



HÁSKÓLI ÍSLANDS

Hugvísindasvið

**Concepts of nothingness and their relation
to classic laws of thought**

Ritgerð til B.A.-prófs

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Leiðbeinandi: Erlendur Jónsson
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Heimspeki

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Abstract

The essay is an exploration proceeding from partly Platonic, or arguably Quinean, premises about the function of philosophy, exploring differing descriptions and definitions of 'nothingness' from diverse fields ranging from mathematical set theory to quantum physics and continental philosophy, arriving ultimately at the conclusion of there being two major categories of descriptions of nothingness with one referring to an abstract form termed 'small nothingness' which pertains to systems of thought or language and is either axiomatic or derived from a contradiction or antagonism with classic laws of thought, and serves as a vent or doorway out of the system in question. This small nothingness, in general forming an infinite series (of meta-systems), ultimately implies what we here term 'Big Nothingness', the description or naming of which is fraught with futility due to its extension beyond the limits of thought and particularly language (in a wide sense). This can be understood as a reference to the concrete absolute, or to indiscernibility, mystery and immanence, the unknown or unknowable.

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Preface

This essay presupposes prior acquaintance with least some of naïve set theory, and with the propositional calculus, or basic logic. However, lack of acquaintance with these subjects will not, in my opinion, render the content of the essay wholly inaccessible to readers. In the interest of creating a text that is not too long winded for those well versed, and a text that is capable of tackling the task at hand without too much ado, I found it necessary to look for a middle ground between explaining too much, and assuming too much prior acquaintance with these rather specialized subjects, and I try to offer intuitive explanations of technical concepts when possible. Due to the quotations in the following text using differing notations and names for concepts some notations will be used interchangeably in this essay, for example ‘class’ will mean the same thing as ‘set’, and differing notations and names for the null set, or the empty set, will be employed interchangeably.

i. Introduction

In this essay we are interested in nothingness, or perhaps more exactly in concepts of nothingness (a term we will seek to clarify to some degree in the next section). However, one might ask: Why are we interested in concepts of nothingness? In particular, one might ask: Why should one be interested in concepts of nothingness from diverse and differing fields of knowledge?

One premise from which we proceed is that focus on the ‘nothing’ can often offer a relatively speedy way of grasping the whole. This applies to many situations. For example, in making acquaintance with a new individual, a person, a human being, it is often useful to get a feel for that individual’s limitations, his or her challenges, where they haven’t been, geographically, socially, intellectually. This affords one with a quick sort of tentative outline of the person’s internal map of the world, or worldview. Just as in geography it is by the borders of countries that we recognize and identify them. Likewise in geometry, it is the edges and corners of shapes that define them.

In this essay we will examine what we judge to be concepts of nothingness from diverse fields of knowledge. Fields of knowledge whose approach is *a priori* and analytical, *a posteriori* or empirical and analytical, and fields that are generally empirical and or *a priori* and aphoristic in expression. The thesis guiding our exploration will be that concepts of nothingness will in general have some sort of relationship or connection with the three classic laws of thought; the laws of identity, non-contradiction and excluded middle or *tertium non-datur*. At the outset the intuition we have about the relationship or connection is vague, but through the exploration we hope to clarify this situation, and arrive at a better understanding.

ii. The general concept of nothingness

Since one of our aims in this essay is to study various definitions of nothingness from diverse fields, we are necessarily prevented from offering an explicit definition of what exactly we mean by a concept of nothingness. I am tempted to say that we shall proceed in truth from intuition about what nothingness is and how it presents itself in different fields; as the void or vacuum in physics, the number zero in arithmetic, the empty-set in set theory, the colloquial nothing, the emptiness in some forms of Eastern philosophies, the nothingness that is revealed through the existential angst for philosophers like Heidegger and Sartre (and so on and so forth) Assembling a list can be equivalent to giving a definition providing that the list is a

finite one, or be it a transfinite list, then at least it could be seen as a definition if it were constructive in a mathematical sense. The list provided above is though, I must admit neither. Firstly, due to my appending of the (and so on and so forth)-phrase, and secondly, to my rather inappropriate usage of this phrase in the context, as it is not perhaps strictly obvious what is to follow in the list. However, this need not bother us, since, as implied earlier, we cannot reasonably be expected to provide an explicit definition of a concept of nothingness, our aim being studying different concepts, some of which could be characterized as definitions while others are more akin to descriptions. Our postulation being that these differing conceptions, originating from different fields, will have some common characteristics. The list, provided here, is a list of ‘definitions’ and ‘descriptions’ of varying vagueness, generality and formality, and these conceptions are the products of human intellectual endeavors resulting from various historical situations. Our aim is to reflect upon them and hopefully learn from them. We can remain agnostic as to whether these differing concepts have indeed anything in common, and at the same time observe, discern and reflect upon the characteristics that we find in common. It is not necessary to interpret these concepts as being different manifestations of a transcendental entity, something akin to the platonic conceptions of the εἶδη (forms, species), whose reflections (εἰδωλα) we see in the phenomenal world. This would be an unnecessary reification. Indeed agnosticism as to the existence of ‘nothing’ is, after all, quite understandable.

iii. The three classic laws of thought

In general the classic laws of thought are underlying premises upon which rational discourse is often based. These three general rules, in various forms and manifestations have a long tradition in philosophy and are in many ways central to the history of science as well as to that of philosophy. Since we are examining concepts of nothingness from different fields, the instances of what we here call the classic laws of thought will necessarily differ with relation to every field we are examining. Therefore the forms of these laws of thought will be analogies or isomorphic instances in a broad sense of a more general conception, as opposed to the strict narrow rules or operators. We cannot here define them too explicitly, we refer to a higher class which will, for the time being, remain somewhat obscure but we contend that we may make reference to them and view them as being in a manner of speaking implemented or instantiated in the various fields we speak of in this essay. The classic laws instantiate themselves for example in being capable of being derived in various systems of propositional calculus as well as in first order logic or predicate calculus using the axioms and

rules of inference, appearing in each case in their respective analogous forms in the context of the system being referred to. Early manifestation of the three classic laws of thought is apparent in the works of Aristotle whose characterization of them became the foundation of scholastic logic, the medieval forerunner to our modern logic. These three laws are: the law of identity, the law of non-contradiction, and the law of excluded middle. The law of identity can be quite simply and perhaps banally characterized thus: an object is the same as itself. Aristotle discusses the matter in his metaphysics:

Now "why a thing is itself" is a meaningless inquiry (for [to give meaning to the question 'why'] the fact or the existence of the thing must already be evident—e.g., that the moon is eclipsed—but the fact that a thing is itself is the single reason and the single cause to be given in answer to all such questions as 'why the man is man, or the musician musical', unless one were to answer, 'because each thing is inseparable from itself, and its being one just meant this'; this, however, is common to all things and is a short and easy way with the question.)¹

Leibniz later brings fourth and elucidates what I believe Aristotle is saying here (as we shall get into later) where it becomes the idea of universal substitutability, roughly that a thing is the same as 'another' thing if the 'two' are universally substitutable for one another.

The law of non-contradiction states that something cannot both be and not be. In propositional calculus notation it can be written $\sim(p \& \sim p)$. In the words of Aristotle: "Evidently then such a principle is the most certain of all; which principle this is, let us proceed to say. It is, that the same attribute cannot at the same time belong and not belong to the same subject and in the same respect "². The earliest known statement of this law is attributed to Socrates in Plato's Republic "It is obvious that the same thing will not be willing to do or undergo opposites in the same part of itself, in relation to the same thing, at the same time"³. The limitations placed on this statement; the 'in the same relation' and the 'at the same part' have a connection to the law of identity as they comment on a discernibility of difference of objects or parts of objects and/or relations. Thus things that are recognized as the same under the law of identity or under universal substitutability cannot then according to

¹ Aristotle. Mckeon, Richard ed. *The Basic Works of Aristotle*. (New York: Random House, 1941.) 810.

