Mathematics of Extinction

Abstract: The following essay explores the possibility of a mathematics of extinction. Using Sextus Empiricus, Jacques Derrida, Yuk Hui, and an excursus into the work of John Bova and Kieran Daly, I ask two simple questions: is extinction a number and, if so, may it be counted? The essay also presents an entirely new reading of Lacan's *Encore* seminar as a mathematization of the end of the world.

I'm wondering whether this isn't a moribund period of art. Aesthetics have gone into things like space and science—those beautiful airships: utility at its height. No artist could compete with that.—Chaplin

Is there a fine art of mathematics? Mystical mathematics. Musical mathematics. Has mathematics merely a finite purpose? Is it not purely theoretical? Truly pure mathematics?—Novalis

Geometry explicitly concerns the angels and for the rest, namely, as regards structure, there reigns only one thing, which is what I call inhibition.—Lacan

It is clear that the letters which upset us so much that we call them, God only knows why, by a different name, 'characters', to wit, Chinese letters, emerged from very ancient Chinese discourse in a way that was very

> different from the way in which our letters emerged.—Lacan

1.

Imagine we start by assuming next to nothing of the definition of each of these terms: ‘mathematics’, and ‘extinction’. Instead of seeing both as relative knowns in an ongoing equation—mathematics as the higher science of number and extinction as the reduction of a species or of all beings to zero—we might see their combination as the beginning of a crisis of definition for both. As Sextus Empiricus wrote, ‘But perhaps definitions are actually undecidable because of the infinity of the particulars on the basis of which they ought to be decided.’ (124) In other words, since the attempt to define either ‘mathematics’ or ‘extinction’ might meet straightaway with a problematic infinity of particulars, and so beg the question of what ‘infinity’ itself is, neither can be defined to begin with, and yet both notions seem at least partly to depend on what may or may not be a ‘mathematical’ notion: infinity.

To know what extinction is, I need to know what its own infinity of particulars is (to make at least a preliminary definition), and yet since ‘infinity’ is not known, or rather since ‘infinity’ is predominantly an open question in mathematics (which art therefore is also unstable of definition and boundary), the reliable

assumption of either ‘extinction’ or ‘mathematics’ is unavailable. And yet this crisis itself, the crisis of the definition of extinction, has something mathematical about it (hence the speculative conjunction of my title: (the) mathematics *of* extinction).

Sextus goes on, in this section of *Outlines of Scepticism* which is about ‘definitions’, to note that,

> It would surely be ridiculous to say that definitions are useful for apprehension or for teaching or, generally, for illumination when they involve us in such obscurity. (125)

I evoke Sextus’ Pyrrhonist suspension of the very being of definition here to open the space of the following essay: a space as if *before* mathematics and *before* some of the more established extinction criticism now available (for example the work of Tom Cohen and Claire Colebrook), a space in which new (or rather very old) questions might be asked about the relation between number and extinction, that is, about the relation between attenuation and devastation and their possibly mutual affects and calculability.

We can therefore add to Novalis’ batch of questions in the above epigraph as follows: Is a mathematics of extinction possible? Is number itself given to the *thinking* of extinction or to the *calculation* of extinction? Is probability calculation possible with regard to this

assumed given, ‘extinction’, and with regard to the future of what might be called ‘life itself’? What does it mean, for example, when we say, without pausing to reflect, that ‘our days are numbered’?

Sextus notes the initial ridiculousness of definitions—for example of number, infinity, extinction—and also, in true Pyrrho-suspensive style, suggests that definitions may not be useful at all in ‘teaching’ since they simply return us to an initial obscurity that remains in effect *uncounted* and, therefore, to be read.

In the ‘Gramme and Number’ section of ‘*Ousia* and *Grammē*: Note on a Note from *Being and Time*’, Derrida remarks while reading Aristotle the paradox whereby ‘even if time comes under the rubric of mathematics or arithmetic, it is not in itself, in its nature, a mathematical being’ (1982 59). There is something that allows itself to be numbered and yet which is itself not a part of that numbering, and, consequently, the being of ‘mathematics’ fails in some minimal way to belong to itself. Mathematics is not just about number, and number is not just mathematical. In other words, the deconstruction of time that Derrida here extends and continues through Heidegger and his note on Hegel and Aristotle is also a movement that traces or introduces into the heart of mathematics a swerve that will not be counted, a limit, a counting down of days that is (numerically) distinct from the number of days itself.

Days cannot simply be counted, since there is a difference according to Aristotle between number and numbered, and so at some point a super-interruption must take place.

It can be affirmed, Derrida says, while still commenting on Aristotle, 'that the mathematization of time *has limits*' or again, a little further down on the same page, 'that time cannot be made perfectly mathematical, that time's mathematization has limits, and remains, as concerns its essence, accidental.' (1982 61)

This non-mathematical moment in the formulation of temporality as *différance* is perhaps not noticed as often as it might be by readers of Derrida, not least because it does not simply leave mathematics behind or escape it, but suggests a perturbation in the concept of number itself, a countless imprecision in the attempt to count days and count time, and an importance of mathematics to everything Derrida says in the rest of his work about what can't be counted or calculated. To what extent is this awareness of a limit to mathematization already an intimation that days are numbered (finitised) and that the mathematical trace is given over to extinction, or to what is sometimes called *Auslöschung* (cancellation in the mathematical sense)?

I leave this question open and to one side for the moment since it perhaps goes too far ahead too soon, and assumes too many definitions at once, risking falling

back into what Sextus might have called *mathematical dogmatism*.

