everything that is to be represented as determined in space or in time must conform, is given a priori as the condition of the synthesis of all *apprehension* – not indeed in, but with these intuitions." (Imm. Kant, *Critique*, pp. 70–71).

Because the intervention of such a mereological structure can only pertain to the regime of the empirical level, we deduce that, since schematism presupposes *a priori* syntheses, it cannot be reducible to the empirical – which is precisely what Wilson claims. On the other hand, it this was the case, it would make both mathematics and the mathematization of phenomena impossible, as well as the synthetic a priori character of these phenomena. Moreover, the structure of the part-whole relation in mereology requires the contribution of syntheses that are not found in sensibility. In fact, this structure requires the contribution of both syntheses: that of the composition of the *homogeneous* in mathematics and that of the manifold of intuition (*nexus*)[43]. Kant does not reduce geometry "in general' to the three-dimensional space or to the geometry of solids, not in the *Critique*. For, the synthesis of *composition* (as *the synthesis of the homogeneous* in everything that can be examined *mathematically* – as a synthesis of *aggregation*, which refers to *extensive* magnitudes, and of *coalition*, which refers to *intensive* magnitudes), along with the synthesis of the manifold (*nexus*), are *both* present in the mathematical construction through the concept of *conjunction*, whose exponent is *unity* at the level of intuition.

Kant clearly states that when, for example, from the empirical intuition of a house, we make a perception through the apprehension of its manifold, what serves as foundation here is *the necessary unity* of space and the sensible external intuition in general, because we somehow draw the shape of this house in accordance with this synthetic unity of the manifold in space. But *the same synthetic unity*, if we disregard the form of space, originates in the intellect and is the category of the synthesis of the *homogeneous* in an intuition in general. Finally, this perception (synthesis of apprehension) must entirely conform to the category of *quantity*. Here is what Kant further claims at B 160: "First of all, I may draw attention to the fact that by *synthesis of apprehension* I understand that combination of the manifold in an empirical intuition, whereby perception, that is, empirical consciousness of the intuition (as appearance), is possible."[44]

Therefore, this synthesis in an intuition is the synthesis of *composition*, of the *homogeneous* in everything that can be examined *mathematically*. Moreover, the synthesis of the *homogeneous* is the synthesis of the elements of the manifold that do not necessarily belong to each other, such as the two triangles in which a square is divided by its diagonal and which do not necessarily belong to each other (B 202).

As a first conclusion, intuition as *singular* must be associated with the original synthetic *unity* of apperception and, therefore, with the contribution of the function of the understanding through the transcendental unity of apperception at the level of sensibility, which surpasses the empirical framework imposed

[43] Imm. Kant, *Critique*, p. 197, B 201 (n.).
[44] *Ibidem*, p. 170.

by mereology (through the involvement of both syntheses – of *composition* or *homogeneous* [in mathematics] and of the manifold [*nexus*]). These processes make intuition an "exponent" of this unity; however, at the same time, intuition is also an exponent of the possibility of non-immediacy: for it presupposes unity, the singularity of intuition accepts manifold, and thus non-immediacy.

However, as we saw in the first part of our paper, Wilson argued that the objectivity of intuition must be presumed *before* the categories participate, as intuition would logically and temporally contain, prior to any experience, principles that determine the relations of objects (A 26/B 42). But Kant only states here that "the form of all appearances can be given prior to all actual perceptions, and so exist in the mind a priori, and how, as a pure intuition, in which all objects must be determined, it can contain, prior to all Experience, principles which determine the relations of these objects"[45]. In B 42, Kant did not discuss "objectivity", but rather space as pure form of sensibility, which encompasses the principles of the relations between phenomena, without talking about phenomena as *objects*. Kant does not define these relations in the sense assumed by Wilson. What we know is that at the level of pure a priori form, we are dealing with *extension* and *figure*.

At the foundation of perception are figure and extension, which pertain to the synthesis of the *homogeneous* (B 162). In this respect, let's recall the example of the *empirical intuition* of a house, where its perception, which occurs along with the apprehension of its manifold in the form of a house, depends on the synthesis of the homogeneous. This synthesis is involved in anything that can be determined mathematically and cannot be *deduced from* the mereology of part-whole relations (although it can be found there). We recall that Wilson claims that mereology *alone* would be the basis of the singularity of intuition. Wilson has considered the types of intuitions in terms of his own interpretation of the criterion of singularity. We know that Kant argues that sensations are included in intuitions to the extent that they allow themselves to be ordered within a spatio-temporal system of relations (A 20/B 34). According to his interpretation, sensations are merely the medium through which the mereological structure of an object of empirical consciousness is represented. Intuitive representations indicate their object by representing its mereological structure, and in the case of empirical intuitions, its empirical properties.