² Aristotle. Mckeon, Richard ed. *The Basic Works of Aristotle*. (New York: Random House, 1941.) 736.

³ Plato. Cooper, John M. ed. Hutchinson, D.S. assoc. ed. *Plato Complete Works*. (Indianapolis: Hackett Publishing Company 1997.) 1067.

non-contradiction both be or not be, or have mutually exclusive properties in the same identity discernible part and/or relation.

The law of excluded middle in the propositional calculus notation can be written $(p \vee \neg p)$. It is also known in Latin as '*tertium non datur*' (no third is given) the 'third' here is generally understood as implicitly referring to possibility. So 'no third possibility is given'. It says that if one proposition is the negation of another, that one must be true. A character of this law is that it presumes the existence of a totality that is complete. It is often used in so called non-constructive proofs in mathematics, which are for the reason of this presumption not accepted when extended to the infinite by so called intuitionists in mathematics who regard the infinite as never being capable of being completed.

There exists a holistic relationship between the three classic laws as the law of contradiction along with the law of excluded middle correlate with the law of identity due to the law of identity partitioning the universe of discourse into precisely two parts 'self' and 'other'. This creates a dichotomy in which the two parts are mutually exclusive and jointly exhaustive with respect to the current domain of discourse⁴. The law of non-contradiction expresses their mutual exclusivity while the law of excluded middle expresses their joint exhaustiveness.

iv. Concepts of the number zero

In the interest of providing an unambiguous and more or less mechanical method for proving mathematical statements, various research programs in the fields of logic, set theory and analysis have existed, that all have aimed at creating axiomatic systems or models that formalize arithmetic. One of the pioneers in this field was Gottlob Frege. His work was later followed up by men like Giuseppe Peano and Bertrand Russell. The so-called Hilbert's program, formulated by the German mathematician David Hilbert was an endeavor to ground all existing theories in mathematics in a finite and complete set of axioms, and provide a proof of their consistency. This was later proven to be unfeasible by logician and mathematician Kurt Gödel [More precisely the consistency of such systems (formal systems with enough power to describe the arithmetic of natural numbers) was proved to be unprovable within the systems themselves, *i.e.* generalized incompleteness theorem.]. However these research programs were none the less fruitful in many ways which we shall not give an account of

⁴ A domain of discourse, sometimes called a universe of discourse is something that is implied for example when we move into first order logic, where quantifiers are used. The quantifiers are said to range over the domain of discourse.

here, as for us they merely serve to provide interesting examples of concepts of nothingness both in the form of concepts or definitions of the number zero as well as definitions of the null set.

We will give Frege's definition of the number zero along with a short excerpt of the following discussion offered in *Foundations of Arithmetic*, and proceed to explain the concepts therein.:

§ 74. We can now pass on to the definitions of the individual numbers.

Since nothing falls under the concept "not identical with itself", I define naught as follows:

0 is the Number which belongs to the concept "not identical with itself".

Some may find it shocking that I should speak of a concept in this connection. They will object, very likely, that it contains a contradiction and is reminiscent of our old friends the square circle and the wooden iron. Now I believe that these old friends are not so black as they are painted. To be of any use is, I admit, the last thing we should expect of them; but at the same time they cannot do any harm, if only we do not assume that there is anything which falls under them-and to that we are not committed by merely using them.⁵

Here the connection with contradiction is quite explicit. The key terms used in the definition are that of number, concept, and identity. A concept according to Frege is any function that maps its arguments to truth values e.g. true or false. This is in tune with his formulations of predicates and ideas of the context principle set forth in his *Begriffsschrift*. The concept of number which Frege sets forth in *Foundations of Arithmetic* involves a relation he calls 'gleichzahlig' (a made up word) often translated as similarity or equinumerosity which involves the possibility of correlating in a one-to-one fashion objects falling under the extension of one concept to those falling under that of another. Number is then defined in the following manner:

⁵ Frege, Gottlob. *The Foundations of Arithmetic a logico-mathematical enquiry into the concept of number*. Trans. Austin, J.L.. (New York: Harper & Brothers, 1953.) 86.

The Number which belongs to the concept F is the extension of the concept “equal to the concept F”⁶ .

Bertrand Russell later develops this conception further, for example in his *Introduction to Mathematical Philosophy* and in his *Principia Mathematica* by identifying numbers as classes of classes having this one-to-one similarity relation to one another, thus for example the number two would be identified as the class of all pairs and so forth. There is a relation here between the concept of a class and the concept of a concept as Russell maintains that all classes that can be described extensionally can also be described intensionally (extensional means referencing each element while intensional means describing a trait or feature unique to the particular class or set).

The definition of identity, Frege borrows from Leibniz, as can be seen here in the following short excerpt from the *Foundations*...

§ 65.

...

Now Leibniz’s definition is as follows:

“Things are the same as each other, of which one can be substituted for the other without loss of truth”.⁷

This concept of identity thus involves what can be considered to be universal substitutability. That is in effect that every possible description of one of the objects also applies to the ‘other’ (or the not-other, if you will).

Thus according to Frege the number naught, or zero is an extension or if you will class or set which contains all classes having this unique one-to-one similarity relation to the class of things not identical to themselves. This class has no members_(elements), since nothing is not identical with itself. Moreover by the concept of identity (universal substitutability) and by the rule of two sets being identical if and only if they have the same elements (often called the axiom of extensionality) , it becomes clear that there is only one nullset, or empty set,

⁶ Frege, Gottlob. *The Foundations of Arithmetic a logico-mathematical enquiry into the concept of number*. Trans. Austin, J.L.. (New York: Harper & Brothers, 1953.) 79.

⁷ Frege, Gottlob. *The Foundations of Arithmetic a logico-mathematical enquiry into the concept of number*. Trans. Austin, J.L.. (New York: Harper & Brothers, 1953.) 76.

(often symbolized by one of the following symbols $[], () \emptyset, \lambda$) and referred to as the nullset, as opposed to a nullset. We should emphasize that there is a clear distinction between the nullset on the one hand, and the number zero which is also a set or an extension according to the systems of Frege and Russell. Russell makes this clear in his *Introduction to Mathematical Philosophy*:

The number 0 is the number of terms in a class which has no members, i.e. in the class which is called the “null-class.” By the general definition of number, the number of terms in the null-class is the set of all classes similar to the null-class, i.e. the class whose only member is the null-class. (This is not identical with the null-class: it has one member, namely, the null-class, whereas the null-class itself has no members. A class which has one member is never identical with that one member, as we shall explain when we come to the theory of classes.) Thus we have the following purely logical definition;--

O is the class whose only member is the null-class. ⁸

Since there is only one null set, it becomes clear that the set of things not identical to themselves, for example, is the same set as the set containing the square-circle, the wood-iron, and the flying pigs (assuming there are none), namely the null set.

What all these conceptions (these intensional descriptions of the nullset, or equally these predicative definitions of the null set) have in common, is that they either inhabit both sides of a dichotomy, thus violating the law of non-contradiction, like the square-circle, or they subsist outside of two sets that are understood to be complements, thus violating the law of excluded middle: an example of this would be neither voting in an election nor not voting. While these laws are being violated, the violating entities can none the less be understood to maintain their own identity in a sense, *i.e.* their conceptualization is asserted to a certain extent and they maintain the property of universal substitutability in a vacuous fashion, that is, every possible description of every instance (of which there is none) of a particular square circle for example can have that same non-instance substituted into other descriptions of the non-instance without loss of truth. On the other hand it is asserted that these entities are not identical to themselves, meaning that this same entity cannot be substituted for itself in all possible descriptions while at the same time maintaining truth. This is explained by these

⁸ Russell, Bertrand. *Introduction to Mathematical Philosophy*. (New York: Dover Publications Inc., 1993.) 23.

concepts being empty descriptions, where nothing within the domain of discourse fits them. Thus the idea of universal substitutability can be seen as both breaking down and not breaking down, and thus forming a contradiction. A concept which extensionally or intensionally describes the empty set when thought of as a function has the property of mapping all of its arguments to the false, whether it be by extensionally listing nothing, intensionally setting up criteria which are contradictory and therefore incapable of being met, or by simply describing something which, although non-contradictory, is incidentally not met by any perspective arguments inhabiting the current domain of discourse. A suspicion that the method of description itself, that is the language being used, could be revealing its shortcomings in some instances of the perceived breakdown of universal substitutability could perhaps lure us into discussions of meaning and language, but we shall resist this urge for the time being. Having discussed these conceptions of the number zero, and having demonstrated their integral connection to the three laws of thought, we now move on to discussing the null set itself and its various properties.

v. The null set.

