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SYMPOSIUM

Singular Representation, Construction, and Apprehension: Comments on Sutherland's Kant's Mathematical World

Tyke Nunez

Philosophy, University of South Carolina, Columbia, SC, USA
Email: AN16@mailbox.sc.edu

Abstract
I begin by introducing Sutherland's account of why Kant takes mathematics to require a non-conceptual source of knowledge of bare numerical difference. Given that objective space and time are wholes, however, I wonder why, according to Sutherland, such a source of knowledge can't be circumvented by taking each spatial or temporal position to have conceptualizable features sufficient for distinguishing them. I then point to an issue with Sutherland's appeals to "construction" and argue that if Sutherland more sharply distinguished between the syntheses involved in mathematical construction and empirical apprehension, then he could avoid some problems that his reading faces.

Keywords: Kant's mathematical world; Daniel Sutherland; space; geometry; synthesis; construction; Leibniz

In his book, Daniel Sutherland (2021) encourages his readers to rethink Kant's philosophy of mathematics, and in light of this, to also rethink Kant's account of empirical cognition. At the heart of Sutherland's project is a reassessment of the role of magnitudes in Kant's philosophy. Kant explains the concept of magnitude (*quantum*) as "the consciousness of the homogeneous manifold in intuition in general, insofar as through it the representation of an object first becomes possible" (B203). My comments will focus on the role of this concept of magnitude in Sutherland's account. I think the second half of Sutherland's book is especially excellent, and I'll begin by pointing out why I love chapter seven, before posing a question that I was left with after reading the later chapters. Then I will turn to a few interconnected problems that I see in the earlier parts of the book and propose a friendly amendment to the account concerning the role of construction and the relation of the categories of quantity to intuition that I think will resolve them.

1. Homogeneity and Why Intuition is Fundamental to Mathematics

Chapters seven and eight of Sutherland's (2021) book offer the deepest reflection I know of on the distinctive structure of intuition. I take the alpha of Kant's theoretical philosophy to be his division between sensibility and understanding. Because these chapters make significant progress on exactly why intuition makes an irreducibly non-conceptual contribution to cognition, I take them to bring our understanding of the origins of Kant's theoretical philosophy forward in a significant and fundamental way. Thus, if you take anything away from these comments, I hope that it is that chapters seven and eight—and really chapters four through nine—of Sutherland's book are well worth reading and rereading.

To convince you, let me say a little bit about what Sutherland does in chapter seven. Here, Sutherland's focus is on the notion of homogeneity. He distinguishes mere logical homogeneity

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from what he calls "strict homogeneity." Two things are logically homogeneous in some respect when they fall under the same concept. For example, a dog and a horse are logically homogeneous with respect to the concept <mammal>. Two things are strictly homogeneous, however, when they are completely logically homogeneous and there is no qualitative difference between them. This is the kind of homogeneity Kant has in mind when he explains the concept of magnitude as "the consciousness of the homogeneous manifold in intuition in general, insofar as through it the representation of an object first becomes possible" (B203). With strict homogeneity, we have two things that will fall under all of the same concepts and are qualitatively identical yet numerically distinct. Examples of this kind of bare numerical difference include two identical one-inch cubes, two identical raindrops, and two drops of water on two needle points. As Sutherland points out, "the representation of strict homogeneity [or bare numerical difference] requires something extra-logical in the sense that it requires something beyond the reach of conceptual representation on its own" (*p.* 201). A basic task of intuition is to provide this kind of extra-logical knowledge of numerical difference.

While laying out how intuition performs this task, Sutherland also argues that Kant takes the representation of such bare numerical difference to be foundational to mathematics. To get a sense of why, note first that, according to Kant, "a part of space, even though it might be completely similar and equal to another, is nevertheless outside of it, and is on that account a different part from that which is added to it in order to constitute a larger space" (A264/B320). Furthermore, Kant claims that "according to mere concepts of the understanding, it is a contradiction to think of two things outside of each other that are nevertheless fully identical in respect of all their inner determinations (of quantity and quality)." This is because the understanding only represents a thing through its inner determinations, and so if these determinations are identical then "it is always one and the same thing thought twice (numerically one)" (20:280). Thus, because Kant holds that the composition of strictly homogeneous parts into ever larger wholes is characteristic of "everything that can be considered mathematically" (B201n), and such homogeneous parts are fully identical with respect to their inner determinations, the representation of bare numerical difference that intuition makes possible is fundamental to mathematics. This, Sutherland argues, is the basic reason why intuition is the foundation of all of mathematics on Kant's account.

