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The mathematical in Heidegger and Badiou

Dylan Armstrong Wade

Louisiana State University and Agricultural and Mechanical College

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THE MATHEMATICAL IN HEIDEGGER
AND BADIOU

A Thesis

Submitted to the Graduate Faculty of the
Louisiana State University and
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by
Dylan Armstrong Wade
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ABSTRACT

In this thesis I am tracing the historical development of subjectivity from its skeptical foundation in Descartes to Alain Badiou's subject as fidelity to truth. Drawing from Martin Heidegger's *What is a Thing?*, this history begins with the turn from an Aristotelian to a Newtonian apprehension of motion, turning towards an *a priori* mathematical projection of spatial uniformity, such that there are no longer different places – only quantifiable distance. It is on the basis of this turning away from tradition, or ordinary experience of different phenomena, that Descartes posits the self-certain I-pole.

Heidegger criticizes modernity, defined as the merging of the metaphysical and the mathematical, for apprehending the relationship between man and world in only one way, as things. I hope show that this development does not derive from the mathematical alone, but from the project of objects against an objective background secured in an I-pole, further advanced by Kant's transcendental reflection of the thing-in-itself over this project. I do this by following Alain Badiou's assessment of Zermelo-Fraenkel's axiomatic set theory, a particular mathematical model that self-destructs, meaning it cannot become absolute or dogmatic.

With this thesis I hope to contribute to the scholarship of facticity, the existential thinking that begins with doubt. If we can dissociate in our ordinary language claims that utilize transcendental reasoning from claims concerning mathematical projection based on speculation alone, perhaps we might find some basis to make existential claims independent of perspective, or subjectivism.

CHAPTER 1: FACTICITY AND INTERPRETATION

1.1 Introduction

In *What is a Thing?* Martin Heidegger criticizes the heirs of Kant's legacy, neo-Kantians or positivists, for failing to understand Kant's original ontological inquiry. While positivists maintained a scientific attitude by holding that the only meaningful assertions were those that could be falsified by experience, Heidegger criticizes this particular school of materialism for a dogmatism of its own, in seeing the relationship between man and world as only describable in terms of discreet units or particular things, that is, mathematically. In order to disclose the historical situation in which thing-ness has come to be apprehended in terms of quantifiable things, I will follow Heidegger's history of subjectivity as a reaction to the speculation of mathematics, secured in the presentation of the I-pole for Descartes, and formalized in the consistent representation of phenomena as spatial for Kant. By dismissing the thing-in-itself as an object of knowledge, the thing-in-itself becomes the determinate apprehension of thing-ness as a limit for speculation. Yet the question of thing-ness can again be raised by returning to the speculative foundation, pure reason, which Kant critiques. In the second half of this thesis, I hope to demonstrate that the speculation of modernity motivates Alain Badiou's claim that the one-is-not, promoting a form of non-dogmatic mathematics that may turn our understanding of existential claims away from subjectivism, by returning to the factual situation of pure reason, or doubt.

1.2 The Facticity of a Thing

By disclosing the historical situation upon which the linguistic assumptions of our ordinary language are made possible (specifically the subject/object relation), Heidegger thereby underscores the degree to which our everyday approach to things has been historically

determined and thus grounded on nothing besides its own history. The question that Heidegger raises to begin paragraph 58 of *Being and Time* is how *Dasein* can be called to be itself, defined as care, care for both things and others. In other words, how can we come to recognize that we are involved in a world, not as some merely present object, determined either by external forces or human nature? Moreover, how can we come to recognize this situation, our facticity, without being informed of it – subjecting that information to a general knowledge of objective facts? Heidegger answers that we must begin with the general knowledge, our ordinary way of talking about ourselves as subjects to objects, given in our relationships with the world and others.

Take any object given as present, some X. Generally, we would speak of this X as pertaining to a certain category or kind. We would say that X is of a certain kind, distinct from some other kind Y. By categorizing these distinct kinds, we suppose a universal schema for their ordering, thus grounding these present objects in a transcendent structure or logos – a logos of objectivity for the positivists or neo-Kantians. Heidegger opposes to category the notion of the existential. In category, the question of being has been distorted, such that being has been thought of as a universal and a-temporal order. This inauthentic distortion prevents any experience of beings except through that supposed universal ordering. By means of a regressive logic,¹ Heidegger opens the relational structure between different kinds of beings, positing existential kinds, that is, different kinds of relations. Existentials relate the whole of being, the facticity of the *Dasein*,² while categories may certainly be appropriate for the particular relationship to objects present-at-hand. Heidegger defines *Dasein* as a thrown project, existing temporally with no before or after, groundless aside from its own history and direction.

¹ One example takes place in the third chapter of Martin Heidegger's *Being and Time* where the present-at-hand, or useless objects, derives from the breakdown of circumspective concern, or the practical relationship between man and world.

² Literally translated as being-there, or what we might call the relationship between man and world.

In *What is a Thing?* Heidegger contrasts the two modes (existential and categorical) in terms of the philosopher and the nursemaid. It has been said that one day while Thales was walking and looking at the stars, he fell into a well, for which a nursemaid laughed at him. Nursemaids laugh at philosophers who focus on objects only as present-at-hand, rather than in a roundabout manner.³ In the modern epoch, when we ask about what a thing is, we are concerned with the thing as present, though one may also ask about a thing as more generally something named, and even more generally as something rather than nothing.⁴

Such a worldview culminates when assertions become the seat of truth, pointing at things as bearing properties.⁵ Moreover, this definition of truth becomes settled, and the very question “What is a thing?” no longer has any meaning. Yet, for example, the sun can both be an object bearing the properties of radiating light and heat, and at the same time a time-measuring device, keeping us all along our way at a certain pace. If, “things stand in different truths,”⁶ then the supposition of self-evident truth in the assertion of a proposition has forgotten how to question. So Heidegger replies, “What is a thing?” If the only things are objects present-at-hand, then what is it about a thing that makes it a thing, which cannot be any particular thing? Heidegger claims that we have forgotten how to question, and so offers a historical analysis of the situation in which Kant questioned after the thing, thereby limiting judgment towards objects against an objective, quantifiable, or mathematical background. He writes, “With our question, we want neither to replace the sciences nor reform them. On the other hand, we want to participate in the preparation of a decision; the decision: Is science the measure of knowledge, or is there

³ Martin Heidegger, *What is a Thing?*, trans. W. B. Barton and Vera Deutsch. (Chicago: Henry Regnery Company, 1967) p. 7

⁴ *Ibid.*, p. 6

⁵ *Ibid.*, pp. 32-36

⁶ *Ibid.*, p. 14

knowledge in which the ground and limit of science and thus its genuine effectiveness are determined?”⁷ The way to create such a decision, to decide upon objectivity as meaningful, must be, “prepared for only by questions with which one cannot start to do anything insofar as common opinion and the horizon of housemaids are concerned.”⁸ Thus Heidegger inquires into thing-ness without regard to practical utility. The structure of particular utilities (towards-which) pervades our everyday living, but the whole reason for utility as such (for-the-sake-of-which) operates on a factual, or historic level. The operations Heidegger inquires into circumscribes our everyday concern, and so cannot be disclosed by any particular concern, just as an inquiry into the scientific project taken as a whole cannot be made apparent by any particular experiment.

To raise again the question of the thing simulates the raising of the question of being, where in *Being and Time* Heidegger destructs ontology to think being as time, to think being as an event or process, rather than as any particular being. The approach of a subject to object, as one particular determination of thing-ness, must be seen as a historically determined process, an ontological venture, where mankind has been thrown into a particular situation. The question for us, the reader, therefore remains how we might interpret our situation and the fact that only facts are said to matter.

1.3 The Interpretive Structure of *Dasein*

Paragraph 32 of *Being and Time* unfolds understanding, a primordial existential that defines *Dasein* as interpretation. Heidegger here describes the way in which understanding, the

⁷ Ibid., p. 10

⁸ Ibid., p. 10

implicit relations amongst *Dasein* projected towards the worldly totality, become explicit through the ‘as’ of interpretation. Heidegger writes:

As understanding, *Dasein* projects its Being upon possibilities. This *Being-towards-possibilities* which understands itself is itself a potentiality-for-being, and it is so because of the way these possibilities, as disclosed, exert their counter-thrust upon *Dasein*. The projecting of the understanding has its own possibility – that of developing itself. This development of the understanding we call “interpretation.” In it the understanding appropriates understandingly that which is understood by it... [interpretation is] the working-out of possibilities projected in understanding.⁹

Every specific action of *Dasein* accords to the structure towards-which, as every action performs a function. Yet the totality of each specific action does not perform a single function, but rather operates as a potentiality in the structure of for-the-sake-of-which. The whole of *Dasein*, as it exists, does not exist for a purpose, but rather directs towards itself as a potentiality. Heidegger calls this direction towards oneself as a potentiality projection (disclosed in being-towards-death), limited or ranged according to its history or facticity. Thus when we are involved with the world, we are directed towards the future, towards a potentiality, which assumes its own fact of existing. Yet if we appropriate this very structure of projection, if we understandingly grasp understanding as projection, then we are making explicit the implicit range of possibilities that constitute our potentiality-for-being.

