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6. J.-A. Miller, *Lacanian Orientation 1, 2, 3, 4*, Course of 22 May 1985, Departement de psychanalyse.
7. J. Lacan, *La méprise du sujet supposé savoir* in *Scilicet* No 1, op.cit., p.32.
8. J. Lacan, *Seminar XI, The Four Fundamental Concepts of Psychoanalysis*, Trans. A. Sheridan, The Hogarth Press, 1977, pp. 29-30.
9. *Ibid.*, p. 28.
10. B. Spinoza, *Ethique, Oeuvres*, 4 vol., Paris, Barnier, 1964-66, *Tome III*, p.252.
11. J. Lacan, *Le Séminaire XVII, L'Envers de la psychanalyse*, Paris, Seuil, 1991, p. 93.
12. J. Lacan, *La science et la vérité* in *Ecrits*, Paris, Seuil, 1966, pp.869-870.
13. J. Lacan, *Function and Field of Speech and Language* in *Ecrits: A Selection*, trans. A. Sheridan, p.55.

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CANTOR WITH LACAN (I)

Nathalie Charraud

With Lacan Cantor's entire enterprise finds a new validation in a perspective that he was not without having some presentiment of as he turned to Theology, Philosophy or Physics.¹ For what he constantly testified to was that the new knowledge that he had elaborated concerned a real. But which one?

This is where Lacan and Cantor converge. If the theory of infinite sets never interested physicists or biologists, as Cantor would have wished, Lacan, by contrast, saw in it a conjunction with his own attempts at formalisation. What Cantor was searching for converges with a point of Lacanian doctrine which can be summed up as follows: Logic and Mathematics are the only means with which we can apprehend the real of structure, including the structure of the subject with which psychoanalysis is concerned.² From this we can understand the growing importance attributed to Mathematics by Lacan in the course of his teaching.

After game theory and some elementary algebraic structures, it is first upon the topology of surfaces, then, in the last years, on the theory of knots, that Lacan attempted to found a theory of the subject.

It is during his 'topological' period (1961-1973) that Lacan makes Cantor a privileged interlocutor. Cantor's mathematics cannot be reduced to the function of providing models for formalisation. Through the real of the structure with which they are concerned, they allow the tie between truth and structure to be displaced into psychoanalysis and tightened.

The structure's vein

Cantor's decision to debate with theologians gives us a nice example of the blindness of the Master seduced by the scientist, for what was at stake was nothing less than the place of God. His interlocutors, high-ranking officials in the Vatican hierarchy, finally gave in without having perceived in which slippery terrain the new theory of the transfinite could drag

them: that, pushed back beyond the transfinites, the place of God becomes inconsistent.³ We will see that it is impossible, following Lacan's logic, to situate the Name-of-The-Father at that place.

Cantor developed his question about the One of the set with philosophers. It is the very question that Lacan took up during his 1971-1972 Seminar, hammering away the formula *Y a d'Un* while stressing its crucial importance for psychoanalysis.⁴

After all, what is there of the real behind our idea of the continuum, behind the paradox of the geometric conception of the point — that great enigma which agitated Cantor all his life — the effects of which we find in the dialectic between desire and *jouissance* as developed by Lacan in 1972-73.⁵

The place of the Name-of-The-Father (unsettled by the discovery of the transfinites), the status of the One and the being of the subject, the dialectic between desire and *jouissance* (linked to the continuum), the accessibility — or not — of a limit — here is the real touched by the Cantorian advances, the real that Cantor himself was unable to elucidate. Although that real is relevant to numerous contemporary discourses, it is via the method internal to psychoanalytic discourse that Lacan took up these questions and elicited the rapport that exists between the truth of the subject and the mathematical structure, to the point of assimilating the Cantorian breakthrough to a new *cogito*.

Hence, not only is the work of Cantor suggestive for psychoanalysts but it also follows the vein of a structure from which we will try to extract the main elements.

