

KANT AND LEIBNIZ ON NEGATIVE MAGNITUDES

Courtney D. Fugate

The essay entitled *An Attempt to Introduce the Concept of Negative Magnitudes into Philosophy* has often (although not always) been interpreted as the sudden eruption of Hume-inspired doubts in the middle of Kant's otherwise rationalist projects, and as heralding the view of metaphysics later expressed in *Dreams of a Spirit-seer*.¹ For this reason nearly all the attention given to this work is focused on Kant's final and quite brief General Remark, which constitutes less than one-tenth of the essay. The real heart of the text, however, lies elsewhere, and once this becomes clear it also becomes evident that Hume is really irrelevant to the entire issue. Indeed, what strikes many readers as reminiscent of Hume in the General Remark is nearly a paraphrase of a few passages from Crusius's famous *Dissertatio philosophica de usu et limitibus principii rationis determinantis* (1743), and the general tendency of the whole is not essentially different from what is seen in Kant's earlier *New Elucidation*. The truth of the matter – or so I will argue in this paper – is that in this essay Kant actually approaches closer to the original ideas of Leibniz than at any other moment in his career, even closer than did Wolff or his followers. Moreover, I argue that in doing so Kant raises precisely the kinds of difficulties with the Wolffian position on the principle of sufficient reason that, I suspect, Leibniz himself would have raised.

In the first two sections, I will begin by explaining Kant's concept of a negative magnitude and the distinction Leibniz draws between necessary and contingent truths. On this basis, I will argue in section three that not only can Leibniz easily accommodate Kant's concept of a negative magnitude, but that Kant himself was motivated to develop this concept by metaphysical concerns close to those at the basis of Leibniz's earlier account of contingent truths. Finally, in sections four and five I will use this background to provide a comprehensive interpretation of *Negative Magnitudes*, its relation to Kant's earlier writings of the 1750s, and what this tells us about the relation between metaphysics and epistemology during this period in his intellectual development.

I

As in his other writings of the period, Kant begins the present essay with the careful explanation of a series of specific instances of reasoning or “tentative experiments,” in this case regarding what he calls “real opposition” (NG, AA 02:189).² Kant then proceeds to draw from these experiments very general rules that appear to govern the use of certain concepts. His specifically stated aim in this essay is to attempt to introduce the mathematical concept of negative magnitudes into philosophy. Of course, this must not be understood as an attempt to extract an originally mathematical concept and to apply it in philosophy. It must rather be understood as an attempt, by means of mathematical examples, to abstract a specifically *philosophical* concept, one which has, despite its origin, tended to be overlooked by philosophers themselves. But this is not a task that can be carried out all at once, because one must be able to show that the abstracted principle actually has a real application within the wider domain of philosophy. For this reason, the essay itself proceeds progressively, starting in the first section with the mathematical instances of negative magnitudes and moving in the second section to examples from the metaphysical foundations of natural science, psychology, moral philosophy and finally natural science. It is only after this progressive induction that Kant hazards to present a few universal principles which he believes can be shown not only to be applicable to all these domains, but indeed to even constitute the higher-order principles of the real grounds in them.

What then is a negative magnitude? Kant introduces this concept by first drawing a distinction between what he calls logical and real opposition. Logical opposition occurs when two things logically contradict one another; real opposition occurs when two things are not contradictory, and so can both be predicated of one and the same subject, but still cancel out one another’s effects when so predicated. Now, the point of *Negative Magnitudes* is entirely missed if one thinks Kant is here treating of the impossibility of two realities, and thus that he is arguing, *contra* Baumgarten and the other Leibnizians, that it is possible that “two positive determinations exclude each other.”³ The opposition Kant has in mind is one in which two realities actually existing in one and the same thing either partially or entirely cancel one another’s *effects*. Accordingly, Kant defines opposition in general to be where “one thing cancels that which is *posited* by the other.” (NG, AA 02:171). Real opposition or real repugnancy is therefore “based upon the relation of the two predicates of the same thing to each other,” and:

That which is affirmed by the one is not negated by the other, for that is impossible. It is rather the case that both predicates, A and B, are affirmative. However, since the consequences of the two, *each construed as existing on its own*, would be *a* and *b*, it follows that, if the two predicates A and B, *construed as existing together*, neither consequence *a* nor consequence *b* is to be found in the subject; the consequence of the two predicates A and B, construed as existing together, is therefore zero. (NG, AA 02:173; emphasis added)

Kant’s understanding of real opposition as expressed in this passage rests on a counterfactual analysis, and amounts to the following:

- 1) If A but not B is a predicate of substance S, then A posits *a* in S.
- 2) If B but not A is a predicate of substance S, then B posits *b* in S.

3) But if A and B are both predicates of substance S, then neither *a* nor *b* is posited in S.

Clearly A and B cannot be logical opposites, nor can they be logical grounds of their consequences, *a* and *b*. The former is not possible because the same thing must be able to have both predicates, and if they are contradictory opposites then the substance S will be something impossible. More interestingly, *a* and *b* cannot be logical consequences of A and B respectively *either*, because then the existence of A in S would necessarily entail the positing of *a* in S, and the same for B and *b*. In this case it would be impossible for A and B to be posited in S without *a* and *b* also being so posited, as we read in reflection 3719:

If the real consequence were contained in the real ground and posited through it by means of the rule of identity, then it would always be found with latter at the same time. All change is therefore only possible through real relation of ground to its consequence, and the logical grounds are therefore distinguished from real grounds not through the limits of my knowledge, but rather in themselves. (Refl 3719, AA 17:266)

If there is real opposition, i.e. a case where two predicates cancel out one another's effects through being both posited in one and the same substance, then A and B must be the grounds of their consequences in S in a way that is not based upon the principle of identity or contradiction. It follows therefore that A and B are not logical, but rather "real grounds" of their effects, taken both separately and in conjunction. This, indeed, is precisely how the concept of real opposition is tied to the concept of real grounds: For real opposition to even be possible, the opposing grounds posited in a thing must be real and not logical grounds of their consequences, taken both individually and in conjunction. Still, it should be noted that *a* and *b* nevertheless are *logically* opposed in the case described, because they are negative magnitudes of one another. In an example similar to Kant's, if a ship is driven by the west wind 4 miles and is driven by the east wind 3 miles, it is surely a logical contradiction for it to be both 4 miles west and 3 miles east of its original position. But this logical contradiction is not the reason why both do not exist together in the subject. The grounds A and B here are really opposed; their natural consequences *a* and *b* are logically opposed (because they are different magnitudes of the same quantity which are to be predicated of one and the same thing); the result however is something else altogether, namely the mathematical difference between the quantities *a* and *b*.