In order to make the project of *Dasein* explicit, to work out the implicit possibilities in our everyday way of going about the world, Heidegger points to the ‘as’ of interpretation. Whenever we grasp a possibility, perform an action for the sake of our-self, we grasp that possibility ‘as’ possible – thereby appropriating understandingly what is understood in projection. Interpretation has a three-fold structure that functions circularly, and it is in this circulation, the shifting dynamics of the three-fold, that the event of understanding becomes

⁹ Martin Heidegger, *Being and Time*, trans. John Macquarrie and Edward Robinson. (San Francisco: HarperSanFrancisco, 1962) pp. 188-189

disclosed. In order to begin to interpret one must have beforehand (or fore-have) some background or involvement that is already understood. In the third chapter of *Being and Time*, Heidegger demonstrates that things present-at-hand are meaningful only insofar as they relate to the world-hood of *Dasein*, so this fore-have simply makes reference to the being-in-the-world of *Dasein*. More specifically, with regards to scientific investigation, one cannot begin to perform an experiment without some implicit understanding of how to perform an experiment, or to simply perform. Secondly, there needs to be some fixed approach to the problem at hand, as fore-sight. Investigation begins with distinction, directed towards a particular semblance, followed by appropriating that semblance as it appears distinct from others. Heidegger writes, “This fore-sight ‘takes the first cut’ out of what has been taken into our fore-having, and it does so with a view to a definite way in which this can be interpreted.”¹⁰ There needs to be a method to experimentation, in order to distinguish that particular action, that particular experimentation, from the totality of implicit background involvements. Finally, one will always have expectations of what is to be found through interpretation as a fore-conception. When one appropriates a semblance in terms of a particular interpretation, there must be some expectation of that phenomenon upon which to judge whether this interpretation suits the phenomenon as it appears. In order for an experiment to be considered a success or failure, there must be some sort of pre-established guidelines for making such a judgment.

With this structure in mind, we can make at least one claim regarding the difference between the human and natural sciences. Even if we claim that each sets out hypothesis (fore-sight) to be proven or disproven (fore-conception), the background knowledge required for each differs. To understand human behavior, one must already have an understanding of the behavior

¹⁰ *Being and Time*, p. 191

in question. If such behavior is very specific to a particular ethnographic region then there presents a problem for the researchers approaching from the outside. Hubert Dreyfus uses the example of Levi-Strauss on gift exchange.¹¹ Without an internalized sense for the tempo of gift exchange, Levi-Strauss had to make up rules for the proper moments and conditions for exchange. However, there could be no sense or verification that these particular moments were authentically those proper moments of exchange because the people performing the exchanges did not operate on such explicit rules. The people could all in a moment completely change their time-sequence of gift exchange without in any way altering their tempo. This activity is meaningful and comprehensible, but only with regards to an implicit background or fore-have.

The natural scientist investigates and reveals incomprehensible nature – the meaningless of things. We will return to this difference between the natural and human scientist when we investigate principled physics in modern science. What I simply want to point out here is that the circulation of the three-fold structure of interpretation differs with regards to distinct backgrounds. The circle of interpretation discloses phenomena if the fore-sight and fore-conception challenge the fore-have. In other words, one interprets phenomena authentically only if the full structure becomes disclosed, meaning that there has to be a shift amongst all its components. The event of interpretation must challenge one's expectations, implicit and explicit, either to validate or defy them. With regards to the investigation in the natural science, one might argue that there will always be an implicit fore-have in the very technological means of investigation, using instruments for example, and every investigation challenges the utility of the instruments and methods used. But what if, instead, natural science was to ground itself, fore-have, upon an *a priori* principled understanding, axiomatic and explicit? Heidegger, we will see, argues that this has become the case in the modern, technological worldview, to our

¹¹ Hubert Dreyfus, *Being-in-the-World*. (Cambridge: The MIT Press, 1991) p. 204

detriment. While there is a particular violence when our implicit presuppositions become challenged, this violence becomes hidden away when our implicit understanding has become fully explicit. Moreover, it is only through this violence that there are events, circulations -- when there are changes.

We can see, then, that the existential of understanding gets organized in a particular way in interpretation. We can never, at least according to *Being and Time*, get around interpretation to understand beings-in-themselves. Heidegger states this very strong claim in the second introduction, “The phenomenology of *Dasein* is a hermeneutic in the primordial signification of this word, where it designates this business of interpreting. But to the extent that by uncovering the meaning of Being and the basic structures of *Dasein* in general we may exhibit the horizon for any further ontological study of those entities which do not have the character of *Dasein*, this hermeneutic also becomes a ‘hermeneutic’ in the sense of working out the conditions on which the possibility of any ontological investigation depends.”¹² In order to grasp the whole interpretation of any particular phenomena (whether that of *Dasein* or of the world) the project of hermeneutics implies a difference between the entities at hand and the condition that structures those entities in their becoming at hand. Any explicit truth first requires that the implicit understanding of phenomena as a whole be disclosed. If we are to assess the truth of natural science, of assertions of objects in space, we must uncover our implicit tendency to apprehend objects in space, and the historical situation in which this tendency happens. Yet the history of *Dasein* as facticity will always remain a question, since each assertion is context dependant; if facticity is made explicit, it must remain immanent and imminent to the assertion, in other words, historically situated.

¹² *Being and Time*, p. 62

We have exposed, here, one existential feature of *Dasein* as depending on a dynamic relationship, namely the circularity of the implicit becoming the explicit object of interpretation, therein reconfiguring an implicit understanding. The whole of interpretation functions only because of the interaction and relationship between its various modes, which cannot be reduced to a particular mode itself. When truth becomes determined by a particular mode itself, such as when assertion becomes the seat of truth or when the implicit has become entirely explicit and a-historical, there are no longer events, or changes. The mathematical nature of modern metaphysics, entirely explicit and axiomatic, explains the failure of modern philosophy to get out from under the shadow of Kant, by failing to understand that axiomatic principles are themselves principled, that is, a historically situated projection of the relationship between man and world.

One work of the philosopher is to make challenges to our presumed relationship to the world, understandingly reassess our ordinary ways of living, making certain relationship within the hermeneutic circle explicit without ever fully doing so. Thus every assertion must be assessed as a presentation – a question, “Does this assertion appropriately respond to the situation at hand?” Every assertion implies such a question.

Heidegger’s assessment that *Dasein* is interpretive all the way through, as the condition for an understanding relationship between man and world, implies a holism, and thus runs counter to dualistic or foundational assertions. Charles Guignon writes, “For Heidegger, our dealing with equipment make it possible for the world to show up for us as an interrelated web of “significance” where what anything *is* is “ontologically defined” by its relation to our goals and practices.”¹³ What things are must always be interpreted against a background of meaning,

¹³ Charles Guignon, “Philosophy After Wittgenstein and Heidegger,” in *Philosophy and Phenomenological Research*, Vol. 50, No. 4 (Jun., 1990), p. 667

established through, “the linguistic customs, conventions, and practice of our life-world.”¹⁴

Meaningful phenomena are only seen against such a pre-theoretical background, sketching out in advance a range of possible meanings that are then redefined through interpretive activity. The historical situation of *Dasein*, *Dasein* as understanding its own situation through interpretation, defines what *is*. Thus the whole of what *is*, facticity or the category of existence, is groundless. Any foundational assertion must be interpreted within the relationship between man and world and, “because things always show up as mattering to us in some way or other, there is no horizonless vantage point for the apprehension of brute “facts”.”¹⁵

This anti-foundational ontology undermines assertions that make absolute and a-historical either a subject or an object; factual claims that assert the existence of either an I-pole or objectivity depend on a pre-theoretical background of meaning. The first chapter of this thesis will follow Heidegger’s disclosure of how the I-pole and objectivity come to appear as axiomatic principles, as factual or as discreet things of which certainty becomes an issue. Modern philosophy’s quest to establish a theory of knowledge follows from a certain historical situation, an ontological event, where phenomena appear as things. In the modern era, the pre-theoretical background becomes entirely axiomatic in terms of quantity, thus developing the notion of a pure reason which becomes assumed and no longer interpreted, and likewise with transcendental reasoning. Each type of reason once asserted with authority and certainty, posited either from an I-pole or limited by the thing-in-itself, cuts off *Dasein*’s self-understanding as interpretation, thereby becoming a dogma of its own, and establishing an ontological foundation from which

¹⁴ Ibid., p. 667

¹⁵ Ibid., p. 656

dualism becomes an issue. Understanding for dogmatic rationalists and neo-Kantians must be objective and factual!

1.4. Language and the Formalization of Facticity

We come to understandingly acknowledge that *Dasein* is its everyday practical dealings through ordinary discourse and, “these ordinary ways of articulating our surroundings into a field of significance are focused and organized in advance by a background of intelligibility opened by discourse.”¹⁶ Ordinary language not only allows *Dasein* to understand its practical dealings, but establishes who *Dasein* is as the one who asks the question of being. When we inquire into the existence of things, either as specific things or categories, we cannot appeal to extra-linguistic facts to make these determinations, “since what we *mean* when we try to affirm the existence of horses and giraffes is always constituted by the linguistic articulations made possible by the background of our “grammar,” there is no way to get out of the language in order to assert the existence of these types of things as they are in themselves independent of any grammar.”¹⁷ The shared implicit understanding of ourselves and world resides within language, and this ordinary understanding holds open the clearing where the truth of any meaningful assertion might happen. Language does not exist outside of *Dasein*, outside of the man world relation, to which we might refer with authority; *Dasein* only exists insofar as language can designate that relationship, or insofar as man and world are meaningful.

