SOMETHING COMES FROM NOTHING : POTENTIALITIES/PERSPECTIVES OFFERED/PROMISED BY THE DISTINCTION BETWEEN A RELATIVE AND AN ABSOLUTE "NOTHINGS"

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Abstract

In the literature, we don't really find a sophisticated positive use of the "nothing". "Nothing comes from nothing" is a key expression of western philosophy, one of the contributions of the greek philosopher Parmenides. From there, "nothing" is quasi systematically assimilated to nothingness and consequently conceived as "absolute".

The purpose of this article is to highlight some constructive uses of the "nothing": this becomes possible thanks to the distinction between an absolute and a relative nothing.

The absolute nothing will be defined as what the relative nothing tends to. The definition of the relative nothing is the main purpose of this paper. For clarity, let us precise that the word "nothing" alone is to be understood as relative nothing, and the word "nothingness" as absolute nothing.

We will start from the analysis of "nothing" conceived as cuts in languages: cuts in natural language, cuts in musical language. After that, we will show a way to build the empty set from nothing in set theory. Using a relative nothing will make clear the difference between the empty set and the void, and between the empty set and an ur-element. We will see that, on a conceptual level, taking into account a relative nothing distinct from the empty set makes it possible to redefine the concept of set and to give the empty set a positive definition and a status of emblematic set. The last section will be devoted to the use of nothing in metaphysics. We will start from the Table of Nothing of Kant and will show similarities and differences with our use of nothing. Finally, we will analyze relations between nothing, nothingness and being.

Keywords: cut, void, potential, pre-element, pseudo-object, condition of possibility, empty set, ur-element, relative nothing, absolute nothing, nothingness.

1 Nothing in Linguistics

1.1 Cuts as conditions of possibility of a language

a

[a]Short history of the genesis of the idea of the use of nothing

The initial questioning, in a mathematical context, was: does a hierarchy of empty sets exist, in the same way that a hierarchy of infinite sets was highlighted by Cantor thanks to the definition of equipotence? The answer seems to be yes, thanks to the introduction, in set theory, of a predicate of potentiality that allows to build a relation of potential membership.[b] This will be the object of another article.
Anyway, potential membership implies potential, and it appeared that this potential could be identified with a void, a relative void different from the empty set and symbolized by the

The definition of a natural language consists in a vocabulary, a syntax and a semantics. Of course, this definition applies to formal languages too. We will consider this special case later. As to now, let us note that the basic constituent of a language is its alphabet. An alphabet consists in letters, sounds or symbols. But there is maybe something more fundamental than letters, sounds or symbols. We cannot have different symbols without *cuts*. Cuts are abstract separators. With respect to the language, the alphabet is constituted not only of letters, but also of (abstract) cuts which make it possible to have at least two different letters. Indeed, the letters a and b, for example, are different from each other thanks to the cut, the separator, that allows to create and to distinguish these two different letters; and each of these letters is different from the cut! Let us precise that it is question here of "external" cuts: letters can be considered as atoms, they do not contain anything. In addition, the cut as separation between letters can be assimilated to an interval. Cuts constitute a condition of possibility of a unique letter too! It is the opportunity to precise the notion of external cut by making the distinction between interval and limits. An element only, in the state of affairs, a letter, has proper limits. Proper limits consists in "initial" and "final" cuts. If the final cut is the condition to avoid that the pronunciation of a sequence of sound to stop, the initial cut is the condition to make possible to begin the pronunciation.
We see that we consider cuts from another perspective here, cuts can be seen as what makes it possible for a letter to be expressed in a finite time. Thus we can consider cuts in a temporal context too.
Intervals have no proper limits. An interval is determined by the final cut of an element and the initial cut of the following element.
The notion of cut as interval is interesting because it can be assimilated to a potentiality for a third element to occupy this interval. The interval has a dimension.

Cuts play a role at any scale of the language: they are separators of syllabs, words, phrases, chapters... but we will not develop this in here.

To conclude this chapter, let us add that, by contrast with the elements of a language, a cut is "nothing", at least nothing standard. But it is what makes it possible for standard elements to appear. So, in the course of this paper, we will assimilate cuts to a "relative" nothing. In other words, cuts are the form that the relative nothing takes in the contexts here considered.

