Appendix 1: Glossary of Logical and Mathematical Notation

Of the following symbols, only ∃, ~, &, ( ) and ∈ need be taken as *primitive*. The others can all be defined by means of these five. It is nevertheless convenient to have separate notation for them. The following table includes most of the mathematical and logical notation used in the thesis, save for a handful of signs used for more complex mathematical concepts that are clearly defined in the body of the text (signs such as ♀ and ∟, for instance).

In the table below, P and Q stand for formulae, while α and β stand for sets. *x* is a variable (which, in the current context, ranges over sets).

Sign	Name	Syntactic Context	Meaning
Logical signs			
∃	Existential quantifier	(∃*x*)(P)	there exists an *x* such that P
∀	Universal quantifier	(∀*x*)(P)	for all *x*, P
~	Negation	~P	it is not the case that P
&	Conjunction	P & Q	P and Q
∨	Disjunction	P ∨ Q	P or Q
→	Implication	P → Q	if P then Q
↔	Equivalence	P ↔ Q	P if and only if Q
( )	Parentheses	(P)	used for punctuation, enclose formulae or subformulae
[ ]	Square Brackets	[P]	same as parentheses, used to reduce ambiguity
Set theoretical signs			
∈	Belonging	α ∈ β	α belongs to (is an element of) β
∉	Non-belonging	α ∉ β	α does not belong to β
⊂	Inclusion	α ⊂ β	α is included in (is a subset of) β (if *x* belongs to α then *x* belongs to β, for all *x*)
⊄	Non-inclusion	α ⊄ β	α is not included in β (there exists an element *x* that belongs to α, but not to β)
=	Identity	α = β	α is identical to (has the same elements as) β
≠	Non-identity	α ≠ β	α is *not* identical to β (either α has an element that β does not, or vice versa)
∩	Intersection	α ∩ β	the set of all elements belonging to *both* α *and* β
∪	Union	α ∪ β	the set of all elements belonging to

			either α *or* β
–	Set Subtraction	$\alpha - \beta$	the set whose element belong to α but not to β
{ }	Set brackets	$\{\alpha, \beta\ldots\}$	a set containing α, β… (the brackets enclose the contents of a set).
< >	Sequence brackets	$<\alpha, \beta\ldots>$	the *sequence* containing α, β…, *in*
$\wp$	Powerset Operation	$\wp(\alpha)$	the set of all subsets of α (the set of all *x* such that *x* is included in α)
Ø	Empty Set	Ø	the set to which nothing belongs
ω_n	n^{th} Limit Ordinal	ω_n	the n^{th} ordinal that is not a successor (that is not equal some other ordinal $m + 1$); these ordinals are *transfinite*
$\aleph_n$	n^{th} Cardinal	$\aleph_n$	identical to ω_n, differs only in context; used when discussing cardinality (quantity) rather than order
| |	Cardinality Operator	$\|\alpha\|$	indicates the cardinality (the 'size') of α; the cardinality of α is the smallest ordinal that can be put into a one-to-one correspondence with the elements of α

Appendix 2: The Axioms of Zermelo-Fraenkel Set Theory

The Axiom of Extensionality
$(\forall z,y)(z = y \leftrightarrow (\forall x)(x \in \alpha \leftrightarrow x \in \beta))$
z and y are identical if and only if they possess all of the same elements. This axiom is discussed in Chapter IV of the thesis.

The Axiom of the Empty Set
$(\exists x)(\sim(\exists y)(y \in x))$
There exists a set to which nothing belongs. This set is unique after the axiom of extensionality, and we denote it '$\emptyset$'. This axiom is discussed in Chapters V and VI.

The Axiom of Unions
$(\forall x,y)(\exists z)(z = x \cup y)$
For every two sets x and y, there exists another set z which contains all the elements of x and all the elements of y.

The Axiom of Power Sets
$(\forall x)(\exists y)(\forall z)(z \in y \leftrightarrow z \subset x)$
For every set x, there exists another set y whose elements are the subsets of x. This axiom is discussed in Chapter VIII.

The Axiom of Infinity
$(\exists x)(\emptyset \in x \ \& \ (\forall y)(y \in x \rightarrow y \cup \{y\} \in x))$
$y \cup \{y\}$ is the set-theoretic representation of the *successor* of y when y is an ordinal (i.e. $y \cup \{y\} = y + 1$). This axiom states that there exists a set to which $\emptyset$ belongs, and which contains the successors of all of its elements. The successor of $\emptyset$ is $\{\emptyset, \{\emptyset\}\} = 1$, so 1 belongs to this set; the successor of 1 is $\{\emptyset, \{\emptyset, \{\emptyset\}\}\} = 2$, so 2 belongs as well, etc. The result is a set which contains *all* the finite ordinals, and which, therefore, is *infinite* or *transfinite*. This set is uniquely determined, and we denote it ω_0. It is the smallest transfinite ordinal.

