

Ian Carey

Dr. Alberto Hernandez-Lemus

History of Modern Philosophy PH201

19 September 2014

Leibniz Through the Calculation of Definitions and Limits

“All other truths are reduced to primary truths by the aid of definitions— i.e. by the analysis of notions; and this constitutes a priori proof, independent of experience. I will give an example. A proposition accepted as an axiom by mathematicians and all others alike is ‘The whole is greater than the part,’ or ‘A part is less than the whole’. But this is very easily demonstrated from the definition of ‘less’ or ‘greater’, together with the primitive axiom, that of identity.” — GOTTFRIED LEIBNIZ, PRIMARY TRUTHS

In order to understand the above, one must use Leibniz’s own *analysis of notions* to help uncover the meaning of the passage. *Analysis of notions* is simply a method by which one looks to understand the meaning of a statement by outlining the nature and scope of its word parts. This, by nature, is definition. The *primary truths* of which Leibniz speaks are those things in which truth is evident from a restatement of the term within the proposition. For example, “A dog is a dog,” is a *primary truth*. As he begins the passage above, Leibniz argues that a good thinker can understand anything as a *primary truth* using analysis of notions, or definitions, to break down more complicated statements. It is essentially taking the proposition a step further to indicate a special feature of the subject’s definition. This is known as a predicate. In the dog example, one would use *analysis of notions* to understand the truth of “A dog is a canine,” in order to highlight a specific part of the dog’s nature. In Leibniz’s opinion, this is acceptable *a priori proof* since the use of definitions comes independent of experience and employable before any sensory information is gathered. This method is able to turn any proposition into an axiom, or statement undeniably accepted as true.

Leibniz's understanding of the importance of definitions and their limits in the search for rational truth was just as vital to his mathematical developments as it was to his metaphysical and epistemological arguments. Namely, that truth could be uncovered through the specificity of definitions that unveil the precise and perfect world God has chosen for existence. According to Leibniz, by understanding the importance of subject-predicate relationships, where-in the subject contains the predicate, one can identify truth. This is because one can understand the predicate as belonging to the subject by analyzing how their definitions are related. In the above example, Leibniz examines a tested axiom generally considered as true, noting that the definitions of "whole" and "part" match the given relationship by the nature of their definitions. In this way the axiom "The whole is greater than the part" or "The part is less than the whole," is proven true. Similarly, the statement "The rock is rolling," is a true statement when the rock is indeed rolling because "rolling" is a predicate of rock in at least the past, present, or future. This is a concept Leibniz describes later in the work as a *perfect notion*— that is a definition of the rock containing all predicates in the past, present, or future. So in this way, when a proposition does not end in a predicate which restates the subject term itself, we are able to identify it as true with *a priori* knowledge. This is also a true principle of all forms of math. Indeed axioms were initially intended to be used in geometric proofs. They were adopted as the methodical standard for rationalist thinking since their process was logical by nature. However, as math advanced in Leibniz's day, he was pressed to understand how the complicating rules of newfound calculus could continue to be understood through the simplicity of axioms and definitions.

One of the key mathematical and metaphysical quandaries which Leibniz faced was his understanding of the infinite. He rejected the concept of infinity, understanding it only as ideal and belonging to few things, namely God. This rejection and labeling of "ideal" is not altogether

uncommon for Leibniz. Much of his metaphysical work aimed at explicating the difference between the two realms of existence. One of these realms was virtual and ideal, consisting of monads which are infinite and indivisible. Otherwise, the universe is full of extended substances which only contain their properties, physical representations of the real world (Hernandez-Lemus). In the same way that monads are ideal, infinity is also ideal. In order to make use of infinitely large and infinitely small numbers in his mathematical work, Leibniz provided definitions for each which made them understandable and practical— fitting into his math and obliging his epistemological process. Infinity to him was not an actual constant number but rather a unique number which changed to be “larger than any given quantity,” (Knobloch, 20). The same was to go for infinitely small numbers which were “quantities smaller than any given number,” (Knobloch, 21).