1.2 Cuts in musical language

Music is an interesting field where we can find a use similar to that of cuts described above and where initial and final functions of cuts are obvious. Indeed, a note, main element of the alphabet of the musical language, has a temporal value. So, the use of cuts as limits is indispensable. There is a beginning and an end to the note. But there is more. As limits, cuts does not necessarily have a

Greek letter Lambda in capital form, Λ.
For our purpose, it appeared that Λ could be identified with a cut and could constitute a condition of possibility of sets. In a more fundamental way, cuts can also constitute a condition of possibility of the formal language in which set theory is developed, and in general of any language. Finally, cuts can reveal very useful in a metaphysical context.

temporal dimension even if it can function in a temporal context as seen in the previous chapter. Now, it is obvious that cuts, as intervals, have similarities with "rests". Really, rests are cuts with temporal value/dimension. And intervals can be assigned arbitrary lenght! So, in music, cuts become manifest through their temporal nature.
As intervals, cuts induce the notion of potentiality. Indeed, an interval can be filled with a note, or with a letter in the case of natural languages.
Now, rests are not necessary to get intervals. As abstract separations, intervals, in a temporal context, can be conceived as the end of a note to the beginning of the following note.
The use of nothing as potential will play a fundamental role in the theory studied in the following chapter.

2 Nothing in Mathematics

2.1 Cuts as condition of possibility of sets

This is where we will see that cuts play a fundamental role in contexts larger than language building. Indeed, cuts prove essential in set theory as separators between elements of the theory, i.e. sets, and as constituents of sets. Even if abstract, cuts have a more concrete aspect in set theory than in language, with the exception of musical language. Indeed, in set theory, cuts can be assimilated to a *void*. It is the opportuniy to add a specification of cuts. Up to now, cuts play the role of external condition only, as limits and as intervals. In set theory, they play the role of internal condition too. This is because sets are not atoms, while letters and notes are: they do not contain anything. A set contains or may contain something. On the other hand, in set theory, the temporal nature of cuts is sleeping.

2.2 Cut as Void

So, we can assimilate cuts to a void. The void, in the sense of a vacant space, is a pre-element and constitutes the only non-element of set theory defined in this article. In a set theory with a non-empty universe, the void, as we will see in the next chapter, represents a condition of possibility of the elements of the theory.
A word on the use of the term "void". In French, the same word *vide* is used for the various English terms "emptiness", "vacuum" and "void". It is extremely difficult to give privilege to one of these different acceptations. Intuitively, "emptiness" would seem to be the more appropriate term for a set theory concept, but it is too empty, too abstract : one cannot say that one fills in an emptiness; but this concept will reveal useful for qualifying a pre-truth value; "vacuum" contains very interesting properties like potentiality and the idea of a vacant space that one can fill in, it also highlights the fact that we are dealing with a kind of abstract physics, but it is too concrete, too specifically physically connoted; "void" is closer to what we mean by "vide" : vacant space that one can fill in, it contains the idea of potentiality with the best compromise between abstract and concrete (in a mereological sense) aspects of the relative nothing.

2.2.1 Axiom of the Condition

A preliminary remark is required here: cuts are of course a condition of the formal language of the theory, as they are of any language, but it is not this use that will be theorized here. We would not learn more of the study of cuts in a formal language. On the other hand, the extension of the contexts where cuts can apply will be of interest. And what is interesting is that cuts can be applied to a context such as set theory. This is why the use of cuts in this chapter will concern sets only. [c]

As we have said, in the same way as elements of a language, sets are determined by external cuts. But they are characterized by internal cuts too. A cut in this context can be seen as a "void". The cut-void as internal cut is a pre-element. We must define the notion of pre-element. Before that, we must notice that the only element of the theory is a set. We will say that the cut-void is a pre-element if, when we encounter an element of the theory, i.e. a set, the cut-void belongs to this element. Now, the way used to highlight the role of internal cut played by the void in set theory is the introduction of a specific axiom that determines the relation between elements, i.e. sets, and the pre-element, i.e. the cut-void. This axiom precisely says that the nothing-void belongs to any set. If the void belongs to any set, it belongs to the empty set. And what belongs to the empty set can be a (relative) nothing only. The interesting thing is that the formal language in which the theory is developed compel us to express this by means of an implication. An implication is itself the expression of a necessary condition. The formal expression of all this can be found in the footnote.
[d]