The Axiom Schema of Replacement
$(\forall a)[(\forall x,y,z)(x \in a \ \& \ \varphi(x,y) \ \& \ \varphi(x,z) \rightarrow y = z) \rightarrow (\exists b)(\forall y)(y \in b \leftrightarrow (\exists x)(x \in a \ \& \ \varphi(x,y)))]$
This unweildly-looking schema is not as complicated as it appears. In essence, it states that, given a set a, there exists another set b, whose composition results from replacing the elements of a, one by one, with new elements, and that the law governing this replacement is *functional*, which means that this law (expressed by a 'propositional function' φ) relates each element of a to one and only one element of the new set. Accordingly, the new set b can be smaller than a, but not larger. Because ZF set theory is expressed in first-order predicate logic, we cannot quantify over the propositional functions φ. If we could, we would preface this formula with '$(\forall\varphi)$'. As it stands, we are forced to write the 'axiom' as an infinite series of particular axioms, each with a different propositional function. For this reason, the Axiom of Replacement is called an 'axiom schema'.

Separation Theorem-Schema
$(\forall a)(\exists b)(\forall x)(x \in a \ \& \ \pi(x) \rightarrow x \in b)$

Often, this schema is presented as an axiom in weaker versions of set theory, in lieu of the axiom of replacement. In *Being and Event*, Badiou presents both in the same axiomatic for set theory. This is unnecessary, however, since the 'Axiom (Schema) of Separation' can be easily derived from the Axiom Schema of Replacement, by fixing φ so that it is endomorphic to a (i.e., so that it maps elements of a to elements of a subset of a). In essence, the Separation Theorem allows us to abstract from an existing set according to a property expressible in the formal language. For example, given the set of natural numbers, we may separate the set of primes.

The Axiom of Foundation

$(\forall x)(\exists y)(y \in x \ \& \ y \cap x = \varnothing)$

Each set contains an element with which it has no elements in common. This axiom is discussed at length in Chapter V of the thesis.

The Axiom of Choice

$(\forall x)(\exists f)(\forall y)(y \in x \rightarrow f(y) \in y)$

First, note that f is a *function* (i.e. a set of ordered pairs $\langle a,b \rangle$ such that if $\langle a,b \rangle$ and $\langle a,c \rangle$ both belong to f, then $b = c$. This means that f assigns a unique value to each argument). This axiom states that for every set x there exists a function that 'chooses' an element from each of the elements of x, without stating a general rule for how this choice is made.

Appendix 3: Two Interviews with Badiou

Part I: "Réponses à Luke Fraser", 2005

The following 'interview' is no more than the result of an informal exchange of letters. I sent the four questions together in a single text, hence the lack of interaction between Badiou's responses and my questions. The questions are composed a bit roughly, and are scattered with subtle misunderstandings that I would later come to correct. They nevertheless seemed to maintain enough interest to warrant their inclusion in this appendix. They also serve the useful function of illustrating some of the lines of thought that fed into this thesis. The crude and circular definition of multiplicity as a relational structure that I offer here, for example, was later refined into the definition with which the entire thesis is framed. I remain much closer to Krivine than to Badiou on this point, and find it self-evident that ZF is "the theory of binary relations satisfying the Zermelo-Fraenkel axioms."[1] The history of foundational mathematics in the twentieth century bears witness to the robustness of the dialectic between relation and multiplicity, each concept usurping the other in turn. (The pendulum seems to have swung back to relation these days, with the ascendancy of category theory over set theory in current mathematical practice.)

ZLF: *It seems to me that the ontico-ontological difference in your work is doubled. The being of a situation is its set, while the being of the set is ultimately absolute inconsistency. What exactly is the ontological status of the set? You say in L'être et l'événement that you are not making the Pythagorean claim that the world is composed of mathematical objects, but you often state that "multiplicities are all there is" and that these multiplicities are, univocally, sets. At times, however, the correspondence between a being and its set seems to be a strictly lateral one, where a given set is the being of an entity as refracted through the ontological situation. If this is the case, then the difference between a given being and its set is not ontological, since the set would exist in the same sense that any other being would. If this is the case, what establishes the correspondence between an entity (a situation) and its mathematical set? What makes the set the ontological description of the entity?*

AB: The difficult point in your question is the sense of the word 'correspondence'. In my theoretical apparatus [*dispositif*], I believe that the question, 'what is the correspondence between a being and its set' is deprived of signification. In effect, only the notion of set gives sense to that of being, in the context of an ontology—so that it must be posited that 'all being' [« *tout l'être* »] is thought in and by the set. This does not at all mean that a given multiplicity is 'the same thing' as the set, but only that insofar as one thinks it in its being, one thinks it as a set. One can also think this multiplicity in its appearing, or in its 'world'. The meaning of this is exhaustively investigated in my book *Logiques des mondes*, which will appear in March. But even then, if one asks what the 'correspondence' between a being-there and 'its set' might be, the only answer one would have is that the set is exactly *what* appears, without being able to distinguish 'what' the set is [*sans pouvoir distinguer entre « ce qui » est l'ensemble.*]

ZLF: *The opposition that you draw between multiplicity and relationality strikes me as a bit odd. The most basic notion of 'multiplicity' is, in my view, the empty form of relationality. X is a multiplicity if the being of X is exhausted in accounting for the extent of beings that X is in*

[1] Jean-Louis Krivine, *Théorie axiomatique des ensembles,* (Paris: Presses universitaires de France, 1969), 6.