The least that can be said about this isolated moment in Derrida's reading of Aristotle on time and number is that it is not just a philosophical moment, and that one consequence of this is that it is not easy to say who or what *a mathematician* is, here, now, in relation to a philosopher, and this will be a theme throughout the present essay, which allows the non-mathematician to mingle with the expert, and the amateur to circle the number domain itself.[1]

Because Derrida's writing sometimes resembles 'philosophy', at least here in *Margins of Philosophy*, it would be a mistake to think that he is thereby *reducing* mathematics by exposing its limit. On the contrary, the movement of his analysis has the effect of revealing mathematics as that which is itself repressed and overdetermined in what he calls (following Heidegger)

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[1] On this question it may be helpful to look at Danielle Macbeth's *Realizing Reason, A Narrative of Truth And Knowing*. Oxford: Oxford UP. 2014. In a footnote, Macbeth comments: 'Because this new form of mathematical practice does not rely on any system of written marks but is instead purely conceptual, and deductive, it seemed, at least at first, to be not distinctively mathematical at all. (This was in large part what was behind Frege's, and also Dedekind's, logicism.) As a Cambridge don is said once to have quipped, "and now we can solve the problem without any mathematics at all, just group theory."' (204 n. 3. Cf. vii and 411 n. 31)

metaphysics. Derrida will make this quite clear elsewhere in *Margins of Philosophy* when he writes that the privilege of speech over writing is also, by definition (if we can use this phrase), the privilege of 'phonetic writing over every other system of inscription, particularly over hieroglyphic or ideographic writing, *but equally over mathematical writing*' (1982 88 my emphasis). In other words, the deconstruction of the metaphysics of presence is not only a deconstruction of the repression of mathematics in the philosophical tradition, it is also a deconstruction of the mathematical metaphysics of presence and of the meta-mathematical presence of mathematics. There is a common ground here between this refusal to subordinate maths and recent work by Yuk Hui to account for multiple cosmotechnics in *The Question Concerning Technology in China*. The multiplicity of cosmotechnical conceptions for Hui is also a variance in conceptions of the *cosmomathematical* domain. It is a mistake to think, for example, that mathematics developed in Chinese thought as it did in the West. Hui proposes the 'delicate and speculative' idea that 'not only was geometry not developed in China; in addition, the question of time was not addressed the same way as it was in the West' (210). Multiple cosmotechnics and world time signatures are thereby joined by differing world-mathematical domains. There is no more one mathematics than there is one form of counting, or one form of counting the one.

An immanent example of this splitting within number and machine (and computational capitalism—we can see what is at stake: the *différance* of *technē* itself), is what has recently been called ‘the splinternet’—that is, the splitting of the internet domain between differing conceptions of how online digital data should be portioned and counted—what Stiegler calls the ‘applied mathematics of correlational algorithms’ (394). China would here be one of at least three main players—the other two being the United States and Europe. As Rana Foroohar puts it, ‘Such a Balkanisation, which experts now refer to as “the Splinternet”, would change the functioning of the internet as we know it.’

If Derrida wants to take a distance from Hegel’s account of writing in ‘The Pit and The Pyramid’ it is because of a refusal of the subordination of mathematical formalization, but it is also has to do with the Chinese question concerning writing and the fact that number for Hegel is problematically paired with the *other* of Chinese inscription: ‘Following the classical framework of the Hegelian critique, Chinese culture and writing are reproached simultaneously for their empiricism (naturalism, historicism) and their formalism (mathematizing abstraction).’ (102) In his attention to Hegel’s allergic reaction to empty mathematic symbols (Chinese script as the equivalent of ‘machine’), Derrida already joins here the space of Hui’s book. One can be more precise and say that, in a certain sense at least,

Derrida's whole itinerary begins (and not just chronologically) with his translation of and commentary on Husserl's 'The Origin of Geometry'.[2] That is to say, it begins with an attempt to understand how it is that 'the mathematical object' attains its ideal transparency in Husserl—or rather, how mathematical ideality impossibilises and possibilises itself in what might be called (Derrida never quite uses this phrase but it is implied) mathematical *différance*. The birth of *différance*, which can be observed in slow motion in the time that Derrida spends on and with Husserl's mathematical speculations, is therefore a geometrical moment of worry or perturbation, a crisis within the philosophical reflection of mathematical objects themselves. The entirety of Derrida's work is nothing other than an *introduction* to the *origin* of *geo-metry*.

Let us repeat, then, speculating in a mode that is neither philosophical nor mathematical, that Derrida's following of the attempt to 'free the question as to the origin of geometry' (Husserl 1978 36) acts as the

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[2] For a very helpful commentary on the significance of Derrida's 'Introduction' to 'The Origin of Geometry' and on how the date of Husserl's text (1936) was significant in relation to Heidegger's choices at that time, Hitler, the birth of *différance*, and so on, see Bernard Stiegler, 'What Is Called Caring? Beyond The Anthropocene.' Trans. Daniel Ross. *Techné: Research in Philosophy and Technology*. 21:2–3. 2017: 386-404. Web. 9 Mar. 2018. 394-398.

non-original origin of his work, and that the failure of mathematical idealization (as precisely what Derrida here calls mathematical infinitization) is also an exposure to a kind of radical monstrosity of *number*.

Number itself, then, can it be counted? Can it be counted on? Is there a One (or more) of extinction(s)?

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In the comments section from David Chapman's hypertext book Meaningness.com, there is a sudden flash of deep insight, the sort of thing that can sometimes make comments sections worth reading. Chapman himself writes:

> I have a guess (which is just a guess). It's that everyone knows that the early 20th century foundational crisis was never actually resolved. It's just that it's been most of a century since it caused any practical problems.
>
> And no one wants to risk getting anywhere near it. Everyone knows that real numbers have actual infinities (Cauchy sequences) hidden inside, and no one wants to talk about *that*. Measure 1 of real numbers are uncomputable: [literally] Unnameable Horrors, with squirming rugose tentacles and [literally] countless scuttling legs. If you thought on that too long and too hard, you could open a portal to

> the Dungeon Dimensions, and shadow monsters from behind the stars would seep through and tear terrible rents in the fabric of spacetime [or at least R^3].
>
> Mathematicians, like everyone else, just want to get on with their work, and not have to think about the Big Picture. If you are working in some subsubsubdomain of low-dimensional functional analysis, the last thing you want to do is worry about what real numbers are. But if you start *talking about* what you are doing, and how, and why . . . nightmares rush in.