II

Kant is quite clear in *Negative Magnitudes* that he thinks the philosophical concept in question has been almost entirely neglected by philosophers. But not only this; it also seems evident that he chooses to focus on this concept because it provides a forceful illustration of his own distinction between real and logical grounds, and by extension, of the distinction between logical and material principles in metaphysics. And since these twin distinctions, on Kant's view, are his own original discovery and contradict the doctrines of both Wolff and Baumgarten (and one would expect also Leibniz), it follows that his likely intention in the essay is to prove the

insufficiency of their views by demonstrating that they cannot account for a real and prevalent phenomenon.

That Wolff and Baumgarten would have difficulty in explaining negative magnitudes seems quite plausible. Both claim to prove the principle of sufficient reason (PSR) based on the principle of contradiction, which would make it difficult, if not impossible, to articulate a consistent distinction between logical and real grounds. That they would also overlook the importance of this concept, is also not very hard to imagine, since its primary examples lie in the field of physics, and neither was a particularly masterful physicist. But what about Leibniz? Although he perhaps flirted with proving the PSR by reference to the principle of contradiction, he nevertheless articulated a quite robust distinction between logical (absolutely necessary) and contingent truths and pioneered the foundations of early modern physics. Indeed, his writings abound in attempts to work out a physical dynamics based precisely on the PSR and the distinction between absolutely necessary and contingent truths.

I believe the following passage in particular shows Leibniz reflecting on the concept of negative magnitudes and its relation to the PSR:

12. *There can therefore be many contrary conatuses in the same body at the same time. ...*

22. If conatuses that cannot be compounded are unequal, they are subtracted from each other, the direction of the stronger being conserved ... For two conatuses can be subtracted from each other, since the less is equal to the part of the greater, and hence, as long as a resolution of the problem is found in a part of either conatus, there is no reason for choosing a third solution.

23. If two conatuses that cannot be compounded are equal, the directions of both will be destroyed, or a third will be chosen intermediate between the two, the velocity of conatus being conserved. This is, so to speak, the peak of rationality in motion, since the problem is solved not merely by a crude subtraction of equals but also by the choice of a more fitting third possibility, and so by a kind of remarkable but necessary wisdom, such as is not easily shown in the whole of geometry or phoronomy. ... But this principle, along with No. 20, depends on the noblest of all, namely:

24. That *there is nothing without a reason*. The consequences of this principle are that as little as possible should be changed, that the mean is to be chosen between contraries, that whatever is added to one thing need not be subtracted from another, and many other things that are important in civil science as well. (Leibniz 1956, p. 221-222)

In this passage, Leibniz asserts that there can be grounds of contrary motions (i.e. opposed conatuses) in one and the same body and that the combination of these conatuses is not merely a logical repugnance. Rather, he says, their combination constitutes a “problem” that is “solved ... by the choice of a more fitting third possibility” governed ultimately by the PSR. So even if Leibniz does not provide here the kind of detailed analysis we find in Kant’s essay, there seems to be every reason for believing that he could have done so. The implication, then, is that Kant’s distinction between logical and real grounds might not be so different from the theory of Leibniz as he himself believed.

But to get a better understanding of why Leibniz should be able to account for negative magnitudes, it will be helpful to recall the main features of his theory of truth. Its bedrock, so to say, lies in what has been called the *in esse* principle. As Leibniz writes in *First Truths*,

The predicate or consequent therefore always inheres in the subject or antecedent. And as Aristotle, too, observed the nature of truth in general or the connection between the terms of a proposition consists in this fact. In identities this connection and the inclusion of the predicate in the subject are explicit; in all other propositions they are implied and must be revealed through the analysis of concepts, which constitutes a demonstration a priori. (Leibniz 1956, p. 412)

And again in correspondence with Antoine Arnauld in 1686 Leibniz writes,

It is that always, in every true affirmative proposition, whether necessary or contingent, universal or particular, the notion of the predicate is in some way included in that of the subject. *Praedicatum inest subjecto*; otherwise I do not know what truth is. (Leibniz 1956, p. 517)

This principle is in fact so powerful that on several occasions Leibniz claims that both of his great principles, namely the principle of contradiction and principle of sufficient reason are mere corollaries of it (see, e.g., Leibniz 1956, pp. 411-417).

Now although all true propositions must be capable of being analyzed (at least in principle) in such a way that the inclusion of the predicate in the subject can be shown, Leibniz nevertheless holds that there are two kinds of truths. The first kind of truths is what he refers to as those that are absolutely necessary. These are governed by the principle of contradiction or identity, and their essential characteristic consists in being reducible to an explicit identity in a *finite* number of steps by means of simple logical analysis. The second kind of truths is what he refers to as contingent truths, as matters of fact, or, at other times, as morally necessary. Of course, in such truths the predicate must also be contained in the subject, but in this case the relevant proposition can *never* be reduced to an explicit identity, even with an infinity of successive steps. Rather, what occurs in this analysis is that the more we analyze the subject term, and the more we include its other independent properties, the more we will find it most fitting for the proposition to be true. But no matter how far this analysis is taken there can never be an explicit identity, because ultimately the inclusion of the predicate in the subject depends upon the free decree of God through which he creates only what is best. As Leibniz explains,

In contingent truths, however, though the predicate inheres in the subject, we can never demonstrate this, nor can the proposition ever be reduced to an equation or an identity, but the analysis proceeds to infinity, only God being able to see, not the end of the analysis indeed, since there is no end, but the nexus of the terms or the inclusion of the predicate in the subject, since he sees everything which is in the series. Indeed, this truth itself arises in part from his intellect and in part from his will and so expresses his infinite perfection and the harmony of the entire series of things, each in its own particular way. (“On Freedom,” Leibniz 1965, pp. 407-408)

This will be clearer if we consider the logical form of such analysis, which I will refer to as “Leibnizian analysis”:

For any contingent truth $A \approx P$ (i.e., “A is contingently P”), where $A - P$ is the complement of P in A, P is the unique concept that when added to $A - P$ will make as perfect

as possible.