relation to. If X has being independent of its relata then X is not a multiplicity but a relation-bearing unit.[2] *I realise that it would be inconsistent to replace 'any relation whatsoever' with '∈'—any symmetrical relation, for instance. But it is the nature of at least all mathematical relations to be reducible to certain configurations of set-membership. I understand that, to a certain degree, 'multiplicity' must remain an undefined term, and my relational definition of it is essentially circular (it uses the phrase 'the extent of beings that X is in a certain relation to'). I agree completely that, ultimately, the only way of rigorously defining multiplicity is through its axiomatisation. But so long as it is a matter of interpretation (of metaontology), the consequence of not identifying multiplicity and relationality completely is the privileging of the specific relation of 'belonging'. As soon as we leave axiomatic set theory to apply this concept to concrete situations, what seems to happen is that the intuitive or imaginary notion of belonging or containment takes over, and this is clearly the sort of thing that you are trying to avoid. Your ontology can offer a robust response to the 'ambiguous' and phenomenological ontologies of relation (Merleau-Ponty's, e.g.), but only if multiplicity subsumes relation rather than subtracts itself from it. (It handles quite nicely, for example, Merleau-Ponty's thesis that "it is of the nature of the real to compress into each of its instants an infinity of relations," and certainly brings this to a level of clarity that phenomenology cannot.)*

AB: When I say that relation doesn't exist, I am naturally alluding to those metaphysics for which relation is primary, constitutive, etc. And which, consequently, reduce rationality to a theory of judgement whose norm is the exact character of the relations affirmed. Against the primacy of relation (for example, that of the intentional relation with Husserl), I declare that the entire being of relation, just like that of being in general, lets itself be thought in the concept of pure multiplicity. In other words, a relation is a particular type of multiplicity. From this point of view, the relation of belonging effectively poses a question, which you very justly elaborate. I will willingly say that this relation is not a relation in the initial sense of the term. It is only the relational (or discursive) elaboration of a thought of the multiple which must confront two forms of immanence, or of being-in. Namely, belonging (the elementary logic of being) and inclusion (the 'mereological' logic of being). This platform of immanence is in reality more fundamental than any relation. It is on this basis that one can distinguish between multiplicities that are relations and those which are not.

ZLF: *You write in "Platonism and Mathematical Ontology" that "the Platonist's desire is for maximal extension in what can be granted existence: the more existences, the better." What do you think, then, of using Aczel's hyperset theory (ZF+AFA) for ontology? Aczel's theoryprovides a much richer universe of sets, but a consequence of this is that the matheme for the event is no longer inconsistent and extra-ontological (since the set* $e_x = \{x \in X, e_x\}$ *is not inconsistent in* ZF^- *+AFA). As I understand it,* ZF^-*+AFA is consistent if and only if ZF is consistent. (I'm not certain about this. I read it somewhere recently, but I haven't seen the proofs.) If we identify* ZF^-*+AFA with ontology, what is the event? If* ZF^-*+AFA cannot be called ontology because it does not foreclose the matheme of the event (EE, 212), what is it that* ZF^-*+AFA speaks of? Is the event such that it is inconsistent with any axiomatisation of ontology (so that if the ontology is reconfigured, the event's inconsistency is refracteddifferently)?*

AB: The question of systems irreducible to ZF or ZFC is a very interesting and important question. I have not closely studied Aczel's system, as I have, for example, studied Quine's (NF)

[2] This is the basic intuition that was eventually developed into the definition of multiplicity with which I have framed the thesis.

or NBG [*sc*. the Neuman-Bernays-Gödel axiomatic for set theory]. Even if, after all, the event turns out to be a singular type of being (characterised by self-membership, the exposition of a site, etc.), that would not be a disaster! You will see that in *Logiques des mondes*, I maintain the 'illegal' dimension of the event, but you will also see that it is less important, that that is not is 'power'. The definition of the latter depends on an entirely different register: that of the 'sublation' [« *relève* »] of an inexistent. That said, it is necessary to look at things very closely. Could you point me to where I may study the system AFA in detail, as well as where I could find the relative consistency proof? All the same, I should point out that I find the admission of classes repugnant, whatever conveniences they may offer, because as I see it, they are nothing but the projection of logical, or linguistic, categories, and have no pertinence on the plane of the intuition of multiplicities (or, if you like, on the level [« *au ras* »] of their inconsistency).

ZLF: *I'm curious as to how you would see the difference between your understanding of the thesis that mathematics is ontology, and Husserl's, given that he makes the same claim in Formal and Transcendental Logic. It's clear enough that you each treat the thesis quite differently, but I would like to hear what you have to say about your specific points of divergence with Husserl over this shared thesis.*

AB: It's been so long since I've read all that! But it seems to me that Husserl's fundamental category is that of *formal* ontology. This supposes that another approach to the thinking of being is possible, even necessary. That ontology cannot be exclusively formal is what drives Husserl's genesis [*devenir*], and also explains the 'passage' from phenomenology to Heidegger. In his seizure of the '*Lebenswelt*', with accents similar to those of Bergson, which one finds very early in Husserl, he seems to me to exercise the philosophical will to simply go beyond the formal dimension of ontology, to show that this formalism is itself a restrictive sedimentation. As for myself, in a sense more Platonic than Husserl, I think that it is of the destiny of a rational ontology to be a theory of Forms, and to have no other available paradigm than the matheme. And so we come back to where we started: insofar as the project is the appropriation by thought of the being what is given, seized in its being 'as such' [*« tel quel »*], then in its historical dimension this project has to be strictly mathematical.