2. Why Could not Concepts do the Work of Intuitions, According to Sutherland?

To put my critic's hat on, by the end of chapter seven, I was left with a question—or a series of interconnected questions. Suppose that we have a view, such as one might attribute to Aristotle or Leibniz, on which the attributes of mathematical objects are qualities in the sense of specific differences of the objects. For example, suppose it is a specific difference of cubes that the length of their diagonals is root three times the length of one of their sides, or it is a specific difference of, say, 12 that it equals 5 + 7. On this view, since the qualities of mathematical objects are specific differences, they are conceptualizable. And since these are conceptualizable features, it looks like mathematical objects can be distinguished conceptually. Now, why exactly is Kant justified in rejecting this kind of view on Sutherland's reading? Why cannot we treat "equaling 5 + 7" as a quality of 12?

To put this in a more Kantian parlance, Kant would agree that 12's equaling 5 + 7, or a triangle's angles adding up to 180 degrees, are synthetic predicates of their objects; it's just that he would reject the claim that they are analytic predicates of them. What separates these two kinds of predicates on Sutherland's reading? And what reasons does Sutherland's Kant have for insisting against Leibniz and Aristotle that this separation is fundamental?

With these questions, I suspect that Daniel's answer will have to do with numerical difference despite conceptual identity and the way that Kant allows for the formation of mathematical concepts, although the original representation that these concepts presuppose must be an intuition. I think we can put a finer point on this worry, however, by coming at the issue through intuition.

Kant maintains that the wholes of space and time are prior to their parts. As a result, it looks like each identical in-itself part of space and time will have properties that are specific to it. So just as the number 12 has properties that look specific to it and would differentiate it from all other numbers, each part of the one whole space seems to have properties specific to it that would be adequate to differentiate the parts of space (and time) from one another. For this reason, it looks like the specific differences of numbers, as well as the parts of space and time, should be sufficient to conceptually distinguish the numbers or the parts of space and time. But if that were the case, then it seems like we do not really have portions of space and time that are identical but distinct; concepts would be able to do the work of intuition, and we could jettison intuition. What is it, on Sutherland's reading of Kant, that blocks this kind of move?

I suspect that at least part of Sutherland's answer to these questions will be that only intuitions can represent singularly in the sense developed in his fifth chapter. That shifts the bump under the rug, but it shifts it in a fruitful way. Now we can ask, "Why is representing singularly so important? And why must we distinguish it from the general representing distinctive of concepts?"

These questions cut to the heart of the motivation for the Kantian distinction between intuition and concept, and thus for the starting point of Kant's theoretical philosophy. I do not know of anyone who has given these questions a satisfactory answer, and thus I do not know of anyone who has seen to the core of this dimension of Kant's project (although, of course, many people—and especially Lanier Anderson—have made progress on them). Still, I think coming at these questions through Sutherland's book in the way that I just have lets us ask them in a newly clear-eyed way, and it should reveal a fundamental and unappreciated motivation for Kant's radically un-Leibnizian innovation of distinguishing intuitions in kind from concepts.

3. A Friendly Amendment: Two Ways the Concept of Quantity Determines Intuition

Now I'd like to turn to the earlier chapters of the book, where one focus of Sutherland's discussion is on the relationship between our concepts and intuitions of magnitudes, and I'd like to offer a friendly amendment to Sutherland's view that I think can clear up some difficulties.

In the first chapter (§1.3, *p.* 16), Sutherland contrasts the interpretation he will develop with one that attempts to separate the conditions of the possibility of experience from the conditions of the possibility of the exact sciences. I agree that these two sets of conditions are intertwined, and I think he is right to think that Kant conceives of the exact sciences as a systematic development of the same knowledge that we have first in everyday experience. Nonetheless, as I reached the end of chapter two, I came to worry that Sutherland was seeing the conditions of the possibility of experience and the conditions of the possibility of the exact sciences as more intertwined than I take them to be for Kant.