[c] So, we will not describe the syntax and the semantics of the 1^{st} order language of the theory where the Lambda constant denoting the void plays an active role. It is possible to elaborate a logic where the only constant is Lambda, with no elements in the domain of discourse. To take into account the void in the language of a set theory with an empty universe makes it possible to highlight a zero-order logic different from the propositional logic. Contrary to what is traditionnally alleged, quantification is possible in zero-order logic. We quantify on a variable that can be instantiated by Lambda, the symbol denoting the pre-element "void", only. This will be done in another paper.

[d] Axiom of the void or of the condition or of the pre-element
The first definition to introduce is that of element: y is an element $\Longleftrightarrow$ y is a set.

After that comes the definition of "pre-element": x is a pre-element $\Longleftrightarrow \forall y$($y$ is an element $\Longrightarrow x \in y$).

In other words, a pre-element is "something" that belongs to every element. If an element is the only thing in the theory considered, a pre-element can only be "nothing".

Finally, we can introduce the fundamental axiom of Lambda-1 theory, the axiom of the pre-element or of the void or of the potential or of the condition:
Axiom of pre-element: $\forall x(x \neq \Lambda \Rightarrow \Lambda \in x)$.
In particular, $\Lambda \in \emptyset$.
This expresses the idea that Lambda is not a set and it allows to give a constructive definition to the empty set.

Lambda is the only thing for which it is not possible not to belong to any set precisely because it is not a thing; it is a *sub-thing*, a pre-element, a potential, contrary to ur-elements, for example, which are real things, elements, even if of a type/nature different from that of sets.

Additional semantical precisions:
$\forall x(\neg(x \in \Lambda))$ and $\forall x((x = \Lambda) \vee (\Lambda \in x))$.

2.2.2 Internal and external cut

We have theorized and formalized the use of the cut-void as an internal cut. The nature of the pre-element is determined by a necessary condition (implication); a consequence of the implication is that the pre-element can only be "nothing" relatively to the elements of the theory considered. Every set contains some void, some nothing. And this is thanks to this nothing that sets can contain other sets. Now, as in languages, the pre-element plays the role of an external cut for the elements too: as an external cut, it makes it possible to distinguish two different sets.[e] What about the theorization of the void as external cut? The trick consists in the interpretation of internal cuts as external cuts. Indeed, in non-emtpy sets, internal cuts can be seen as external cuts since they allow to differentiate the elements contained in a set. So, internal cut and external cut are the same in this case. On the other hand, let's consider pure void, encircle it with a set, we get the empty set, which is a kind of *set of all void*, and external cut becomes internal cut. The process functions with non-empty sets too.

2.3 Cut as Potential

Thus we meet in the axiom of the pre-element the main common characteristic of the notions defined in this paper: be it called (relative) nothing, cut, void..., it is always question of a "condition of possibility".
Now, it is interesting to introduce and keep in mind subtle slight differences in the determination of the nature of the nothing used here. The relative nothing as cut takes the form of a void, and the void can be assimilated to a potential. If we focuse on the empty set we evoke in the end of the last paragraph, it can be seen as a set that contains potential only. In other words, the empty set can be seen as a set that "could" contain elements. As such, this set that had no conceptual legitimacy at the birth of set theory since it appeared absurd to conceive a set of nothing becoming the emblematic set of the theory, once the relative nothing has been conceived as potential. Indeed, non-empty sets themselves can be seen as sets that contain potential in addition to their elements, i.e. the possibility to contain additional elements.
[f]

In a nutshell, the nothing-cut can be seen first as a void and then as a potential too. With respect to set theory, the void-potential, as an internal and an external cut, is a condition of possibility of sets. As an external cut, it makes it possible to differentiate sets. As an internal cut, it makes it possible for a set to contain elements. Without the internal cut that the void-potential represents, a set would be an atom, an ur-element. So the use of a nothing in set theory allows to distinguish sets and ur-elements. Now, the cut-void is a condition of

[e] Every element can play the role of a cut compared to the other elements, from which it is different, but then it is a 1^{st} order cut. The void constitutes a zero-order cut because it denotes a potential, the condition of possibility of the elements. A first-order cut does not constitute a condition of possibility.