What Chapman touches on here is the affective dimension of the mathematical revolution that Cantor, for example, was part of, but which was also felt by Husserl and Derrida and Einstein and Chaplin and others.[3] The still not resolved 'early 20th century foundational crisis' here mentioned is the crisis which Husserl names in his unfinished 1936 book, *The Crisis of European Sciences and Transcendental Phenomenology*, and which Derrida will be attentive to throughout his reading of the original moment of geometry. The crisis of definition Sextus is none too early to notice here unfolds in more precise terms as the

[3]For an analysis of Einstein's view on Chinese geometry see Yuk Hui, *The Question Concerning Technology in China*. Urbanomic, 2016. Print., 206ff..

monstrous aspect of ‘real numbers’ with actual infinities that nobody wants to talk about—the standard ‘working definition’ for a ‘real number’ is an infinite decimal, although this begs the question of the mathematical status of such a definition: is it merely amateur? The challenge of uncomputable horror may be compared (but again what does a comparison mean in this context, and is it on the side of mathematics or philosophy?) to the affective dimension of extinction, as itself the infinity of an uncountable or unfaceable ‘truth’. If we begin to consider that anthropically caused extinction may be happening as a one-off (assuming human life to be unique, and this may be counted), then ‘extinction’ is inscribed not as part of a humane discourse on the culture of death and finitude, but as a *critical part* of a mathematics that is in effect beyond ratio.[4] And yet, that the truth of such a ‘one-off’ would be ‘far worse’ or ‘far more problematically infinite’ than any counting of days is available to us only as knowledge according to an

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[4] The relation between the non-mathematics (a maths beyond cipher) here implied and a Laruellian non-philosophy of the radical One would need to be explored with proper time and space. At the end of ‘Deconstruction and Non-Philosophy’, Laruelle writes: ‘We ask how the empirical is itself given to us, given to the philosophical subject, and how does this philosophical subject know that he or she has rightful access to language or mathematics? Does the subject speak? Is she a mathematician?’ (63)

abacus or sliding scale seemingly on the verge of dissolve.

Returning to ‘The Pit and the Pyramid’, we can see that according to Derrida there may be for Hegel something that is *to be faced* in the extreme externalities that mathematical concepts can present:

> The preface to the *Phenomenology of the Spirit* had posited the equivalence of understanding, formality, the mathematical, the negative, exteriority, and death. It had also posited the necessity of their work, which must be looked at in the face. (1978 106-107)

The monstrosity of number, precisely insofar as it challenges and perhaps devastates conceptuality, acts here as a task, the task of facing an extinction neologised in this passage as ‘death’. To look the real number of extinction in the face, is that possible, and under what conditions?[5] Derrida will call this a possible

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[5] John Bova has written: ‘But Pythagoreanism and Fregeanism are guided by a consistency which makes it possible for them to provoke and discover their own impasse in the face of a mathematical Real which they can neither assimilate nor reject.’ ‘Could all functions be concepts? A note on the dialectic of logicism (Frege/Sartre)’ Again the question here is whether the mathematical Real can be counted or counted on at all—and whether the extinction named in our essay is merely an analogy or mathematical trope.

contemplation of ‘pure loss’ and connect it back, significantly just after his discussion of Hegel’s rejection of Chinese script, to the machine, which is to say to the counting machine, and to the future danger of world technology (1982 107-108).

The insistent problem here is that we continue to beg the question of Sextus’ initial quandary. We proceed towards extinction as if it were simply death and something that could be faced (as if death and extinction were the same and belonged to the same mathematical domain), and we proceed towards mathematics as if we knew what mathematics itself is. To insist on placing extinction next to or within mathematics, as if higher mathematics were a natural partner for extinction criticism, is to act as if a part of the discourse of mathematics (real numbers) can simply be analogous to the still-undefined term ‘extinction’ as a monstrous facticity. Sextus ends the section of his *Outlines of Scepticism* on definitions as follows:

> For when they want to establish what a definition is, they fall into an interminable dispute which, because of the plan of my work, I here pass over, even if it seems to overthrow definitions.
>
> So much is enough for definitions. (126)

We have still not defined ‘extinction’, and we have still not defined ‘number’. The one may be analogous to the

other, simply insofar as the reality of extinction simplicter may be close to the reality of real numbers in their monstrosity, but this already assumes a problem Derrida is sensitive to, that of mathematical metaphors. In a passing comment in ‘White Mythology’, made during an analysis of the problem of ‘philosophical metaphors’, Derrida writes: ‘Thus, one would classify the places they [the metaphors] come from: there would be metaphors that are biological, organic, mechanical, technical, economic, historical, mathematical—geometric, topologic, arithmetic—(supposing that in the strict sense there might be mathematical metaphors, a problem to be held in reserve for now).’ (1982 220) Is the problem of *mathematical metaphor* one that Derrida ever returned to, or was it one that had already been covered in his early work on Husserl and Geometry? The following problematic possibility remains: only a non-mathematician might understand why such an extinctive maths would be necessary and yet only a mathematican would know which maths would already apply.

1.

John Bova is a philosopher who works ‘at the intersection of metamathematical-metalogical and metaethical-metapolitical lines of conceptualization’, and his work might be useful for continuing to think about the

relation of these two unknowns: extinction, and number. Since Bova seems to define himself in part as a philosopher (he has written a great deal on Sartre for example), the mathematical insistence of his work is especially fascinating. As in Derrida, there is a refusal to allow mathematics or mathematical language to be subordinated to or subordinate any one disciplinary domain. Indeed, Bova's concern at least in part is with the ethics of making juridico-theoretical calls about the domain of mathematics itself. He is perhaps not a mathematician as such, then, not in a self-designating way, and yet his writing bears directly on mathematical content and praxis, and, following the lesson of his own meditations, there seems to be no real reason to say that what he writes is not itself a (meta)mathematical praxis (assuming again the definition of what that praxis would be).

Bova's 'Meditation on the Arithmetical Hierarchy' considers the problem of mathematical difficulty and of the conditions under which 'thinking seems to possess an unlimited "formal" power over multiplicity'. If there is an ethical bent to Bova's work, or rather, to be precise, a metamathematical-metalogical and metaethical-metapolitical bent to it, then it is most clearly located here, with this question about the sustain-power of number-conceptuality itself. There are conditions, Bova says, under which thinking rallies and continues to have power over whatever multiplicity can be imagined

(of a chosen type), and yet this also implies or threatens to imply a moment where that power may go. The ethical and metamathemtaical question posed would be just where or whether the point of going may be ascertained. And what do we mean here by *going*?