Quentin Meillassoux categorizes Heidegger’s treatment of language as strong correlationism: that any given phenomena can only be asserted as a given in the relationship

¹⁶ Ibid., p. 661

¹⁷ Ibid., p. 668

between man and world.¹⁸ He contrasts this stronger version to a weaker form found in Kant, where the world cannot be understood outside of its relationship to man but can be thought, such that one can know that there exists a transcendental subject but cannot understand it completely or apprehend it as a thing-in-itself. In Heidegger's stronger version, the world can neither be understood nor known outside of its relationship with man – since the very meaning of world-hood depends on the clearing formed by language.

Meillassoux poses to this strong correlationism the problem of the arch-fossil.¹⁹ If I were to make the claim that a fossil existed a billion years ago, it is hard to think how this assertion can be inscribed within the relation between man and world. A strong correlationist would likely reply that the scientist who claims the fossil exists as an object only asserts such a naïve realism for pragmatic reasons. In other words, asserting objective claims is simply what a scientist does. So while a scientist can meaningfully make objective claims, such claims are not really objective at all, but dependant on a subjectively constituted world-hood (world of science), where the subject, cleared by language, makes world-hood what it is through an activity of relating. The problem, however, is that factual assertions made by a scientist and a creationist, who rejects that fossils existed a billion years ago, may both be true at the same time, true for the scientist as a scientist and true for the creationist as a creationist. As a simple factual assertion, shouldn't this claim be interpreted only a single way? Worse, under strong correlationism, there can be no privileging of one language or background meaning over another – the worlds of meaningless material things and meaningful divinely created things are ontologically on par.

What I hope this thesis shows is that, for Heidegger, these two perspectives are not ontologically on par, because only through one of them might *Dasein* understand its own history

¹⁸ Quentin Meillassoux, *After Finitude*, trans. Ray Brassier. (London: Continuum, 2008) pp. 5-8

¹⁹ *After Finitude*, pp.10-12

by understandingly grasping the mathematical outlook as determined through a particular question of things. The mathematical outlook of modernity, explicated in Descartes pure reason and appropriated in Kant's transcendental reason, posits objects against objective space, based on the self-assurance of an I-pole. The mathematical as uniform and axiomatic sets up the possibility of transcendental reasoning -- the transcendence of the thing-in-itself over representation defined by objectivity. Heidegger criticizes the mathematical outlook of modernity as it gets taken over by the positivists who have forgotten its origins in the speculation of the mathematical, doubt as it arises in the history of ontology, establishing the law of non-contradiction and the I-pole through Descartes' reversal of creation.

If Heidegger has destructed the history of ontology and made apparent the historical grounding of subjectivism, that is to say, if we have become aware of the assumption of subjectivism in any claim of a thing as represented in space, perhaps we can dissect speculation grounded on this subjectivism from speculation grounded on facticity. Badiou maintains the merging of the mathematical and metaphysical in order to reassess the capacity of transcendental reasoning altogether, to break free from the logic of representation that unifies sensation and anticipation, such that we might think or speculate beyond the limits of man as he represents himself as an I-pole directed towards objectivity. He can maintain this view because mathematics auto-destructs. The expression of facticity is implied in axiomatic set theory, where the axiom of choice can be expressed as a principle of facticity – that any fact stated using this axiom could be otherwise, or the One-is-not. The existential analytic in operation through ordinary language, with the transcendental assumption embedded within, depends on the concept of facticity, which can be speculated on the basis of pure reason since math auto-destructs. Thus our thought may proceed beyond the limitations of ordinary language and also the

representations of transcendental reasoning, by a strict analysis of the anti-dogmatic tendency of mathematics, stated directly as One-is-not. On the basis of this process of formalizing facticity, the opening of the mathematical as pure speculation, *Dasein* can make sense of itself as nothing other than itself, nothing other than potentiality.

CHAPTER 2: THE MATHEMATICAL IN MARTIN HEIDEGGER

2.1 Introduction

Heidegger investigates the context wherein Kant criticized the metaphysics of pure reason in order to assess the possibility of stepping outside of Kant's shadow. At the time of the lecture series entitled *What is a Thing?*, the neo-Kantian schools of thought were engaged in increasingly sophisticated inquiries into theories of knowledge, epistemology, operating between a presumed subject and object. These positivist schools held that meaningful assertions were only those that could be objectively verified by experience – that a description must correspond to a particular situation of individual things. Yet the very inquisition into the matter of objectivity depends on the transcendental reasoning of Kant, reasoning that explicitly utilizes principles in operation through extension, space, or quantity to define that which is transcended. Kant's inquiry into an object as objective, object as limited to representation, depended on a quantitative outlook that developed in Newton, treating motion as uniform. Furthermore, it was out of Newton's principled reasoning that Descartes broke from the ancient and medieval metaphysics by positing a self-certain subject, a subject who grasped the world through pure reason. Heidegger criticizes dogmatic modernity for failing to understand the history of ontology, the origination of the mathematical outlook, and thereby dogmatically apprehending things only as standing-reserve

In *Being and Time*, Heidegger opposes to the transcendental reasoning of philosophy, apprehending an objective background against which objects appear, a return to ordinary experience. But if we cannot return to original phenomenological experience, such as Aristotle's view of motion, perhaps we can at least dissociate our current ordinary language and

speculations from the language and speculation that depend on modern presumptions of uniformity and principles, such as that occurring in Descartes method of doubt, which speculates according to neither traditional nor transcendental reasoning.

2.2 Mathematical as Pre-theoretical Understanding

Heidegger criticizes modernity for failing to ask the metaphysical question, “What is a thing?” This has happened because the mathematical and the metaphysical have merged together, such that world and man only appear in terms of quantity. Yet for Aristotle, the mathematical could better be described as the condition for metaphysics. Heidegger writes, “The mathematical is that evident aspect of things within which we are always moving and according to which we experience them all, and as such things.”²⁰ The mathematical could be also described as the pre-theoretical understanding of man and world, within which we are always operating, or the condition for any possibility of knowledge. Thus the mathematical, as the condition for knowledge, operates *a priori*, or what Heidegger calls, “what can be learned and thus, at the same time, what can be taught.”²¹

To further explicate the concept of the mathematical, or pre-theoretical *a priori* understanding, Heidegger gives a phenomenological account of mastering a weapon. Learning how to use a weapon does not simply mean grasping the weapon, neither collecting up or categorizing the weapon, nor even practicing the weapon. When one practices shooting a particular rifle, the learning that takes place occurs along multiple levels. One isn't simply learning how to shoot that particular rifle, but rifles in general, and moreover, this practicing involves an entire network of motor operations from moving the body in ways with posture, strengthening the leveling of the arm, focusing one's attention on a target, coordinating multiple

²⁰ *What is a Thing?*, p. 75

²¹ *Ibid.*, p. 69

muscles without breaking equilibrium, etc. In other words, practicing a gun involves a multiplicity of body operations that one already knows how to do, yet simultaneously learns to do adaptively. There is a back and forth between all of these operations that condition the whole, specifically the whole of shooting a gun, a certain way. Moreover, practicing with a rifle will utilize and operate across cerebral involvements as well. Practicing the shooting of a low-caliber rifle might condition one to anticipate the backfire on greater or lesser caliber rifles as well, and one might even develop a feel for ballistics in general.

How the rifle works as a gun depends on how it works as a thing, a thing utilized as a gun. This particular thing operation must already be familiar before practicing; otherwise it would not have even been able to be made originally by an artisan. So before practicing and learning how to shoot a rifle, one must in advance have a prerequisite understanding of how that type of thing must work. The mathematical corresponds to that type of learning where we already, in advance, know how to use a thing as the type of thing about which we are learning. In order to learn how to shoot a gun, one must have an *a priori* understanding of the operations of a gun, even if these operations are not explicitly or theoretically understood. Thus, one can only learn what one already knows, and this capacity to learn what one already knows allows the possibility of teaching, where a teacher might practice or make explicit an understanding already implicit in the student.

While numbers are mathematical, the mathematical is not numerical. Heidegger writes, “Numbers are the most familiar form of the mathematical because, in our usual dealing with things, when we calculate or count, numbers are the closest to that which we recognize in things without creating it from them.”²² We tend to think that numbers correspond to objects because we are familiar with seeing things quantitatively. Take, for instance, the old saying, “don’t

²² Ibid., p. 75

confuse the forest for the trees.” The collective forest only becomes counted in terms of discreet trees by a familiarity of working with particular trees. A forest, a whole, may operate significantly in our life as a place of mystery or wilderness, but in our everyday workings, we cut up individual trees, not forests, to make wood for our livelihood. This tendency may further explain our inability to manage forests as a whole to the detriment of our overall environment. Number figures within our everyday operations, not derived from discreet objects. One can only count if one already understands the meaning of addition, the meaningfulness of having more of something rather than less. Sitting down at a dinner table, I may take a knife and loaf of bread and say, “I have both of them.”²³ But this does not just mean “ $1+1=2$ ” because it is only after we have added a third to the set, a cup, to form a whole meal, that “plus” becomes meaningful instead of “both.”