To understand this principle properly, we must recognize the underlying complexity of Leibniz's position. Despite what this principle might seem to imply, Leibniz is no voluntarist. Contingent truths are not true, on his view, because God has willed them. Rather, considered *sub ratione possibilitatis*, predicate P is included with other predicates to compose A in some possible world in which God has also decreed by will a general order in which the existence of a being with this concept is most suitable. So the combination of P with other predicates to make up A already depends, not upon a divine decree, but upon some specific divine decree seen *sub ratione possibilitatis* (see in particular: Leibniz 1965, p. 507-20). The truth in question is therefore purely hypothetical in nature: If God decrees a certain set of laws and things, then an A, which is P, will be among them. Now since God has in fact created the best possible world, if there is an A which is contingently P in it, then this is because A is most suitable to exist given this decree. Furthermore, since in such a world each complete being or monad perfectly reflects the world of which it is a part, Leibniz is able to draw the conclusion that assuming as given all the other predicates of A, if P is in actual fact combined with these, this is because the inclusion of P will render the collection the most perfect possible. This is the real foundation for why the analysis of A alone, combined of course with the decree to create only the best possible, is sufficient to provide the reason for the inclusion of P in A.

It is this analysis that provides the sufficient reason for $A \approx P$, and the principle of sufficient reason in this case would be just the statement that for every contingent truth, the conditions in the formula above are always satisfied. The key feature of this analysis is, of course, the concept of perfection, which Leibniz always insists is measured by the balance of simplicity amid variety. This concept of perfection is the measure of convergence, which ultimately determines that, given the entire complement of P in A, only the addition of the single predicate P can render the greatest possible increase in perfection. Furthermore, it is precisely the uniqueness of this P in being the single "remaining" element that must be added to reach a maximum of possible perfection that is the reason for the inherence of P in A.⁴ Of course, something further is still required in order to guarantee that such a P will in fact be found combined with the concept A – P in the actual world, and this is the principle that God actually wills the best possible world.

This Leibnizian analysis is clearly teleological in two respects. First, it holds that the ground of the inherence of certain properties within a thing, and to this extent its very *being*, lies in a decree of the divine will (albeit viewed *sub ratione possibilitatis*). Secondly, in the case of actual things the decree in question is that of the best world possible, which means that actual things are not only constituted in view of a plan, but indeed a plan that is "good" or is the "best." What a thing is, in other words, is internally constituted according to a design, and in regard to what exists, this design is a principle of perfection.

The most common kind of example Leibniz provides of this principle at work is that of the complete concepts of existing monads. As is well known, Leibniz holds that all created monads contain within their essences and from all eternity every fact that can ever be true of them. Yet

every fact regarding an actual monad he deems to be merely contingently true. To use Leibniz's favorite example, every fact about Caesar inheres in his essence, or is included in his concept, but that he crossed the Rubicon is only a contingent truth (see Leibniz 1989, pp. 44-45). Yet, the more we examine the life of Caesar, and the world in which he lived (which in Leibniz's view results in the same thing because the monad perfectly reflects its world), the more we will become convinced that given the infinity of other facts about him, and the infinity of possibilities as to what he might do at that very moment, his crossing of the Rubicon was the best possible thing (according to the balance of order and variety) for him to have done at that moment. And, in the end, it is true of him, because although neither we nor God can carry out this analysis completely (it has no end), the divine being can nevertheless see that it converges uniquely on this fact and selects for creation the Caesar of which it is true for this very reason.

Now, in the cases of complete concepts, Leibniz is quick to admit that no human being can ever deduce the truth of a contingent fact with complete certainty. Hence, in most cases we must know a contingent truth only through experience (Leibniz 1965, p. 408). However, there are other cases where he says such truths can be known by reason, and in particular by applying the PSR. To illustrate how the analysis in such a case can be both infinite and yet also possible for the human mind to grasp, Leibniz writes

Assume the case that nature were obliged in general to construct a triangle and that for this purpose only the perimeter or the sum of the sides were given, and nothing else; then nature would construct an equilateral triangle. This example shows the difference between architectonic and geometric determinations. Geometric determinations introduce an absolute necessity, the contrary of which implies a contradiction, but architectonic determinations introduce only a necessity of choice whose contrary means imperfection – a little like the saying in jurisprudence: *Quae contra bonos mores sunt, ea nec facere nos posse credendum est.* (Leibniz 1956, p. 787)

There are, as before, an infinity of possibilities for how a triangle of a specific perimeter can be constructed, and surely the human mind cannot run through them all consecutively. But we also need not consider each of them to see which nature will construct, because it is clear that *relative to these conditions* all such triangles are equally suitable, and there will be just as much reason for making, for instance, one side longer than the other two as there will be for making it shorter. Thus there will be no reason for choosing any irregularly shaped triangle at all, and the only possible triangle left is the one that is unique in the fact that it is the most regular or determinate, having all sides of equal length so that there are no differences that are not accounted for by some reason (see especially Leibniz 1956, pp. 782-783).

This is in fact the essential structure of most, if not all, of Leibniz's examples of teleology in regard to natural laws: The actual laws of nature are precisely those in respect to which the substitution of any other possible law would give rise to possibilities, or "twins," between which there could be no ground of choosing one rather than another. The one that is best and is therefore chosen is hence that alone which is unique. Notably, unlike in the case of a complete concept, it is not the properties of the thing that are infinite, and thus preclude a complete analysis, but rather the number of possible predicates from among which a single one must be selected. Such arguments rely on two peculiarities of Leibniz's thought, namely, that all else being equal,

determination is a perfection, and that there is no determination without a sufficient reason. In this case particularly, all other determinations are excluded by the latter, while the creation of the world in which there is not an equally perfect alternative is justified by the former.

III

We can now see that it is possible for Leibniz to defend the concept of a negative magnitude because the inclusion of a contingent predicate in an actual thing is determined precisely by the sum of all other predicates in the remaining concept of a thing along with the extra principle of perfection. Thus, it is perfectly possible for Leibniz to formulate an analogue to Kant's counter-factual analysis above as follows:

1. Assume the existence of the complete notion N in the divine intellect in a state of possibility, and that it has contingent properties A and B. Also assume that:
 - a. The divine analysis of N-A yields A, and this is morally, not logically, necessary.
 - b. The divine analysis of N-B yields B, and this is morally, not logically, necessary.

Note: Here N-A = "the set of all properties in the complete notion of N excluding A." This set of properties N-A is not complete and so does not describe the complete notion of any possible thing. It is merely a hypothetical set of properties upon which God exercises his analysis. Hence, if we exclude A from N, then we also exclude *all the consequence that would follow in N as a result of A's being in it*, according to both morally and logically necessary connections.