We will first give a very short introduction to Zermelo–Fraenkel set theory before proceeding to study how it views the null set. Zermelo–Fraenkel set theory with the axiom of choice, abbreviated ZFC, is the standard form of axiomatic set theory today and as such the most common foundation of mathematics. Standard ZFC involves nine axioms and avoids the paradoxes of naïve set theory like Russell’s paradox specifically by not allowing unrestricted comprehension. The *axiom schema of comprehension* (unrestricted) reads:

$$\forall w_1, \dots, w_n \exists B \forall x (x \in B \Leftrightarrow \phi(x, w_1, \dots, w_n))$$

that is in words:

There exists a set B whose members are precisely those objects that satisfy the predicate ϕ .

This would lead directly to Russell’s paradox where as ϕ could be defined as the property of not being a member of oneself, thus we would have B the set of all sets not being members of themselves, and B thus neither belonging to itself nor not belonging to itself (violating excluded middle), hence the paradox. ZFC avoids this by using only the axiom schema of separation (sometimes also referred to as the axiom schema of specification, subset

axiom scheme or axiom schema of restricted comprehension) which is a special case of the axiom schema of comprehension, and this along with some of the other axioms of ZFC make up for some of what is lost by dropping the schema of comprehension. The axiom schema of separation reads as follows.

$$\forall w_1, \dots, w_n \forall A \exists B \forall x (x \in B \Leftrightarrow [x \in A \wedge \phi(x, w_1, \dots, w_n, A)])$$

or in words:

Given any set A, there is a set B such that, given any set x, x is a member of B if and only if x is a member of A and predicate ϕ holds for x.

Both are called axiom schemas because they involve one axiom for every predicate. The chief difference of this later schema from unrestricted comprehension is that one needs to proceed from the existence of a set A to separate that set A into two sets with respect to the elements satisfying the predicate ϕ or not. One cannot just assume that one can define a set given just a predicate. There are many different formulations of the ZFC axioms which have been shown to be equivalent. All of mainstream mathematics is thought to be capable of being carried out in ZFC, and there is a general consensus or faith in the consistency of this system. Paul J. Cohen writes in his book *Set Theory and the Continuum Hypothesis* (note: here ‘Consis ZF’ means the statement that the ZF axioms are consistent, ZF refers to Zermelo–Fraenkel set theory without C; the axiom of choice):

...the Incompleteness theorem prevents a proof of Consis ZF being given in ZF. In the final analysis Consis ZF is essentially an article of faith and all the consistency and independence results we give are only relative consistency results depending on it.⁹

(Cohen outlines a proof of the independence of the axiom of choice from ZF as well as the independence of Georg Cantors continuum hypothesis from ZF in his book *Set Theory and the Continuum Hypothesis*, these proofs hinging on the consistency of ZF). So now that we have some general ideas about the axiomatic system ZFC (which we can view as having some authority in its function of formulating a theory of sets, since it is today’s standard in this, and its consistency is a general article of faith among mainstream mathematicians today) we shall proceed to examine and discuss the axiom of the null set therein.

⁹ Cohen, Paul J.. *Set Theory and the Continuum Hypothesis*. (New York: W.A. BENJAMIN INC., 1966.) 56.

In the formal language of ZF, the axiom of the null set reads:

$$\exists x \forall y \neg(y \in x).$$

In words:

There is a set such that no set¹⁰ is a member of it.

This is in effect a sort of negative description of the set \emptyset where every possible set is evoked and described as not being an element of \emptyset . The Axiom of the null set itself seems to be understandable as firstly an infinite act of negation in which case it could be seen as problematic from certain standpoints (namely from a constructivist standpoint), secondly it could be understood quite simply as the assertion that there exists a set which has nothing in it, this interpretation, one could argue though, is slightly reliant on the colloquial term and could be perceived as having a bit of a circular quality. The judgment is therefore that the null set is an artifact of the system as a whole, being an axiom. One can proceed from the axiom of the null set itself alone and accept the absolute existence of a set containing nothing, which heralds a sort of border to the system, a discreteness as opposed to continuity, or proceeding from the axiom schema of separation one can envisage descriptions or things whose descriptions cause a contradiction in relation to the language being used thereby being specified or separated into the null set but only in relation to a given set. This given set could not be V the set of all sets on pain of paradox. It could however be a set forming a model, a structure satisfying the formalization, a universe or domain of discourse. The axiom of the null set itself is merely a statement, being fundamental, but attempts at arriving at the null set from other axioms for example the axiom schema of separation will involve language and above all contradiction. This relates to our overall theme of conceptions of nothingness involving an antagonistic relationship with the classic laws of thought.

vi. Alain Badiou's 'meta-ontology' of set theory

Since I first started thinking seriously about the null set I thought that I sensed importance and relevance to philosophy in this particular subject, although my ideas were very vague to

¹⁰ This definition is from within a system where everything is a set, namely Paul J. Cohen's portrayal of the Zermelo-Frankel Set Theory from his book *Set Theory and the Continuum Hypothesis*. A more general translation/Interpretation of the axiom might be for example read 'There is a set such that nothing is a member of it.'

begin with. In a similar way during my study of mathematics alongside philosophy I have been convinced of there being profound connection between the two disciplines. I put, I suppose, some great stock in the implications of the words of the famous inscription above the doors of Plato's Academy 'Let no one destitute of geometry enter my doors'. In discussing my various thoughts with my fellow students, I was early on made aware of the existence of a Frenchman who, I was told, was thinking along similar lines. It wasn't until I finally read some translations of Alain Badiou's work along with a general introduction to his ontology that I discovered a contemporary in philosophy sharing a similar sentiment and intuition in these matters. Furthermore I was astonished to see the degree of development of these ideas in Badiou's work. I will admit that I was perhaps partly a little disappointed to discover that a lot of what I had perceived to be novel notions and fertile soil for fresh discovery was in reality quite old, but this slight disappointment was thoroughly overshadowed by relief due to the resulting of legitimization of these aforementioned intuitions of mine, and a joy and renewed faith in continued progress in philosophy. Before we discuss Badiou's conception of nothingness and its place in his philosophy, due to the holistic nature of his philosophy we will need to discuss some of his philosophy in general.

Alain Badiou's ontology, which is in a unique way fundamental to his philosophy in general, seeks to bridge the divide in contemporary philosophy between the traditions of continental and analytic philosophy. He borrows from Heidegger the idea of the ontological difference (the difference between being(s), and the fact of their being), and from Wittgenstein the idea of the situation, and proceeds to produce a conception of a modern ontology of being as multiple multiplicities. The 'situation' is described as presented multiplicity, and is prior to the distinction between substances and relations. Backing away from the Aristotelian fundamental ontological claim 'there are substances', Badiou only ventures to make the claim 'there are situations'. The effect of unity in being for Badiou is achieved through a process he terms 'counting for one'. Presented multiplicities, that is, situations, have a structure that is formed by the act of counting for one. This 'act' determines what belongs to the situation in question by counting various multiplicities as elements of the situation. However the distinction between a situation, and its counting for one, only holds within ontology. Ontology, I gather, in itself can thus be understood here as the creation of a situation in thought.