[f] It is interesting to note that in theories where the universe of discourse is empty, the void is just a potential. Now the relative nothing is not used to say that there is nothing in the universe of discourse, but to denote the *nothing*. If the void-potential was just used to say that the universe is empty, it could not be used in a theory where the universe of discourse is not emtpy!

possibility of an ur-element too, but as an external cut only.
If internal cut implies potential, by reciprocity, the external cut as limit can also be assimilated to a potential. Remove the empty set, potential remains. Internal cut becomes external cut.
This void-potential is not a set but it is not the absolute nothing either.[g] Its potential aspect distinguishes it from the absolute void. As a potential, the void is a relative void; the absolute void is that towards what the relative void tends to.[h] We will analyze this more thoroughly in the Metaphysic's section.

2.4 Interest of cuts in set theory

In most of the classical interpretations of the empty set, the nothing contaminates, encroaches on the empty set. The clear distinction between nothing and empty set gives rise to a new conception of the empty set and of the notion of set itself. The empty set acquires a real legitimacy and even becomes the emblematic set of the theory since it exemplifies the capacity of any set to contain additional elements. We thus have a redefinition of the notion of set and a reformulation of the empty set axiom. [i]
The construction of the empty set by means of a contradictory property is no longer useful since we met new ways to build it. [j]
We can simplify the axiom of infinity.
[k]

We can propose a solution to the puzzle of the null class of Russell. [l]
We can make a clear distinction between void, zero and empty set. [n].

[g] While the empty set is not nothing, neither absolute nor relative, Lambda does not denote the absolute nothing, but rather a relative nothing.

[h] The assimilation of the void to a potential naturally leads to the elaboration of a logic of the potential. This is the subject of a further article.

[i] The axiom of the empty set, such as found, for example, in ZF, is no longer necessary. It can be reformulated in a constructive way: $\exists x(x \text{ is a set } \wedge \forall y(y \in x \Rightarrow y = \Lambda))$ or $\exists x(x \neq \Lambda \wedge \forall y(y \in x \Rightarrow y = \Lambda))$. In set notation: $\emptyset = \{y : y = \Lambda\}$. No use of a contradictory property. The empty set is the only set that contains potential only. Other sets contain potential and elements.

[j] An interesting result of the use of the nothing-void in a set theory context is the construction of the empty set by means of the axiom of pairing in combination with the axiom of separation. We get the empty set as singleton of Lambda: $\{\Lambda\}$.

[k] The classical axiom of Infinity: $\exists x(\emptyset \in x \wedge \forall y(y \in x \Rightarrow y \cup \{y\} \in x))$,
the Lambda axiom of Infinity: $\exists x \forall y(y \in x \Rightarrow y \bigcup \{y\} \in x)$.

[l] In the "Principles of Mathematics", Russell proposes an analyze of the nature of the null class, equivalent to the modern empty set.[m]
Russell names the null class Lambda. To avoid confusion with our Lambda, we will rename the null class of Russell R-Lambda. In the "Principia Mathematica", Russell interprets the universal class as the highest degree of abstraction, the something. He defines the null class, which he interprets as the nothing, as the negation of the universal class. So, conceptual priority is given to the universal class over the null class, accordingly to Parmenides philosophy. Now, we have seen that our Lambda belongs to the R-Lambda.

If our interpretation of the nothing is correct, we must find in the "Principia Mathematica" evidence that R-Lambda is in some way a condition of possibility of the universal class. And this is the case!