Transfinite and repetition

The quantic formulae are very powerful means with which to explain the overall phenomena of the psychoanalytic experience in which phallic signification is everywhere present but equally so the not-all. The latter concerns subjects beyond the question of their sex, just as phallic signification and the Name-of-The-Father govern signification to both sexes. From what we have been able to extract from the structure of the transfinites, it seems expedient to use them as mathemes where 'not-all' appears.⁶

In this way Lacan identifies the fundamental structure of repetition in the succession of ordinals, in the impossibility of a natural end point,

either through a limit or an encompassment.⁷ On the one hand there is indefinite repetition, for a man, in his attempt to exhaust the feminine not-all; and on the other, the repetition of the demand — severed from the need or a precise desire — which becomes an unconditional demand for love that has no natural end point, but rather turns around a nothingness.⁸

To illustrate the necessary repetition *vis-à-vis* the feminine not-all, let us confront the opacity of the following sentence from *L'Étourdit*: "the support of the two to make them two that this not-all seems to give to us is an illusion. But the repetition which, in sum, is the transfinite, shows that it is a question of an inaccessible from which, the enumerable being sure, the reduction becomes so also".⁹

After having delineated the 'men' side of the sexuation formulae and made the difference with the not-all of the 'women' side, Lacan puts us on guard against the illusion that this would make two, that there would be a One [*un Un*], the dream of love that would unite those two. Indeed to attain that not-all of the feminine Other, one needs the transfinite of repetition — which shows that this two is itself inaccessible.¹⁰

As regards the unavoidable reduction grounded on the fact that, as speaking beings, we are of the order of the enumerable and even of the finite, Lacan's effort was to direct this reduction in such a way that it would conceal the structure as little as possible. Man's symptoms, mixture of clumsiness and 'nice little touches' to fend off the feminine not-all, are as many examples of reductions that one can point to in experience and these are evoked by Lacan in order to oppose them with "the logic which reveals itself in them, and into which my pretension is to break him in".¹¹

Let's follow Lacan in the direction of such a logic which has the ambition to touch upon another rock than that of castration: the real of the structure.

"Why would this real not be the number — bare and raw after all — that language carries anyway?"¹²

We draw a double lesson from that real so cast in mathematics, in numbers in particular. Besides the inaccessibility of the two which, in this way, founds the sexual non-rapport, the repetition of the demand finds its

source in the fact that since Cantor the enumerable takes us to the transfinite, hence to the inaccessible:

"Hence what is uttered through Cantor's saying is that the suite of numbers represents nothing other in the transfinite than the inaccessibility which starts with two, through which the enumerable is constituted at infinity".¹³

The correct reduction — that which, revealing the structure, could also give cause to hope for its modification in the analytical experience — cannot be satisfied with numbers as they always bring us back inexorably towards the infinite. This is why Lacan turned to topology; and it is on the basis of closed and limited topological surfaces¹⁴ — elaborated throughout a dozen years — that he will situate repetition and, therefore, what presents itself as transfinite.

We will only focus on the surface of the torus (which, to give an idea, has the form of an inner tube), as the other topological constructions do not directly concern the repetition of demand:

"A torus, as I showed ten years ago to people trying to lock me in with their own contraband, is the structure of neurosis in so far as desire can, through the indefinitely enumerable repetition of demand, close itself in two loops".¹⁵

Let's pose as an axiom that the aim of the operation is to transform the torus — structure of neurosis — into a Möbius strip — structure of the subject — by means of a closed cut. A cut is defined by the number of rounds made around the central axis of the torus — called rounds of desire — and by the number of rounds around the internal circular axis — called rounds of demand. From a strictly topological point of view one round of demand and two of desire suffice to obtain a Möbius strip; the number of rounds of demand can be bigger but has to be an odd number in order to obtain a strip with only one edge and one single side (i.e. a Möbius strip with more than one torsion).

The fact that one round of demand can suffice — providing it uncoils on two rounds of desire — brings us to the crux of the matter in that, clinically speaking, 'one round' of demand does not exist; on the contrary, demand is characterised by its enumerability and by the fact that it never closes itself in one go. The passage from the torus to the Möbius

strip therefore gets complicated by the transfinite of the demand that has to be combined with the double round of desire — which has no reason to multiply itself as its fixity is marked by the central hole: "But if, as our first figuration of the cut that transforms a torus into a Möbius strip ensures, one demand suffices, a demand that, being enumerable, can repeat itself, then, one might equally say that the demand only gets combined with the double round on which the strip is founded, by grounding itself upon the (Cantorian) transfinite".¹⁶