Considering pure intuitions not in relation to empirical intuitions, but in themselves, Wilson argues that, for Kant, pure intuitions of space and time are the mediums through which the construction of mathematical objects takes place (*Prolegomena* § 10). In this sense, pure schematism provides the proper tools of mathematical construction (A 140-1/B 180), and "a schema is a model obtained by interpreting a mathematical concept in a mereological system"[46]. Here, Wilson approaches Kant's schematism through Tarski, who showed that mereology provides

[45] *Ibidem*, p. 71.
[46] D.K. Wilson, "Kant on Intuition", p. 260.

the logical foundations for a geometry of solids, a geometry that admits only figures to the body[47].

Wilson argues that constructing a concept in intuition, i.e., providing a schema for a mathematical concept, is a formal procedure through which the concept is modeled within a mereological system sufficient for the geometry of solids. Kant states that "certain universal conditions of construction" determine the object of a mathematical concept (A 714/B 742). These conditions are determined by the structure of space, but until space is understood in mereological terms, we do not have a clear conception of how these conditions are established. These conditions are nothing but the axioms of mereology (e.g., the fact that the part-whole relationship is transitive) and the special axioms necessary for the geometry of solids. Moreover, we can be certain that the axiomatic system of three-dimensional Euclidean geometry has a model in the geometry of solids – that is, in Kantian terms, geometrical concepts can be accompanied by schemata in the pure intuition of space. Wilson concludes by saying that "unfortunately, there is ample evidence that Kant himself did not appreciate the wholly formal procedure for obtaining schemata for geometrical concepts in the pure intuition of space"[48].

However, schematism primarily belongs to intellect, and the way Kant discusses the schema as a formal condition of sensibility is that this condition belongs to sensibility but is realized by the intellect through imagination, which, at its limit, is even the intellect itself (B 162 n; B 105; B 197). At B 180, Kant explicitly states that "the schema is in itself always a product of imagination. Since, however, the synthesis of imagination aims at no special intuition, but only at unity in the determination of sensibility, the schema has to be distinguished from the image."[49]

This is a crucial aspect, as even within a specific model like mereology, the schema must be distinguished from the image (or images): the latter merely guide schematism at the empirical level. Mereology is not a universal model, contrary to Wilson's claim that identifies it with schematism. Kant states that "this representation of a universal procedure of imagination in providing an image for a concept, I entitle the schema of this concept"[50] (B 180). Schemas underpin sensible concepts, as Kant further explains (A 141/B 180), and this assertion is made in connection with mathematical construction, distinguishing between schema and image: "No image could ever be adequate to the concept of a triangle in general. It would never attain that universality of the concept which renders it valid of all triangles, whether right-angled, obtuse-angled, or acuteangled; it would always be limited to a part only of this sphere. *The schema of the triangle can exist nowhere*

[47] *Ibidem*.
[48] *Ibidem*, p. 260.
[49] Imm. Kant, *Critique*, p. 180.
[50] *Ibidem*.

*but in thought. It is a rule of synthesis of the imagination, in respect to pure figures in space*."[51] [my emphasis]

With respect to empirical concept, Kant explicitly states that it "always stands in immediate relation to the schema of imagination, as a rule for the determination of our intuition, in accordance with some specific universal concept"[52] (B 180). Thus, the image is subordinated to the schema as a rule belonging to thought itself, unrelated to sensibility or intuition – the schema does not pertain to any particular construction within sensibility, such as that of mereology, *though it can condition it*. On the one hand, schema as procedure is general and distinct from images; and on the other hand, the latter guide and select appropriate schemas within a particular empirical model. Therefore, it can be said that the images *specify* the schematism, adapting it according to the needs of "local" construction, so to say. Thus, we observe a form of schematism – an operation of the imagination and intellectual syntheses – *even within* mereology. However, this schematism is not precisely Kant's schematism of the intellect. It represents a contextual adaptation, tailored to specific applications, but always rooted in the overarching intellectual framework that governs the unity of thought and intuition.

The participation of transcendental objective unity through schematism is preserved by the famous "argument of the identity of function" (B 105). This argument became well-known in Kantian exegesis primarily due to Karl Reich[53], who attempted to apply a mathematical interpretation to the concepts and procedures used by Kant in his first *Critique*. However, Wilson places Kant's transcendental schematism on the foundation of mereology, which would imply that mereology acquires the characteristics of schematism, which is not the case. The distinction is the following: schematism is a priori, general, and transcendental, while mereology is simply a model – a specific construction intended to solve certain problems related to the distribution of parts within wholes, based on empirical experience, with the explicit task of avoiding antinomies[54].

Imagination, which runs schematism in relation to experience, belongs to sensibility only when it works *within* sensibility, where it can model experiences

[51] *Ibidem.*

[52] *Ibidem.*

[53] Karl Reich, *Völlstaendigkeit des Kantischen Urteilstafel*, Berlin, Richard Schoetz, 1932; reprinted as *The Completeness of Kant's Table of Judgments*, translated by J. Kneller, M. Losonsky, Stanford, Stanford University Press, 1992.