Part II: Excerpt from "*The Concept of Model,* 40 Years Later: Interview with Alain Badiou (2007)"

The following is an excerpt from an interview that Tzuchien Tho and I conducted with Badiou in the Spring of 2007. The full text will be appearing as an appendix to my translation of Badiou's 1968 text, *Le Concept de modèle* (re.press, forthcoming). Many of the questions posed in the interview were formulated by Tzuchien and I beforehand, shortly after I completed the body of my thesis. The interview provided me with the opportunity to pose several questions that had stubbornly survived all the efforts towards a solution that I had made while working on my thesis. The excerpt presented here contains a handful of these, including, most notably, a question bearing on the awkward relation between the ontological situation and the situations allegedly schematised by it in ontological form, a problem tackled with limited success in Chapter III of my thesis.

The questions themselves were put to Badiou by Tzuchien, who was fortunate enough to be in Paris at the time. My questions are marked **ZLF**, Tzuchien's, **TT.** The footnotes to this text have all been provided by Tzuchien.

ZLF: *The topic of formalism has long been central to your work, and has recently been revitalized in* The Century *and* Logiques des mondes*.* The Century *concludes with the directive to overcome the 'animal humanism'* [l'humanisme animal] *that characterizes our current ideology by way of a 'formalised in-humanism'* [in-humanisme formalisé].[3] Logiques des mondes *defines the subject as being, in general, 'un formalisme porté par un corps'.*[4] *Among other things,* The Concept of Model *offers us an extended analysis of what mathematical formalization is, shedding light on the way in which this operation is thoroughly bound up with mathematics' relation to its own historicity. Formalization, in* The Concept of Model *and other early texts, however, is understood as an important dimension of the a-subjective process that is mathematics, whereas the concept later reappears as a dimension of the subject itself.*

My questions here are very general. First of all: what has changed in your understanding of the subject and formalism, such that they have ceased to be mutually exclusive and come to be implicated in one another? Second: how far can we generalize the key theses in The Concept of Model *on formalism—are they specific to mathematics, or can they be brought to bear on the other modalities of subjective formalism addressed in your recent work? What are the essential differences between, say, mathematical, artistic, and political formalism?*

AB: This is a very just, very good question. I think you have posed a central question. This is a question of the relation between formalism, that is, form, and the theory of the subject.[5] It is clear that in the first part of my work, the general orientation was one of separation, of delimitation, between formalism, considered as completely objective activity, perhaps even as objectivity itself, and the subject, which I interpreted, in those days, a bit like Althusser, that is, as an ideological given (I think because I was still an Althusserian at the time even if he later talked about the subject as ideological interpellation). I think in that period I was freeing myself from Sartre, existentialism and phenomenology, but unfortunately it was not a focused or deliberate effort and thus the subject was rejected as ideology. This brought me to a critique of Lacan that we see in "Marque et Manque", an article published around the same time, where I said that the thesis of the suture is a thesis which does not permit us to account for mathematical formalism, which I considered as principally non-subjective. This is to say that mathematical formalism is neither sutured nor subject but, in fact, non-subjective.[6] Here I was at a preliminary point of departure. I would say that what first seduced me in my mathematical education was the non-subjective, the making possible of a capacity to think outside of all intentionality and subjectivity. I reconsidered this point when I came to understand that, even if it is not right to consider formalism as something constituted as intentional subjectivity, it was necessary to take and maintain some aspects of subjectivity in the elements of formalism itself. I am not saying this for political reasons but I remain convinced that every philosophy that eliminates the category of the subject becomes unable to serve a political process. That is not to say that a subject should be identified from the outset as the working class or the like. Certainly, there is subjectivity in politics and there is subjectivity in art and subjectivity in love and subjectivity in science itself. As such, I attempted to completely rethink the relation between formalization and subjectivity.

To answer the first question, I attempted to recommence, as one should always do, with the theme of separation, radically and absolutely. From *Théorie du Sujet* and onwards in the

[3] Alain Badiou, *The Century*, trans. Alberto Toscano, Polity, Cambridge, 2007, pp.177-78.
[4] 'A formalism carried by a body.' *Logiques des mondes*, p. 593.
[5] Badiou develops the relation between form and formalism in *Being and Event* especially with respect to his notion of subjectivity in meditation twenty-two, 'The form-multiple of intervention'. *Being and Event*, pp. 223-231.
[6] Alain Badiou, 'Marque et Manque: a propos de zéro', *Cahiers pour l'analyse*, no. 10, 1969.

1980s, I began again to re-knot these terms in a different way.[7] But that is not to say that I abandoned the primacy of formalization because it remained a thought. I found it necessary to re-knot this formalism with the figure of the subject. But, from that, what do I conserve of the separation or what do I still hold of the separation? I think the separation I maintain is the idea that the relation between the subject and formalism is on the side of formalism and not on the side of the subject. In the rigorous examination of formalization, one can dispose or place the subject, ultimately, as an effect and not as a cause. Thus, finally, an event is that which renders possible a new formalism for such a relation. The subject will be the subject of the formalism or with respect to this formalization. Where there is an effect of puncture in the particular underlying structure, the subject will be defined as a new process of formalization. It is a bit messy, but there you go. If we want to think the subject, one should begin by thinking through formalization.