2. Now assume also that:
 - a. The analysis of N-B reveals that property *a* follows A in N-B with moral necessity.
 - b. The analysis of N-A reveals that property *b* follows B in N-A with moral necessity.
 - c. Analysis of N reveals that property *e*, but neither *a* nor *b*, follows both properties A and B in N with moral necessity. So in this case neither *a* nor *b* occur in N at all, and they can very likely be logically opposed as well.

Note: None of this implies a contradiction of any kind, since none of the connections here are based on the law of contradiction; they all have recourse to God's wisdom in composing the best series. One need also not worry about the fact that in truth the complete notion of N is determined in the divine understanding and already contains property *e*; for the divine wisdom itself in conceiving N, according to Leibniz, actually takes into account these other possibilities just as has our analysis. Thus such counter-factual possibilities are really possible *in themselves* and are taken into account in Leibnizian analysis.

3. It follows that B (or a logical consequence of B) is the reason for A's not resulting in a in N, and that A (or a logical consequence of A) is the reason for B's not being followed by b in N. Thus A and B are opposed in that they cancel one another's effects, and the result of their addition is actually e .

4. Finally, to understand the kind of numerical cancellation Kant speaks about, we would have to add some machinery to our Leibnizian model, namely, a persistent state S in N, which has a numerical magnitude. We would then say the analysis of N-B shows that A is followed by a change in state S from S1 to S2; analysis of N-A shows B is followed by a change in state S from S1 to S3; and the analysis of N shows that after A and B, N is in state S4, which has a magnitude equal to the numerical value $S2 - S3$.

If this is correct, then although he could hardly have been aware of it himself, Kant's position in *Negative Magnitudes* is in fact strikingly similar to Leibniz's on a number of points. First, unlike Wolff, both Kant and Leibniz hold it as possible for two predicates belonging to one and the same thing to cancel out each other's effects without being logically contradictory. Secondly, they are both able to maintain this for the same reason, namely, because they defend the existence of a kind of non-logical grounding, where the properties of a being do provide a reason, but not a logically sufficient reason, for the positing of an effect. Thirdly, Kant seems to have arrived at this position for reasons close to those adduced by Leibniz. For his view that we can have no purely logical or rational insight into the laws by means of which possibilities combine to produce their effects is a direct consequence of his idea – articulated both in the *New Elucidation* (PND, AA 01:413-414) and the *Only Possible Argument* (BDG, AA 02:85-100) – that all reality, even in its essential determinations and relations, is materially dependent upon the plan of the divine wisdom. In other words, because the constitution of all possibility is not limited to concepts of essences whose determinations are governed by the principle of contradiction alone, it follows that since the principle of contradiction constitutes our sole principle for *a priori* insight, there is simply no way for us to have such insight into the real constitution of things through reason alone. Thus, although the actuality of real opposition is not derivable from the ground of all reality, its possibility is at least thereby guaranteed. The aim of Kant's essay is then to show that real opposition is a universally occurring fact given to us through several different realms of actual experience.

The main difference between Kant and Leibniz on this issue would seem to lie in Kant's rejection of our capacity for insight into any such connections through reason alone. But even here the matter is not so clear. Of course, it must be granted that Kant believes there are a great number of grounding relations into which we cannot have insight; this is one of the chief contentions of *Negative Magnitudes*. But on both sides of the comparison, it is hard to find a clear and hard reason for disagreement. Even in a text like *Tentamen Anagogicum*, Leibniz indicates

that reflecting on final causes through reason is more a guide to discovery and a test for theories than it is a strictly deductive source of knowledge. As for Kant, despite differences I have pointed to elsewhere (see Fugate 2014b), he clearly believes real grounds to be subject not only to general rules of order, but indeed to rules that exhibit the greatest teleological unity, among which are those very laws of nature that so attracted Leibniz's attention. In *The Only Possible Argument*, for instance, Kant writes:

Since a will always presupposes the internal possibility of the thing itself, it follows that the ground of possibility, that is to say, the essence of God, will be in the highest harmony with his own will. The reason for this is not that God is the ground of the internal possibility in virtue of his own will. The reason rather is this: the same infinite nature is related to the essences of things as their ground; at the same time it also has the relation of highest desire for the greatest consequences which are thereby given, and the latter can only be fruitful if the former are presupposed. Accordingly, the possibilities of things themselves, which are given through the divine nature, harmonise with his desire. Goodness and perfection, however, consist in this harmony. And since goodness and perfection harmonise in one single principle, it follows that unity, harmony and order are themselves to be found in the possibilities of things. (BDG, AA 2:91-92)

And a bit later, after pointing to the properties of space and the laws governing matter as examples of harmony, Kant remarks,

Maupertuis ... proved that even the most universal laws of matter in general – whether it be at rest or in motion, whether in elastic or in non-elastic bodies, whether in the attraction of light in refraction or in its repulsion in reflection – are subject to one dominant rule, according to which the greatest possible economy of action is always observed. This discovery enables us to subsume the effects produced by matter ... under a universal formula which expresses a relation to appropriateness, beauty and harmony. (BDG, AA 2:98-99)

It is notable in this regard, that Maupertuis “proof” referred to here by Kant is not based upon experience, at least not in any pedestrian sense (see Fugate 2014a, pp. 88-97). So in at least one text written about the same time as *Negative Magnitudes*, Kant appears to be committed, like Leibniz, to the view that we can gain knowledge not only of real grounds in experience, but even of broader teleological laws that govern such grounds collectively.