Until then the inaccessible resolution of the demand was conjugated with the 'quantitative' feature of the transfinite. The demand is also 'transfinite' because its not-all does not only apply to this a-priori unachievable repetition but also to each particular demand. Each of them is marked by the not-all because the round of demand does not exist, does not close individually on itself: repetition is never repetition of the identical — hence each of its occurrences is coined transfinitely. Consequently 'one' round of the demand does not exist as a countable unit: "I insist: the round in itself is not countable; being repetitive it does not close anything, it is neither spoken nor to be said i.e. without proposition".¹⁷

Hence, the demand, 'transfinite' in its repetition from the beginning, is therefore clearly qualitatively transfinite. That is the drive(n) dimension of the demand, outside the signifier ('without proposition'). If one wants to 'count' the rounds of the demand despite the existence of the individual round, it is 'required' that the transfinite and this one be odd (which is permitted by the transfinite arithmetic):

"Nevertheless the strip can only be constituted if the rounds of demand amount to an odd number. The transfinite remains exigible because nothing can be counted in the transfinite, as we have put it, without the cut closing up; and the transfinite of what is said [*le dit transfini*] is summoned, like God himself (whom we know to be quite happy with it), to be odd".¹⁸

The question of the end of analysis as it is approached in this excerpt from *L'Étourdit*, rests on the accessibility or not of the closure of the cut. That an odd transfinite, written $2a+1$, be 'accessible' gives an idea of a certain direction to the end of analysis via the mastery of the last

round of the demand that closes the cut to transform the torus into a ribbon. This last round is crucial for the ribbon to be Moebian; it is this last round — conjugated to the two rounds of desire regulated by interpretation, which allows the closure of a conclusion: the realization of the subject in its division — but with the plasticity of knowing that the verso is in Moebian continuity with the recto.²⁰

The continuum and jouissance

The year that saw the publication of *L'Étourdit* is also that of Seminar *Encore* (1973) where Lacan spoke about love and *jouissance*. The latter ever since Lacan took it into consideration in 1960, is characterised by its 'infinite'.²¹ One could therefore expect that, in one way or another, the transfinities that Lacan had at hand — as shown in *L'Étourdit* — would find their role in that seminar to approach *jouissance*. And even more so as we stressed the 'not-all' aspect appearing in the 'naïve' theory of the transfinities which could therefore answer the not-all of feminine *jouissance*. The fact that it is not the case poses the question of knowing why Lacan refused himself what was however seductive to the imagination: an analogy between the transfinities and feminine *jouissance*.

This analogy could not go as far as a correspondence between the 'transfinities' which are inconsistent as a whole, and therefore inexistent as a set, and feminine *jouissance* which, on the contrary, exists with the status of a substance. As a matter of fact, although the choice for the path of mathemes and topology is rather opposed to the propensity to ontology characteristic in Philosophy, Lacan will, first, pose the notion of *jouissance*-substance in order to talk about *jouissance*. The concept of substance seems necessary to pass to a *matheme* afterwards.²²

This is how the *jouissance*-substance of the body comes to complete the thinking substance [*substance pensante*] and the extended substance [*substance étendue*] of Descartes. The first, like the latter two, will be able in a second step to free itself from ontology in order to be written in a *matheme*. Thinking substance has been profoundly modified by psychoanalysis while extended substance corresponds to the mathematised space of Physics.²³

As far as *jouissance*-substance is concerned, Lacan delineated its space in the first session of *Seminar XX*, talking about the space of *jouissance* before a no doubt dumbfounded audience. He defined this space as a closed and limited part of real space, i.e. as a compact space. Compactness is a property which allows an (enumerable) infinite to be reduced to a finite: if the compact space is covered by an infinite number of open sets, it is possible to extract a finite sub-coverage from it. Women being 'not-all',²⁴ an infinity would be needed for a man to cover the space of his *jouissance*. But if a finite number can be extracted from it, then it becomes possible for women to be counted one by one..., thus founding the myth of don Juan!²⁵

Thus relations between infinite and finite, accessible and inaccessible, open and closed sets are at the heart of the question of *jouissance* from the very beginning and display a 'convergence' between topology and analysis.²⁶

The topology which is convergent with the analytic experience is that of the continuum — which had been an enigma for Cantor throughout his life. Cantor's work delineated the local structure of the continuum linked to the notion of limit on the one hand, and the problem of the cardinality of its totality on the other.²⁷

Phallic *jouissance* (masculine and feminine) is hooked to the local structure of the continuum while the other *jouissance*, more specifically feminine, turns to the undecidable question of its globality.