The mathematical becomes merged with the metaphysical when we begin to see things only as objects, against a numbered or spatial background. The turn towards a spatial, uniform background begins with Newton’s rejection of Aristotelian motion and continues with Descartes’ pure reason. When our implicit, pre-theoretical understanding becomes entirely explicit, when the mathematical becomes purely numerical, how are we to know whether we have come to a full understanding of man and world, or have we simply become dogmatic into seeing man and world only as individual objects? Perhaps we can only have a complete, explicit understanding if we recognize the historical development imbedded in our everyday approach. Heidegger returns to the Greek concept of the mathematical, as what is both learnable and teachable, in order to de-absolutize number – in order to undermine the unity of the mathematical and metaphysical inquiry by placing this modern determination within a context. In the next chapter, we will follow some of Alain Badiou’s mathematical thought to demonstrate that number de-

²³ Ibid., p. 74

absolutizes itself, and so we do not need to return to an original experience through attending to ordinary phenomena as Aristotle did in order to break free from dogmatic appropriation of *Dasein*.

2.3 Nature in Aristotle and Newton

Heidegger cites Kant's preface to *Metaphysical Beginning Principles of Natural Science*, quoting, "However, I maintain that in any particular doctrine that in any particular doctrine of nature only so much *genuine* science can be found as there is mathematics to be found in it,"²⁴ in order to underscore that science, for Kant, meant specifically modern, mathematical science developed through the specific principles of Newton. The mathematical projection of modern science appears most clearly, in contrast to ancient science, through Newton's First Law of Motion, or the principle of inertia. This principle, for modern science, has become a self-evident truth and the fundamental attitude towards all things, things moving in space. Yet this principle was not self-evident before the mathematical metaphysics. Both Newton and Aristotle apprehended the same thing in nature, the same what, but the how of nature differed, moved in different ways. Heidegger offers a historical analysis where modern science decided upon a mathematical metaphysics, beginning with the turn away from the ordinary experience of different phenomena in Aristotle to the uniform and axiomatic apprehension of movement in Newton.

Both Aristotle and Newton sought to attain knowledge of phenomena itself, independent of knowledge stemming from activity of "concerning busily with creating on things," or actively "imagined."²⁵ What they found common in nature was that nature moved, and any resting was

²⁴ Ibid., p. 68

²⁵ Ibid., p. 81-82

only a special kind of temporary motion. Yet how things moved for each differed. Heidegger writes of the Greek apprehension of motion, that each phenomena, “has its place according to its kind, and it strives towards that place.”²⁶ The place of fiery objects was in heaven, and the place of the earth was below. Among the higher, fiery plane objects moved circularly and here on the lower place objects moved linearly. Movement against nature was violent. Lighting a match caused a violent explosion, where the fire in sulfur split away and floated towards the heavens, while the earthly ash fell to the ground. Different modes of being are determined by the different spheres or places, thus different bodies exist in different ways. Heidegger writes, “According to Aristotle, the basis for natural motion lies in the nature of the body itself, in its essence, in its most proper being.”²⁷ Since there are different bodies, in different places, there are different kinds of motion depending on the different places. Thus when a body moves, it should move for a certain space determinate for its kind of body. For a body to continue in motion requires further, complex, explanation involving multiple bodies.

In Aristotle’s view, our pre-theoretical understanding gets challenged by various experiences, because different kinds are not first projected, but found in ordinary experience and then generalized from experience. Thus when we witness violence, not only our theoretical or explicit understand of only a single kind of body becomes challenged, but also our implicit pre-theoretical understanding learns, because this challenge involves a multiplicity of different kinds of bodies. Returning to the structure of interpretation, violence challenges not only our foresight (theoretical, explicit) but also our fore-have (pre-theoretical, implicit); thus violence challenges an interpretation of man and world.

²⁶ Ibid., p.83

²⁷ Ibid., p. 85

Newton's First Law of Motion, in an abridged form, states, "Every body left to itself moves uniformly in a straight line."²⁸ In this view of nature, motion is uniform and thus may be captured axiomatically. Every body is of the same kind, all in relation to our place (earth) where things move in straight lines. The circularity of the heavens then needs explaining, rather than how an object continues in a straight line for longer or shorter in different circumstances. In this uniform view of motion, one position relates to every other position; there are no different places, nor different bodies.²⁹ Heidegger writes of Newton's first law, "being in motion is presupposed, and one asks for the causes of a change from motion presupposed as uniform, and in a straight line."³⁰ Rather than motion as determined according to different natures and forces, force for modernity is defined as divergence from uniformity – the uniformity of space presupposed as a fundamental law. Change has here been captured between the absolutes of force and mass, both quantities, where the degree of difference of a body in motion away from a uniformly straight line determines the mass/force figuration. As place becomes uniform, "the determination of motion develops into one regarding distances, stretches of the measurable, of the so and so large. Motion is determined as the amount of motion."³¹

When the how of being becomes equivalent to the what of being (merging of mathematical and metaphysical) as measurable, bodies become only another unit of measurement and the difference between body and principle are lost. In such a model, experimentation challenges explicit principles, or axioms. We only anticipate motion according to the motion of bodies moving in uniform space, anticipating according to axiomatic principles.

²⁸ Ibid., p. 86

²⁹ Gilles Deleuze's concept of the body without organs here can be seen as Newtonian

³⁰ Ibid., p. 86

³¹ Ibid., p. 88

In the place of different bodies, different phenomena, we have instituted the principle of an imaginary object, the uniform motion of a body, such that, “The law speaks of a thing that does not exist. It demands a fundamental representation of things which contradict the ordinary.”³² This defines the mathematical project of modern science, where a project allows the possibility of an entity to exist. The mathematical project of modern science as spatial, only allows the possibility of entities to exist as spatial, or represented in space.

Such a project is *a priori*, and the facticity of this project can be found clearly in the contradictory interpretations of a body falling between Galileo and his peers. Privileging laws over ordinary experience only became self-evident far after the time of Galileo dropping bodies of different heaviness from the tower of Pisa; he interpreted the results in favor of something like Newton’s First Law while others interpreted the results in favor of the traditional, ordinary analysis. When two bodies of different weights fell from the tower, they did not land at the exact same time. The difference, however, was interpreted in two different ways. For Galileo, the difference was so slim that it justified the mathematical project of uniform motion. For others, the difference, *prima facie*, demonstrated that different bodies move at different rates.

Thus, at least with regards to this crude experiment, there was no fact of the matter that established who the experiment verified. Each interpreter came at the experiment in different ways. Where ordinary experience would see bodies simply moving to their proper place, restoring the disequilibrium of violence, mathematical experience would see a challenge to axiomatic principles, a challenge that verified these principles for Galileo. Yet it is questionable whether, in the later case, there is any interpretation going on if the pre-theoretical is not challenged. Such an experiment certainly, as an experience, lets the experimenter learn the

³² Ibid., p. 89

practice of experimentation, but what gets challenged in such a learning are not merely the principles, but the very relationship between man and world.

2.4 The History of Transcendental Reasoning

Newton identified modern science with verification, such that all scientific knowledge must be revisable,³³ prompting experimentation such that explicit axioms are challenged by empirical, quantitative data, and thereby distinguishing this type of knowledge as knowledge of nature. After making clear that this modern conception of nature operates according to axiomatic principles, Heidegger discloses that the philosophical operations of Descartes and Kant were conditioned by this modern, mathematical metaphysics. He writes, “Because the metaphysical is now mathematical... the particular must be derived from the general as the axiomatic according to principles. This signifies that in the *mathematica generalis* what belongs to what is as such, what determines and circumscribes the thing-ness of a thing as such, must be determined in principle according to axioms, according to the schema of positing and thinking as such.”³⁴ In order to demonstrate how “what is as such” becomes determinate in Kant as the thing-in-itself, Heidegger must first recall Descartes positing of pure reason, or “thinking as such.” In overturning the medieval relationship between man and god, Descartes founds scientific inquiry on the self-certain subjectivity, utilizing inductive and deductive procedures guaranteed by Ideas present to this pure reason, namely the Idea of non-contradiction.

Descartes’ self-certainty developed an explicit and axiomatic foundation for pure reason, simultaneously positioning the I-pole as the foundation for thought and restricting the domain of objects to space. The method of doubt calls into question the traditional relationship between man, world, and god, specifically assurances that man and world were created by God in a

³³ Ibid., p. 82

³⁴ Ibid., p. 111

certain way. This doubting enabled the possibility of asserting the self-certain ego, on the basis that there must be some *subjectum* underlying the doubting, a *subjectum* that becomes a subject. Through doubt, the classic notion of substance becomes the modern notion of subjectivity. The rejection of Christian metaphysics in modernity, specifically through the method of doubt, enabled the transition to a new secular authority, the authority of the I-pole. From doubt alone we can detect a new metaphysics, metaphysics of facticity instead of fact. Being as a whole does not exist for a reason given by god, because being could exist in another way (i.e. an evil god or for no reason at all).