On the second point, formalization, in its essence, is not only mathematical or logical. While mathematical and logical formalization is a paradigm for formalization, formalization is not identical with this. The question of knowing what is, or how one should analyze the formalization of artistic or political formalization comes down to a question of analyzing those very sequences. If we have an event that makes possible a new formalization, we should study this possibility of formalization for itself. There, the principles of formalization, even if they can be comparable to or analyzable with mathematics, would not be identical. Definitively, the study of the different types of generic procedures is truly the study of the different types of formalization. You know, as I described in *Logiques des mondes*, if we are to begin a study of a particular formalization, it would be necessary to return to the position of the difference between formalization and the evental *énoncé*, the stakes are always there.[8] Well, what follows from this are the enquiries particular to the process. Thus the general schema is that every event is an opening of a new possibility of formalization, carried forth by a new body. This new body always supports the formalization with respect to formal articulations.[9] This is maintained for every truth procedure, and the study of particular formalizations will be the study of a regional world.

ZLF: *Mathematics has always held a privileged place in your thought, from your earliest published works to the most recent. Beyond this rather general interest in mathematics, however, model theory—the topic of your first book—seems to stand out as of utmost importance. From* The Concept of Model *to* Being and Event*, several of the canonical mathematicians in your work are those whose greatest breakthroughs have been in the theory of models—Gödel and Cohen leap to mind here.*

In the work of these mathematicians, we see model theory employed in a manner that strikes a profound resonance with several of your own writings; it combines, in an almost paradoxical fashion, an attentive examination of the effects of formalization with a sort of underlying Platonism which aims to locate the precise points where a given formalized theory transcends itself, or opens onto a point of undecidability. I say that this combination seems paradoxical because we find, often together in the same texts, a commitment to the (formalistic) identity or immanence of mathematical thought and its mode of expression, but also the espousal of the Platonistic idea that the reality accessed by mathematical thought transcends its mode of expression. Without the former conviction, one could not seriously take, say, a denumerable

[7] Alain Badiou, *Théorie du sujet*, Paris, Éditions du Seuil, 1982.
[8] Badiou discusses the relation between formalization, subjects and the types of truths in evental announcements (énoncé) in *Logiques des mondes*. A schematic presentation is given in book I, section 8. pp. 81-87.
[9] A theory of bodies is developed in book seven of *Logiques des mondes*. pp. 471-526.

model as offering a genuine interpretation of the axioms of set theory, even if Löwenheim's theorem proves to us that such an interpretation is possible. (Bernays dismissed the importance of Cohen's findings along these lines.[10]) Without the latter conviction, neither Cohen nor Gödel would have grounds to see several of their results (the incompleteness theorems, the independence of the continuum hypothesis, etc.) as any indication of the limitations of mathematical thought.

My question is: what exactly is the importance of the theory of models in the context of your general understanding of mathematics? Is there a connection between your early theses on model theory and the formalistic Platonism that you espouse in your later works (notably in Court traité d'ontologie transitoire*)?*

AB: Evidently, the concept of model is absolutely central because it is the heart of what follows from formalization. The fact that I began with the concept of model is not a coincidence. It turned out well because, at base, a model is a concept I investigated in an attempt to focus on what one could call the dialectic of formalization. I call it the dialectic of formalization due to the fact that every creation of thought is in reality a creation of a new formalization and at the same time this new formalization establishes a relation or takes part in an interaction with the particularity of what we are trying to express. In this case, we determine the formalization as a universality, but it is ultimately a particularity that carries universality in the model. Because, at base, we can say that, even if we take, for example, a painting by Picasso, that is, if we are taking a cubist painting by Picasso or by Braque in 1913, we find the creation of a possibility of a new type of pictorial formalization.[11] That is to say, it renders possible a way to formalize in the space of painting something that was previously unacceptable before. On the other hand, it realizes itself in a particular context, with respect to the materials used or in the sorts of cultural references that render the painting a particular painting. It is a model. Picasso's work is a model of this possibility of formalization. It is not that the formalization is drawn abstractly from thin air. It is rather something that was realized in a particular time and place. And thus the model, since my earliest reflections, has been something that assumes the particularity or the singularity of a region of being or of a world, and at the same time, raises the universality of a possible new formalization. This is why it is effectively a concept that describes the dialectic of formalization. That is to say that it is a dialectic of the truth procedure as such.

It is entirely situated then, in what at times can be called "situations" and other times "worlds" and, at the same time, it transcends its situation because it proposes a new type of formalization which has the power to be summoned up in the history that follows. Thus, if we return to the dimension of mathematics, we will see that we have been given completely bare, as one might say, a particularity with least possible particularity. Thus while mathematics is a particularity just like everything else, mathematics will be the least particular or that which carries with it the least particularity.

TT: *Right, as you said in the Duchamp lecture, 'the least particular particularity'.*[12]

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[10] See Paul Bernays, 'What Do Some Recent Results in Set Theory Suggest?' in Imre Lakatos (ed.), *Problems in the Philosophy of Mathematics*, Amsterdam, North Holland Publishing Co., 1967, p. 82.

[11] In his lengthy introduction to *Logiques des mondes*, Badiou takes Picasso's *Deux chevaux traînant un cheval tué* (1929) and *Homme tenant deux chevaux* (1939) as artistic examples of the logical treatments of truth procedures in worlds. In this context, he relates these works to the prehistoric grotto paintings of horses at Chauvet-Pont-d'Arc, Ardèche, see *Logiques des mondes*, pp. 25-29.

[12] Badiou used this expression during a lecture on the work of Marcel Duchamp at L'École Normale Supérieure, March 3 2007, seminar series of the *Centre Internationale d'Etude de la Philosophie Française Contemporaine* (CIEPFC).