Bova's subtlety is to want to know not just where the go power of number-conceptuality may stop, but also just how such a moment of stoppage (what Sextus might call *epochē* as such) can be counted or enumerated. If there is a moment where number power is already besieged, or if just that is its ability to power up and be idealized, but also to outnumber and overawe, then what is the measure of that, and does the asking of this question fall on the side of maths or thought? This is not just a question for what Lacan would call (as we will see in a moment) the signifierness of mathematical language but of what Bova calls (perhaps echoing Lacan but perhaps not) 'the *mathematics* of the *language* of *mathematics*'. Not the language of mathematics, or the language in mathematics, but the calculation of the words and formulas needed to delimit (or not) what is assumed to be mathematical:

> What must it be, then, which, even in the sandbox of a first-order speaking of number, records the refusal of being to cede to thinking an immediate and sovereign power to make one-over-many, and

> indexes an increasing resistance on the part of the content to being counted formally as *mere* content? *I.e*., what must be the measure of the difficult, not only insofar as the latter is *counted*, making one out of the many all-too-easily, but in its rebound upon *counting*? What must be *counted* of the *language* of *counting*, in order to measure the multiple at the level of the concept, or the *difficult* proper? (By this third formulation, we're able to confirm that we're on the terrain of metamathematics—the *mathematics* of the *language* of *mathematics*.)

We can also attach to the name of John Bova (his writing is dispersed online in an essential scatter) the following thought: 'when sad, do math' (@johnbova 28 May 2017). What does it mean to turn from sadness, as anthropic affect, to math? Is this a mathematical move?

We might imagine this turn as a kind of unquantifiable conversion that also turns from pathology to formality, or from maths to metamaths, in a way that is inevitable and worth extended contemplation. To do this we briefly introduce Kieran Daly's essay 'No More: Pyrrhonism and Non-Philosophy', not just because it returns us to Sextus and his blanket denigration of easily assumed disciplinary discourse, but because it seems to transition irreversibly from a psychological or even psychoanalytic mode of intervention (what he calls the

‘conflatory’ interpretation of Pyrrhonism) to a strictly formal means of ‘intervention’ that stresses fixation on anthropic particulars as ‘the overextension of “feelings” or contingent impressions to formal ends’ (Daly, unpaginated, year of publication unknown). If ‘extinction’ as a still ill-defined concept (who is going extinct exactly and compared to who and in which universe?) is taken to imply affect (sadness, melancholia, and so on), then ‘maths’ here, instead of being paired with the former, would seem to imply a break. ‘When sad, do math’: this implies not just a distraction or self-help move, a shift from one mood to another, but a fundamental recognition of a category error. To be sad would be, in essence, to misrecognise the *mathematics* of the *language* of *mathematics* as something other than a metaethical unfolding. It would be to refuse to ask the *right questions* about mathematics and the mathematician.

The conjugation of maths and extinction (even worse, their direct correlation in the maths *of* extinction) might be met with the double disbanding of a double ‘perhaps’—which is to say an absolute Pyrrhonic suspension. The ‘perhaps’ or ‘maybe’ is one of the Pyrrhonist modes that Daly happens not to reference, even though it is implied by the other main ‘behaviours’: equipollence (or what Daly elsewhere calls nullipotence (Daly 2013)), epochē, ataraxia, aphasia, and aporia. In *Outlines of Scepticism*, Sextus comments: ‘We take

“Perhaps” and “Perhaps not” in the sense of “Perhaps it is and perhaps it is not”; “Maybe” and “Maybe not” for “Maybe it is and maybe it is not”; “Possibly” and “Possibly not” for “Possibly it is and possibly it is not”. (48). For the practising Pyrrhonst—bearing in mind that one of the main intents of Daly’s essay is to remain open to there being no such thing—there is an equal convincingness and unconvincingness of any given statement, such as for example ‘extinction is happening’ or ‘there is a relation between mathematical concepts and extinction’. Although Pyrrhonism is not generative as such (because it is suspensive without inhibition), it is also not prohibited from producing or simply being the site of the following statements:

> Perhaps there is extinction.
> Perhaps there is no extinction.
> Perhaps there is a maths of extinction.
> Perhaps there is no such thing as a maths of extinction, and not least because perhaps there is no (unary) extinction and no (unary) maths.

In the section of the *Outlines* on subtraction and addition Sextus will distinguish between subtraction and annihilation, stating that ‘what includes something must be greater than what is included, and that from which something is subtracted must be greater than what is subtracted, in order that something should be left behind

after the subtraction—this is how subtraction seems to differ from total annihilation' (167). According to this one moment (there are no 'arguments' as such in Sextus, since everything self-brackets), one might set in motion the following experimental statements:

> Subtraction is not total annihilation.
>
> Since subtraction is not total annihilation, maths must be separated from total annihilation since number can never accommodate an absolute lack of remainder (unless maths can be separated from subtraction—or subtraction subtracted from maths).

But the insistence of an absolute decoupling of math (subtraction) and extinction (annihilation) is perhaps just as question-begging as their conjugation. The false dichotomy would be either dissolved in favour of an equipollence already in place and already known (perhaps extinction and non-extinction are both innacurate tropes for no one thing in particular) or never arrive at the point of the forcing of a decision.

Perhaps there is a difference between the implications of what Daly calls nullipollence and what Bova calls the *metamathematical-metalogical and metaethical-metapolitical*. From the point of view of nullipotence (not just the equality but equal nullity of all claims about maths and extinction) one can never arrive at an identity claim about extinction, or its metaphoric

comparison with *x* or *y*, and not least because the definition of ‘extinction’ would always land one back in the quarrelsome infinities Sextus rejects. No conjunction of extinction and maths, then, and no separation. Or, more acutely, no knowledge or attestation of extinction at all. Perhaps no extinction. Extinction perhaps. From the side of Bova, the question of mathematical difficulty and the exact overload of measure (number) persists, and has a hyper-ethical edge to it. Knowing that the numbering of extinction could be simply disbanded might be more easeful—the Pyrrhonists refers to this as aphasia in a technical sense, that is, the feeling of not having to or being able to know what or that extinction is—and yet the maths of the language of maths contains a restlessness that Bova sees as perhaps part of a jump, nonetheless, from sadness to pure maths itself.