It was with similar grace that Leibniz made use of definitions to prove the axioms of his metaphysical work. Just as he considered infinity ideal, he also thought the same of space and time. Since space, by definition, would contain many infinitely identical points which is impossible because no two things can be different in number alone (Leibniz, *Primary Truths* 150). Time, too, varies in number alone and is therefore ideal (Kolak, Thomson 146). These are consistent with another core metaphysical argument— that each thing is endowed with a perfect individual definition that makes it unique among and representations of God in the universe. For Leibniz, God chose each thing from amongst many versions of the same so that the best world may come to fruition. (Kolak, Thomson 147) It is crucial that each thing is unique so that it can be distinctly defined and therefore prevent confusion within an axiom.

Through specific definitions Leibniz creates a concrete system to find truth in all subjects. It was with this method of precise definition that he endeavored to apply logical genius to all

areas of study including his work in linguistics and law (Kolak, Thomson 144). These specific rules became influential in finding truth in these areas just the same way as they did in math. Take, for example, two triangles which are proven to be similar by comparison of their known angles. Or in Leibniz's instance, the use of limits or derivative rules to find tangent lines. These rules can also account for change in their subjects. Just like derivatives are seen as a rule for finding the slope of a tangent line regardless of the point, so too does Leibniz's *perfect notion* of things take into account changes in their state of existence, such as a man who contains both the predicates sleeping and awake but never at the same time. The man is either sleeping or awake but he can't be both in the same instance. We are aware that man contains both of these as possible true predicates, however our certainty of their application at any given moment is only known to God. God alone can fully understand the ideal perfect notion. Use of sensory information gained *a posteriori*, or after experience, is the only way which humans can attempt to understand these sort of contingencies accounted for by the perfect notion known only to God since *analysis of notions* is an infinite process in this case. One must use sensory perception to understand whether the man is asleep or awake according to their *a priori* understandings of each respective definition. This tenant of Leibniz's metaphysical campaign is outlined in *Necessary and Contingent Truths* (153). Similarly in calculus, one is left to make an inference about the nature of a graph when its limits are only known ideally. One can only assume that the limit of a function containing x as an exponent will approach infinity as x increases. However deductive this may appear in comparison to understanding the sleeping or waking state of a man, it is still conducted under the same method of reliance on definitions to make assumptions.

Another core metaphysical argument of Leibniz is his "Principle of Sufficient Reason" outlines shortly following the passage above. According to it's author, the principle is based on

the “accepted axiom, ‘There is nothing without a reason’ or ‘There is no effect without a cause’,” (Leibniz, Primary Truths 150). As previously stated, God chooses the best possible world which is made up of all things in it also as perfect as possible. God chooses each part of the world and sets it into motion under a set of rules which give it reason. This, according to Leibniz, is the reason for all the world’s occurrences. Take for example, the proposition that the universe could take many arrangements. Leibniz would decry such an idea because of his belief that the arrangement of the universe in existence was chosen by God for a given reason (Kolak, Thomson 146). While such a reason may not be known to mankind, it is God’s choice that is the reason and law governing all events on the earth. Hence, it is understood that each individual choice of God is unique because there is a reason behind it. This is why detailed definitions appropriately compose Leibniz’s system for achieving *primary truth*. Such is also true in the world of math. As each equation represents a specific and unique graphic function by the rules of algebra and calculus, so too does each individual represent a special aspect of God’s plan. Understanding Leibniz’s metaphysical framework makes evident the reason of his mathematical epistemological system of beliefs. Each part is interlocked with the rules and logic inspired by pure mathematics in the traditional nature of rationalists.

Leibniz’s understanding of the importance of definitions and their limits is best understood as inspired by his belief in the Principle of Sufficient Reason. His search for rational truth in this manner is appropriately related in a method reminiscent of mathematical reasoning. The German inventor of calculus best propagates his metaphysical argument through an explanation in his epistemological method.

Works Cited

- Hernandez-Lemus, Alberto, PhD. "On Leibniz." History of Modern Philosophy PH201. Colorado College Baca Campus, Crestone. 16 Sept. 2014. Lecture.
- Knobloch, Eberhard. "Leibniz and the Infinite." Documenta Mathematica. Berlin: Technische Universität Berlin, 2012. 19-23. Web.
- Kolak, Daniel, and Garrett Thomson. "Gottfried Leibniz (1646-1716)." Introduction. The Longman Standard History of Modern Philosophy. New York: Pearson/Longman, 2006. 144-47. Print.
- Leibniz, Gottfried. "Necessary and Contingent Truths." Ed. Garrett Thomson. The Longman Standard History of Modern Philosophy. Ed. Daniel Kolak. New York: Pearson Longman, 2006. 153-54. Print.
- Leibniz, Gottfried. "Primary Truths." Ed. Garrett Thomson. The Longman Standard History of Modern Philosophy. Ed. Daniel Kolak. New York: Pearson Longman, 2006. 149-52. Print.