AB: Exactly. Thus, what we can see here is that the model is that which permits the study, on one hand, of the power of formalization, but also on the other hand, at its limits, that it becomes something that permits us to arrive at a dialectical point, the most concentrated point. These are specific points or certain times, at which the infinite power of formalization and its limitations are irreducible and present a point of undecidability distinct from the others. Thus, what interests me in particular is something that in fact supports my peculiar Platonism. I should say that Platonism, in the end, is the knowledge of ideality. But this is also the knowledge that we have access to ideality only through that which participates in ideality. The great problem of Platonism is not really the distinction between the intelligible and the sensible, but the understanding that sensible things participate in the intelligible. What interests me in Plato is participation and what would otherwise be very obscure becomes very clear. It is central to note that, in the end, the eternal truths as well as ideas would be nothing if they were incapable of being accessed from what is given in the sensible. We talk about the idea of the table, to take a classical example, that there would be no idea of a table if there were not a table. We would have no idea of the idea of the table if there were not tables. We could take other examples with things that are on a level a bit more technically formulated. The model is thus that which allows us to conceive formalization; conceived after the fact, given mathematical inventions are not simply formal inventions but rather an invention of models. It is that which permits us to access formalization or to access the universality of things, at the same time it permits us to determine the particular point of limitations. To put it more directly, the model is that which allows us to think through participation.

TT: *So it seems that there is an interesting history here, your personal history. As you said, you discovered Lautman after this period, but for Lautman the question of Platonism was exactly that of* metaxu *or participation.*[13]

AB: Absolutely, that is right. Lautman directly expresses this point. As he put it, in a certain sense, mathematics is the *model* of the dialectic; but for Plato, mathematics was an *introduction* to dialectics. The Lautmanian interpretation centres on the dialectic of ideas in the history of mathematics to which we finally gain access with Gödel.

TT: *So it seems to me that there are two sides of Platonism here, of which we have already spoken. On the one hand, with Gödel, we have a sort of classical Platonism or, as it were, an Anglo-Saxon version; and on the other hand, there is something else that you seem to be closer to, the Platonism of Lautman.*[14]

AB: Yes, absolutely. I think that while Gödel's Platonism is a Platonism of ideal objects, of formalization as the construction of ideal objects, Lautman's Platonism is a Platonism of participation. What I would say is that we have a Platonism that's a bit too dogmatic versus a dialectical Platonism (or something like that). Gödel himself struggled against the American

[13] See Albert Lautman, *De la réalité inhérente aux théories mathématiques* and *Essai sur les notions de structure et d'existence en mathématiques* for short but precise discussions of platonic participation in modern mathematics. Lautman, *Les mathématiques, les idées et le réel physique*, pp. 65-69, 125-223.

[14] For Badiou's discussion of his opposition to a standard Anglo-analytic formulation of Platonism in mathematics as represented by Fraenkel and Bar-Hillel—a camp in which Gödel is often included—see *Briefings on Existence*, pp. 89-99 (also published as 'Platonism and Mathematical Ontology,' trans. and ed. Ray Brassier and Alberto Toscano, *Theoretical Writings*, London, Continuum, 2002, pp. 49-58). However, in this text Badiou nuances his interpretation by distinguishing Gödel from a standard expression of mathematical Platonism.

trend of empiricism and against this American empiricism; he said, no, mathematical objects exist in themselves. Thus he maintained an over-idealised Platonism against this trend of empiricism. For us, in France, we had much less of this confrontation with empiricism; instead the question of dialectic has always been central. Thus, there is more development in my work apropos of mathematics that engages in a dialectical interpretation of Platonism. As such, the heart of dialectics in Plato is the question of participation. It is not so much the distinction between the sensible and the intelligible. Rather, I found it more useful to think through the problem of the intersections between the sensible and intelligible that Plato called participation, something which is finally formally realized in the concept of model. A model is developed from a particular world, and it participates through the idea of formalization.

ZLF: *In The Concept of Model, you make a thorough case against what you call the bourgeois-epistemological versions of the category of model, both in the 'vulgar' form you encounter in Lévi-Strauss and others, and the sophisticated form you find in positivist epistemologies such as Carnap's. The fault you find with the former is that, by envisioning science as the confrontation between formal models and empirical reality, it amounts to little more than the importation of the ideological opposition between thought and reality, or culture and nature, into the philosophy of science; an importation that more often than not operates by crudely analogical means.*

As an example, you cite a few passages from Von Neumann and Morgenstern's Theory of Games and Economic Behaviour*, where the authors write that models 'must be similar to reality in those respects which are essential in the investigation at hand', and that 'similarity to reality is needed to make the operation significant'.*[15] *Here, we get a depiction of scientific activity that amounts to little more than 'the fabrication of a plausible image', and the historical, productive and transformative character of science is effaced.*[16] *You recognize positivist epistemology as attaining a far greater level of rigour and fidelity to the logical* concept *of model (i.e. positivism exhibits a true philosophical* category *and not a mere ideological* notion)*, insofar as it both reverses the vulgar image of science and treats the empirical as the model of the formal, formulating a rigorous set of rules for the interpretation of the scientific syntax in an empirical model.*