Where the Pyrrhonist, if there is one, may proceed to the suspension of all truth claims about extinction and mathematics, and to the suspension of any attachment to this mode of suspension, Bova proceeds along the same edge, and yet wants to ask, without affirming either way, whether something like a facing of what he calls ‘cosmic pessimism’ is possible:

> Yet the interest of thinking is in nothing but this possibility of fulfillment, of the sudden collapse in which an articulable logos compresses the multiple beyond previous bounds. Insight. Thinking *must* bet

> against insight, and thus against itself globally. Must—can—thinking then bet against itself locally? Does the truth of global, cosmic pessimism license taking this pessimism as the maxim of thinking's local act? Can it abandon the tension by which it maintains itself in the still pursuit of insight? Can thinking place itself on the side of the hopeless complexity of being? Can it stop waiting for those events of insight in which the One is momentarily effective? Once again, the consequences of diagonalization's reconfiguration of local and global would be misinterpreted, I think, in this natural application. At least, it is provably impossible for thinking to be justified in taking this last step of wagering on the normal coincidence of upper and lower bounds of complexity.

It remains possible that there is truth claim 1, *tc1*, that extinction is possible, that it may happen tout court, once and for all, and that number since forever has been thought partly as a guard against this truth (Brassier: 'the truth of extinction'). The distinction here, and what makes Bova's work hyper-ethical, is between *tc1* as possibility, and the nullipolence of all statements about extinction, *nc2* let us call it, that Daly's work might be said for convenience to represent. What type of relation, if there is one, there is between *tc1* and *nc2*, between Pyrrhonist nullipollence of all claims about extinction and

the metamathematical *mathematics* of
the *language* of *mathematics*, is itself an open question, and also perhaps the one Bovas is asking as and calling, neologisticially, *ethical*. This may be notated for now as

tc1 . . . < . . nc2

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Lacan's revolutionary 'return to Freud' depended for much of its weight and scope on the mobilization of not only mathemes, but of geometric forms of knowledge, for example Borromean knots and other tropes of non-representability, and on a certain passion for the Orient. So much is relatively well-known (Greenshields 2017, Roudinesco 1993 351-357). What is perhaps less often notated is the coincidence of Lacan's evolution of mathemic analytic intimation with an awareness of what might be called, following his script, 'the end of the world'. One of the key sites for the evolution and explication of the Lacanian set of mathemes is the *Encore* seminar of 1972-1973, which focuses on feminine sexuality and jouissance. The only explicit reference to the end of the world in these pages comes in one of the headings of the fourth session, which reads 'THE END OF THE WORLD AND THE PARA-BEING' in the English translation. Although the phrase 'end of the

world’ appears only there, the theme is developed with a degree of silence throughout the whole of the fourth session. For instance at one point Lacan pauses to ask: ‘On the contrary, isn’t there something in analytic discourse that can introduce us to the following: that every subsistence or persistence of the world as such must be abandoned?’ (1999 43) In early Derrida the actual process of mathematical knowledge production (infinitization and idealization) is a key site for the generation of further ‘knowledge’ that can then ipso facto be counted (on) as neither merely philosophical nor merely mathematical. (*Différance*, if there is one, if there is some one of it, is what happens at the moment mathematical origination becomes critically finite.) Because a formulation is wrested from the mesh between disciplines in a state of flux, it is hard to route it back to either one. In Lacan the awareness of radical attenuation (the abandonment of every subsistence of the world: the end of the world) is also a site of mathematical knowledge production, and vice versa. Reading *Encore* it is no doubt difficult to decide which comes first: matheme or end of the world. And yet the connection between the two seems clear, as we are about to show. The end of the world seems born along by the adventure of mathematical knowledge production as it takes in not only a world, but an earth, a cosmology, and beyond: the fine count of universal calculation.

We will argue that the *Encore* seminar is, like Derrida's engagement with Husserlian critical geometry, a key moment in the mathematization of the end of the world, or rather a key moment in the enigmatic ongoing relation between mathematics and the infinity of extinction, and that all of this will be subtended by a *mathematical perhaps*. Lacanian mathemes are to some extent always extinction mathemes, or mathemes of the end of the world, and this tendency can be tracked through the attention to feminine jouissance and the Other's body in these specific seminars. Does mathematics become necessary, originally, sensuously and non-sensuously, simply because the discourse of the end of the world is always what Lacan is figuring as the discourse of the other? We must ask then: is there a maths of extinction? Is there a maths of sex? Is sex a type of maths? And so on.

That the reference to the end of the world at the beginning of the fourth session of Encore, 'Love and the Signifier', is a sub-heading and that this fact gives the heading an uncertain relation to the body of the text (was it placed there only by an editor?) lends extra interest. In English we have 'THE END OF THE WORLD AND THE "PARA-BEING"' and in the French we have '*La fin du monde et le par-être*'. Even the capitals (however incidental) are perhaps doing something active to finitive sense. There is, after all, a remarkable difference between the end of the world, and the End of

the world writ large. This is something I have written about and formalised elsewhere in terms of an extincto-thanatological difference, and marked with a new matheme, in which extinction is separated from death using a spaced Lacanian *poinçon*, a 'punch' mark or lozenge. This symbol, '<>', was in effect an invention of Lacan's, used in the designation of fantasy in his early work. In ongoing work I introduce a space into the lozenge itself to indicate a mathematical heterogeneity (extinction may be absolutely separable from death, the End Of The World may be absolutely separable from the end of the world) and, in effect, a possible rupture of the two terms in my title:

e < > *d*

or

there would be no one mathematics of extinction

In the fourth session of *Encore* there is (it is worth repeating) no explicit reference to either extinction or the end of the world (only a heading). Even though, in other words, the session deals with the radical lack of subsistence of the world that the subject may be invited to face, or at least to mathematize, there is no end of the world here as such. There is a gap (and it's the same for all the sessions) between the headings and the session,

and this gap makes the reading *tense*. That gap opens the seminars to *contemporary* reading and inheritance and interruption. I place the pseudo-matheme *e* < > *d* in the gap between heading and text, author and editor, original and translation. The gap may be part of Lacan's mathematical language production itself, which is already concerned with a topology of gapes and compacts, breaks and tears, but may also lack an explicit matheme for its own reflection on its end of the world *as such*. Part of the answer to this textual conundrum (but why not answer with the matheme *e* < > *d*?) may come from how the seminars were transcribed and edited, whether it was just '*texte établi par Jacques-Alain Miller*', and so whether the end of the world as such was Miller's or Lacan's imposition of words. Moreover, that difference between originator and inheritor is interesting as soon as we allow that Miller as editor will always bend and entrust things slightly differently.