Being, seen as non-unified inconsistent multiplicity, through the effect of the 'count-for-one' is seen as a presented unified and consistent multiplicity, a situation. This is

Badiou's doctrine of inconsistent multiplicity. He sheds some light on this in the following passage.

A situation (which means a structured presentation) is, relative to the same terms, their double multiplicity; inconsistent and consistent. This duality is established in the distribution of the count-as-one; inconsistency before and consistency afterwards.¹¹

The ontological difference lies between a situation and its being, and like Heidegger, Badiou sees this disjoining of a situation from its being as allowing ontology to unfold. Whereas Heidegger sees the being of a situation as something that only a poetic saying can approach, Badiou sees it as simply the situation without, or prior to, the effect of counting for one.

Proceeding from the thesis that Being is inconsistent multiplicity Badiou concludes that the most suitable discourse for being is no longer Philosophy but Mathematics. Badiou maintains that ontology is mathematics; due to its foundational position in the field, set theory thus gains a special relevance to philosophy. Badiou discerns between pure ontology, which he chooses to equate with traditional Zermelo-Frankel set theory with its nine axioms, and the act of discussion and translation of set theory into a philosophical language which he terms 'meta-ontology'. Allowing set theory as ontology results in each of the axioms having profound consequences for philosophical problems.

Another important concept in Badiou's meta-ontology is the 'event'. The event occurs at an 'evental-site' inside a 'historical situation' which is one of the types of situations in Badiou's meta-ontology. The event is seen as something completely unpredictable, and to some degree disruptive to the situation as it is. The event is unpredictable at least within the framework of the situation itself, and perhaps even absolutely since there is not necessarily any absolute meta-situation programming the occurrences of events in various other situations. However, one could conceive of a meta-situation relative to some situation programming or foreseeing an event relative to that situation, but the existence of such a meta-situation for every situation is not asserted. Thus events ultimately could be seen to hail out of the non-unified inconsistent multiplicity, *i.e.* out of Being.

A transformation or fundamental change which can follow an event is said to be reliant, firstly on a recognition of the event as such, as an event, along with a naming of the

¹¹ Badiou, Alain. *Being and Event*. Transl. Feltham, Oliver (London: Continuum, 2007.)p. 25.

event, and secondly on a ‘fidelity’ or ‘generic truth procedure’. This pertains to a series of inquiries into how to transform the situation in line with what is revealed by the event. It is termed a truth procedure, since it is seen as unfolding a new multiple. This new multiple is seen as initially predicatively indefinable within the confines of the current situation. An example here could be modern art, which, initially at least, eludes definition. The common criticisms of contemporary art being, not art, or indeterminate, or that “it could be anything whatsoever with the label ‘art’ slapped on it”, hit the nail on the head with regard to a new multiple not being ‘anything whatsoever’ according to established knowledge. Badiou explains how something such as a new multiple can both exist and be destitute of any predicates, by evoking the concept of the generic set.

The generic set is a concept Badiou takes from the set theory work of mathematician and logician Paul Cohen, and it is a very involved and quite difficult concept. However there are some intuitive explanations of this concept, in particular as it pertains to Badiou’s meta-ontology as opposed to the ‘ontology proper’ or mathematics of Cohen. We will keep mainly to the meta-ontology and steer clear of the intricacies that would be involved in any sort of a full mathematical explanation of this concept. Nevertheless, we shall offer a short excerpt from a discourse wherein the concept of the generic set is introduced in Cohen’s *Set Theory and the Continuum Hypothesis*.

The a which we construct will be referred to as a “generic” set relative to M . The idea is that all the properties of a must be “forced” to hold merely on the basis that it behaves like a generic set in M .¹²

To gain some understanding of this it is important to note that a set a is generic relative to the model M , which contains among other things all the possible predicates that could be used (within M) to define (predicatively) any set within it. In M , an infinite ‘complete sequence’ P_n of ‘forcing conditions’ which are sets, will ‘force’ (forcing is a particular concept that can be defined in ZF) any statement A to be either true or untrue in M of a . Since it decides every property about a it in truth determines a itself, a ’s identity. This procedure shows that N (another set constructed from the model M , in accordance with particular rules and taking the set ‘ a ’ into account) is a model of ZF, while N contains a as an element but M does not.

¹² Cohen, Paul J.. *Set Theory and the Continuum Hypothesis*. (New York: W.A. BENJAMIN INC., 1966.) 111.

Models of a set theory are structures satisfying the axioms of the set theory. These models, as structured multiplicities can be treated as sets. A model of set theory has its own language. A generic set is a set that cannot be discerned by that language.

For every nameable property, the generic set has at least one element that does not share that property or else the property is not unique to the generic set within the model in question. To show the existence of generic sets Cohen develops a procedure where he adds to the existing ‘ground model’ M (a minimal model of ZF) in such a way that the result is another model N of ZF containing the generic set, a , at the level of inclusion only. The generic subset is only present at the level of inclusion, and, unlike the other subsets cannot be known via its properties. Cohen develops a method of making finite descriptions of the new supplemented set using only the resources of the initial set M . This is the term *forcing*, and for Badiou this becomes a term used his ontological model pertaining to the process of ‘fidelity’ to an event.

For Badiou the ‘generic’ is indiscernibility or novelty. The generic set, in its construction involves going outside the original set, the original model M , thus there is a connection here to the null set, since the null set in a sense, represents that which is outside of the current model, in the language of the model itself. Although the null set itself is in the model, the new set, a , is not in the model originally, so if the new set were said to be anywhere in the original old model, it would in a sense be relegated to the null set, since it is not in the model, and being ‘nothing’ (in the model) puts it in the null set. It is not however hailing from the null set of the model, which is a limited sort of artifact of the language or model, but rather in my view hailing from that which the null set of any model has a tendency to suggest. Namely, something outside of the model.

The null set for Badiou due to his conviction that set theory is a sort of pure ontology, results in a meta-ontological translation of the axiom of the null set into his philosophical terms. This is Badiou’s doctrine of the void, which is the second of two major doctrines that he puts forth in his *L’être et l’événement*, or *Being and Event*. The other is the doctrine of inconsistent multiplicity, which we have already touched upon. The doctrine of the void espouses that in every situation there is the being of the void. This is in effect the meta-ontological translation of the set theoretical fact of the null set being a subset of every set. That which is in the situation is counted-for-one, while the non-unified inconsistent multiplicity itself as well as the act of the count-for-one are by definition uncountable¹³.

¹³ Interestingly in the ‘ground model’ or the minimal standard model for set theory that Cohen uses in his proofs, the identity $V=L$ holds. Where V is the set of all sets (technically not a set) and L is the set of countable sets (a

The void, according to Badiou, is the ‘subtractive suture of being’. It is the suture between being and presentation. The concept of subtraction in Badiou’s writing is different from arithmetical subtraction, as subtraction is merely the word he uses for this concept he created, similar to set difference this subtraction involves a certain partitioning away that implicitly implies a destruction which is secondary to the creation of the new partitioned part.