[n] In some way, technically, the empty set behaves like zero, e.g. in the cases of union and intersection of sets: $x \cap \emptyset = \emptyset$ and $x \cup \emptyset = x$; this can be compared with: $0 * 0 = 0$ and $0 + 0 = 0$. We also have $\emptyset \cap \emptyset = \emptyset = \emptyset \cup \emptyset$, and $0 * 0 = 0 = 0 + 0$. Now, zero denotes the

Using a relative nothing as internal cut makes clear the difference between the empty set and an ur-element.
Finally, we will see in another paper that the anomaly of the intersection of an empty family is solved thanks to Lambda; it is no longer necessary to restrict the intersection to non empty collections.[o]

3 Nothing in Metaphysics

This is where we try to generalize and interpret the use of "nothing". We have seen that the nothing, as cuts, is a condition of possibility of any language, and, as void-potential, a condition of possibility of sets. Logically, we can make the supposition that it constitutes a condition of possibility of more concrete elements too. So, we don't see any a priori reason to disqualify the application of internal and external cuts to physical entities. It is not absurd to assimilate a physical entity to a set. From there, the interpretation of the nothing as a transcendental pre-element irresistibly comes under consideration. Who says "transcendental" naturally thinks about Kant. In the "Table of nothing" of his "Critique of Pure Reason", Kant considers some interpretations of this notion. But none of them completely evokes the use we make of nothing, and certainly not the possibility to make it a transcandental pre-element.

3.1 The table of nothing

Kant considers four interpretations of the nothing. The nothing as :

1. **Empty concept without object : ens rationis.**
2. **Object devoid of concept, nihil privativum.**
3. **Empty intuition without object, ens imaginarium.**

"absence" of element; proof: in the number 10, 0 is not really a number but the indication of a vacant place for one of the integers 1 to 9. It is a way to clearly show the left shifting the zero of the integer 1. It would not be possible by simply letting an empty space at the right of 1 because it could be confused with a cut between two different elements. The integer 10 constitutes a whole that could as well be written "1_" where we see clearly that "_" is not a number, even if the possibility exists to decide that "_" will acquire the statute of number. Really, "_" can become a number when replaced by one of the integers 1 to 9! Now, 0 acquired the status of number, and this is what is confusing when we try to identify 0 to the empty set. Because, despite of its technical similarities with 0, the empty set is not the indication of an absence. It is a full element while 0 is a pseudo-element. Indeed, we have seen that the empty set is what contains Lambda only. The empty set is the "delimitation" of an absence. As for 0, again, it is a name for "nothing". And a name for nothing is by definition the role of Lambda. This is not the case of the empty set. Though, we have $\emptyset \cap \emptyset = \emptyset = \emptyset \cup \emptyset$! Despite of this, the empty set is what contains the nothing, as it is the case for any set, but the empty set contains the nothing only. It is not a name for nothing! If zero is a pseudo-element, the empty set is a meta-zero: it behaves like zero technically, but it contains zero (considering that zero and Lambda both denotes an absence, and that the empty set contains Lambda). In short: as Lambda, zero denotes the absence, a nothing. Contrary to Lambda, zero does not constitute a condition of possibility (of letters, notes...). Technically, the empty set behaves like zero. Contrary to zero, the empty set does not denote the absence but the delimitation of the absence. The empty set contains Lambda

[o]The paradox of the empty set as universe disappears.

4. **Empty object without concept, nihil negativum.**

Ens rationis refers to hypothetical things. Nihil privativum refers to the absence: the reality is something, its *negation* is nothing. Ens imaginarium refers to simple form of the intuition, purely formal condition of an object, as pure space and pure time. Nihil negativum refers to impossibility: contradiction, antinomy; nothing as non-being.

The relative nothing has no connection with 4, but some connections with 1, 2 and 3. The relative nothing has no connection with nihil negativum which could refer to a kind of nothingness we will describe below as absence of being and potential. Ens rationis could have some connections with potentiality as reference to some particular potential thing. As the relative nothing, nihil privativum denotes the absence, but it is a secondary absence while the relative nothing plays an essential and active role in our approach.

Now, the reading of this table is interesting because it leads to the question of determining the similarities between our relative nothing and, space and time, as conceived by Kant. For Kant, space and time are the a priori forms of sensible intuition. They are the frame in which things can appear, but they can not be conceived if there are not things that can be perceived. As condition of possibility of things, Ens imaginarium could seem similar to our relative nothing. But cuts play a more fundamental role since they are a condition of possibility of differentiation of things, as initial and final limits of entities, and in a sense they are a condition of possibility of space and time themselves. And entities can be conceived as cuttings of space and time. So, cuts are neither space nor time. If space and time are transcendental forms, cuts as conditions of space and time, as conditions of possibility of a condition of possibility, are obligatory transcendental forms.