Heidegger writes, “The subjectivity of the subject is determined by the “I-ness” of the “I-think.” That the “I” comes to be defined as that which is already present for representation.”³⁵ The positing of a self-certain subject signifies that I avoid contradiction based on the grounds of thought given over to representation in the presenting of thought as such. I cannot think that two objects exist at the same time at the same place – the law of non-contradiction, of consistent representation, depends on a doubt, where thinking as such becomes present, and defined according to subjectivity. Breaking from tradition, doubting makes possible the self-binding of subjectivity. Descartes formalizes the law of non-contradiction in the cogito, yet the grounds for such a law are first presented in doubt, or facticity. The principles of axiomatics and uniformity are themselves principled in facticity, understandingly doubting.

This assessment of Descartes *cogito* counters the dominant view that the father of modern philosophy was primarily concerned with epistemology. Heidegger writes, “Descartes does not doubt because he is a skeptic; rather, he must become a doubter because he posits the mathematical as the absolute ground and seeks for all knowledge a foundation that will accord

³⁵ Ibid., p. 105

with it... This absolutely mathematical principle cannot have anything in front of it and cannot allow what might be given to it beforehand.”³⁶ Doubt begins with the drive to ground being in mathematical space, rejecting the traditional relationship between man and world as created, and unifying the mathematical and metaphysical question. As man and world become groundless, thrown as a whole in modern science, any particular relationship becomes doubtful.

Mathematical certainty of objective existence, as an *a priori* understanding that then becomes formalized or explicated, follows from a rejection of traditionally held assumptions about nature, such that any principle can be revised. This turn, proceeding from the situation of doubt, shifts the violence of unanticipated experiences into a challenge of explicit principles.

To clarify this historical decision, establishing as principled subjectivity and the law of non-contradiction as well as the anticipation of objects against an objective, spatial background, we may raise the further question of whether the law of non-contradiction stems from simply the position of the I-pole, or rather does the law of non-contradiction allow for the I-pole to become an issue. For Heidegger, the mathematical isn't some subjective concept, but the mathematical within the history of metaphysics is the condition where subjectivity becomes an issue.

Meillassoux derives the law of non-contradiction from change alone, speculated on the basis of facticity, which itself derives from the rejection of man and world as created, either by god or principle.³⁷ He does this basically by speculating about the nature of change, drawing from Hegel. If a principle doesn't change, then this principle's other would be identical to itself, causing contradiction. Yet change doesn't cause contradiction, because any principle is always becoming other and never other than itself at one time. Meillassoux raises this example in order to demonstrate that any notion of absolute principle would violate the law of non-contradiction,

³⁶ Ibid., p. 104

³⁷ *After Finitude*, p. 57

except the principle of facticity itself, that is, doubt, or the modern mathematical from which subjectivity in Descartes is posited.

The modern mathematical basis, or pure reason presented in doubt and secured in an I-pole, provides the historical circumstances for Kant's positing of the thing-in-itself, an X that grounds the logic presented in pure reason, through doubt, in experience. The thing-in-itself as transcending phenomenal experience limits the boundaries for knowledge, such that objects of knowledge might only be apprehended as objects, that is, against an objective background defined by representation in space. Yet the positing of the virtual thing-in-itself comes about through a particular mode of questioning into thing-ness. Heidegger writes, "In view of Kant's essential definition of the essence of the thing as a natural thing, we can judge that from the beginning Kant does not pose the question of the thing-ness of the things that surround us. This question has no weight for him. His view immediately fixes itself on the thing as an object of mathematical-physical science."³⁸ A thing, for Kant, only appears as an object in space, as a represented object. Yet as we have seen, the treatment of things as spatial, or quantitative, was itself a historical development. In other words, the model of representation as spatial was itself historically presented, specifically through doubt. Thus when Kant seeks to limit the powers of pure reason by treating objects as objects of experience, in response to dogmatic rationalism, he neglects the non-dogmatic grounds in which pure reason developed, as a specific modern mode of apprehending thing-ness

This neglect manifests through the axiomatic character of Kant's intuition as representation. Kant develops axioms for experience given in intuition, axioms of sensation and anticipation. The whole of space cannot be constructed out of parts of space, and so experience

³⁸ *What is a Thing?*, p. 128

must first sense space as a whole, given in *quantas*. As we have seen, the giving of *quantas* develops historically, out of the facticity of *Dasein*. Yet when *quantas* becomes axiomatic, this presentation becomes lost, because the implicit man and world relation has become entirely explicit and a-historical. What Heidegger reinforces is that this particular representation of reality given in *quantas* develops out of a history, such that transcendental reasoning happens when thing-ness becomes determined as, “how the object is the object of the assertion, how the assertion represents the object in advance, how our knowledge passes over to the object, *transcendit*, and how, thereby, and in what objective determination the object encounters.”³⁹ This very method of representation, of objects against an objective background, only became possible due to the presentation of consistency in experience, or what Kant calls the unity of apperception, upon which transcendental subjectivity can be speculated according to the limits of pure reason. Yet, from Descartes, we have found that the consistency of experience, the presentation of non-contradiction, was given through doubt, anti-dogmatic speculation, or the modern mathematical. In Kant’s experience of natural objects as objects of representation, we have disclosed the embedded voice of facticity, of a deep-seeded doubt or question, which both the I-pole and the unity of apperception (or transcendental subjectivity) have covered over and made dogmatic.

Both the cogito and axioms of intuition were speculated, projecting a quantitative background, yet came back to define the direction of *Dasein*. If we forget the ontological grounds of the objectivity limited to representation, and assume only an epistemology in relation to objects, then we have dogmatically accepted not only the self-certain subject and objects against a field of objectivity, but we further see ourselves as standing reserve.

³⁹ Ibid., pp. 178-179

2.5 Ontology of Standing-Reserve

Science forgets the question of being by forgetting its own origination. Moreover, by forgetting what origination means, science remains closed and unable to apprehend new origins. Technology expresses this forgetfulness by being “too revealing . . . the revealing that rules in modern technology is a challenging.”⁴⁰ In technological revealing, our world challenges the earth by putting, “to nature the unreasonable demand that it supply energy which can be extracted and stored as such.”⁴¹ Technology reveals by un-concealing the energy that is locked up in nature and transforming this energy into a standing reserve. Science, by extension, challenges the earth as well by setting up a configuration such that nature reveals itself only as forces that are calculable prior to any particular revelatory instance. The projection of science, therefore, remains closed by restricting the possibilities of nature to matter and energy.

All experiences of nature are compared to our expectation of how matter and energy should perform, that is, we recognize experimental instances as conforming or non-conforming to our expectations. The key point is that we comprehend the totality of being as matter and energy prior to any particular scientific experience, thereby forgetting the question of being. Why matter and energy and not nothing? Why not something else? If the question of being is truly forgotten, then there will be no new beginnings, only repetitions of law-like cycles between matter and energy.

Technology and science as the culmination of metaphysics threatens us, first, because it conceals that it itself is a particular mode of disclosure. As I mentioned earlier, if experimentation becomes the primary mode of gathering knowledge, then one might question

⁴⁰ Martin Heidegger, “On the Question of Technology” in *Basic Writings*, ed. David Krell (London: Harper Collins Publishing, 1993) p. 320

⁴¹ *Ibid.*, p. 320

whether there are ever any authentic interpretations ever occurring, if the presuppositions of axiomatic sciences are ever questioned. Secondly, the human being itself becomes just another source of energy, while simultaneously we think we have total control over the earth. Through the conversion of earth into force, objects are recognized only as means to an end. Nearness, our implicit relation of world-hood, is lost because of this uniformity imposed upon all things. To avoid appropriating things as objects, to let things be, or to approach things in their nearness all mean to revert to a phenomenological frame of mind, the frame wherein original acts of projective saying occur. To let things be means to give proper respect to the contingency of things, to recognize that all particular directives are projections.

The absolute horror, however, of the technological thinking arises through not only through thinking of things as objects, but through seeing human beings only as formed matter. He describes this point of “precipitous fall... where he himself [*Dasein*] will have to be taken as standing-reserve.”⁴² The great irony of the situation is that *Dasein* becomes less than nothing simultaneously while thinking he has come to a complete understanding of being. The deferring of sense away from objects as they present themselves therein also defers sense away from any particular individual’s existence. We exist only to the extent that we fulfill a purpose that has been imposed on us. Forgetting the origination of this sense, mankind at the same time loses all sense-bearing and any possibility for an originary disclosure.

From the perspective of a post-war Germany, Heidegger lived firsthand the destruction that scientific thinking wrought. Nazi Germany proved the model case for how biased a scientific perspective can be with regards to the prejudices dominant in a particular society. For all the apocalyptic thinking that happens in Heidegger’s analysis of science, he at the same time

⁴² Ibid., p. 332

mentions a possibility for a saving power within technological revealing. The *gestell*, or frame, of science, like all revealing, has an ambiguity to it. A framing destines to the effect that it limits a range of possibilities. But any possibility remains so only insofar as it has not happened. Thus all *gestells*, including the technological perspective, are future-looking.

The danger can be averted by watching-over technology, to make sure that certain possibilities do not become actualized. “How can this happen?” he writes, “Above all through our catching sight of the essential unfolding in technology, instead of merely gaping at the technological. So long as we represent technology as an instrument, we remain transfixed in the will to master it... the essential unfolding of the essence of technology propriates in the granting that needs and uses man so that he may share in revealing.”⁴³ The danger of technology can be averted if we do not forget that science is a particular mode of revealing and not the only compartment to being. Moreover, we must not forget to whom science reveals. Why is there being and not nothing? Simply posing this question already begs at least one answer – because of a history of rejecting dogmatism. While Heidegger underscores the danger inherent to the merging of the metaphysical and mathematical as it threatens the dwelling of man and world, Alain Badiou has outlined at least one mathematical model that de-absolutizes this relationship.