Ian Carey

Dr. Alberto Hernandez Lemus

PH 201 History of Modern Philosophy

14 October 2014

Immanuel Kant: An Exact Measure

“But the utility of this separate table of the categories will be still more obvious when, as will soon happen, we separate the table of the transcendental concepts of reason from the concepts of the understanding. The concepts of reason being of quite another form from that of the concepts of understanding. This so necessary separation has never yet been made in any system of metaphysics, where as a rule, these ideas of reason are all mixed up with the concepts of the understanding, like children belonging to one family— a confusion that was unavoidable in the absence of a definite system of categories.”

—**Immanuel Kant**, *Prolegomena to Any Future Metaphysics*

As evident in the passage above, the creation of an exact system is necessary for Kant’s transcendental theories of philosophy by preventing confusion, like that of previous philosophers, between the commonly considered synonyms of reasoning and understanding. In confusing these two faculties of the mind, one falls into the trap of transcendent use of reason and is led under illusion to false metaphysical conclusions. For the past century, philosophers— rationalist and empiricist camps alike— considered *a priori* and *a posteriori* knowledge distinct and incompatible pathways to knowledge. Kant disregarded these beliefs showing how knowledge is gathered through use of *a priori* and *a posteriori* methods sometimes in conjunction. Knowing the difference between understanding and reasoning and when to make use of each of these forms of knowing is necessary to come to conclusions of physical and metaphysical knowledge. It is this distinction which had previously been lacking in the philosophical sciences, and it is this distinction which Kant set out to illuminate.

To understand Kant's epistemological system, marked by the difference between understanding and reasoning, one must grasp the exactness of his definitions. First, metaphysics is that which cannot be known through experience. Part of what Kant aims to do through his *Critique of Pure Reason* is to inquire into the possibility of the science of metaphysics thus helping add to its definition (*Prolegomena* 9). Our knowledge of the world and beyond is known through three faculties, two of which are mentioned as important and often confused in the passage above. Transcendental reason, as referenced, is that which questions the conditions of the possibility of experience through *a priori* knowledge. This is the proper use of the faculty of reason and the only pathway to metaphysical knowledge if it is indeed possible. On the other hand, one more often uses his or her reason in a transcendent manner—attempting to apply these concepts to experience and thus claiming more than he or she can know. The other faculty referenced above is that of understanding which is a series of empty concepts (formats of sort such as *causation* or *possibility*) that make use of perceptions gathered as sensible intuitions formatted through space and time. Understanding gives one legitimate knowledge through experience making use of his or her sensible intuitions.

The most important distinction which Kant makes in outlining his metaphysical system is the difference between reason and understanding and their use in the quest for knowledge. Reason, operating through ideas, makes no use of experience or perception. These ideas “carry with them an illusion, likely to mislead,” if they are related to have their object in experience (Kant 65). It is the goal of the *Critique of Pure Reason* to point out the conditions of this illusion, known as the “Analogy of Experience” (Kant 71). It is in making obvious this illusion that the *Prolegomena to Any Future Metaphysics* (an analytical abbreviation of the *Critique of Pure*

Reason) makes clear the problem of the transcendent use of reason: “one never even suspected that he was in quite another field from that of the understanding,” (Kant 65). In doing this Kant makes it clear that experience is not known with certainty strictly *a posteriori* as it requires the *a priori* concepts of understanding. Similarly, that those things known *a priori* are not only applicable to reason, since understanding makes use of that known *a priori* as well. Previous philosophy made no distinction between the two, simply supposing that known *a priori* as reason and that known *a posteriori* as experience. They were led into the illusion of assuming reason when they were actually understanding. As such Kant debunks the rationalist and empiricist camps with the same theory. But in doing so Kant calls into question the possibility of metaphysical knowledge.