3.2 Relative nothing, Relativity, Quantum void

Moreover, if we accept the lesson of the theory of Relativity of Einstein according to which space, time and matter are intimately interconnected, we must consider that space and time, along with matter, are potentially contained in the relative void. The relative void can be seen as the frame in which space and time will arise, along with energy and matter. The entities are extracted from their potential state. If we make the hypothesis that the tank/holder of potentialities is not infinite, it is logical to think that the more entities are extracted, the more potentialities decrease. In a sense, the more entities are extracted, the more the relative nothing goes to death, to nothingness. If the potential is infinite, it infinitely tends to the absolute nothing.

We make here an hypothesis: black holes could be seen as patent proofs of the potential nature of the void, the way the relative nothing uses to regenerate and to escape death, i.e. absolute nothing.

3.3 Pythagoras, Democritus and atomistics

The most remarkable anticipation of our relative nothing can be found in Pythagoras. Contrary to Kant, Pythagoras did consider the function of condition we assign to the nothing: "The void exists... It is the void which keeps things distinct, being a kind of separation and division of things. This is true first and foremost of numbers; for the void keeps them distinct."[p]
The atomists Leucippus and his student Democritus theorized that the natural world consists of two fundamental and opposite, indivisible bodies: atoms and void (void is mere nothing, or the body's negation). [q]

Strong contrast with Parmenides: "if the void is, then it is not nothing; therefore it is not the void", and Aristotle's horror vacui or "nature abhors a vacuum".

3.4 Membership

But we have an advantage on Pythagoras and Democritus who did not know set theory.
Since we assimilate entities to sets, we will make use of the fundamental concept of set theory, the membership relation. In a general way, we will say that the void-potential, as an external cut, is a condition of possibility of any entity. In addition, we will say that if an entity is not an atom, it contains void-potential, which in this case plays the role of an internal cut. In any case, cuts play the role of limits or intervals. But we want more.
The key of the exploitation of nothing in a physical context would be the discovery of a physical equivalent of an axiom of set theory.
We would like to find physical equivalent of axioms of our set theory in order to build something from nothing! May physical forces play this role? We don't think so, because cuts must be a condition of possibility of physical forces as they are of language and axioms.
Let's consider the most simple situation: the absence of any entity. We just have potential. How could something be extracted from potential? By vibration? In the same way as virtual particles arise from the quantum void? But what could be the cause of this vibration? Potential itself? The snake bites one's tail.
Black holes evoked above could be a candidate through phenomenons of evaporation discovered by physician Stephen Hawking.
And what about the Big Bang? If the initial state of the universe was a relative nothing, the Big Bang could be the way the potential used to give birth to energy and matter.
Some theories put pure information at the origin of the Big Bang. But what does pure information means? In any case, it has nothing-cuts as condition of possibility of its expression.

3.5 Potential and Entropy

We can include here a word on the relation between being, potential and *entropy*.

[p] Aristotle quoted in J. Robinson, *An introduction to Greek Philosophy* (1968), Boston, p. 75.

[q] Berryman, Sylvia, *Ancient Atomism*, The Stanford Encyclopedia of Philosophy (Fall 2008 Edition), Edward N. Zalta (ed.), http://plato.stanford.edu/archives/fall2008/entries/atomism-ancient/

Entropy is the tendancy to equilibrium of a closed system by dispersion of energy.
If the universe is a closed system, it must be in expansion to obey the second principle of thermodynamics because there is nothing[r] outside the universe where energy could disappear.
The important thing to note is that entropy operates in the frame of being. So, it can not be assimilated to potential. Let's be notice that our potential cannot be assimilated to potential energy of classical physics because classical potential energy is kept in matter.
On the other hand, entropy makes sense only in the "nothing self creates, nothing disappears" perspective.
If we define the universe as "being + potential", extraction of virtual particles from quantum field and evaporation of Black holes (expressions of potential) would be the ways used by universe to compensate entropy and regenerate.
From there, the principle of conservation of energy and matter must be reinterpreted in the light of our potential. We must speak of conservation of being and potential.
Also, the classical alternative/dichotomy about the origin of the universe: "universe from nothingness/eternal universe", does not make sense anymore. Indeed, in our approach, being comes from a relative nothing, and in its most simple state, as pure potential, universe can be eternal. Or eternity can be conceived as an alternation of pure potential and "potential + being".