My worry stems from how Sutherland is thinking about the construction of the concept of quantity and the role that he sees the categories of quantity as playing in empirical perception. The core example of how the category of quantity is involved in this kind of perception for Kant comes from §26, when he discusses the apprehension of a house. Here, there seemed to be some tension in Sutherland's discussion. On the one hand, when he first introduces the case of the apprehension of the house, he seems to acknowledge that Kant does not think we construct the shape of the house, because he points out how Kant says here that I only "*as it were* draw its shape…" (*p.* 44 n30). On the other hand, as Sutherland goes on, he suggests that the empirical apprehension of the house not only involves merely "*as it were*" drawing its shape, but also actually *constructing* this shape (*p.* 47 n36). Furthermore, he claims that "the cognition of a determinate space or time requires construction in intuition" (*p.* 45 n34). So, although I'm not sure that, on his considered view, Sutherland thinks we construct the shape of the house in apprehending it, there were a few passages that gave this impression.

I do not think, however, that we perform a construction in empirical apprehension according to Kant. The construction of concepts happens through an act of the will, and the concepts of

mathematics are also electively (*willkürlich*) made (A729/B757). When I empirically apprehend a house, however, I see no evidence for thinking that my will is involved, according to Kant. He does not seem to take it to be involved in my "as it were" drawing the house's shape. Kant also nowhere suggests that empirical perception is a part of mathematics or that such perception involves construction. Furthermore, as Sutherland points out, "Kant delimits the field of mathematics by appeal to construction" because mathematics "consists of those cognitions established through the construction of concepts, and only those cognitions" (*p.* 47). Thus, it does not seem that empirical apprehension involves construction for Kant.

If that is right, then Sutherland slips up when he claims that empirical apprehension involves construction. Although this can look like a small slip, it is tied, I think, to a deeper issue that faces Sutherland's reading. In the rest of this section, I will explain why I think Sutherland sometimes slips up in this way and propose a friendly amendment that acknowledges this motivation while prohibiting the slip. In the next and final section, I will turn to the related deeper issue and explain how taking on my friendly amendment will allow him to address it as well.

Why, then, might Sutherland be attracted to the claim that we are performing constructions in everyday empirical apprehension, as in the case of seeing a house? At the beginning of the Axioms of Intuition, Kant claims that appearances cannot be apprehended "except through the synthesis of the manifold through which the representations of a determinate space or time are generated, i.e., through the composition of that which is homogeneous" (B202–203). Of course, we have seen that in mathematics, we compose that which is homogeneous, so it looks like the same kind of act of synthesis is involved in empirical apprehension. Indeed, if we consider, with Kant, the cases of constructing a circle in *a priori* intuition and the empirical apprehension of a circular plate (A137/B176), we might say that the very same act of synthesis is involved in the two cases, since in both the homogeneous manifold is composed into a circle. That is, in both cases, the composed homogeneous manifold of intuition is equidistant from a center point.

Nonetheless, while it is true in this sense that the same synthesis is involved in both the determinate construction of a circle and the determinate empirical apprehension of a circular plate, in the former case we make the *a priori* intuition through an elective (*willkürlich*) act of construction, while in the latter case we are given the empirical intuition, and we determine it through, *as it were*, drawing the circle in apprehension, which is not something that we choose electively to do. Thus, we must be careful about the sense in which it is "the same synthesis" that is involved in the made mathematical and the given empirical case. In both cases, there is a determination through the category of quantity, and both are species of composition. Indeed, the manifold can be composed by each into a determinate intuition with the same shape (as with the plate and the circle). Nonetheless, the cases are separate because of the quite different role of the will in each. My friendly amendment to Sutherland's reading is that he should understand the sense in which the same synthesis is involved in both cases in this way, and thus should not take construction to be involved in the case of empirical apprehension.

4. "Indeterminate Intuition of a Whole" and a Footnote from the First Antinomy

In these same passages, Sutherland also makes clear that he thinks we can have an intuition of a whole within boundaries, such as a spatial figure, although that intuition is indeterminate (*pp.* 45 n34, 85 n41). I'm not clear on what it would mean to have such an intuition on Sutherland's account.