⁴³ Ibid., p. 340

CHAPTER 3: THE MATHEMATICAL IN ALAIN BADIOU

3.1 Introduction

How would revolution be metaphysically possible if the changes of physics, of nature as space, were merely the result of a previous condition, following out of causal necessity? In other words, how can there be spontaneous beginning within time? Badiou, from a rationalist and a materialist perspective, criticizes empiricism for an inability to think of a future. A priority on the senses, sense of particular things, disregards what is essentially human, pure quantity or pure thought. Peter Hallward writes, “Were the multiple to be founded on something else – an *élan vital*, a primordial agonism, a Creative or chaotic principle, an elementary unit or ‘atom’- its multiplicity would to some degree be constrained by this thing beyond its immanent logic. Such philosophies have presumed the ‘radical originality of the multiple’ meaning pure or *inconsistent* multiplicity, multiplicity that is ontologically withdrawn from or inaccessible to every process of unification, every counting-as-one.”⁴⁴ We should wonder if we can let go of transcendental reasoning, especially since the transcendental logic presumes a virtual obstacle to speculation, limiting speculation to objects against an objective background. What Badiou instead proposes is “to subtract the concept of multiplicity per se from any such reference, however implicit, to the notion of substantial differences between multiples... instead, ‘what comes to ontological thought is the multiple without any other predicate other than its multiplicity. Without any other concept than itself, and without anything to guarantee its consistency.’”⁴⁵ In other words, Badiou fully embraces facticity, or the groundlessness of the whole of being. Any multiplicity

⁴⁴ Peter Hallward, *Badiou: A Subject to Truth* (Minneapolis: University of Minnesota Press, 2003) p. 82

⁴⁵ *Ibid.*, p. 81

cannot be thought aside from multiplicity as such, just as being cannot be thought aside from being as a whole. Coming from Lacan, what is sayable is not what is real⁴⁶, and thus philosophy may be conditioned by multiple discourses or truths, multiple realities, as opposed to being conditioned only by the dynamisms of a single historical project – the project of objects against an objective background..

3.2 Mathematics as Ontology

In this section I will explicate the reasons why Badiou sutures ontology to mathematics, through the multiplicity that is decided upon in Zermelo-Frankel's axiomatic set theory, that is, through the process of quantification. As a result of this quantification, the "One-is-not" and so the multiple is affirmed as the grounds of thought alone. Badiou's own ontology, in terms of mathematics, guides our thought through the presentation of representations, the counting of being. He does this so that we might once again think of a way to have spontaneous beginnings, representing ourselves anew, both to uphold the principle of facticity based on speculation alone and possibly also a limited transcendental reasoning. Badiou affirms the speculation of poetic disclosure, of politics, and love. Yet mathematics has a certain privileged position because of its formalization. Destructing ontology, it may not be enough to say "being is nothing" or "being is facticity," simply because of the material tendencies of modernism. For facticity to work in modernity, for doubt to be raised again, this doubt must be completely explicit. Thus, Badiou attempts a revolutionary metaphysics in two senses. He not only revolutionizes ontological thinking, but he also provides, in his own ontology, the possibility of beginnings, such that we might actually have a revolution: mobilize and hope.

The ontology of mathematics draws exclusively from Zermelo-Frankel's axiomatic set theory. As a student of Lacan, Badiou sutures ontology to this self-referencing sign system. To

⁴⁶ Within the context of this thesis, we might rephrase as what is represented is not what is presented.

suture simply means to posit, “X is Y.” Such an essential claim, however, will always cover up as much as it exposes, closing off the world such that one particular meaning will be brought forth. Why set theory? John Mullarkey writes, “set-theoretical inscriptions seem impervious to reduction, and that is why Badiou believes that they are the language of immanence – there is no “outside” beyond them.”⁴⁷ Mathematicians usually think of axiomatic set theory as a formal approach to mathematics, since these nine axioms alone can express all mathematical statements, thereby not grounding these expressions on any objects, just the materiality of the decision itself, the decision to think and the material writings that force the reader to respond in particular deductive patterns. Yet as we have already seen, the essence of the mathematical depends on the whole of pre-theoretical understanding, presented as anti-dogmatic speculation in modernity, and not number, thereby undercutting the very distinction between formalism and constructivism.

Set theory was first developed by Georg Cantor in 1874 as a method for ordering different kinds of numbers, for instance demonstrating that real numbers $\{1.1, 1.2, 1.11 \dots\}$ exceed natural numbers $\{1, 2 \dots\}$. The most important aspect of set theory, for the purpose of this thesis, is that any set can be represented in multiple ways. For instance, from the existence of the set $\{1, 2, 3\}$, we could also deduce the existence of the sets: $\{1, 3, 2\}$, $\{2, 1, 3\}$, $\{3, 2, 1\}$, etc. as well as the set of all these sets. This can be deduced from the power set axiom. What Cantor discovered, however, was that theoretically for a set containing infinite numbers there should be an infinite number of sets for the set of infinite numbers. Mathematicians express this discovery as the cardinality of ordinal numbers. The set of ordinal numbers is the set of all natural numbers, and thus is infinitely large. However, as a set with a certain consistent structure (being natural numbers), we can imagine adding one to ordinal numbers, thus introducing a cardinality to numbers. By counting numbers we can develop a hierarchy of numbers, from

⁴⁷ John Mullarkey, *Post-Continental Philosophy: An Outline* (London: Continuum, 2006) p. 187

ordinal to cardinal, and onward in growing sizes of infinity. In this counting procedure, Cantor introduced a principle called the continuum hypothesis, or that an infinite set plus one $\{I+1\}$ equals an infinite set of one order greater, $\{I^1\}$. With the introduction of this hypothesis, there would be no sets “between” $\{I\}$ and $\{I^1\}$. This provides for two immediate conclusions. First, sets of both finite and infinite sizes would be well ordered, meaning one could make deductive proofs between sets of different sizes. Secondly, with this hypothesis at hand, one could deduce the existence of the set of all sets, signified with a variable of an order greater than any other variable.

However, Gödel’s incompleteness proof in 1931 caused the mathematical community to doubt the existence of the continuum hypothesis, and to reformulate it into the axiom of choice, which for Badiou becomes the decision thought in terms of quantity alone, or facticity in action. Given the difficulty of trying to formalize one of the many different incompleteness proofs, I will simply try to convey the general sense of the difficulty. If one were to give every object a Gödel number, what would be the Gödel number of a Gödel number? Any number given will at the same time be a Gödel number and not be a Gödel number. This is because this number will simultaneously be a Gödel number and prove the existence of Gödel numbers. In other words, to prevent circularity between problem and proof, the Gödel number named for the Gödel number of a Gödel number cannot be a Gödel number. Yet any number given will be a Gödel number, and so there will be a contradiction. This proof can be reconstructed in terms of any first-order logic, such as set theory, that consists of only one kind of variable. The result is that any first order formal system cannot be at the same time complete and consistent. If it were complete, it would have to formalize itself and thus introduce an inconsistency by positing a proof that was also not a proof. Yet to be consistent, it must deny the existence of its own self as formal. Thus,

for the sake of consistency, Zermelo-Fraenkel's axiomatic set theory introduced the axiom of choice, an axiom that stands out because it must be made on other grounds than deduction alone. In other words, the axiom of choice is a meta-mathematical proposition. It is not deduced from any other rule or definition, but assumed in order to provide consistency to the axiom schema.

Thus the mathematical community, in its incessant search for completeness and consistency, found itself at a moment of choice, where the only way to continue to be consistent was to be inconsistent from its previous determinations, to introduce a rule that was not deduced from any other definition, to speculate beyond its traditional limitation. In other words, mathematics as a study in general attempts to universalize its structure and it is the very principle of this universalizing, the principle of self-identity, that creates the direction of mathematical progress. Yet in order to progress, the mathematical community had to decide otherwise, decide a course completely other than it was determined to on the grounds of its very condition as universal and consistent. The axiom of choice basically states that for all sets containing at least one member, there is at least one set consisting of only one member from each of these sets. This axiom relates to the continuum hypothesis in two ways. First, it allows for there to be well-ordered sets. Secondly, however, it rejects the possibility of there being a set for all sets. There must always be multiple sets. A mathematician who chooses to use this formal system chooses that there is not a Gödel number for a Gödel number, that there is not a set to all sets, that the One-is-not. In other words, the usage of the axiom of choice, or Zermelo-Fraenkel's axiomatic set theory, affirms the multiplicity of being without this multiplicity being given or presumed. The representation of any multiplicity could be presented a different way!

Badiou treats the turning away from the continuum hypothesis, the turning away from thinking of set theory as unified, as the example of all truth procedures. In his ontology as

mathematics, there are an excess of presentations over representations, an excess of application of the axiom of choice that cannot at any given time be formalized. The history of set theory does not stop, though it may be naturalized in a particular structure, a structure that even now is changing with the advent of category theory. Thus the mathematical speculation of Zermelo-Fraenkel's axiomatic set theory cannot ever become static, or absolute.