Nevertheless, one does not seriously break with the bourgeois depiction of science as an imitative activity, concerned first and foremost with drawing a correspondence between the formal and the empirical. Once again, the historicity, productivity and transformational capacity of science are ignored. Bearing this in mind, it surprises me that in Being and Event *we find the situation of ontology (set theory) opposed to 'non-ontological situations' in a way that seems to mimic, down to the details, the bourgeois opposition between the formal and the empirical. Like Carnap, you seem to treat non-ontological situations as if they can legitimately be understood as 'models' of the ontological situation (for instance, in order for Cohen's methods to be of any use in understanding truth procedures, our situation must be understood as being analogous to a denumerable, transitive model for the Zermelo-Fraenkel axioms). Like Von Neumann and Morgenstern, you seem to leave the operation of correspondence between the ontological situation and its non-ontological 'outside' up to the vagaries of analogy, as when you write, at the beginning of mediation twelve in* Being and Event:

> Set theory, considered as an adequate thinking of the pure multiple, or of the presentation of presentation, formalizes any situation whatsoever insofar as it reflects

[15] John Von Neumann and Oskar Morgenstern, *Theory of Games and Economic Behaviour*, Princeton, Princeton University Press, 1953, p. 32. Cited in *Le Concept de modèle*, p. 21.
[16] *Le Concept de modèle*, p. 20.

> the latter's being as such; that is, the multiple of multiples which make up any presentation. If, within this framework, one wants to formalize a particular situation, then it is best to consider a set such that its characteristics — which, in the last resort, are expressible in the logic of the sign of belonging alone, ∈ — are comparable to that of the structured presentation — the situation — in question.[17]

How does Being and Event *avoid or respond to the criticisms voiced in* The Concept of Model*?*

AB: Yes. In a certain sense, the difficulty that you point out in *Being and Event* is part of the origin of *Logiques des mondes*. You see, *Logiques des mondes* shows that the relation between a formal ontology of sets and the question of effective situations cannot be adequate to being a relation established through the form of analogy. This is true but I have never read a critique in the way you have posed it. But it is in a certain regard quite pertinent. There (in the passage quoted), I was concerned with the idea, perhaps not very well posed, that the ontology of the pure multiple can be a model of a concrete situation. In reality, this does not at all capture the real relation. While real situations are composed of pure multiplicity like everything else, there are nonetheless some different parameters. This is why the transcendental was introduced in *Logiques des mondes* as an element which localizes or which topologizes multiplicity and not as something which turns out to be a formal imitation.

What happened in *Being and Event* was that I left to one side the particularity of the situation, or, as I announced in the beginning, that I occupied myself with the ontological structure of multiplicity, an abstraction made full by the singularity of the situation (of mathematics) and thus I developed a theory of the ideality of the multiple and not a theory of participation. Hence I gave myself the goal in *Being and Event* to attempt a formal description of what a truth procedure could be.

I might clarify myself with respect to the critical passage here by saying that, since there is a diversity of situations as well as laws governing situations, the question might then be how these diverse situations participate in the same ontology. In *Being and Event* what interested me was to arrive at thinking the possibility of a process of truth as an exception from a general regime of the simple repetition of the multiple. If you like, I would say that, at each point of my approach to the question of the particularity of the situation in *Being and Event*, I treated them as something related to the situation as a multiplicity. Thus, to be able to say that *this* multiplicity is different from another, I had no other recourse than an analogy to set theory. The root of the problem is that when we want to pass from the theory of pure multiples to the theory of a composed world, we need resources that are not available in *Being and Event*. In *Being and Event*, we had that which one could strictly access from the structures of belonging or inclusion of the void, with a certain number of the formalizations of set theory. From this sort of approach, I gave an account of what an event is, what fidelity is, or what the consequences of the construction of generic truth are. In the end, *Being and Event* achieved its goal when it specified the ontology of truth as the being of the construction of a generic multiplicity. Certainly, this is valid for all truth procedures. This is all good, except for what concerns the particularity of each kind of truth procedure. In the last instance, the particularity of truth presupposes that we can think the particularity of a world and we could not think this particularity with the materials of *Being and Event*. In this sense we might say that the criticisms in *The Concept of Model* were an anticipation of *Logiques des mondes*. The positive dimension of the critique was realized more in *Logiques des mondes* than in *Being and Event*.

[17] Badiou, *Being and Event*, p. 130.

TT: *It seems it would be a confusion to say that the four procedures of truth, from different situations, are all connected to the base of ontology or the base of mathematics. This would be a misunderstanding of your work.*

AB: Yes, certainly. While we might say that the four processes of truth, in a strictly formal sense, continue to be held together as generic multiplicity, by doing so we would not have said anything about their differences. As such, we cannot base the four truth procedures in set theory. For this reason, we need to engage, at one point or another, with that which gives some indication of singularities, that is, an investigation into the question of what is a "type" in truth procedures. This is a question that is not reducible to ontology. Ontology can only give what it can give, it cannot but be what concerns multiplicity as multiplicity. However, when a break is situated in a world, in a certain historical shift or an interruption as a particular event, we are in a different register and it will be a different question.

TT: *So perhaps we can reformulate this general confusion as a confusion concerning the terms situation, presentation, multiple, and now… a world.*

AB: Yes. (Laughs)… and now a world.