The structure of the continuum at a local level is equivalent to the principle of the encased segments (which is nothing other than the extrapolation at infinity of the encasement of the Russian dolls).²⁸ This principle affirms that this encasement converges to a point at infinity. This point is called 'a' by Lacan; it is the point of focalisation of phallic *jouissance*, the point of inaccessibility of Zeno's paradox. Because of its infinitude, *jouissance* is a failure both for men and women in the sexual rapport:

"...what Zeno hadn't seen is that the tortoise does not escape the destiny that weighs on Achilles — its steps too gets shorter and shorter and it never arrives at the limit either. It is on that basis that a number, any number whatsoever, can be defined, if it is real. A number has a limit and it is to that extend that it is infinite. It is quite clear that Achilles can only pass the

tortoise — he cannot catch up with it. He only catches up with it at infinity”.²⁹

Let's attempt to grasp the fatality of this failure more precisely. Freud says it resorts to the physiological order. It is the pleasure principle — as the guardian of life — which stops *jouissance* totally accomplishing its mortal demand — to the point where *jouissance* would no longer exist, having lost the support of the living body. *Jouissance* — because of the logical impossibility of its accomplishment implied by the death drive — represents a real in which psychoanalysis is interested. As a real, *jouissance* can become matheme. As inaccessible, *jouissance* is concerned by the matheme of the infinite in its most complete representation i.e. that of the continuum.

What is it in the object of desire that makes the subject vacillate? It is, says Alcibiades, something like the *agalma*, a small box in the shape of a silenus containing other puny objects, encased as Russian dolls. For Alcibiades, Socrates represents the *agalma*, and as object of desire³⁰ he is that nothing that is enclosed in the last Russian doll encased to a finite number.³¹

Phallic *jouissance* is therefore both positivised as regards that desire which is desire for nothing, and postponed to the infinite because of its logical impossibility. The compact space of phallic *jouissance*, closed and limited part, could be represented by that last silenus where the encasement of the *agalmata* seems to end.

But *jouissance*, because of its infinitude, implies the extrapolation of the encasements and the limit of the point 'a'. When Lacan says that *jouissance* is a limit he says that this 'a' is present in the part that man enjoys [*jouir*] in the body of the Other — *jouissance* of an object which is always partial, in a Sadian notation.³²

The object *a* (not to be confounded with point 'a') is the object that the subject enjoys [*jouir*] in the body of the Other.³³ It also encapsulates the point 'a', limit point, point 'at infinity' on which phallic *jouissance* is focalised.

The Other *jouissance*

The structure of the continuum not locally this time, but in its spatial globality, introduces us to the other way to enjoy [*jouir* of] the Other. To keep the image of the Russian dolls, that continuous space would correspond to a

space of *jouissance* obtained this time through an encasement of Russian dolls the other way round i.e. that of the indefinite amplification without limit. The *jouissance* linked to it is what that Lacan called not-all, the supplementary *jouissance* that a woman feels without knowing it. She does not know anything about it as she cannot say anything about it apart from the fact that she feels it.³⁴ As a speaking being she accesses — as a man — phallic *jouissance* but her *jouissance* is not all phallic.

The space that represents that not-all of *jouissance* is an open space (not necessarily infinite) and therefore not compact as opposed to phallic *jouissance*. It is not-all insofar as it does not contain limits. That makes it fundamentally different from Cantor's representation of the transfinite as he progressed precisely by the successive addition of limits that allowed him to pass beyond them each time. Indeed we know that Cantor did not stop at the continuum as his construction progressed. By means of limiting successively classes of ordinals Cantor intended to attain ever greater ordinals. He did not thereby encounter a problem of undecidability (as he did regarding the place of the continuum in the suite of the ordinals) but of inconsistency — with the paradox of the biggest transfinite.³⁵

Lacan did not follow Cantor's construction whereby the latter was convinced that the continuum took the second position in the series of cardinals ($c=2^1$, hypothesis of the continuum): since Cohen (1963) we know that the continuum could just as validly be supposed to be — in an appropriate axiomatic — the biggest of the transfinite.