3.6 Nothing and Nothingness

At this stage, we can get lessons on the nothing on a metaphysical ground. The main lesson is the necessity to make a clear distinction between a relative nothing and an absolute nothing. The relative nothing, as cut/separator is a condition of possibility of things. In more concrete contexts, the nothing can take the form of a void. In all contexts, it is a pre-lement, a pseudo-object. In all cases, it can be seen as a potential.

Contrary to absolute nothing, relative nothing admits predication.
Relative nothing is relative in two senses: relative to being, more precisely to the elements of the field where it applies, and relative to absolute nothing.
Absolute nothing will be called nothingness.

The relative nothing is the potential complement of being. It is to be conceived in a different way than complement in topology or in set theory where the complement of a set of elements is another set of elements. More potential means less being and reciprocally.
Let us precise that if the relative nothing as cut, void or potential is a condition of possibility, (a force?) of differentiation of being, it is not being. Density of being can increase by fusion of entities. At the extreme, we can conceive an entity infinite in space and time, i.e. without any limit. Absolute being means[s]

[r] If we conceive a relative nothing, assimilated to a potential, this is where energy can disappear.

[s] But is it so simple? what about "pure being", pure material atom?? Would pure being not coincide with pure potential? The maximum of being concides with nothingness, but the

no potential means absolute nothing.

From there, we can analyze the relations between nothing, nothingness and being.
The more entities are extracted from the potential, the more the relative nothing tends to absolute nothing. The lessons are these: the way towards being is the way towards non-being in the sense of nothingness. Nothingness and being are classicaly opposite. In our vision of the things, they go in the same direction, even if it can seem rather counter-intuitive. On the other hand, relative nothing and being go in opposite directions.
Up to now, we have worked with the hypothesis of an arbitrarily high but not infinite potential. If the potential is infinite, by extraction of being, the relative nothing infinitely tends to the absolute nothing.
But what is nothingness? Absence of potential? Absence of potential and being?
To give an answer to this question, we must say what being is. Being is per se the absence of potential. If nothingness is the absence of being, it is the absence of absence of potential, so it is potential. Since nothingness is obligatory the absence of potential, we have a contradiction. This nothingness would correspond to the nihil negativum of Kant's table.

So, nothingness is the absence of potential only. And we would have absolute being as condition of nothingness. This is a conclusion reached by the French Philosopher Sartre too: "... the total disappearance of being would not be the advent of the reign of non-being, but on the contrary the concomitant disappearance of nothingness. *Non-being exists only on the surface of being.*"[t]

Now, is it possible to conceive a nothingness that would be absolute absence, absence of being and potential? This makes sense if absolute nothingness is conceived without being compared to anything. Absolute nothingness isn't relative to anything. It makes sense in monovalent frame only.
We will call *absolute nothingness* the total absence of being and potential.
The absolute nothing, which is not absolute nothingness, is the only "thing" whom the relative nothing is not a condition of possibility. Reciprocally, the absolute nothing is not a condition of possibility of the relative nothing, but it is that towards what the relative nothing tends to. As any form of being depends on the relative nothing, the role of axiom can only be assumed by less than the relative nothing, i.e. the absolute nothing that would play the role of a kind of force, by default. But it is absurd since it would mean that nothingness can be predicated.
Let us note that potential is the absence of being and nothingness.
Contrary to what Aristotle, Descartes and Sartre, [u] under the probable influ-

latter can not be predicated, so can't the former.

[t](J.P. Sartre, *Being and nothingness* (tansl. H. Barnes), Routledge, London (1998), p. 16.).

[u]*Nothingness haunts being.* That means that being has no need of nothingness in order to be conceived and that we can examine the idea of it exhaustively without finding there the least trace of nothingness. But on the other hand, nothingness, *which is not*, can have only a borrowed existence, and it gets its being from being. Its nothingness of being is encountered only within the limits of being, and the total disappearance of being would not be the advent of the reign of non-being, but on the contrary the concomitant disappearance of nothingness.

ence of Parmenides,[v] thought, nature likes void; and, more than that, nature needs void!