[54] Here is what G. Küng says about mereology: attempting to find his own solution to the antinomies of class theory, the "father" of mereology, Leśniewski, developed a new and specific theory, mereology. Within this framework, antinomies do not arise because mereology does not deal with genuine classes but only with concrete entities. Instead of references to abstract classes, it contains references to concrete collective totalities, to "wholes". The arguments "A' and "B" in the proposition "A is B" are not considered proper names of classes but rather as referring to individual, concrete objects. (See Guido Küng, *Ontology and the Logistic Analysis of Language*, New York, The Humanities Press, 1967, pp. 105, 111).

mereologically. However, it is ultimately a function of the intellect (B 105). The determination of phenomena at the level of sensibility in accordance with schematism cannot function properly if schematism is reduced to the principles and constructions of mereology. Such a reduction would simply limit the scope of mathematization – and mathematics as a whole – to mereology. Let us not forget that mathematical construction takes place in the pure intuition, not in the sensible or the empirical intuition.

Wilson's interpretation would imply an overlap of schematism with this form of space or a reduction of the entire schematism to mereology, which is not possible. If that were the case, mathematics and mathematization themselves would be entirely reduced to mereology. However, I emphasize that Kant deliberately leaves the relations at the level of intuition *undetermined* – not out of ignorance, but precisely to enable the "route" categories – schematism – principles of pure intellect – phenomena (intuitive representations).

For schematism formulates the "conditions for the principles of pure intellect" (A 136/B 175), being co-substantial with both the categories and phenomena. Kant assigned schematism a position between the categories and the "mathematical principles", thus enabling the application of mathematics to phenomena. In this framework, mereology could potentially be "above" intuitive representations only as one of the options made possible by the conditions of experience – a possibility not confined to Euclidean geometry (*pace* Wilson). Mereology may indeed be part of a separate construction, such as the one found in *MANW* (*Metaphysical Foundations of Natural Science*), but not *in general*. Therefore, it is not (and could not be) a part of the Analytic of the Intellect.

The structuring of phenomenon independently of any action of the intellect is not possible, much less through mereology, as mereology itself must find its condition of possibility also within the intellect. Mereology can only be admitted in the framework of the empirical, for other, more general mathematical structures can also be developed based on schematism. Schematism is the condition of possibility for the "mathematization" of experience; it does not presuppose nor is it reducible to a particular mathematics or geometry (such as solid geometry or Euclidean geometry, for example). Those can be *separate construction options* derived from schematism.

Mereology cannot substitute for schematism, nor can it underlie intuition. According to Kant, schematism, which involves both syntheses, forms the foundation of intuition. The synthesis of the *homogeneous* is the condition of possibility for any intuition, even a mere empirical one. This is because empirical intuition also presupposes *unity* as an exponent through the synthesis of apprehension in any perception. Moreover, this unity is *inherent* to intuition itself, accompanying it *prior* to any perception. Thus, singularity is possible only under the condition of the *unity* of the intellect, which serves as a condition of possibility through the synthesis of the *homogeneous*, acting as its exponent. It is not established by a mereological structure, which would primarily relate to the other synthesis – the synthesis of the manifold – in which a necessary connection between elements (*nexus*) is expressed. From this perspective, I ground singularity not on a mereological part-whole relation but on the synthetic *unity* of apperception *through* the synthesis of the *homogeneous*, which resides in the intellect, not in sensibility – while this unity is also reflected in intuition through its form, presenting itself as singular, as *one*.

The mereological schema can be a solution, but only if based on the unity of the intellect through the syntheses of the *homogeneous* and the *manifold*, in a separate construction dedicated to modeling the geometry of solids (or the Euclidean geometry). *Extension* and *figure*, the forms of intuition that remain after the removal of all sensation from intuition, are grounded in the synthetic unity of apperception, which provides the singularity/unity of intuition. Similarly, schematism, as mediator between categories and mathematical principles, provides a mathematical tool that is based not on a mereological structure but on the synthetic unity through which the intellect introduces a transcendental content into sensibility. In the Transcendental Aesthetic Kant referred to it as *the singularity* of intuition, while in the Deduction of the Categories he referred to it as *the unity* of intuition.

In fact, the problem amounts to the classic issue of the mediation between intellect and sensibility; but objectivity is received from the categories, not from sensibility. On the other hand, the singularity of intuition pertains to its possibility of being one, to its unity, and unity is already a mark of the original unity of apperception (the concept of connection), which, as intellect, introduces unity at the level of sensibility. Therefore, we cannot speak of objectivity without unity, nor of unity without the contribution of the intellect *via* the schematism of the intellect at the level of sensibility which presupposes both syntheses (that of composition/ homogeneous and that of the manifold as *nexus*).