Lacan's own appeal to mathematics is openly vague, or rather carefully amateur. It should not and cannot be described and delimited as simply mathematical, as a mobilization of maths in psychoanalysis. In the first session of *Encore* he refers to the relation between the locus of the Other, the sex of the absolute Other, angel beings (*être-ange*), and 'the most recent development in topology' (9). This 'development' is at first relatively obscure, but is then

named, in a slightly adrift way, as ‘compactness’ and the question of intersection and infinite numbers. Lacan leaves it to the eventual editor to locate this reference to topology back in an earlier essay of Lacan’s own, but it might be noted that the use of topology is, as it were, not strictly mathemo-topological in itself. The reference to a mathematical figure, or area of thought, accrues for itself a precise amorphousness. It is analogy adrift, or toplogical awareness ripped out of what might have been its original context. The scholar may pursue what mathematical knowledge was Lacan’s, but doing so also risks returning the matheme to a disciplinary enclave (Greenshields 2017). In Derridean terms, we might say that there is nothing that can assure us that the reference to a mathematical figure is itself mathematical. And this raises the question not only of whether there is mathematical knowledge as such, and of whether such knowledge has to be always located in *psycho-analytic* awareness for Lacan, but of what non-mathematics is: is there for example a non-mathematics in the style of what Laruelle calls non-philosophy? The basic difference between mathematical knowledge and non-mathematical knowledge can be seen for example in debates about the popularizability of theorems such as Cantor diagnolization. Who is to decide which theorems are popularizable and which are not?

The lack or non-subsistence of the world, its missingness, or voiding, is the point of continuity in

Encore between the subject's own experience of itself and sexuality. In other words, the fact that Lacan will introduce into the discourse of the subject a gap is precisely what allows analytic discourse to be open to the blank spaces of topology. Instead of moving only in the direction of the body, the subject moves, and in this confluence of a compacted topoi and the impossible movement of desire, the body goes ahead and formalises. This is, quite simply, the way that for Lacan 'topology converges with our own experience' (1999 11). Since the subject 'never resorts to any substance, never refers to any being, and breaks with everything smacking of philosophy' (11), then the subject is not only amenable to mathematization but defines mathematics *as non-subjective space* from (its) inside. This diaphanous gameness of the subject towards the matheme is also perhaps what makes the Lacanian subject, here poised at the end of the world, be taken for an angel being (*être-ange*), or a being towards the angel. The *faille* (gap, lack, defect, break) Lacan wants to detect in formation is something that can only be detected in 'very strange glimpses' (8)—non-mathematical glimpses, we might say, into topology—and yet these strange glimpses are also for Lacan the moments that show through the angel. It is because the subject is liquefied towards the missingness of the topos, dissolved in advance in what might be called a 'being-towards-extinction', that it can

be thrown into the non-place of the angel. Only an angel can go, one might say; only an angel can go far enough; or only an angel can face (its own face). The very strange in Lacan's French breaks down, he himself says, into the *être-ange*, the *êtrange* (8). But the question remains whether Lacan saw extinction through the matheme grid or only glimpsed it, whether the breakthrough of the matheme as a form of commemoration in psychoanalytic knowledge that Bion was also to take up in the form of his grid, foresees or forestalls what I call the matheme of the end of the world: *e* <> *d*.

Lacan also makes some comments in *Encore*, riffing on *L'Ange au Sourire* (The Smiling Angel, also known as the Smile of Reims), about the angel's 'stupid smile' when it is 'up to its ears in the supreme signifier' (20). Later on in the seminar he discusses Angelus Silesius, mysticism and politics: 'Mysticism isn't everything that isn't politics.' (76). An essay should be written reading these moments in the *Encore* seminar—on stupid angelicism and political mysticism—in terms of what Novalis calls a mystical mathematics and the well-known and increasingly global 'grin' of Xi Dada: The Smile of China.[6]

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[6] For more on smiles and mathematics see my essay, 'Going Nuclear: Notes On Sudden Extinction In What Remains Of Post-Nuclear Criticism'. *Angelaki*. 22, 3. 2017: 139-147. Print. 144ff., where I talk about Châtelet's comment that

To return again to what may seem a point of detail, the question of the heading of the fourth session of *Encore*. It seems that the fourth session is going some

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mathematical diagrams are ‘moments where being is glimpsed smiling’ (ix). And for more on Lacan and angels, there is the following passage for example: ‘So then I am going to all the same note for you in passing what is *symbolically imaginary*. Well then, it is geometry; the famous *mos geometricus*, that so much has been made of, is the geometry of angels, namely, something which despite writing does not exist. I formerly teased the Reverend Father Teilhard de Chardin, a good deal by pointing out to him that if he was so keen on writing, he should recognise that angels existed. Paradoxically Reverend Father Teilhard de Chardin did not believe in them, he believed in man, hence his business about the hominisation of the planet. I do not see why one would believe more in the hominisation of anything whatsoever than in geometry. Geometry explicitly concerns the angels and for the rest, namely, as regards structure, there reigns only one thing, which is what I call inhibition. It is an inhibition that I attack, I mean that I worry about, I concern myself about everything that I bring you here as structure, a concern which is simply linked to the fact that a genuine geometry is not what one thinks, one that depends on pure spirits, as much as one that has a body, that is what we mean when we speak about structure, 106 and to put that for you in black and white, I am going to show you what is at stake when one speaks about structure.’ Lacan, Jacques. *L’insu que sait . . . Seminar XXIV. Final Sessions 1-12. 1976-1977*. Trans. Cormac Gallagher. Jacques Lacan in Ireland. Collected Translations And Papers by Cormac Gallagher. Web. 9 Mar. 2018. 105-106.