Analytic experience shows that it is the fantasy that limits, that bounds *jouissance*. Thus the absence of a limit to feminine *jouissance* is perceived from the point of view of masculine fantasy, as a lack that the fantasy could suture with the object 'a'. In fact the not-all *jouissance* of the woman does not lean on the fantasy as phallic *jouissance* does, but refers to the fundamental incompleteness of the Other as treasure of the signifier. Lacan writes this incompleteness $S(A)$, signifier of the lack in the Other, which entails that whenever there is a question of a guarantee of truth or a closure of signification, the not-all is at the heart of the symbolic. Feminine *jouissance* is that *jouissance* which could only be fulfilled by this limit, by an Other of the Other — and is as such always a suspended

jouissance. The *jouissance* of a woman (in that sense that “The woman does not exist” as Lacan maintains), is that which would fulfill the Other, or at least that is what gives the idea of its completeness. Mystical *jouissance en rapport* with God.³⁶

That there would be a *jouissance* of the Other, ensured, beyond S(A), by an Other of the Other which would guarantee its consistency is the belief that Cantor repeatedly demonstrates whenever he adds a limit to what is not-all. Each breakthrough that he made bore witness to this will to plug holes by completing them with limits, only to pass beyond them again. This is probably the reason why Lacan did not value the inconsistency of the ordinals as not-all — in the sense of the not-all of the Other: S(A) cannot be situated in a place that pretends to have passed it for it represents an incompleteness which is structurally impossible to go beyond!

The question of the One

Despite Frege's exhortations Cantor did not situate the question of the set's unity from the point of view of the logic of his time. His concern was rather philosophical, Plato and Aristotle being his interlocutors. It seems that Cantor adopted at the same time two philosophical positions which were rivals in the Antiquity: that of the One of totality as stated by the Eleatics and the distributive unity proper to each individuals as taught by Aristotle. Consequently Cantor linked the explanation of the One of the set to the Aristotelian idea of organism (i.e. the unity of the body), and, at the same time, authorized himself to speak of the set of all ordinals which is equivalent to the whole universe since for him transfinite numbers covered all things that exist.

The idea of the one of the organism is linked to the unity of the body and founds the One on the body. Lacan distanced himself from this: the One of the signifier precedes the One of the body according to Lacan. François Regnault deduced from this that the doctrine of the number is subordinated to that of the signifier: “It seems that the doctrine of the signifier via its formula *Y a d'Un*, goes as far as possible in the assumption of the preceding difficulties. That it situates itself at the point from which it can get them all”³⁷

François Regnault shows that the doctrine of the signifier objects to both the dogmatism of ‘only the One is’ and to the positivism of a stratified distribution of types of ones.

The dogmatism of the One of the whole is refuted by the fact that there is, for Lacan, no metalanguage, or that there is no Other of the Other. Consequently the Whole cannot make One, having no external point to designate it. This Lacan writes S(A): the Other cannot be globalised, or ‘the Other does not exist’ (in the same sense that “the Woman does not exist”).

The second point (the positivism of a stratified distribution of the ones) does not hold because it is opposed to the fact that the only primary unity is that of the signifier and that each signifier is one amongst others. There is no possible hierarchy or stratification amongst signifiers as was the case in the scholastics between gender and species.

We can see that the first point drags outside of language the Zermelo-Fraenkel axiomatic which subsumes set theory into a formal language in which a totality of language is given. The second point refutes the solution given by Russell's theory of types.

If the signifier unifies the body, we also know that it makes it a fragmented body as well, as proven by the hysterical symptoms. The unity of the body leans on three sides. As thinking substance on the signifier, as extended substance on the mirror image, and also as *jouissance*-substance. Since Schreber we know that the unity of the body also depends on the way that a subject gathers itself around a *jouissance*. Phallic *jouissance* as centered on the point as limit, or feminine *jouissance* sent back to an inaccessible infinite, that of the not-all. The signifier One as signifier of the unity of the body and signifier of *jouissance*, is the signifier of a problematic existence, an existence extracted from inexistence, which escapes existence unless it is caught by a letter, by a symbol.