Before I get into why, let me first say that it is in his discussions of the possibility of indeterminate intuitions within boundaries that Sutherland comes closest to taking a stand on issues of direct relevance to the conceptualism/non-conceptualism debate. In this connection, Sutherland is at pains to stay neutral and consistently draws his reader's attention away from the debate and back to issues that Kant is more clearly concerned with. I like this attitude toward the dispute. I tend to find both conceptualism and non-conceptualism to be infused with contemporary ways of thinking

about perception. I suspect that it is in part because the concerns of the debate really stem from this contemporary discussion, not from Kant himself, that, although this debate has attracted a lot of attention from many of the most brilliant minds working on Kant today, the back-and-forth has generated a whole lot more heat than it has light. As a result, I find Sutherland's attempts at neutrality and redirection laudable.

So what makes it difficult to get clear on how an indeterminate intuition of a whole within boundaries is possible on Sutherland's view? He argues that there are indeterminate and determinate magnitudes (*pp.* 84–85), and that determinate magnitudes divide into extensive and intensive magnitudes (*pp.* 55, 96). In chapter four, he solves what he calls the extensive magnitude regress problem by pointing out that although intuitions of extensive magnitudes—like line segments—start and end at determinate boundaries—like points—they are continuous in between; they, therefore, have no smallest parts and so their parts are indeterminate (*pp.* 101, 119). In this sense, the line segment is determinate because it has two end points, but the continuum connecting them is an indeterminate magnitude because it could be indefinitely divided. Here, it seems that what it means to be "determinate" is to be a whole and have boundaries, while to be "indeterminate" is not to have boundaries. Insofar as we think only of the indeterminate portion of our line segment, on Sutherland's reading, we leave out its boundaries, and it is not a whole. Thus, on Sutherland's view, it seems to me that there cannot be an *indeterminate whole* intuition within boundaries; it looks like a *contradictio in adjecto*, as Kant would say.

Sutherland is pushed to accept the possibility of indeterminate wholes enclosed within boundaries by a footnote in the First Antinomy (A426n/B454n). I think if he takes on my friendly amendment, however, and allows that the categories of quantity are deployed in two ways—one in *a priori* mathematical construction, the other in empirical apprehension—then he can read this important footnote in a different way. In the text, Kant says:

> We can think of the magnitude of a *quantum* that is not given as within certain boundaries of every intuition* in no other way than by the synthesis of its parts, and we can think of the totality of such a *quantum* only through the completed synthesis, or through the repeated addition of units to each other.† (A426/B454-A428/B456)[1]

The two attached footnotes are:

> *We can intuit an indeterminate *quantum* as a whole, if it is enclosed within boundaries, without needing to construct its totality through measurement, i.e., through the successive synthesis of its parts. For the boundaries already determine its completeness by cutting off anything further.[2]

> †The concept of a totality is in this case nothing other than the representation of the completed synthesis of its parts, because, since we cannot draw the concept from an intuition of the whole (which is impossible in this case), we can grasp it, at least in the idea, only through the synthesis of the parts up to their completion in the infinite.[3]

[1]Nun können wir die Größe eines *Quanti*, welches nicht innerhalb gewisser Grenzen jeder Anschauung gegeben wird,* auf keine andere Art, als nur durch die Synthesis der Theile und die Totalität eines solchen *Quanti* nur durch die vollendete Synthesis, oder durch wiederholte Hinzusetzung der Einheit zu sich selbst gedenken.†

[2]*Wir können ein unbestimmtes *Quantum* als ein Ganzes anschauen, wenn es in Grenzen eingeschlossen ist, ohne die Totalität desselben durch Messung, d.i. die successive Synthesis seiner Theile, construiren zu dürfen. Denn die Grenzen bestimmen schon die Vollständigkeit, indem sie alles Mehrere abschneiden.

[3]†Der Begriff der Totalität ist in diesem Falle nichts anderes, als die Vorstellung der vollendeten Synthesis seiner Theile, weil, da wir nicht von der Anschauung des Ganzen (als welche in diesem Falle unmöglich ist) den Begriff abziehen können, wir diesen nur durch die Synthesis der Theile bis zur Vollendung des Unendlichen wenigstens in der Idee fassen können.