way towards an extended sense of the end of the world, if only with Miller's help, and then Fink's help with the CAPITALS in the English edition. If the end of the world is not visible in the session itself then Miller (perhaps) would have made it felt and then Fink (maybe) would have ratcheted it up subtly to another level, in so far as it is a question in the session itself of 'a space whose status is ever more precariously established' (42). From precarity to *la fin du monde* to END OF THE WORLD, closer and closer. Lacan refers to this increasing attenuation in the fourth session when he is describing the impact of the Copernician revolution and how it can be placed on a scale. At one end of the scale there is what might be called classical being, that is to say 'being' conceived in the earliest forms of Christian, Greek, Judaic etc. ontological discourses of love. Being is being, we might say, it auto-affects and auto-reflects, and we ourselves are the suns self-loving in our own systems, the love that radiates from our own sphere. This 'classical' psychological cosmology is not dismissed by Lacan outright but located and beautified with an expression, '*êtrenel*' (translated by Fink as 'be-eternal-ing'), and is placed in the context of a modern cosmology which introduces an essential hole or revolution into the assumption of astrobiological eternity. There is perhaps, we might say, no *ceternity*. What Lacan notes at the other end of the scale, the end of finity, the end of 'a space whose status is ever more

precariously established', is that the Copernician revolution was never really a revolution as such because it merely replaced the earth with the sun, and now the sun too has been shifted and relativized. For Lacan cosmology even on a universal scale always implies and assumes a world (*cosmos*), even as it may introduce in modern terms an element of infinite decentring. Analytic discourse, on the other hand, will introduce us to what might be read off as the concealed content of the Copernician revolution: an actual displacement of man as centre in the direction of a mathematically conceived unconscious wherein there is always the abeyance of *something I don't know*—something we are *unconscious of*. It is from this point of view that one can begin to understand the imposition of the heading, '*La fin du monde et le par-être*', and it is here too that one can best understand the reliance on the matheme as a form of knowledge preservation and dissolution.

Part of the effect of reading *Encore* is the cognizance of the ways in which the saying of something does not at all exhaust that thing or even make it visible. Since cosmological knowledge is itself met by a discontinuity that potentially shatters what was meant by the Copernician revolution, analytic discourse in Lacan's hands has to go in the direction of 'breaking up anew (*rebriser*)' (44). Cosmological congruence is a cut; cosmic continuity a trick of stellar light; and extinction a generics (a maths). Space, which is to say

cosmological space as well as the inner space of the psyche in its compatibility with the spaces of topology, is shrinking. The resulting sense of niche finality or unique finity is part of the analytic haul of these sessions on sexual jouissance and the motor for the turn to what Lacan will call ‘the use made of the letter by mathematics’ (44). Put more simply, we are suggesting that the Lacanian matheme was not only a result of what Zupančič almost calls a sexual ontology (or their problematic coupling: sex *and* ontology), but of what might be called an endology—endology here would imply a study and discourse of the end, which is to say a mathematics and poetics of extinction, as opposed to a new ontology or hauntology. The matheme is to begin with a matheme of the end of the world, and sexual ontology has to vie here with an ontology of radical finitude (endology) that may itself be *chastising*. The use made of the letter by mathematics suggests a plastic interplay between letter and equation: a using, a manipulation, a graft, an abacus. What Lacan comes back to again and again here is that the formal language of math(s) is a necessary recourse, from the letter’s side, because language cannot say, or rather *can only say* the end of the world. If *e* < > *d functions* it is because it is ‘what results from language regardless of what we do’ (44). The matheme of extinction states something, maybe even everything, but what it states primarily is that if we remain in language alone without

recourse to a stating of its formal split (the *Spaltung* of the Splinternet), language is unable to see *this* end of the world.

David Fincher's *The Social Network* (2010) allows one to see this 'Lacanian realism of consequences' (Zupančič 2017 81) in active form. Lacan said the matheme was defined by having consequences, like making the July 1969 moonwalk possible (maths = exotopy) (Lacan 1998 93). The example of a mathematical consequence in Fincher's film is Facebook. The mathematization of the Harvard collegiate Facebook (originally 'the Facebook') begins a plastic explosion that has effectively nuclear consequences. The film is itself the film of a process of mathematical knowledge production. If there is a social content to the story it is Zuckerberg blurring the line between *needing you* and *needing the algorithm*. Is the whole film a ritornello of mathematical ressentiment? Does Jesse Eisenberg leave behind Rooney Mara or vice versa? It fails to really matter in the long and short term because numeric ferocity takes over (the internet as a power of cancellation and Facebook as a universal import blocked only by China). The film is effective because from the first scene the main idea is that the social space is already curved *as bias*, without return. The feud over ownership of Zuckerberg's company also fails to matter because Eisenberg is mathematically formalising what is already happening, which is

irreversible social injustice. All of this can be seen in a mathematical formula on the Harvard glass, and in a shouted conversation in a nightclub. In his pyjamas on the street like the ageless child Proust, Eisenberg (the real Zuckerberg) folds down a whole civilization of the book into the 1, which is what Justin Timberlake as Sean Parker indicates when he suggests the removal of the definite article, from *the* Facebook to Facebook.

A few general statements or perhapses may be drawn from what has been written so far:

1. There is something in the very idea of a mathematics of extinction that defies calculation and the statistical, the ‘stat’, the long or short term prediction, from the very start, and yet this fact itself seems to call to the number-power (‘numbers’) and has a suspensive, nomination effect. We saw this in Sextus’ suspension of the mode of definition itself: if extinction may not be defined, then how could any conceivable maths, however modern, begin to train or think it? Once we assume that ‘extinction’ may be generic, plural, universal, and so on, the matter of number either falls away or, precisely, is given to the matheme in a new way that needs to be defined (as in for example Chaplin and Einstein or Keats). However, the uncountabilty of ‘extinction’ does

not and cannot mean it does not and cannot count. On the contrary, since the Pyrrhonist mode is self-suspensive and self-bracketing (Castagnoli 2000), the lack of definition available to ‘extinction’ may also, and may also *have to be*, suspended. Or rather, it itself (this new non-mathematics) self-brackets in the process of thinking what the mathematics of extinction may be. At this point, what Derrida calls the limit inside mathematical infinitization, the limit as given, a definition, a topology, a deadline, a countdown of the days, cuts in: your days are numbered; extinction is (perhaps) real.

2. The mathematization of extinction also opens out to other domains and contains those other domains within a non-mathematical domain or series of subdomains of speculation: a non-mathematics comes online but it is not a non-philosophy of the radical One. Following the work of Adam Frank on what he calls the astrobiology of anthropocenes, we might begin to think about the mathematics of anthropocenes. Frank takes a scientific view of anthropocenes (plural), and proposes that understanding the astrobiology of generic anthropocenes means bridging theories of mathematics, geo-science, evolutionary biology and eco-system theory (Frank 2017). The question of number here is

acutely thought and felt as the question of the number of habitable planets: is Earth a one-off? Is life probability calculation given to number at all, or are we it? Which is to say, perhaps universal life probability already is and will have been us. It is here, with this ‘perhaps’, that we can see the mathematics of extinction, together with the astrobiology of generic anthropocenes, become an intimately Pyrrhonst set of compilation-discourses, an endology of perhaps. One would perhaps have to understand all of these to understand the other.