Recognizing this pattern in the history of mathematics, Badiou takes set theory to be the multiple thought in terms of the multiple alone, a decision to make inconsistency consistent, due to the quandary of the incompleteness proof that results from the presupposed drive for consistency. Badiou writes, "Ontology, axiom system of the particular inconsistency of multiplicities, seizes the in-itself of the multiple by forming into consistency all inconsistency and forming into inconsistency all consistency. It thereby deconstructs any one-effect; it is faithful to the non-being of the one, so as to unfold, without explicit nomination, the regulated game of the multiple such that it is none other than the absolute form of presentation, thus the mode in which being proposes itself to any access."⁴⁸ To maintain the consistency of set theory in the face of the incompleteness proof, one must introduce a meta-mathematical proposition, namely the axiom of choice. Thus to maintain consistency, mathematics had to become inconsistent with regards to its original orientation of following the path of deduction for the sake of consistency.

By suturing ontology to mathematics, Badiou has freed philosophy from thinking in terms of ontology alone, to allow philosophy to engage in multiple discourses, because any ontology will be consistent only on the grounds of its own facticity: deduction sacrificed for the sake of consistency. In other words, Badiou has chosen a specific form of the mathematical that self-destructs, undermining its own authority as absolute. Any mathematical explication using

⁴⁸ Alain Badiou, *Being and Event*, trans. Oliver Feltham, (London: Continuum, 2006) p. 30

set theory, specifically the axiom of choice, explicitly asserts that it could be explicated a different way. The mathematical as absolute may still be speculated, but this speculation only holds over its own particular domain or limit, as absolute speculation, as irreducible possibility.

The reputation of materialism has been tainted by the positivist legacy, who forgetting the ontological basis of Kant's *Critique of Pure Reason*, claimed that only particular things exist. Such a view, vulgar materialism, has been described by Zachary Fraser as a structural materialism.⁴⁹ Structural materialism posits only individual materials, or objects. Problems in such a view are numerous, dating back to the pre-Socratic atomists positing the existence of atoms and void. The problem can be summarized in Heisenberg's uncertainty principle, which basically states that if you know there exists an atom, it will only be at a location according to probability and if you know the location of an atom, you only know it exists according to probability. What Alain Badiou thematizes with ontology sutured to mathematics is the "there-is" of any existential claim. Stating "there-is" is not a factual claim, but a factual claim or a speculation. Yet this speculation adheres to the law of non-contradiction, so matter as "there is" is a category of existence, and not a description of particular objects. Ontological materialism assesses the whole of *Dasein*, the whole of existence, by making explicit through the axiom of choice the implicit question of being, the fact that any represented multiplicity could be presented another way, or facticity.

To exemplify this feature of Badiou's ontology, Meillassoux uses the example of cutting a piece of rope.⁵⁰ If I have a piece of rope, there is a probability that if I cut it in a certain place it will take so long to break. But this probability changes as one actually cuts it, because the

⁴⁹ Alain Badiou, *The Concept of Model: An Introduction to the Materialist Epistemology of Mathematics*, trans. Zachary Luke Fraser and Tzuchien Tho, (Melbourne: Re.Press, 2007) p. xxxvi – xliii

⁵⁰ *After Finitude*, p. 102-103

interwoven fibers are complex; the breaking point of the rope will jump suddenly to varying probabilities. In order to assign an absolute probability to the breaking point of the rope, one must imagine the rope to consist of an absolute set number of individual pieces of certain extension. Yet this absolute probability, derived from a static or absolute multiplicity, is explicitly denied in Zermelo-Fraenkel's axiomatic set theory, as the One-is-not, the axiom of choice.

Claims of particular objects may be stated factually, but only within a larger, consistent, factual understanding of mathematics as a whole. In other words, factual claims are never made from the position of a subject. A scientist doesn't say fossils exist as a scientist; rather, the assertion that fossils exist is a speculation, within a methodology of doubt. Ontology as sutured to mathematics explicitly states, or formalizes, that what exists will always exist as speculation, and thus the implicit can never become fully explicit. One cannot ever confuse the forest of mathematics for the trees of mathematics. Any attempt to do so, such as in the representation of Kant that falls back and limits the presentation of representation to space, will lead to dogmatic thinking, such as structural materialism.

3.3 Truth and Subject

In the ontology as mathematics we have discussed two particular axioms: the power set axiom, or that a multiplicity of sets is deducible from any set, and the axiom of choice, or the decision that any multiplicity of sets must be multiple. Through the excess of presentations over representations, Badiou demonstrates a particular pattern to ontology, a pattern of following the event or real with the, "rigour of the subtractive, in which being is said solely as that which cannot be supposed on the basis of any presence or experience...it is in being foreclosed from presentation that being as such is constrained to be sayable, for humanity, within the imperative effect of a law, the most rigid of all conceivable laws, the law of demonstrative and formalizable

inference... If there cannot be *a* presentation *of* being because being occurs in every presentation – and this is why it does not present *itself*- then there is one solution left for us: that the ontological situation be the presentation of presentation”⁵¹ Where what is sayable always accords to a certain rule, what is sayable excludes any original given (lest that given be gifted according to a rule). This is the ontological situation: the subtraction of the given from discourse.

Sutured to mathematics, then, what is said of being will be grounded only on the multiplicity of axioms. These axioms are not given, but decided upon. Under the axiomatic of set theory, the only existential afforded goes to the empty set or \emptyset . In other words, in set theory there are only sets, ordered in particular ways. Sets consist of elements, elements which themselves are sets consisting of elements. Our representation of an object O would be formalized as the set including O, or {O}. But belonging to this set would be multiple parts, $\{O_1, O_2, O_n\}$. For any given representation, or set of elements, there will be multiple presentations of representation, presenting the parts of these elements in a multiplicity. This suture provides not only a rigor with regards to ontology, but will allow us to reformulate truth and the subject as the represented event and the fidelity to it. We saw this pattern, the truth-generic process, take place in the above section as the discovery of power-sets leads to a particular change of course in the direction of mathematics, a represented event. Set theory as consisting of sets and power sets led one direction, in the direction of unification, yet through sheer quantification or thought, the direction shifted in a diagonal direction. In other words, the determination of consistency led to a moment of decision, of indetermination, of change.

All that can be said of nature must be represented. When speaking of a situation which is presented, that presentation will be represented only as the state of that situation. Thus what *is*

⁵¹ Ibid., p. 27

cannot be what *is said*. The complexity of a given situation cannot itself be given in a representation of that situation. Badiou distinguishes between a situation and the state of the situation, meta-X and X. He writes:

Once counted as one in a situation, a multiple finds itself presented therein. If it is also counted as one by the meta-structure, or state of the situation, then it is appropriate to say that it is represented. This means that it belongs to the situation (presentation), and that it is equally included in the situation (representation). It is a term-part. Inversely, the theorem of the point of excess indicates that there are included (represented) multiples which are not presented (which do not belong). These multiples are parts and not terms. Finally, there are presented terms which are not represented, because they do not constitute a part of the situation, but solely one of its immediate terms. I will call normal a term which is both presented and represented. I will call excrescence a term which is represented but not presented. Finally, I will term singular a term which is presented but not represented.⁵²

The key distinction to understand in this paragraph is the difference between belonging and inclusion. Elements belong to sets, but if these sets are supposed to represent an event or presentation, then the set will include parts which are not represented as elements. Whatever we say of situation will exclude some parts of the world, because the world (situation) is complex while what we say is simple (state of a situation).

The only verb or action that takes place in set theory is belonging, the relationship between different sets. To say that one set belongs to another means there is a relation between the sets; that one set belongs to another. Thus one set is considered to be an element in another set: the sets $\{O_1\}$ and $\{O_2\}$ belong to the set $\{O_1, O_2\}$. There will be many different representations of any represented set, deduced from the power set axiom: we can deduce from the representation of set $\{1, 2\}$, representations such as $\{1\}$, $\{2\}$, and $\{2, 1\}$.

Badiou seizes Heidegger's' notion of presence, or the facticity of a situation, but replaces presence with presentation, presentations which can only be represented according to a rule. A representation will not change, such as saying a particular set includes X. But this set, this

⁵² Ibid., p. 99

presence, must be multiple, or n-dimensional. The power set axiom has important philosophic implications when we begin to apply to it our involvement with things. He calls this demonstration the point of excess, where the power set axiom is applied to Ideas, or “open” sets. When the power set axiom is applied to Ideas, or n-dimensional sets, there will always be parts that are presented yet not represented as elements in that set. Though two elements $\{O_1\}$ and $\{O_2\}$ are represented in the set $\{O_1, O_2\}$, these elements (as Ideas) will contain parts left unnamed which can be presented in multiple ways. Any represented belonging-relation will include a multiple of parts that are not represented. Thus there are always parts of a situation that are excluded by the state of a situation. There will always be an excess of presentations over any representation. There will always be a point of excess.

For instance, there is the set of all citizens afforded legal representation, consisting of elements, namely represented individuals. Among this set of represented individuals that belong to the state of the situation, there will eventually be parts (unnamed individuals) included in the situation that are not recognized by the state of the situation. So there will always be the possibility of some that should be afforded legal representation yet are not represented at any one moment. Whenever the state represents its populace, this representation cannot be completed because it will always leave out some possible presentation. Put simply, history always exceeds nature. However we choose to naturalize things, there will always be a historical instance that exceeds this naturalization, which creates an exception.