To see that Kant maintains this view also in *Negative Magnitudes* itself, let us look more closely at his characterization of real opposition and the conclusions he draws from it. The first point he stresses in section one of the essay is the fundamental, but also general rule that “real repugnancy only occurs where there are two things, as *positive grounds*, and where one of them cancels the consequence of the other” (NG, AA 02:176). The issue here, in other words, is the opposition of two realities, or positive determinations. They must therefore exist in the same subject, stand in no logical opposition and negate one another's effects. The second point is the rule that “wherever there is a positive ground and the consequence is nonetheless zero then there is real opposition” (NG, AA 02:177). This, interestingly enough, is a rule for the inference of the existence of a real ground from the non-existence of a real effect. It is thus a *universal* principle governing the relation of grounds and consequences, causes and effects, and at least a partial expression of a principle of determining ground, or sufficient reason. Indeed,

after extending the concept of real opposition, and thus also of real grounds, to the whole of philosophy, Kant returns to and expands upon this principle. “I accordingly maintain,” Kant informs us,

that every passing-away is a negative coming-to-be. In other words, for something positive which exists to be cancelled, it is just as necessary that there should be a true real ground *as it is necessary that a true real ground should exist in order to bring it into existence* when it does not already exist. (NG, AA 2:190; emphasis added)

From this it is fairly evident that Kant means to maintain a rather robust form of the Principle of Determining Ground (much like the PSR), just as he had earlier in the *New Elucidation*. He argues elsewhere in the essay, for instance, that although we are not always aware of the grounds in our souls that cause a change in our thoughts, we can be certain of the existence of their real grounds from their passing-away; for this passing-away requires an opposing ground to cancel the original activity (NG, AA 2:191). Admittedly, it is not clear whether this principle is in fact drawn from the “tentative experiments” in the same way as the general concept of real opposition is, and thus is meant to be established by analogy and induction, or whether it has an entirely different, rational foundation, which Kant does not mention. But we will examine this point more closely in our analysis of the third section of *Negative Magnitudes* below.

IV

If looked at with an unbiased eye, the general structure of the work leaves no doubt that the third section is really the heart of *Negative Magnitudes*. The first section, as we have just seen, presents a basic outline of the concept of real opposition by reference to mathematics, while the second section merely runs through a series of analogical examples in various philosophical domains. As interesting as Kant’s brief explanation of these latter are – in the longest example he even proposes various experimental arrangements for verifying an attractive negative principle of heat – the main conclusions are left to section three. In this section he first returns to and illustrates the principle of ground mentioned above in section one. “Suppose,” Kant argues,

that a is posited, then only $a - a = 0$. In other words, only in so far as an equal but opposed real ground is combined with the ground of a is it possible for a to be cancelled. Physical nature everywhere offers examples of this principle. A movement never stops, either completely or in part, unless a motive force which is equal to the force which would have been able to generate the lost movement is combined with it in a relation of opposition. But also our inner experience of the cancellation of representations and desires which have become real in virtue of the activity of the soul completely agrees with this. In order to banish and eliminate a sorrowful thought a genuine effort, and commonly a large one, is required. And that this is so is something which we experience very distinctly within ourselves. (NG, AA 02:190)

This surely is nothing other than a negative formulation of the Principle of Determining

ing Ground articulated in the *New Elucidation*. In that essay Kant formulated it in the terms “Nothing that exists contingently can be without a ground which determines its existence antecedently” (AA 01:396). Now, as Kant has made clear, the state 0 here is not a mere absence, but something positive, an actual deprivation relative to the grounds which, in the absence of opposing grounds, would necessarily produce *a*. Thus, 0 is something positive which has arisen in the very passing away of *a* (it is in this sense that “every passing-away is a negative coming-to-be”). Since every passing-away is the coming-to-be of a real privation (and not a mere lack), Kant’s principle therefore has as a corollary the proposition that every such coming-to-be requires a prior real ground by means of which what was opposed to its coming-to-be is itself opposed. The key differences between the two formulations lie in three separate points:

First, the Principle of Determining Ground in *Negative Magnitudes* applies not to contingent things in general, which includes for instance created substances, but more specifically to changes in the states of substances. In this respect, much of Kant’s argumentation here is more reminiscent of his derivation of the Principle of Succession from the Principle of Determining Ground in the *New Elucidation*.

Secondly, here Kant formulates the principle not in terms of the coming-to-be, but in terms of the passing-away of something. The two are nevertheless clearly equivalent as I just argued. Kant also signals his recognition of this fact in the quote earlier, where he says that this principle is just as certain as that “it is necessary that a true real ground should exist in order to bring it into existence when it does not already exist.” Why then this new formulation? I think this can be traced to Kant’s concern to avoid a crucial mistake which he emphasizes in several passages, namely the confusion of what is a merely lack with a real privation. As Kant explains, a lack requires merely a logical ground, because it is nothing more than the result of a certain absence of any ground within the essence of a thing, whereas a true privation requires a real ground, indeed it requires at least two real grounds which cancel each other’s effects. Now, if the principle is formulated in accordance with the *New Elucidation*, it tells us that every contingent being, and so every contingent *reality*, requires a prior ground. But Kant also holds that we can have no insight into the inner natures of things other than through their empirical effects. Thus, the only way in which it is possible for us to know that something is a contingent reality is to see it either come-to-be or pass-away, and, more specifically, the only way to know that an absence of a certain determination is a privation or rests upon a reality is by observing the passing-away of a previously existent state. This new formulation has the benefit therefore of more closely fitting the principle to the proper conditions under which we are capable of using it.

Another way to see the same point is to ask how the principle of the *New Elucidation* could be used in practice. It tells us that every contingent being has a prior determining cause of its existence. But how do I know that something is a contingent being in the first place, if not from the fact that I observe its coming-to-be? I surely cannot cognize by any rational means that from its determining ground it will arise or has arisen from such a ground, because causality in Kant’s view is an irresolvable fundamental concept or relation. But if I observe the passing-away of the opposite of something, then I can be sure that what arises in this way is a contingent being, and according to this principle it must have a prior ground by which its op-

posite was canceled. Kant's concern for the manner in which we become aware of the existence of a cause-effect relationship is recorded in reflection 3845:

There is the question: what do we know first. Do we know first, that something is an effect, and so has a cause, or that something is a cause and therefore has an effect. The former. That something is an effect, or is something that occurs, is posited by reason only *per aliud*; we know only *a posteriori* this *nexus*. If we knew the cause beforehand, then the *nexus* would be known *a priori*. (Refl 3845, AA 17:310)

Kant's reformulation of the Principle of Determining Ground is thus the result, I believe, of his deepened concern for formulating his principles in a way that is consistent with his own views on the manner in which knowledge – as a result of these same principles – must be understood as possible.

Thirdly and finally, this new formulation is supported, not by *a priori* arguments as in the *New Elucidation*, but rather by *a posteriori* analogies, those “tentative experiments” mentioned above. Thus in one case Kant is hesitant to make use of the concept of real opposition when speaking of God, because, he says, the “foundation of these concepts can only be found within ourselves” (NG, AA 02:200). Nevertheless, in regard to the domains within which he adduces examples of real opposition, Kant does not hesitate to conclude to their universal applicability.