I term *void* of a situation this suture to its being. Moreover, I state that every structured presentation unpresents ‘its’ void, in the mode of this non-one which is merely the subtractive face of the count.¹⁴

The void is here seen as a prerequisite for the presentation of all that is in the situation, the backdrop that allows the constituents of the situation to present themselves. From the meta-ontological point of view, the axiom of the null set forms ZF’s first ontological commitment, since while the other axioms presume the existence of at least one set, they do not themselves establish the existence of sets. However the axiom of the null set states that the null set exists (a sort of *de re* necessity, within an establishing world that is *de dicto*, the model, or situation.) From this initial point of existence all the other sets of set theory unfold through the use of the other axioms. Using the axiom of the power set, we can show from \emptyset , the existence of its power set, $\{\emptyset\}$. And from this the existence of $\{\emptyset, \{\emptyset\}\}$ and then $\{\emptyset, \{\emptyset, \{\emptyset, \{\emptyset\}\}\}$, and so on and so forth, giving us the sets we can interpret as the ordinal numbers, as well as the whole infinity of sets, if we use all the other axioms as well (countable infinities if we use the axioms in a programmable fashion, otherwise the whole inconsistent multiplicity of uncountable infinities). Set theory thus weaves its sets out of the void, out of what is in all other situations termed the subtractive suture of being to that situation. Badiou’s doctrine of the void proposes that in every situation there is the being of the nothing. No situation is, however, seen as the ultimate meta-situation, and thus there is no assertion of an ultimate existence of an ultimate nothing. There is only ultimately the non-unified inconsistent multiplicity, and the only ‘nothings’ or ‘voids’ are null sets or voids only relative to their present situations or models. They are the particular ‘nothings’ of their particular situations.

set which is countable is either finite or said to be capable of being put in a 1-to-1 relation with the set of integers).

¹⁴ Badiou, Alain. *Being and Event*. Trans. Feltham, Oliver. (London: Continuum, 2007.) 55.

As I said earlier, Badiou's ontology is fundamental to his philosophy in a unique way. I say this because the status of what 'ontology' is, is different in Badiou's philosophy than in most other philosophical systems. Badiou's ontology is more limited in many ways than many a traditional ontology would be, it has for example nothing to say about qualities or identity of any concrete situation. There is a complete indifference of this ontology towards the concrete. Such is for Badiou rather the province of other discourses.

vii. A point of view from contemporary physics

Within the discourse of contemporary physics the concept most analogous to the idea of the 'nothing' is the concept of the vacuum. This concept has a long and interesting history in our western science and philosophy. From the early ideas of atoms and void of Leucippus and Democritus (circa 5th century B.C.) to the later empirical study resulting in the first produced laboratory 'vacuum' in 1643 by Evangelista Torricelli, and on up to contemporary times, the vacuum has been a topic of debate. We will gloss over the historical progression and skip right to the current conception of 'vacuum' that is prevalent in mainstream physics today. The fundamental physics of today is quantum theory, whereas the Newtonian behaviors of comparatively larger phenomena (larger than atoms and electrons at least) are considered to be emergent from the quantum world. Thus Newtonian laws are seen as descriptive and not fundamental, in the sense that they are not axiomatic but rather seen as emergent and at least theoretically derivable from quantum laws. Due to Heisenberg's uncertainty principle having precise knowledge of there being no particles in a region of space implies knowing nothing about motion in that space and thus nothing about the energy potentially inhabiting that space. Making the assertion that there is an absolute void thus violates the uncertainty principle, therefore there is a minimum amount of energy known as zero point energy. The uncertainty principle is not a statement about the observational strength of current technology but a result of intrinsic properties of particle systems. Thus the zero point energy forms a sort of epistemological horizon beyond which it is not foreseeable that we will ever peer with empirical methods. But is this zero point energy potentially real in some sense or just merely an artifact of these epistemological bounds formed by the uncertainty principle? Physics professor Frank Close addresses this question in his book *Nothing, a very short introduction*

First we need to be convinced that zero point energy is real and not some artifact of mathematics. A physical consequence was suggested in 1948 by Hendrik Casimir and, after years of attempts, was finally demonstrated experimentally in 1996.

The Void is a quantum sea of zero point waves, with all possible wavelengths, from those that are smaller even than the atomic scale up to those whose size is truly cosmic. Now put two metal plates, slightly separated and parallel to one another, into the vacuum. A subtle but measurable attractive force starts to pull them towards one another. There is of course a mutual gravitational attraction of the one for the other, but that is trifling on the scale of the ‘Casimir effect’, which arises from the way that the plates have distributed the waves filling the quantum vacuum.¹⁵

Professor Close goes on to explain how this effect is attributed to the metals conducting electricity thus affecting any electromagnetic waves in the zero point energy field. Quantum theory implies that only waves with exact integer wavelengths in relation to the distance between the plates can exist between the plates. Only those waves that are ‘in tune’ with the gap in between the plates can vibrate there, whereas outside the area between the two plates all possible frequencies can still exist. This causes a discrepancy between the pressure exerted on the inside of the plates and the outside resulting in an overall force pressing inwards. Quantum mechanics predicts the magnitude of this force and its magnitude is specified in proportion to Planck’s constant, h . The force is also inversely proportional to the distance between the plates. Professor Close goes on to write.

The force has been measured, the effect confirmed, and the concept of zero point energy in the void established. The Casimir effect demonstrates that a change in the zero point energy is a real measurable quantity, ...¹⁶

Thus we have a result regarding the point of view of physics, the existence of the absolute void, the ‘nothing’ is not asserted in contemporary physics. Both the prominent fundamental theory of contemporary physics, quantum theory and the empirical research contradict the assertion of an absolute vacuum with nothing in it, an absolute void or nothing.

Some continental or aphoristic philosophy

¹⁵ Close, Frank. *Nothing A Very Short Introduction*. (New York: Oxford University Press Inc., 2009.) 103.

¹⁶ Close, Frank. *Nothing A Very Short Introduction*. (New York: Oxford University Press Inc., 2009.) 104.

In the interest of investigating modern philosophical perspectives of concepts of nothingness we will now examine conceptions from continental philosophy. What has come to be called ‘continental’ philosophy today can perhaps be more rightly characterized as more aphoristic than analytic philosophy, serving us by providing a more intuitive perspective, while being less exact and rigorous. This foray into continental philosophy will be nowhere near an exhaustive treatment, and the conceptions chosen here for examination are more or less chosen arbitrarily. The arbiter being the author of this very text, and the subjects chosen based on acquaintance with the work of the continental philosophers, and a well known emphasis on nothingness therein. A wide range of philosophers could have been chosen here, but owing to the size of the essay I decided that it would be better to give a relatively more thorough treatment of two existentialist philosophers whose philosophies are connected and thus offer us some continuity. This being said, we can proceed to examine some examples of philosophy concerning the nothing from the writings of Martin Heidegger and Jean-Paul Sartre.

Heidegger is a philosopher for which the nothing has a central significance. For Heidegger the nothing is more original than mere negation and the ‘not’ prefix. The nothing, says Heidegger, is a negation of the totality of beings. In this, according to Heidegger, we bring the nothing under the higher determination of the negative, viewing it as the negated. However, negation is a specific act of the intellect. This, for Heidegger, poses a question about whether we are altogether sure about what we are presupposing when we discuss these matters.

Is the nothing given only because the “not,” i.e., negation, is given? Or is it the other way around? Are negation and the “not” given only because the nothing is given? That has not been decided; it has not even been raised expressly as a question. We assert that the nothing is more original than the “not” and negation.¹⁷

Heidegger discusses the question of the intellect in its act of negation being dependent possibly on the nothing. The possibility of intellectual negation and the possibility of intellect are thus for Heidegger connected to the nothing. In conceiving of the nothing as the complete negation of the totality of beings, there arises the need for the totality of all being to be given

¹⁷ Heidegger, Martin. Krell, David Farrell ed. *Martin Heidegger Basic Writings*. (New York: HarperCollins Publishers, 1993.) 97.

in advance. However, if the totality is thought of as an idea, then there can be the negation of this idea. This gives us the concept of an imagined nothing but not the nothing itself. The absolute nothing, or the 'proper' nothing, says Heidegger, is given to us only as a fundamental experience. Heidegger, formerly a student of Husserl, adheres to the distinction of phenomenology from empirical psychology. Heidegger speaks of a 'founding mode of attunement (*die Befindlichkeit der Stimmung*)', which he says reveals beings as a whole, as well as being the basic occurrence of our Da-Sein. In short Da-Sein, which literally translates 'being there', refers in Heidegger's writing to a 'being in the world', that is a being or an awareness that is in engagement with the world. Heidegger writes.

Does such an attunement, in which man is brought before the nothing itself, occur in human existence?