This is why Frege's elaboration of the construction of natural numbers was of interest to Lacan the year of his Seminar during which he repeated *Y a d'Un*. Frege attributed the symbol zero to what does not exist, and defined the number One from there.³⁹ Lacan commented upon this construction, saying that the signifier One is the signifier of inexistence.⁴⁰ It is the signifier of the *jouissance* of the Other — if that

jouissance existed — which founds the number One (and the ones of repetition at the same time).

So, Cantor continued to follow the veins of the structure; after the construction of real numbers, after having demonstrated the distinction between the two infinities (enumerable and continuous) and after having elaborated the transfinite numbers theory, Cantor stopped and wondered how a set — even a finite set — holds together, how it makes One. That old question of existence and unity: Lacan thought it could only be resolved through logic and writing.

The signifier One is the signifier of *jouissance*. For the subject it is a signifier, one amongst others, which will represent him/her as an organism; and it is this signifier, noted S_1 by Lacan, which will be at the origine of the way that signifiers come to affect the body. As master signifier in the subject's destiny it is a signifier to be handled with precaution⁴¹: for Cantor that signifier was *Erfolg*, the success that his father, in an unbridled ambition, expected his son to fulfill. Each time this success was close to becoming a reality, Cantor went to pieces. He was pinned down by that signifier without being able to be represented to another signifier. S_1 is the signifier of the One alone, detached from the signifying chain and banner of the subject's unity. It is totally remarkable that after his first depression, the question that Cantor formulated and was preoccupied by precisely concerned this unity. This question permitted him to avoid for ten years a new encounter with his own S_1 which imposed itself as an unbearable real because, due to his psychotic structure, it was not registered as a semblance.

By contrast, a neurotic subject even if s/he isolates a master signifier through the analytic journey in a moment of 'pass', will not perceive it as a real but as a semblance — the reason why this isolation can be liberating. This moment of encounter with a signifier, S_1 , which separates the subject from the signifying chain, was compared by Lacan to the experience of the Cartesian *cogito* in which all acquired knowledge is suspended.⁴² From this point on, accumulated subjective significations can be unburdened and a new knowledge can elaborate itself.

Cantor's experience is not an example of an analytic 'pass'. The temporality was even reversed regarding the *cogito*, as the symbolic

breakthrough was ensued by the triggering of his psychosis; the Cartesian methodic doubt — which confronts the paranoiac moment of a misleading 'evil genius' — precedes the moment of the *cogito*, the moment of separation which opens onto a new knowledge (in the seminal case of Descartes, that of modern science which freed itself from the weight of scholastic knowledge).

Nevertheless, the discovery of the transfinites in its simplicity and its obviousness, is taken by Lacan as an example of a knowledge which seemed to wait in the real, a knowledge not yet known which takes consistency thank to the tenacity of a desire.⁴³ This is why when Lacan prepared the procedure of the pass — which offers to the analysand who has become analyst, to testify of his/her moment of breakthrough — for his School, he takes the example of Cantor to show that a truthful crossing comes with an invention of knowledge without which the crossing-of-the-fantasy will be short lived if not ephemeral, and without real consequences.⁴⁴

Translated by Vincent Dachy and Philip Dravers

1. N. Charraud,., *Infini et Inconscient. Essai sur Georg Cantor*, Paris, Anthropos, 1994.
2. See for example, J. Lacan, *Seminar XX, Encore*, trans. B. Fink, Norton, 1998, p. 131.
3. The set of all transfinites is actually an inconsistent set: if Ω designates its ordinal, $\Omega+1$ would be a bigger ordinal — which is contradictory with the fact that Ω would be the biggest ordinal.
4. J. Lacan, *Le Séminaire XIX, ...Ou pire*, (1971-1972), unpublished.
5. J. Lacan, *Seminar XX, op.cit.*
6. N. Charraud, *Paradoxes, La Cause Freudienne* No 21, Paris, Navarin-Seuil, 1992.
7. J. Lacan, *L'Étourdit, Scilicet* No 4, Paris, Seuil, 1973, p.24: "repetition which is in sum the transfinite".
8. J. Lacan, *Le Séminaire VIII, Le Transfert*, Paris, Seuil, 1991, p.414.
9. J. Lacan, *L'Étourdit, op.cit.*, p.24.