In many other respects, however, Kant's treatment of this version of the Principle of Determining Ground clearly harkens back to the *New Elucidation*. First, as there, Kant here claims that this principle applies equally to both physical and spiritual occurrences. As he explains:

If one considers the grounds which form the foundation of the rule which we have just introduced, the following point will be instantly noticed: in what concerns the cancellation of an existing something, there can be no difference between accidents of mental natures and the effects of operative forces in the physical world. (NG, AA 02:191)

Secondly, in the *New Elucidation* Kant argued that a corollary of the Principle of Determining Ground is that the “quantity of absolute reality in the world does not change naturally, neither increasing nor decreasing” (PND, AA 01:407). In this earlier work, Kant also explained that the reality in the world can actually increase, and indeed is always increasing, but that this is only a relative increase because the production of one reality always results in the production of an opposing reality of the same magnitude. Thus, if the “calculation is performed by subtracting from each other the motions which strive in different directions,” then the total change will be zero since “these motions will, of course, in virtue of the fact that they are opposed to each other, somehow eventually cancel each other out” (PND, AA 01:407). Nearly a decade later in *Negative Magnitudes*, Kant draws two very similar corollaries from his new Principle of Determining Ground, namely:

In all natural changes which occur in the world, the sum of that which is positive is neither increased nor diminished, provide that the sum is calculated by adding together positings which agree with each other (not opposed to each other) and subtracting from each other positings which are really opposed to each other. (NG, AA 2:194)

All the real grounds of the universe, if one adds those together which agree with each other and subtracts from one another those which are opposed to each other, yields a result which is equal to zero. (NG, AA 2:197)

These two “extremely important” propositions, along with their elucidations, make up nearly the entire body of the central third part of *Negative Magnitudes*. We are forced to conclude therefore that it is these towards which Kant’s efforts are chiefly directed in the essay as a whole. Notably, just as Kant regards his new Principle of Determining Ground as applicable to both physical and spiritual beings, so also he points out that these two corollaries extend to both realms. They are thus to be understood as universal metaphysical principles, and not merely as rules of physics.⁵

But what precisely is their importance? The first thing to note is that they are propositions concerning the totality of created reality. The former provides a fundamental *distributive* principle of the *form* of the realities produced in the natural world, namely that they are always produced in equal and opposing pairs. The latter provides a fundamental *collective* principle of the *form* of all such production of realities, that their absolute magnitude is always constant, indeed equal to zero. The formality of these principles, however, is not of the kind found in the principles of contradiction and identity, because it concerns not the form of judgments, but rather the systematic form of material truths themselves. Together these two principles accordingly provide the most general form of the dynamics through which the created world both physically and spiritually develops towards perfection. They form the foundation for the very type of dynamic theory of the unfolding of creation which Kant so admired in Pope’s *Essay on Man* and attempted to produce himself in the *Universal Natural History of the Heavens*.

Some have suggested, however, that Kant’s admission in this essay that evil is something real in fact marks a change in his views from the 1750s.⁶ But this rests on a misinterpretation of Kant’s previous position, which in fact does not differ from the one voiced here. For just as the essential unity and perfection of the physical world is completely compatible with the existence of the opposing forces of attraction and repulsion, so also the essential unity and perfection of the moral world is completely compatible in Kant’s view with the existence of the opposing moral forces of virtue and vice, good and evil. Indeed, more than being simply compatible, Kant would ideally like to show that it is precisely *through* the laws governing the interactions of these opposing forces that the world is propelled forward and manifests the essential *dynamic* harmony and perfection the possibility of which God implanted in the essences of things at the very moment of their creation. As Kant writes here in *Negative Magnitudes*,

The perfection of the world in general very much consist in this conflict of real opposed grounds, just as the material part of the world is, in the most obvious fashion, maintained in a regular course simply by means of the conflict of forces, and it is always a serious mistake to conflate the sum of reality with the magnitude of perfection. (NG, AA 02:198)

Again emulating Pope, the young Kant regards evil as truly opposed to the good in particular things, but nevertheless as possessing a merely relative reality. Within the world the

production of every good requires the production of an opposing evil, just as the production of an evil requires the production of an opposing good. The balance is always such that they cancel one another out. Here Kant explains that the sum of such reality, when calculated in the right way, is precisely equal to zero because the world by itself is not capable of containing, let alone *producing*, any reality that has not been given to it by God. Since the original reality of the world forms the ground of the possibility of all later things, this means that this original state of the world contains all the reality that will ever belong to the world (when calculated in the right manner). Still, as Kant now argues in *Negative Magnitudes*, although the sum-total of the reality of the world taken by itself is thus precisely equal to zero, when the world is considered relative to its ground the sum is positive, because God and the world do not oppose one another. Put differently, the creation of the world is certainly the production of a degree of reality that was not there before, since it does not give rise to a corresponding opposite, or negative quantity of reality.

In a note to the third section, Kant is careful to point out that these principles do not deny that the sum of reality or perfection can increase naturally in the world. Quite to the contrary, Kant thinks that both are constantly increasing as physical and spiritual realities unfold. The explanation for this is that the opposed forces which are often produced by means of natural change are both positive realities, and thus although they are opposites of one another, and so cancel out in the whole, they nevertheless increase or add to the realities within the world. Similarly, the perfections which consist in the harmony, regularity and purposive connection within the whole are, in a certain sense, the same as that which lies within its original essence, but in another sense they increase throughout all change. If Kant's position in this respect is the same as he held previously, then, like Pope, he thinks that everything is perfect considered in itself, but that a thing is only truly considered in itself when it is considered with a view to the inner law by means of which it is driven by conflicting forces to harmonize and unite with the whole (see, e.g. Refl 3703-3705, AA 17:229-239). Here in *Negative Magnitudes* Kant has reduced that seeming paradox to perfect clarity: According to these dual principles all reality and perfection is already contained in the first ground of all things, and in the further development of the world throughout all space and all time nothing new ever arises relative to this original ground. However, the infinite wealth of the reality and perfection contained in this original seed, as it were, can never cease in displaying and giving rise to new *particular* realities, perfections and purposive arrangements throughout all creation. Through this dynamic unfolding by means of opposing forces, this original and universal reality and perfection *particularizes itself* and in doing so becomes visibly reflected in the infinite purposiveness and variety among created things.