This can and does occur, although rarely enough and only for a moment, in the fundamental mood of anxiety. By this anxiety we do not mean the quite common anxiousness, ultimately reducible to fearfulness, which all too readily comes over us.¹⁸

Here, Heidegger describes the mood of 'anxiety' or 'Angst'. In the usage of this term he draws from the Danish philosopher Søren Kierkegaard. This angst is not a directed emotion, nor can it be equated with the free floating anxiety described in psychology, since, according to Heidegger, this angst is pervaded by a peculiar type of calm. This feeling is also described as a sort of receding of beings as a whole. Thus 'Anxiety reveals the nothing'¹⁸. It introduces the slipping away of beings as a whole.

In anxiety beings as a whole become superfluous. In what sense does this happen?

Beings are not annihilated by anxiety, so that nothing is left. How could they be, when anxiety finds itself precisely in utter impotence with regard to beings as a whole?

Rather, the nothing makes itself known with beings and in beings expressly as a slipping away of the whole.¹⁸

Heidegger stresses the need for the nothing in order for human consciousness to express itself. The nothing nihilates (*Das Nichts nichtet*), but this is neither a negation nor an annihilation. This aspect of the nothingness is a repelling gesture toward the retreating whole

¹⁸ Heidegger, Martin. Krell, David Farrell ed. *Martin Heidegger Basic Writings*. (New York: HarperCollins Publishers, 1993.) 100-104.,

of beings, revealing them in their strangeness and radical otherness facing the nothing. Heidegger equates Da-Sein with transcendence, and characterizes it as a ‘being held out into the nothing.’. A being beyond beings. *Without the original revelation of the nothing, no selfhood and no freedom*¹⁸. Heidegger says that the nothing is not merely the opposite of beings but that it originally belongs to their essential unfolding as beings¹⁸. The parallelism here between this above aphoristic philosophical writing and the unfolding of the sets of set theory from the null set, is quite impressive. Here is another quote from Heidegger concerning angst, which I find interesting.

Anxiety is there. It is only sleeping. Its breath quivers perpetually through Dasein, only slightly in those who are jittery, imperceptibly in the “Oh, yes” and the “Oh, no” of men of affairs; but most readily in the reserved, and most assuredly in those who are basically daring.¹⁹

This passage to me speaks to the perceived potency and omnipresence of the nothingness and thus relates to the properties of the null set in set theory of being a subset in every set yet devoid of elements..

Heidegger speaks of the Christian conception of God creating *ex nihilo* and this necessitating God being able to relate himself to the nothing. This however contradicts the ‘Absolute’ excluding all nothingness and God not being able to know the nothing. The nothing is not understood by Heidegger as the counter concept of being ‘proper’. Instead the nothing is seen by him as belonging to the ‘Being of beings’. Heidegger quotes Hegel:

“Pure Being and pure Nothing are therefore the same.” This proposition of Hegel’s (*Science of Logic*, vol. I, *Werke* III, 74) is correct. Being and the nothing do belong together, not because the both—from the point of view of the Hegelian concept of thought—agree in their indeterminateness and immediacy, but rather because Being itself is essentially finite and reveals itself only in the transcendence of Dasein which is held out into the nothing.²⁰

¹⁹ Heidegger, Martin. Krell, David Farrell ed. *Martin Heidegger Basic Writings*. (New York: HarperCollins Publishers, 1993.) 106.

²⁰ Heidegger, Martin. Krell, David Farrell ed. *Martin Heidegger Basic Writings*. (New York: HarperCollins Publishers, 1993.) 108.

Here, and throughout Heidegger's writing on the subject, we find a clear distinction between the nothing of the imagination, relating to thought, language and negation, on the one hand, and the nothing of the absolute, on the other hand, the metaphysical nothing. The latter nothing, for Heidegger just as for Hegel, assumes an affinity for the Being. Being while being for Hegel a motive force, an immediacy, a becoming, is for Heidegger an individual engagement with the world essentially inseparable from it, in a phenomenological unity, the Dasein. Henceforth the metaphysical nothing is not really a nothing in the same sense, as the nothing of the imagination. In the above quote Heidegger says that Being is essentially finite and reveals itself only in the transcendence of the Dasein. However, this could be understood as meaning that Being generally reveals itself in an essentially finite way to the Dasein.

Philosopher Jean-Paul Sartre, who was greatly inspired by Heidegger, examines the relationship between what he calls being-for-itself, which bears a great resemblance to Heidegger's Dasein and 'being-in-itself' which has the character of a sort of brute natural being in general, in his treatise *Being and Nothingness*. Interestingly, Sartre associates the for-itself with nothingness as well as with consciousness. The Being of the being-in-itself is without nothingness when it is disassociated from the for-itself, but the in-itself relies on the for-itself to be able to manifest itself as phenomena for the for-itself. Temporality comes into being through the for-itself, thus there is no sense in speaking of the in-itself before the advent of the for-itself.

The For-itself and the In-itself are reunited by a synthetic connection which is nothing other than the for-itself itself. The For-itself, in fact, is nothing but pure nihilation of the In-itself; it is like a hole in being at the heart of Being.²¹

Consciousness is thus for Sartre the 'hole in being at the heart of being'. It is in a relation with being of mutual dependence, the raw positive being of the in-itself however not being necessarily dependent in the same way. The relationship is thus not a completely reciprocal one. How the nothingness is connected with consciousness for Sartre is quite interesting. Consciousness is seen as always necessarily a consciousness *of* something and in failing to become its own object, and as possessing no essence. Thus it is equated with the Being-for-itself and the nothingness.

²¹ Sartre, Jean-Paul. *Being and Nothingness*. (New York: Washington Square Press, 1966.) 786.

It would be inconceivable that a Being which is full positivity should maintain and create outside itself a Nothingness or transcendent being, for there would be nothing in Being by which Being could surpass itself toward Non-Being. The Being by which Nothingness arrives in the world must nihilate Nothingness in its Being, and even so it still runs the risk of establishing Nothingness as a transcendent in the very heart of immanence unless it nihilates Nothingness in its being in connection with its own being. The Being by which Nothingness arrives in the world is a being such that in its Being, the Nothingness of its Being is in question. The being by which nothingness comes into the world must be its own Nothingness.²²

The For-itself is this nothingness that is spoken of above, and this being is, in fact, consciousness for Sartre. But can a consciousness be conscious of nothing and yet still remain a consciousness?

A consciousness which would be consciousness of nothing would be an absolute nothing. But if consciousness is bound to the in-itself by an *internal* relation, doesn't this mean that it is articulated with the in-itself so as to constitute a totality, and is it not this totality which would be given the name *being* or reality? Doubtless the for-itself is a nihilation, but as a nihilation it *is*; and it is in *a priori* unity with the in-itself. Thus the Greeks were accustomed to distinguish cosmic reality, which they called *Tó πάν*, from the totality constituted by this and by the infinite void which surrounded it—a totality which they called *Tó ὅλον*.²³

Here we have an occurrence of the conjunction of words 'absolute nothing'. Here there is a nothing, a consciousness, a void which normally surrounds a positive totality, but here this consciousness is conscious of nothing thus comprising an absolute nothing. This however, due to an internal relation between the in-itself and the consciousness or for-itself results in an appeal or connection to a totality. Thus here again we see the theme of connection between the absolute nothing and the totality or pure Being.

²² Sartre, Jean-Paul. *Being and Nothingness*. (New York: Washington Square Press, 1966.) 57.