3. The stakes claimed by a mathematics of extinction are therefore potentially acute: either the Earth is unique in the present, or may be unique in all possible time-spaces (is, will be, has been); or there are countless non-habitable, and super-habitable planets (literally an *astronomical number*); or, perhaps, such knowledge may be precisely unavailable to anthropic experience as such. Frank’s work raises the almost devastating question of priority: if the statistics and mathematics of extinction could somehow be filled in and communicated (and surely more of this is bound to take place as time goes on, for example the explosion in exo-planet science), how would this effect epistemological and lived priorities (Frank and Carroll-Nellenback 2017)?

> When Derrida traced the process of mathematical knowledge production in Husserl, he was perhaps carefully calibrating this as a domain and a demand in advance and under threat: the deconstruction of mathematics and its limit, the deconstruction of astrobiology and its limits, the relations of writing and extinction, the possibility that all of these are complicated by the complexity, whether simple or involute, of number. This is what we are calling mathematical *différance*. In other words, Derrida's work on Husserl was already tracing and testing the way mathematical idealization goes all the way out not just to the cosmos but to the mathematics and potential mathemes of what Frank and Carroll-Nellenback call the 'anthropocene generalized'. We are raising the question of generic and singular extinctions, of the extinction of the One and of the Two: *Auslöschung* as cancellation.

To further understand the consequentialism of the matheme as Lacan sees it we need to go back one more time and see how the matheme functions in his work more broadly and in relation to metalanguage. In Zupančič's psychoanalytic interrogation of the culture of lying and telling the whole truth, 'Lying on the Couch', she touches on Lacan's repeated claim (made perhaps

most famously in the first few lines of *Television*) that the truth is ‘not whole’ (or ‘not all’, *pas-toute*). Zupančič explains that Lacan’s attestation is not based on epistemological limitations or relativism, but rather on the relation between what is said and the language in which it is said, which is to say: the issue of metalanguage. What makes the truth—what Brassier calls the ‘truth of extinction’ (239)—impossible to tell as a whole, as an all, is not so much a missing element that can’t be tracked, but, more paradoxically, the very fact that the truth *can be stated*, and *can be stated exactly and with regard to exact numbers, figures and letters*. It is this excess, the excess of a truth being said in a language that enfolds it, rather than an element that is occluded in the saying of truth, that makes the truth impossible to tell as such, as a whole. What may sound like a quasi-mystical claim in Lacan’s *Encore* (‘Mathematization alone reaches a real’, 131) therefore retains a precise basis in this way language has of blocking the very things which get said in it—they are blocked in and by it precisely because, as it were, they are said in it. Instead of lack of truth as lack of adequatio, what blocks truth even as it is truth is the conflict of something said being at the same time a piece of language *and* the language which does the saying itself. Zupančič quotes Miller to this effect in the introduction to *Television* talking about ‘The Notion of Truth in Formalized Languages’ and how Tarski

demonstrates therein that truth is undefinable within the language one speaks. To define it, one must step outside of that language, as is done in formalized languages which are numbered and hierarchized; at the n+ 1 level, you establish the η-level truth; this uncoupling of levels, termed ‘metalanguage’ by Carnap, cannot be carried out in the case of the language we speak, for it is not formalized. And that is the meaning of Lacan's aphorism that there is no such thing as a metalanguage [. . .] (xxii)

We can now see that the turn to the matheme in Lacan, which according to our reading is also a turn to the matheme of and at the end of the world, is necessitated by the conflict of faculties within language of the saying and the said. To state, for example, ‘we are going extinct’, may be an absolute truth, the truth of extinction, but the very fact that we say so within a language that refuses to formalise itself, means that this truth of extinction conflicts with itself. No sooner is it said than it is ignored. No sooner said than gone. And yet Miller’s suggestion here is badly reminiscent of what Sextus warned us about at the start of the essay: definition. ‘To define it, one must step outside of that language, as is done in formalized languages . . .’ To define extinction, one must go to the matheme, and yet that still leaves intact the matter of definition itself—which Sextus makes

it Pyrrhonstically impossible to not leave well alone. Perhaps what Lacan says is slightly different, and absolutely paradoxical. Since the truth (for example of extinction) *can be* defined, it *must be* defined: and this is perhaps a way, or the only way, of having done with it. Leaving it alone means stating it (Lacan 1991 141). The truth of extinction may be mathematicised as *e* < > *d* and this itself may be a statement about the quandary of metalanguage which is the aporia of the matheme's use of the letter (what Lacan calls a formalization of the impasse of formalization), but this does not stop anything happening: it does not stop the saying of the truth of extinction from happening, it does not stop the matheme from being written, and it cannot stop extinction itself from happening (if it does and if there is one or two or three . . .). If the truth of extinction is to be counted as a mathematical truth, it is perhaps because it is the only thing that counts. If the truth of extinction is tantamount to a movement of chaste jouissance, it is because nothing can speak it, no one sex can unstate the matheme's distinction—that *e* is not *d*. And if the matheme of the end of the world is chaste it is because it refuses generation, like a Sofia Copolla film.[7] Lacan

[7] Apart from Trip and Lux making love on the football field in *Virgin Suicides* (1999) and a castrated Colin Farrell copulating with Kirsten Dunst in *The Beguiled* (2017), there is (let us

ends *Encore* by talking about love, rats, and the word ‘encore’ itself. I have never known, he says, if I will see you next year, we have never known if we will still be here. ‘Why not stop the *encore* now?’ (146) It is here at the end that there are not just letters or numbers, but animals, rats, and the signifying swarm (*essaim*), the strangeness of absolutely non-angelic matter, and what Cixous in *Twists and Turns in the Heart’s Antarctic* will call ‘mathematical animal objects’ (108)—but that demands another story, a supernumerary computation to come.

If definitions are undecidable, as Sextus said many centuries ago, then perhaps number and count hardly move the stave at all; and yet perhaps, in that case, at the same time, the beads go all the other way: perhaps definitions are given, and there is now only one X that truly counts.

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suppose this as a matheme to be tested) never any sex in Sofia Coppola films.

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