I now come to the final General Remark, which has received so much attention from commentators. Kant's essential point in this remark is that real opposition, and so also the concept of real ground, is fundamentally distinct from what he has called a logical ground. But here he for the first time draws the necessary conclusion that, since the entire higher faculty of thought consists in judging by virtue of the principles of identity and contradiction alone (as was argued in *False Subtlety*), and since the connection of real grounds with their consequences is not governed by this principle, it follows that it is simply impossible for us to have insight into such connections *a priori*. Of course, Kant thinks that these connections are both

objective and necessary, and that we can have cognition of them *a posteriori*. Crucially, he also clearly thinks that they can be captured in concepts. What he is in fact claiming, therefore, is the following:

- 1) Assume concept A, which is composed of a series of concepts x_1, x_2, x_3 , etc., and also assume that one and only one of these partial concepts, say x_i within A, is a ground of the positing (or cancelling) of consequences of kind B.
- 2) Now, from the analysis concept A - x_i alone, it does not follow by either identity or contradiction, or by any series of syllogisms no matter how long, that the concept x_i should be included in it and thus that A is a ground of the positing (or cancelling) of consequences of kind B.

Put still another way:

- 1) Assume as much as you like concerning two things A and B, making sure to leave out only that A is the real ground of the positing (or cancelling) of B or something in B (something, however, that we know to be true from experience).
- 2) In no wise can it be rationally proven (by identity or contradiction, or syllogism) that A stands in such a relation or possible relation to B or something in B.

Kant himself is not quite so clear as this schema, but a close reading of the General Remark, I believe, leaves little room for doubt that this is his basic idea. Kant's central concern throughout *Negative Magnitudes*, and later in the *Inquiry*, is to show how metaphysical concepts *first originate* within the mind. His contention that real grounds cannot be explained by the principles of identity or contradiction therefore means essentially that there are no resources by which to rationally (i.e. by contradiction, identity, or syllogism) extract from the concept we have of something that it will be the ground of something else, *before* we have discovered this *a posteriori* in experience. Of course, *after* such experience we can add this newly discovered truth to the concept of the thing in question. Moreover, once we add to the concept we had before, such as A - x_i above, that it is the ground of things of kind B, then it follows by merely formal principles that A - x_i (i.e. the concept we had before the experience) + x_i (i.e. the concept of the discovered connection between A - x_i and B) = A, which posits (or cancels) B as a real ground. But here the truth of such real positing or cancelling does not genetically arise from the truth of the formal principles, but rather these principles only govern the form of the judgments in which our material knowledge is expressed.

Since, as far as I am aware, the formulation above goes beyond and departs in many ways from any other interpretation of Kant's argument in the General Remark, I should provide at least some direct textual justification for it. First, Kant accepts that if the concept of one thing is

contained in the concept of the other, then the one really does follow by the principle of identity from the other. Indeed, he even admits that the concept of a consequence is contained in the general concept of a ground in this way. As for real grounds, Kant says explicitly “this relation belongs, presumably, to my true concepts, but the manner of the relating can in no wise be judged” (NG, AA 2:202). To illustrate this conception of a real ground, Kant gives the example of God, which is something, positing the world, which Kant stresses “is *something completely different*” (NG, AA 02:202). So from the analysis of the concept of God alone one will never find within his concept “posits the world.” However, immediately after stating this Kant goes on to explain:

If I already regard something as a cause of something else, or if I attach the concept of force to it, then I am already thinking of the cause as containing the relation of the real ground to its consequence, and then it is easy to understand that the consequence is posited in accordance with the rule of identity. For example, the existence of the world can be understood with complete distinctness in terms of the omnipotent will of God. But here ‘power’ signifies something in God, in virtue of which other things are posited. But this word already designates the relation of a real ground to its consequence; but it is this relation which I wish to have explained. (NG, AA 02:203)

It is clear from this that the real issue is not that concepts are limited in their grasp of the world, but rather that our concepts and the manner in which they are first constituted by our minds does not allow us to have rational insight into the real essences of things. The concept of A in the formula above might be called a “real concept” in the sense that it is that complete reality contained in an object A; it would be A insofar as it is comprehended in all its real connections with the rest of the universe in the divine intellect. However, our minds are only able to approach such real concepts through experience, and for precisely the reason that we cannot have insight into real connections and real grounds according to the process of analysis.

What our analysis allows us to do, rather, is to resolve our ideas until we reach fundamental concepts of real grounds, which from this point must be adopted as true based upon *a posteriori* evidence. Thus the most basic data of all our concepts will consist in the atomic or unresolvable concepts of real grounds. As Kant concludes,

the relation of a real ground to something, which is either posited or cancelled by it, cannot be expressed in a judgment; it can only be expressed in a concept. That concept can probably be reduced by means of analysis to simple concepts of real grounds, albeit in such a fashion that in the end all our cognitions of this relation reduce to simple, unanalysable concepts of real grounds, the relation of which to their consequences cannot be rendered distinct at all. (NG, AA 02:204)

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From all of this it is easy to see that Kant is by no means claiming in the General Remark to *Negative Magnitudes* that logic is merely subjective,⁷ or that real relations somehow cannot be captured in concepts, and thus are brute empirical facts. As is clear from the *Only Possible Argument*, he is in fact fully willing to accept Leibnizian complete concepts in the divine intellect (BDG, AA 02:75). The mood in this essay is therefore not in principle anti-rationalist, as some have suggested, although it is certainly opposed to any rationalism that would seek to reduce all conceptual connections to identity and contradiction. As we have seen, Kant’s

thinking is in fact closest to that of Leibniz who holds that the complete concepts of things are constituted by two essentially different kinds of connections, namely those which follow by contradiction and those which follow by divine analysis. That Kant has not radically departed from his position in the 1750s, and has not indeed departed from a broadly metaphysical standpoint, should also be clear from the fact that in this same essay, as we saw, he defends a universally formulated Principle of Determining Ground along with those corollaries which give form to the total reality contained in the created world.

One key feature of Kant's understanding of conceptual analysis, as I have interpreted it in the formula provided in the previous section, is that it is counterfactual in structure. Kant's argument is thus not that real relations cannot be captured conceptually, or even that they are not governed by the principle of contradiction, but rather that *if* we were unable to add such determination to our concepts *a posteriori*, *then* there would be no *a priori* ground connecting them by the principle of identity or contradiction either. However, once we have established such a real connection, then it follows that connection of the two are also governed by the principle of identity or contradiction. Kant is, in other words, trying to show how experience itself is *essential* to the genesis of our concepts of real essences, and so also to metaphysics.