10. The inaccessibility of 2 is again verified if we refer to a definition given by Gödel, by which we verify that 2 is the only finite number with 1 to be inaccessible. Lacan recalled this definition by Gödel in the session of the 10th May of the Seminar ...*Ou pire*: a number is accessible if it can be written as a sum of numbers smaller than itself and the number of numbers needed in this sum must be smaller than itself. See K. Gödel, *Sur la nature du problème du continu* (1947), J. Largeaut, *Intuitionisme et théorie de la démonstration*, Paris, Vrin, 1992, pp.525-526.
11. J. Lacan, *op.cit.*, p.25.
12. *Ibid.*, p.34.
13. *Ibid.*
14. Closed and limited surfaces are compact, a property which also allows the reduction of the infinite to the finite, a property that Lacan exploited, as we will see soon below, to found the myth of don Juan.
15. J. Lacan, *op.cit.*, p.42.
16. *Ibid.*, p.43.
17. *Ibid.*
18. *Ibid.*
19. Accessible as explained in the above note 10.
20. J. Lacan, *op.cit.*, p.44.
21. J. Lacan, *Subversion of the Subject and the Dialectic of Desire in the Freudian unconscious* in *Ecrits: A Selection*, trans. A. Sheridan, Routledge, 1977), p.319.
22. J. Lacan, *Seminar XX, op.cit.*, p.24.
23. *Ibid.*
24. Which can be transcribed from a topological point of view, by the fact that they will be represented by open subsets (of the space of *jouissance*) i.e. those which do not contain their border.
25. J. Lacan, *Seminar XX, op.cit.*, p.10.
26. *Ibid.*, p.11.
27. The 'hypothesis of the continuum' supposes that this cardinality is the second transfinite (aleph 1). In 1963 P.-J. Cohen demonstrated that this proposition is undecidable.
28. The principle of encased segments: if $[a_n, b_n]$, $n \in \mathbb{N}$, is a suite of encased segments, their intersection is not empty. Or, as well, suites of the type (a_n) or (b_n) are convergent and have an assignable limit.
29. J. Lacan, *Seminar XX, op.cit.*, p.8.
30. J. Lacan, *Le Séminaire VIII, op.cit.*, p.51.

31. That nothing(ness) where the signifier of the phallus is located - signifier of desire as signifier of the lack.
32. J. Lacan, *Seminar XX, op.cit.*, p.23.
33. It contains the negativised presence of the phallus ($-\phi$) which makes it enter the series of objects of transaction of desire.
34. J. Lacan, *Seminar XX, op.cit.*, p.74.
35. See footnote 3.
36. J. Lacan, *Seminar XX, op.cit.*, p.82-3.
37. *Ibid.*, p.142-3.
38. F. Regnault, *Dieu est inconscient*, Paris, Navarin, 1985, p.116.
39. G. Frege, *Les fondements de l'arithmétique*, Paris, Seuil, 1969, p.209: "1 is the cardinal number which belongs to the concept "identical to zero"".
40. J. Lacan, *Le Séminaire XIX, ...Ou pire*, (1971-1972), unpublished, lesson of 19th January 1972.
41. J. Lacan, *Seminar XX, op.cit.*, p.143. To simplify we talk of a S_1 alone; Lacan talks about a swarm ('essaim') of S_1 . But each S_1 is 'one alone' in so far as it is not possible to articulate one to the others — which makes its specificity.
42. J. Lacan, *Seminar XI, Four Fundamental Concepts of Psychoanalysis*, trans. A. Sheridan, London, Penguin, 1977, p.44.
43. J. Lacan, *Proposition du 9 octobre 1967 sur le psychanalyste de l'école* in *Scilicet* No 1, Paris, Seuil, 1968, p.21.
44. This demand will be even more heavily affirmed in the *Note italienne*, 1973, *Ornicar?* No 25, Paris, Lyse, 1982, pp.7-10.

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