²³ Sartre, Jean-Paul. *Being and Nothingness*. (New York: Washington Square Press, 1966.) 790.

viii. Some geometrical intuitions along with our conclusions

Proceeding from our postulation that differing descriptions and definitions from various fields and disciplines of what we choose to call “concepts of nothingness” will have some characteristics in common, we have examined a few ideas that we have counted in this group. The legitimacy of grouping these conceptions together is open to questioning of course. The choice, and grouping together of these conceptions is simply taken as given here in this essay. On the one hand, this exercise can perhaps be considered a Socratic questioning of these various disciplines regarding ‘the nothing’, proceeding from an intuition spawned by perhaps an implicit Platonic reification on my part. On the other hand, the exercise could be perhaps more amicably looked upon as adherence or fidelity to Wittgenstein’s appeal in the *Philosophical Investigations* to “Don’t think but look”²⁴. Thus the examination proceeds prior to extensive formulation of anything resembling a thesis, with the hope that reflection on the things examined will precipitate some learning. The disciplines chosen range from the purely *a priori* and analytical and mathematical to the contemporary efforts to bridge the analytic continental divide of Alain Badiou fusing mathematics and philosophy, on to the empirical and mathematical techniques of modern physics to the purely empirical, in the phenomenological sense, and aphoristic techniques of the existentialists, Heidegger and Sartre. The examples of disciplines chosen, although few, span a wide range, in their approaches to the gathering of knowledge. This, I hope, will give some generality to the implications gleaned from this short and limited examination of these intellectual phenomena. The results we gain can only be implications, in the manner that ‘recognizing’ or perhaps diagnosing, a pattern in any finite section of an infinite sequence will never guarantee that the pattern will hold forever. That being said, let us proceed to examine the results we have seen in relation to our tentative thesis of concepts of nothingness generally involving violations of the three classical laws of thought.

With regard to the concept of the number zero as put forth by Frege and Russell, the connection to violation of the law of non-contradiction in its first order logic or predicate logic form is quite explicit. A predicative definition of a set is offered that is contradictory, and the extension of this set is then named the number zero (extension meaning class, as is made explicit by Russell). The preferred contradictory predicative definition “not identical to

²⁴ Wittgenstein, Ludwig. *The Blue and Brown Books*. (New York: Harper Torchbooks, 1965.) 66.

itself” also involves the identity relation, so equally the predicative description could be seen as describing something violating a manifestation of the law of identity. The other predicative definitions that could also be substituted all either violate the law of non-contradiction *e.g.* (the square-circle, the wood-iron), or by designating something outside the domain of discourse such as for example a “flying pig”. Thus implying the existence of something outside the domain of discourse thus refuting the completeness of the totality, in effect violating *tertium non datur*.

When it comes to the null set itself, we encounter it in ZF as an axiom. The very fact of it being an axiom in ZF makes it, in my opinion, a quite safe bet that it is independent from the other axioms therein²⁵ (anybody doubting this contention is of course free to try to derive the null set axiom from the others). Taking the example of the axiom of separation; one can, given a set β , separate that set into a dichotomy by using a predicate. This predicate will however need to be either a violator of non-contradiction or a destroyer of the completeness and totality of β thus violating *tertium non datur* in order to designate the null set. This aside, we cannot designate β as V , the set of all sets, since V is not a set. Thus I gather that we can quite safely assert that outside the axiomatic presentation of the term \emptyset (which is a non-defined term wherein the system as a whole implicitly gives it its identity by prescribing the rules for its manipulation), we need recourse to violations of one or more of the three classic laws of thought in some of their manifestations in order to derive the existence of \emptyset .

The concept of nothing is directly related to the null set in Alan Badiou’s set theoretical meta-ontology, thus the connections to the three classic laws are the same. To me it seems worthwhile to examine the concept of the generic here also and its connection to the null set. As we have discussed before, there is a subtle connection between the null set and the generic set, seeing that, relative to the ground model M , the generic set ‘ a ’ hails ‘vacuously’ from the null set of the model M , since it is not in M . Furthermore, within the new model N , the generic set ‘ a ’ cannot be predicatively defined within the language of N , thus the set of predicates defining the generic set’s true(nonforced) properties does not exist in N . As I have said earlier, the generic set ‘ a ’ hails in a sense not truly as opposed to vacuously from the null set of M but rather, in my view, from that which the null set of any model has a

²⁵ There are of course, as has been said earlier, many equivalent formulations of the ZF axioms, some of which go without a special axiom of the null set, using for example the ‘axiom of infinity’ which asserts among other things the existence of the null set. A system that implies the existence of a set could use the axiom of separation to imply the existence of the null set by specifying elements that satisfy a contradictory formula, this however relies on contradiction. Also in some formulations of ZF a constant symbol is used in stead of the null set, the difference here is that its emptiness is not asserted.

tendency to suggest. That is, something outside of the model, thus we have a refutation of the totality of the model and a thwarting of *tertium non datur*.

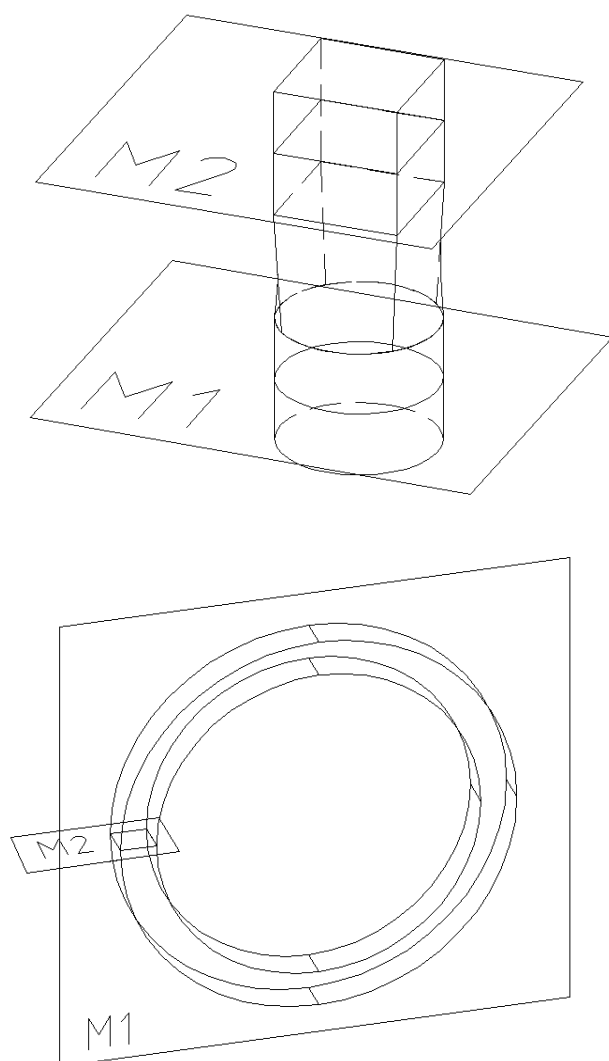
A model, such as a model for set theory can be seen in Badiou's meta-ontological terms as a situation. A situation M_1 can be conceived of as having a meta-situation M_2 such that M_1 is a proper subset of M_2 . Furthermore M_2 could be conceived of as being able to predict things in M_1 and describe things that are indescribable, or nonsensical, within the limited language of M_1 , relative to the richer language of M_2 . However there is no ultimate meta-situation for all situations, just as there is no V , the set of all sets (that is still itself a proper set). The models we speak of can also be thought of as games or languages, in that they are abstractions, thus arises an analogy here with Alfred Tarski's ideas of an endless hierarchy of meta-languages, an idea we can certainly appreciate in this context although we cannot explore this facet in detail in this short essay.