These are complex passages where Kant is differentiating how we think of an infinite magnitude like space and time from how we think about their parts. Sutherland's focus is on the first asterisked footnote (*pp.* 45 n34, 102ff). He rightly points out that the focus in that note is on the construction of the *quantitas* of a *quantum* through measurement. This involves taking a plurality of units together as a totality, and thus involves an *a priori* mathematical construction that deploys all three categories of quantity. Sutherland rightly reads the first footnote as pointing out that in order to intuit a *quantum* as a whole within boundaries, we do not need to perform such an *a priori* construction.

Now, in line with my friendly amendment, once we recognize that the categories of quantity have two kinds of deployment—one in made *a priori* construction, the other in given empirical apprehension—a new contrast is opened. Rather than reading Kant as affirming the possibility of a completely indeterminate intuition of a whole within boundaries, it looks like the sense in which the intuition is indeterminate is that it has not been measured through an *a priori* construction. That does not entail that it has not been empirically apprehended. After all, it is a whole enclosed within boundaries. This gives us a way of making sense of how Kant could think that we can cognize an extensive *quantum* within boundaries, apart from determining its measure (*quantitas*) (compare Sutherland's discussion, *p.* 120), even though enclosure within boundaries, on Sutherland's reading, seems to require the involvement of the categories of quantity, because to have such enclosure is to have a determinate intuition (*pp.* 43–45). On this reading of the footnote, then, the apprehension of the intuition within boundaries involves the deployment of the categories of quantity in empirical apprehension, while this is nonetheless indeterminate insofar as we have not constructed its measure *a priori* through those same categories. Thus, keeping the amendment in mind, Sutherland is not saddled with the supposition of a *completely indeterminate whole* intuition. It is indeterminate insofar as it has not had its measure mathematically constructed; it is a (determinate) whole, however, insofar as it has been empirically apprehended.

This point may also ameliorate some lingering large-scale discomfort that a reasonable reader might be left with by Sutherland's interpretation. The principle of the Axioms of Intuition has the following formulations in the first and second editions of the first Critique, respectively:

> All appearances are, as regards their intuition, extensive magnitudes. (A162)

> All intuitions are extensive magnitudes. (B202)

According to Sutherland, however,

> A more precise statement of the A-edition principle would be: All appearances are, as regards their **determinate** intuition, extensive ***quanta***. A corresponding more precise statement of the B-edition formulation would be: All **determinate** intuitions are extensive ***quanta***. (*p.* 93, my emphasis)

If Sutherland were to adopt my friendly amendment, however, then there would be a clear reason for Kant not to have said "determinate intuition" in either principle. After all, "determinate" intuition might be read as implying that the *quanta* had been *constructed* mathematically, since this is what Kant means in the First Antinomy by a determinate *quantum*, on my proposal. Such construction, however, is absent with mere perception of the house because there we are not actually constructing its measurement. So, to avoid the suggestion that determinate mathematical construction of the intuition is required, and because he could rely on the place of the Axioms of Intuition in the Transcendental Analytic to convey that the intuitions in question are nonetheless determinately apprehended, Kant had good reason not to include "determinate" in his formulations of the principle. In this way, Sutherland can avoid rewriting the principles as he does, while still holding on to the substance of the point that leads him to want to rewrite them, which is that the

intuition in question cannot include the unapprehended and indeterminate formal intuitions of space and time.

Tyke Nunez is an assistant professor in the philosophy department at the University of South Carolina. His research centers on Kant's philosophy and the history of analytic philosophy, with a focus on issues in the philosophy of logic, mathematics, and teleology. His work revolves around the question: what got lost, philosophically, when Frege and Russell's new mathematical logic displaced older approaches to the foundations of mathematics in which space, rather than logic, served as the bedrock of mathematical knowledge. Among other venues, his work has appeared in *Mind*, *Australasian Journal of Philosophy*, and *Philosophers' Imprint*. Some of his recent work examines Bertrand Russell's early Kantian philosophy of geometry.

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