Historically, rationalists and empiricist used their perspectives on the dual nature of reason and understanding as the foundation for their metaphysical inquiries. Rationalists, like Descartes, claimed to use reason when they considered the infinite or limited existence of God. These claims, according to Kant, are entirely transcendent uses of reason because they attempt to apply intuitions of sense, specifically those of space and time, to the object of their reasoning which must be entirely independent of the sort of experience which understanding produces with the forms of intuition of space and time—being empty formats which require *a posteriori* information to fill them while existing as forms *a priori* themselves. While the specifics of transcendent reason unravel the rationalist arguments for metaphysics, it is the specifics of understanding which counter the empirical arguments that portend things can only be known for certain through *a posteriori* knowledge. Not only does Kant prove the impossibility of such by demonstrating the *a priori* nature of the forms of intuition of space and time but he also makes it clear that since

metaphysics transcends the material world, it is impossible to know through the senses, even through experience. He says that “Metaphysics has to do not only with concepts of nature, which always find their application in experience, but also with pure rational concepts, which can never be given in any possible experience,” (Kant 64).

With such specificity, Kant disarms the inconsistencies of previous philosophers. He abandoned inconsistent language and works through a series of set vocabulary. Abolishing previous vocabulary like perception, impression, and reflection, Kant leaves no room for implicit definition in those terms which he does borrow from his philosophical predecessors. In this way he is able to make clear the distinction between understanding and reason so vital to his metaphysical and epistemological conclusions and his solution to the problems of his discoveries.

The difference between the faculties of understanding and reason is crucial to the respective faculties uses in the search for knowledge, and thus Kant draws his epistemological conclusion around this difference. Understanding, as noted, is necessary to make sense of experience and thus necessary to understand math and natural sciences. Working with intuitions, understanding makes experience possible. Although Kant says that “We cannot indeed, beyond all possible experience, form a definite notion of what things in themselves may be,” (Kant 86). Thus, our faculty of understanding is strictly limited. However practical experience is in uncovering the workings of the physical world around us, it only brings us knowledge of observable *phenomena*, thus leaving the true object or *noumena* unknown and only mediated by sensible intuition. In this way it is possible to know that understanding is good for knowing some things but does not work to draw conclusions about others because of its strict limitations. On the other hand, according to Kant, our use of reason should also be limited. Yet this is an entirely

different situation of limitation than that of the understanding. Reason itself has indefinite limitations and thus we are stuck guessing as to where our actual capabilities of knowing end and what lies beyond. Kant sums his conclusion as follows, “As long as the cognition of reason is homogenous, determinate bounds to it cannot be thought. In mathematics and natural science human reason admits of limits but not bounds,” (Kant 87). Thus Kant suggests that, while understanding is limited precisely, reason admits only bounds of which our capabilities may fall.

This conclusion is especially problematic for Kant’s examination of the possibility of metaphysical knowledge. The contrast of reason and understanding calls into question whether metaphysical knowledge is even possible (as was Kant’s intention) and the problems which it presents for reason as a faculty—namely its transcendent use, confusion with understanding, and uncertain boundaries—are the crumbling keystone on which current metaphysics is built. Here lies Kant’s critique of pure reason which he suggests as necessary because “there is no other means of supplying this pressing want [for metaphysical knowledge] which is something more than mere thirst for knowledge,” (Kant 101). Claiming that metaphysical inquiries are altogether instinctive, he urges an exploration into the use of reason as he had just attempted. Otherwise if no one completes the task of determining the exact use of reason, the human race is left to use speculative, or theoretical knowledge to attempt to explain their metaphysical inquiries brought about by an instinctive thirst. Thus, Kant says we are to “forego metaphysics itself... for the sake of adopting a rational faith,” (Kant 104). Kant answers his own problematic conclusion— drawn from the separation of reason and understanding— with the suggestion that metaphysical knowledge with the current workings of reason is altogether impossible to know in an exact sense.

Works Cited

Kant, Immanuel. *Prolegomena to Any Future Metaphysics That Will Be Able to Come Forward as Science*, with Kant's Letter to Marcus Herz, February 27, 1772. Trans. James W. Ellington. Indianapolis: Hackett Incorporated, 2001. Print.