4 Conclusion

4.1 Synthesis

We have tried to highlight the positive role the nothing plays in three fields: linguistics, mathematics, metaphysics. In the three cases, we first assimilated the nothing to cuts. Cuts are conditions of possibility of the elements of the respective field, and they are of a different nature than that of these elements. Cuts can be external and internal. External cuts can take two forms: a temporal form where they determine the initial and the final limit of the element, or an interval; an (abstract) spatial form where they determine the limits of the element in any direction, or an interval. Then, we assimilated the nothing-cut to a void, which reveals interesting in set theory in order to make clear the distinction between the empty set and the nothing. It is the occasion to underline the internal role of cuts. Internal cuts allow to make the distinction between atoms and molecules. Now internal cuts can be seen as the external cuts of the elements belonging to a set or an entity. At a next step, the nothing-cut-void is assimilated to a potential. The notion of void-potential is interesting in order to make a distinction between an active role and a passive role of the nothing. As cut, the nothing has an active role, as we have described here above. If the universe, be it physical or discursive, is empty, no need of cuts; but the void-potential remains. The nothing as potential is to be distinguished from nothingness, which can not be predicated. Nothingness is defined as that towards what the relative nothing tends to. Nothingness is the total absence of potential. It is not the absence of being, because absence of being means potential. So there is at least two kinds of non-being: a relative and an absolute nothing. And relative nothing can be so in two ways: relative to absolute nothing and relative to being. We can consider that the nothing is relative to the field of application too.

4.2 Interest of the use of the relative nothing in linguistics, mathematics and metaphysics

In linguistics, cuts appear to be the most fundamental constituent and the condition of possibility of any language.

In mathematics and more particularly in set theory, the use of a void-potential makes it possible to build the empty set by means of the axiom of pairing applied to the void. There is no need of an axiom of the empty set nor of the construction of the empty set by means of a contradictory property.

Non-being exists only on the surface of being."(J.P. Sartre, *Being and nothingness* (tansl. H. Barnes), Routledge, London (1998), p. 16.). Really, Sartre is half wrong or half right. He is right when he links being and nothingness and when he says that the latter depends on the former. He is wrong when he says that being does not need nothing. This is because he does not make the distinction between a relative and an absolute nothing.

[v]"if the void is, then it is not nothing; therefore it is not the void".

The theory legitimates and gives an emblematic status to the empty set, now defined as the only set that contains only potential, and makes it possible to redefine the concept of set: a set is the expression of a potential. According to us, the notion of "set" acquires a real ontological dimension.
The theory allows us to distinguish the void from the empty set, solving what can be called the puzzle of Lambda as found in Russell: not only does the empty set exist, but the void itself is not exactly *nothing*: it is a relative nothing that constitutes a potential, and as such a *transcendental* (pre-)element.
The theory also allows us to distinguish the empty set from ur-elements, which are generally considered as kinds of empty sets. No thing belongs to an ur-element, even not the *relative nothing*. This is why a ur-element is a kind of atom.

In metaphysics, the use of a nothing makes it possible to modify the opinion of the greek philosopher Parmenides who could only bring himself to believe that there is but one way of not being; there are at least two : the absolute nothing and the relative nothing, the absolute nothing being that towards what the relative nothing tends. Nothingness, which is our word for absolute nothing, is not the absence of being, more, it is not opposite to being. It is opposite to potential. And as in two other fields, relative nothing, far from being useless and even haunting for nature (It is no more question of nature abbhorring void), constitutes the condition of possibility of being.

We learned that potential is the absence of being and nothingness, nothingness and being the absence of potential.
Principle of conservation of matter and energy must be reconsidered at the light of potential.
The classical alternative "being from nothingness/eternal being" is superseded by the coexistence of the two branches.
Absolute being can not be predicated.
The classical "To be or not to be" can be replaced by "To be or to be potential".
For each field considered, the balance in terms of investment and profits is clearly positive: the investment is *quasi-nul* - *nothing* is added -, the gains are numerous.

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