TT: *Situation, presentation, multiple, world.*

AB: I should clarify this point. They are not at all identical. Presentation is a particular qualification at the level of situation; presentation is a synonym of belonging (*appartenance*).[18] In a situation, there is not only presentation but also representation because we should not forget that there is also a state of the situation. They are not at all the same, presentation and situation. On the other hand, the entire effort of *Logiques des mondes* has been to ask another question. Why is it that I speak about worlds? A world is not reducible to a situation because, if we look at *Being and Event*, a situation is a multiple. That is all. As such, with respect to a world, we have something that is already much more complicated. First, there is not simply a multiplicity, but there is an inaccessible infinity of multiplicity and there is also a transcendental map of connections and relations.[19] You are absolutely right to point this out. Situation, presentation, multiple and world are concepts that should remain distinct.

ZLF: *In "Marque et manque", a text published around the same time as* The Concept of Model*, you level what is, in my view, a decisive critique of Jacques-Alain Miller's attempt to connect the psychoanalytic concept of 'suture' with the mathematical zero.*[20] *The main thrust of your argument is that mathematics lacks nothing that it does not produce, that it organizes these lacks according to a process of stratification, and therefore never encounters the sort of uncontrolled lack such as Miller posits in "Suture". In* Being and Event*, however, the concept of suture returns, and you say that the empty set (Ø) is, in truth, set theory's 'suture to being'. What is unsettling about this return is that nowhere do you provide a defence against your earlier attacks on this concept, neither in* Being and Event*, nor in your brief discussion of Miller's text in* Le Nombre et les nombres*, despite the prominence of the notion of ontological suture in both*

[18] This is a central thesis of *Being and Event*, meditations three and seven, pp. 38-48, 81-92.
[19] In *Logiques des mondes*, Badiou gives an account these terms in book four, section one, entitled 'mondes et relations', pp. 319-342.
[20] Jacques-Alain Miller, 'La suture (elements de la logique du signifiant),' *Cahiers pour l'analyse*, no. 1, pp. 39-51. Available in English as 'Suture (elements of the logic of the signifier),' *Screen,* 18.4, pp. 24-34.

books.[21] *I am aware that much has changed in your understanding of mathematics between* "*Marque et manque" and* Being and Event *— mathematics, for instance, goes from being understood as a process, even a 'psychosis', without a subject, to being at once the science of being and a subjective procedure par excellence — but it is unclear how these changes might allow you to evade your earlier critique.*[22] *Is the notion of suture, as it functions in these later texts, still subject to the critique put forth in* '*Marque et manque*'*? If not, why not?*

AB: Yes. I understand the complexity of your question. However, the problem here is that the word suture changes its meaning between Miller's text and my usage in *Being and Event* when I discuss the suture to being. Why is there this change of meaning? In Miller's text, suture designates the point of absolute lack which accommodates the heterogeneity of the subject. At the point where there is lack, one can discern the symptomatic of the subject. Here I would repeat my disagreement with Miller, while clarifying that this problematic does play the same role in *Being and Event*. For me suture designates a juncture between ontology and its 'object'. To hold mathematics as ontology, the very limits of being as such will be touched by the void. But, as such, the void is not the point where we discern subjective heterogeneity. The void is the point on which we found the constructible sets which allow us to unfold the characteristics of pure being. In this sense the void also represents inconsistency.[23] If we admit both that multiplicity is inconsistent and that ontology makes itself consistent in that possibility. With inconsistency (of the void), we are at the point where it is equivocally consistent and inconsistent. That is the void. Since the void is the multiplicity of the nothing, the question of knowing whether it consists or not is split by a pure mark (Ø). Suture carries its importance in my work in this way in relation to this difference in meaning. For Miller, it is a dynamic according to which all repetitions are conditioned by the marking of lack as hidden subjectivity. In *Being and Event* however, I simply provided a justification of the fact that mathematics, since it is consistent, is an ontological discipline that measures its (suture's) connection with the void. Whether the void is consistent or inconsistent is undecidable. Thus, it is both that (in the void) there is nothing that consists and which can yet be considered to consist in not consisting.

That is what I have to say on suture but I would like to return to another part of the question that was supposed in what we spoke of earlier. There is an important transformation in my work that is not really addressed in the question of suture by itself. Here, I think there has been an important transformation in my work between *Marque and manque* and *Being and Event*: between the two, I have reintroduced the category of the subject. By consequence, even in thinking of mathematics as a truth procedure, there is a sense of the subject in this procedure. In doing this, I did not put the subject on the side of the void. In what I developed elsewhere, I showed that the fundamental difference between Lacan and my position is that the central concern for mathematics in Lacan is his suggestion that the void is on the side of the subject, while for me the void is on the side of being. So this is precisely the gap between the two senses of the word suture. On the one side, we have a suture to being and on the other, a suture of subjectivity. But at the same time it remains true that the construction of this interpretation of mathematics makes possible the existence of the subject in the mathematical procedure insofar as the subject of mathematics will not be localized in the void. Rather, the void is not at all the subject but rather the 'object' of the procedure. This is the important shift.

[21] Alain Badiou, *Le Nombre et les nombres*, Paris, Éditions du Seuil, 1990.
[22] Badiou's use of the term 'psychosis' comes out of the critique of Jacques-Alain Miller's use of the term to describe the structure of science. Jacques-Alain Miller, 'Action de la structure', *Cahiers pour l'analyse*, no. 9, pp. 93-105.
[23] In *Being and Event*, many of Badiou's central theses on the identity of ontology and mathematics hinge on the point that "The void is the name of being," *Being and Event*, p. 56. Badiou gives an account for the void's linking of consistent and inconsistent multiplicity in meditation four, pp. 52-59.

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