Wittgenstein said: "We may say that thinking is essentially the activity of operating with signs"²⁶. Thus we can conceive thinking in general as operation within a language or a model. Many, however, would like to think of thinking as potentially independent of language. This is I contend, a very understandable position particularly if the conception of 'language' is a narrow one. If we reflect on what experiences thinking consist in, we find that they can, beside the 'hearing' of sentences or 'seeing' of words or symbols of some sort also involve perception of images, sounds, smells, tastes and tactile sensations. The perceptions we associate with 'thought' being in general experienced as fainter than the experiences we generally characterize as, if you will, 'primary perceptions', although confusion can and will occur with respect to this, and we will refrain from passing absolute judgment here on what is 'real' and what is 'thought', since such speculation is not the subject of this essay. We will try to keep our discourse independent of these metaphysical categories. However, we will make the observation that anything occurring in these spheres of senses taken individually, all together, or in any combination can be understood as 'language' if we take a general position regarding what constitutes a language. Thus we can, I think, attribute some legitimacy to Wittgenstein's idea of equating thought with operating with signs or symbols. This operation can occur in a modular fashion adhering to the realm of one sense or there can be interaction between different sense realms or sensory modalities in an integrated experience. This activity all occurring on the 'stage' of our consciousness, the proverbial stage light or spotlight being either wide or narrow, depending on the degree of our focus. Thus I think

²⁶ Wittgenstein, Ludwig. *The Blue and Brown Books*. (New York: Harper Torchbooks, 1965.) 6.

there is justification for calling the three classic laws of thought, laws of thought, since the essential character of their nature is, I think, preserved when we apply them in different conceptual sensory modalities. I think it may be helpful to examine some visual representations so that our geometric intuitions can perhaps guide us in acquiring fuller appreciation of these matters.

The three classic laws of thought can be seen as in a holistic relationship. The latter two being in truth aspects or expressions of the law of identity (see end of section on three laws). The partition of the universe of discourse into 'self' and 'other', and the mutual exclusivity and joint exhaustivity of these sections of the partition, raises the issue of scale. That is the discernibility or degree of resolution of this partitioning in the language. Through the use of geometrical visualizations we introduce the concept of dimension.



If we return to our old friend the predicative description: 'square-circle', we can quite easily intuit that it cannot be sensed/thought to exist on a normal sort of plane surface. Thus if the domain of discourse is a traditional plane surface we can classify 'square-circle' as a description of the null set. This null set is, however a particular null set, one relative to the domain of plane surfaces.

If we, however, were to allow for a sort of transworld identity, of an object existing both in and out of our respective domains of discourse, and yet however maintaining the relation of identity to itself, we can at least envision examples such as the ones in the diagrams to the left, wherein a transcendental sort of identity or object presents, as a circle in M_1 but as a square in M_2 . These two languages or domains M_1 and M_2 have in common that they are both 2-dimensional in our representation of them, but the way in which we visualize these two situations of an object presenting both as a circle and a square in different domains or languages is through the perspective of a 3-dimensional language (or a 2-dimensional representation of a 3-dimensional situation in this case, using the laws of perspective or isometric drawing).

This third perspective, allowing us to see both the planes M_1 and M_2 as well as the three-dimensional objects that intersect these two-dimensional planes, we will term as M_3 . In forming these examples we have, however, to contend with the restrictions placed on the law of contradiction, vague as though they are, having to do with the ‘parts’, ‘relations’ or ‘senses’ of a thing. Thus different parts or relations to an identity perceived as an identity in our 3-dimensional language M_3 are capable of presenting in contradicting manners in other languages of lower dimension. Thus the contradiction itself within a language while it implies the null set of that language also implies a possible kind of reconciliation of the contradiction in higher dimensional space. Within a language or domain we can also conceive of the possibility of differing coarseness or fineness of scale. Thus, for example the ring shaped object in the second picture could conceivably present as a circle in M_1 , due to the language not discerning the distance of the thickness of the ring while, M_2 possibly being a more fine-grained language could discern the presented square there completely. I gather that the relation of identity has no meaning outside of a model or a language. Given the two languages M_1 and M_2 we need a third language M_3 containing both M_1 and M_2 in order to conceive of some identity independent of M_1 and M_2 and presenting differently in the two respective languages.

The aforementioned omnipresent character of the null set within a domain of discourse (being that it is a subset of every possible set in the given domain) strikes a sort of consonant chord with the idea of dimensions in geometry or meta-geometry. Seeing as a character of a higher dimension relative to a lower one is that every point in the lower domain is a section of a line in the subsequent higher one, every line in a lower, a section of a plane in the subsequent higher, and so on and so forth. Higher dimensions offer supplemental infinities, to every finite or infinite presentation. Thus for every situation or language the null set or nothingness can be understood as making reference to, or at least hinting at, that which potentially exists outside of the language, that which is not presented. This includes all increased exactitude of power of specification or separation within the language, all increased breadth up to infinity of the current dimensionalities, and all infinite supplementation of dimensions.

Thought itself is essentially abstraction insofar as it is a presented thought of something as opposed to thought, the concrete process itself, and the laws of thought, the characteristics of the law of identity, are artifacts of this abstraction. *M. Laport says that an*

*abstraction is made when something not capable of existing in isolation is thought of as in an isolated state. The concrete by contrast is a totality which can exist by itself alone*²⁷. The major conclusion of this foray of ours into ideas of nothingness is for me that based on the examples we have studied, there seem to be two major categories of conceptions of nothingness. One category we shall term the 'Big Nothingness' and the other we shall term a 'small nothingness'. The former having to do with the concrete and the latter being associated with abstraction, language and thought. Small nothingness has great correlation with our idea of nothingness since it is precisely *our* idea, an idea, a thought. Thus this is the type of nothingness that is associated with violations of the laws of thought within the respective language or model to which that particular 'small nothingness' is 'the nothingness'. The Big Nothingness has indeed very little correlation to our ideas of nothingness since it seems to be anything but nothing. The Big Nothingness implies a span of an uncountable number of limits of infinite hierarchies. Thus this Big Nothingness could be associated with Hegel's 'pure Being'. There is a futility in speaking of this 'Big Nothingness' since it defies language and even thought itself. It can be thought of as the absolute, the concrete, the indiscernible, ultimate reality. We term this 'Big Nothingness' only because we approach it from the standpoint of examining nothingness, but really it cannot truly be said to be nothingness any more than it can be said to be anything else. Thus our ultimate conclusion is that there is no true, absolute nothingness in reality but nothingness in general is only the 'little nothingness' which is only ever an artifact of language in the wider sense of the term language. This 'language' we also associate strongly with thought in general, a chief characteristic of which being the digital nature of the identity law, wherein mutual exclusivity and joint exhaustiveness preside over the fundamental nature of the inherit processes²⁸.

For Sartre, consciousness is actually a sort of nothing. This consciousness, this nothing, when focused on itself, nothing, unveils the limits of its current domain, due to an internal relation of the consciousness to the 'in-itself'. Thus, if we make an analogy to the realm of thought, we can say that, a stopping of thought, an arresting of systematic activity, can perhaps open the proverbial 'doors of perception'. Repeated recourse to the 'nothing' of the current domain in a recursive fashion offers the potential for seemingly infinite expansion of the models or domains wherein new nothingnesses abide. Thus we have a prospect for

²⁷ Sartre, Jean-Paul. *Being and Nothingness*. (New York: Washington Square Press, 1966.) 33.

²⁸These inherit processes could be postulated from a materialist or psychophysical parallelist metaphysical point of view, for example, to emerge from the fundamentally digital nature of the axonal firing of the cells in our nervous systems. So called 'action potentials' in our nervous, endocrine and muscular cells have the character of being all-or-none or 'boolean' in that they either occur fully or not at all. This however is only a minor speculation positing one kind of accounting for the inherit processes or internal relation we speak of.

expansion of nothingness, or expansion of consciousness, accompanying the increase and or modification of current knowledge and science.

Chapter 48

To learn,
One accumulates day by day.
To study Tao,
One reduces day by day.
Through reduction and further reduction
One reaches non-action,
And everything is acted upon.
Therefore, one often wins over the world
Through non-action.
Through action, one may not win over the world.²⁹

²⁹ Lao Tzu . *Tao Té Ching*. Trans. Chang, Chung-yuan. *Tao: A New Way of Thinking A Translation of the Tao Té Ching with an Introduction and Commentaries*. (New York: Harper & Row Publishers Inc., 1977.) 121.

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