Badiou calls singular those parts that are excluded (presented but not represented), normal those parts of the situation that belong to the state of the situation (presented and represented), and excrescence those terms belonging to the state of the situation that are not included in the situation (represented but not presented). Truth happens when a singular

instance, an event, is normalized, or when a term becomes included in the state of a situation. Zizek writes, “Truths are materially produced in specific situations, and each begins from an event or discovery that eludes the prevailing logic that structures and governs those situations... Such an encounter or event has no objective or verifiable content; it takes place in a situation but is not “of” that situation. A truth persists, then, solely through the militant proclamation of those people who maintain a fidelity to the uncertain event whose occurrence and consequences they affirm – those people, in other words, who become subjects in the name of the event.”⁵³ Events, or singularities, are presented but not represented. They happen but not according to any rule. Truth follows these singularities, when rules are challenged, but this challenging first requires a count, a prevailing logic.

However, the exceptions themselves can never be spoken of without becoming themselves represented. We can assume that exceptions exist exclusively from a univocal ontology of sets and the axiom of choice. This assumption can be demonstrated through thought alone, or *a priori*, without any observation of anomaly, because the exceptions occur within the thinking itself. Thus Badiou has only one ontological or existential category, events. Events are singularities or presentation. Yet presentation can only be expressed in representation, and it is in this dynamic that we can notice, through what we have named, the beginnings and endings of things. Truth occurs when presentation becomes represented, when we follow the event. Sophism, or opinion, only refers to representation. Thus truth no longer can be associated with being, with a happening, but with the activity of a subject who decides upon a fidelity to that happening. If I declare myself the member of a party, at the same time, I am representing myself in a party, but furthermore the party itself “is” only in the utterance, in its pure presentation.

⁵³ Badiou: *A Subject to Truth*, p. xxv

We may represent ourselves, say we are human, but such statements are only opinion unless the statement presents something original as well. Originality cannot be foretold, and so we can only speak and hope.

What purely “is” is singular and cannot be represented. Yet these presentations exist in history which we might only express as nature. We can understand Badiou’s subject as a part of the truth procedure, an event following the real, the real which cannot be signified. One implication of the death of god is to reject the finitude or mortality of humans, and to focus on the infinite attainable by humans, those structures of infinity that humans create through sheer speculation, doubting, or the facticity of existence. We must think through concepts of infinity, of material infinities or mathematical infinities, within their own structures, without supposing they point to any transcendental infinity.

The infinite is created through a fidelity to the decision that the one is not. In this thought, this truth procedure in terms of pure quantity, a subject appears in the decision upon the axiom of choice. The subject only appears in the truth procedure, subtracting the natural from the real. Žižek writes, “Like Althusser and Lacan before him, Badiou equates reality in this sense with ideology pure and simple. And since it is always “reality that gets in the way of the uncovering of the real,” the first task of any generic practice of thought is the “subtraction” of whatever passes for reality so as to clear the way for a formalization of the real.”⁵⁴ Not only must we subtract representation from how we approach the real, or presentation, like Heidegger, but we must also subtract any process by which we identify presences, such as through ordinary language. Only through the subtraction of all reality, all concepts including the flexibility of everyday language, will we maintain the openness of being, what is not said from what is said.

⁵⁴ Ibid., p. xxi

This radical thesis may appear counterintuitive, but the claim is that only through associating being with void (that which is quantified in set theory) will philosophy be open to multiple truth-disclosures, from politics, science, art, and love. Only through the void will speculation remain free from dogma.

Simon Critchley assesses Badiou's thought as a situated universalism.⁵⁵ When Badiou asserts the One-is-not, he is making a top-down claim from a bottom-up perspective. The ontological thesis encompasses the whole of being, it is universal, yet has been asserted only because of the particular material circumstances of mathematical development. Truth happens in such an assertion because of a commitment or fidelity to that particular material event where the mathematical auto-destructed, or challenged itself. This fidelity holds open the event by applying the new representation as a rule, voiding any contradiction. Fidelity begins with the law of non-contradiction, asserted not subjectively, but as the very grounds of reason or representation in the presentation of doubt.

The turn toward mathematics does not follow out of any logical necessity, but has materially happened, by Zermelo-Fraenkel's axiomatic set theory in the context of modernity. Drawing from Heidegger's hermeneutics, we have already accepted that each assertion begs a question, assuming the conclusion that an assertion can be its own seat of truth. Badiou, opening up the circle of hermeneutics with its formalization, has asked again, "why something rather than nothing." Badiou's embrace of mathematics, in the context of modernity set out by Heidegger, immediately raises Descartes' doubt, ontologically rather than epistemologically. What can we be certain of? Mathematics, because Zermelo-Fraenkel's axiomatic set theory explicitly states that it cannot be explicitly stated. Saying the same thing different ways can be interesting in a particular situation, such as when doubt becomes dogmatic as subjectivism. This doubt,

⁵⁵ Simon Critchley, *Infinitely Demanding* (London: Verso, 2007) p. 42

presenting thought as such for Descartes, has been represented in a different way in set theory. Thus truth is here a process of fidelity to an event (presentation of doubt), held open through a commitment to the rule asserted in the event (Zermelo-Fraenkel's axiomatic set theory), by the facticity explicitly affirmed in the axiom of choice and not simply the belief of a subject.

3.5 Conclusion

Subjects for Badiou do not *make decisions*; rather, they *happen* alongside truth-events. Freedom is thus an activity that must be sustained, rather than an ontological characteristic or product. Thus the fidelity occurring in truth is not simply a subjective belief, but speculation in the sense of Descartes; only when one doubts the universality of any given rule can one speculate about rules that are universal. Thus the neo-Kantian approach of objectivity fails to speculate about its own origins, but accepts as given the rule of objects against an objective background secured in an I-pole. Yet the principle of the neo-Kantian rule, from Descartes, was itself doubt, or facticity. Badiou, breaking from the neo-Kantian attitude through mathematics rather than through a return to ordinary experience, asserts truth and subject hand-in-hand on the basis of pure reason, doubt, or facticity, not the attitude of an I-pole. Hallward writes, "Badiou's subject ... is in a certain sense consciousness in its purest forms: decision, action, fidelity."⁵⁶ Only through the decision that the one-is-not (death of god) will we be provoked to come to grips with the illusion of subjectivity, or even transcendental freedom, as actual. Without decision, without the excess of history over nature, there would be no beginnings.

Every existential claim, mathematically speaking, is novel. When a scientist claims that fossils existed a billion years ago, he does not make this assertion as a scientist. He makes this assertion as a modern metaphysician, as speculating about a possible existence that could later be shown to be inconsistent with regards to the presentation of thought as such, inconsistent with

⁵⁶ Ibid., p. 12

the consistency of facticity made explicit in set theory. There can be hermeneutic analyses for interpretations of how particular things might exist, about the features of particular objects relative to world-hood, but existential claims are speculated independently. The independence of thought as such from representation happened with facticity, with the presentation of doubt in Descartes, calling into question the dogmatic relationship between man and world. Every existential claim, made within the principled facticity of Zermelo-Fraenkel's axiomatic set theory, holds open this event, this challenge to representation, by deciding upon the explicit principle that any principle could be otherwise.

In order to be consistent, in order to maintain the law of non-contradiction, the very consistency of existential claims must imminently be called into question. One way for such an immanent and imminent, materialist and non-dogmatic, speculation has been developed in the methodology of the mathematical community, a model of belonging in set theory that is consistent with the facticity of *Dasein*. The unification of ontology and the mathematical does not have to be dogmatic if the explicit mathematical model used has imbedded within the implicit question of facticity. Every existential claim using this model of set theory performs a violent act against the whole of its structure, challenging any explicit representation of the belonging set as such, and calling into question implicitly the facticity of thought, presented in doubt, represented in the One-is-not.

We have already demonstrated the problematic account of thought in constructivist terms, thinking that numbers correspond to particular objects. This does not have to introduce either a transcendental reasoning, a limitation of reason according to represented objectivity, or a dualism between quantity and reality. Rather, we should recognize the historical eventuality of thought, the separation, the change occurring; the impossibility of trying to *think* pure history makes

apparent the uncanny of our situation. The event of truth is different from other events, but not substantially; the trick is to represent presentation, to realize doubt. Only through decision can something become represented, or spoken. Keeping fidelity to this decision can only happen through human representation, but a representation grounded in the ontology of facticity, in groundlessness. The way we put ourselves into groups, into communities, naturalizing ourselves, allows for the possibility of breaking a historic dialectic, of material determinism, without introducing a non-material element. Material must be present in a multiplicity of ways, and through representation one possible way would be to follow the truth, following events, hoping for change without anticipating its form, without anticipating the sameness of representation, either spatially for Kant's extension and intension, or temporally for Heidegger's being-towards-death.

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VITA

Dylan Wade was born in Athens, Georgia, in 1984. He moved to Baton Rouge, Louisiana, in 1987 and has remained in the area since. He received his Bachelor of Arts in philosophy from Tulane University in 2006, and his Master of Arts from Louisiana State University in 2008.