This should remind us of Kant's formulation of the Principle of Coexistence in the *New Elucidation*, which was also structured counterfactually. To recall the point, Kant argues there that if God did not sustain all things according to a common schema of relations, then it would be impossible to comprehend the real interaction of substances from their mere existence (see esp. PND, AA 01:414). But since God has established their essences in accordance with just such a schema, nothing over and above the real essences established in this way is necessary to bring about a community of substances (PND, AA 01:415; cf. BDG, AA 02:103). Now the two points, I would argue, are perfectly parallel. Just as Kant argues in the earlier text that we cannot conceive real relations between substances through their mere existence as substances (i.e. apart from such a ground), so in *Negative Magnitudes* Kant is arguing that we cannot conceive real relations by virtue of the principle which allows us only to draw out the non-relational components of the concept of a thing.

The recognition of this parallel in terms of both the content and form of Kant's arguments in the two works is extremely important because it offers a reply to Adickes rejection of the relation between these two texts when it was suggested by Höffding back in 1894.⁸ Adickes argues that the distinction between logical and real grounds is not actually similar to the case of substances and their real relations in the *New Elucidation* because Kant there holds that, since the real relations of substances do in fact have a foundation in the divine schema, their causal connections are really contained within their essences, and thus causal connection as such is perfectly understandable. But if my interpretation is correct, then this reply by Adickes fails to recognize that Kant is not denying the general intelligibility of causality in *Negative Magnitudes* any more than he is in the *New Elucidation*. What Kant is denying in both is rather the reducibility of real relations to properties that can be understood as belonging to the *relata* prior to or apart from such a relation. In both cases, we can only ascribe such real relations to the essences of things (or to their concepts), if we already presuppose that they stand in such a relation. But the only ground we can possibly have for this is

empirical, for we are only acquainted with real possibility insofar as it is *given* to us.

Equally, I believe Adickes is wrong to conclude from the fact that real relations are established in the *New Elucidation* as inhering in the essences of the *relata*, that they are therefore perfectly understandable. This only stands if whatever is contained in the essence inheres in it by virtue of the principle of identity or contradiction alone. But Kant's originality, much as Leibniz's, lies in recognizing that there are *two different kinds of connections* by means of which properties can inhere in a real essence, namely by identity or by agreement with the divine plan. To see this one need only ask the questions: Does Kant think it belongs to the complete essence or concept of a thing that it has certain fundamental powers, and does he think that such powers make their consequences necessary? There can be no doubt about the first, for as he writes, "who can deny that in the representation which the Supreme Being has of them [i.e. things generally speaking] there is not a single determination missing?" (BDG, AA 02:72). As for the second, Kant writes in reflection 3757: "That, the positing of which in a necessary manner (according to universal laws) is bound to the positing of something else is called its ground" (Refl 3757, AA 17:285). This means that the distinction between logical and real grounds is either merely an epistemological distinction, i.e. one stemming from the limitation of our minds, or else it must reflect a distinction in the manner of inherence of a determination in the essence, as I suggested. But as Kant writes in reflection 3719 "logical grounds are therefore distinguished from real grounds not through the limits of my knowledge, but rather in themselves" (Refl 3719, AA 17:266). To be precise, then, the correct order is not that logical and real grounds are distinct because of the limits of our faculty of reasoning, but rather that our faculty of reasoning is limited because of the distinction that exists *in nexu reali* between logical and real grounds, and this latter has its foundation in the nature of God. As Kant writes in reflection 3706, "where the combination of a predicate with a thing is not arbitrary (*willkürlich*), but rather is bound by the essence of the thing itself, then the predicate does not belong to the thing, because we think the former as in the latter, but rather it is necessary to think it as in the latter, for the reason that the predicate belongs to the thing in itself" (Refl 3706, AA 17:241). This also evidently means that the methodology of the *Inquiry* rests in fact on metaphysical rather than epistemological foundations, and it suggests, again, that Kant's position at this time may not be so radically different from that of Leibniz.

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ABSTRACT: This essay argues that Kant's standpoint in the essay Negative Magnitudes is not essentially different from that of Leibniz. Rather, if seen in the context of Kant's views on the nature of the divine being and its grounding relation to the essences of created things in the same period, it becomes clear that Kant here comes closer to Leibniz's original views than did Wolff or his followers. On this basis, the essay argues that the prevailing view of Negative Magnitudes as marking a turn from rationalism to empiricism is mistaken. Moreover, the article shows and analyses some significant elements of continuity of Kant's Essay on the *Negative Magnitudes* with both the *New Elucidation* and the *Only Possible Argument*.

KEYWORDS: Negative magnitudes, Contradiction, Principle of sufficient reason, Necessary/contingent Truths.

Courtney Fugate is fellow at the Center for Arts and Humanities (AUB) and Associate Professor of Philosophy and Civilization Studies at the American University of Beirut. His current research focuses on Kant's moral and pre-critical philosophy and on pre-Kantian German philosophy. He has co-translated (with John Hymers) A.G. Baumgarten's *Metaphysica*, and is the author of *The Teleology of Reason: A Study of the Structure of Kant's Critical Philosophy* (2014).

NOTES

1 In the older tradition see Paulsen 1966, p. 83-4, and more recently Watkins 2005, p. 160-170 and Longuenesse 2005, p. 130. Of course, the opposite opinion is also well represented by the likes of Wundt, Adickes, Henrich, et al.

2 When available, translations are taken from The Cambridge Edition of the Works of Immanuel Kant, ed. by Paul Guyer and Allen Wood.

3 This mistake is made in Paulsen 1966, p. 83.

4 If the analysis has no end, then what sense is there in speaking of a remaining element that "completes" the series? The difficulty here is merely verbal. Leibniz understands this process as one of approximation on analogy with the concept of a limit in differential calculus. According to this concept, a series can be infinite and unending, and yet contain every but a single completing element that is, nevertheless, uniquely determined by the series itself. E.g.,

$$\lim_{x \rightarrow \infty} \frac{2x^2}{x^2 + 1} = 2.$$

5 See the Introduction to the Cambridge translation in *Theoretical Philosophy 1775-1770*, lxxviii.

6 See the Introduction to the Cambridge translation in *Theoretical Philosophy 1755-1770*, lxii.

7 See Schönfeld 2000, p. 232.

8 See the issue of *Kant-Studien* from 1895, esp. p. 74-5. I only became aware of Höffding's essay after formulating my own interpretation. I have been unable to obtain a copy of it, so my knowledge of his interpretation rests entirely on Adickes comments.

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