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SOMETHING, NOTHING AND LEIBNIZ'S QUESTION. NEGATION IN LOGIC AND METAPHYSICS

Abstract. This paper discusses the concept of nothing (nothingness) from the point of logic and ontology (metaphysics). It is argued that the category of nothing as a denial of being is subjected to various interpretations. In particular, this thesis concerns the concept of negation as used in metaphysics. Since the Leibniz question 'Why is there something rather than nothing?' and the principle of sufficient reason is frequently connected with the status of nothing, their analysis is important for the problem in question. Appendix contains a short critical analysis of Heidegger's famous statement *Das Nichts nichtet*.

Keywords: nothingness, *creatio ex nihilo*, non-being, Principle of Sufficient Reason, Leibniz, Heidegger, *Das Nichts nichtet*, negation.

The history of philosophy and theology is full of deliberations on nothing or nothingness (see [1], [5], [7], [10] for historical remarks; as far as I know there is no detailed history of the concept of nothing). Omitting various ideas present in various religious denominations, two historical facts are relevant to the present debates in analytic philosophy.¹ Firstly, the ancient Greek view, articulated by Lucretius' passage from *De Rerum Natura*, that *ex nihilo nihil fit* (nothing comes from nothing). However, this opinion was strongly rooted in Greek cosmology (even pre-philosophical, going back to Homer) and philosophy (Parmenides even prohibited thinking about nothing). The phrase *natura horror vacui* (nature fears nothingness) – became another expression of the ancient rejection of nothingness as belonging to the ontological repertoire of reality. The second point is just opposite, namely the idea of *creatio ex nihilo*, the standard element of Christian theology. The opening sentence of the *Hebrew Bible* says that at the beginning God created the heaven and the earth. The second paragraph says that "the earth being without form and empty". Although these fragments do not imply that God created the heaven and the earth *ex nihilo*, Jewish tradition (as espoused by Judah Halevy in the Middle Ages) accepts that the act of creation was executed "from nothing". Christian theology

adopted this view in the 3rd century (Basilides, Tertulian). St. Augustine of Hippo incorporated *creatio ex nihilo* into Christian doctrine. The final version of this idea was elaborated by St. Thomas Aquinas in *De Aeternitate Mundi* (On the Eternity of the World). Christianity accepts unconditionally (it is even Catholic dogma) that God called the world into existence out of nothing. This view stood in contradiction to Greek philosophy on the strength of the *ex nihilo nihil fit* principle. Paul of Tarsus met with Greek philosophers (Stoics and Epicureans) in Athens during his second mission journey dated CE 50–52. According to The Acts of the Apostles (17:24), he delivered a sermon in the Areopagus, where he said, among other things, that God made the world and all things therein. Although these words do not imply directly *creatio ex nihilo*, the phrase “the world and all things therein” may be understood in the spirit of the mentioned dogma. The “men of Athens”, as Paul addressed them, were probably not convinced. Although from their words, “We will hear thee again of this matter”, usually interpreted as a reaction to Paul’s preaching about resurrection, we may suppose that they reacted similarly to statements contravening the principles *ex nihilo nihil fit* and *horror vacui*.

The above very short historical report suggests that nothingness in both mentioned perspectives, mutually exclusive, is understood in a similar manner, namely as the denial of being. Yet the realm of being is not the same in these ontological proposals. For Greek mythology, gods are beings belonging to the same reality in which natural objects exist, but for Christian philosophers and theologians, the contrast of nothingness is not quite univocal. Firstly, nothing is the “complement” of God plus the reality created by Him.² Since God is eternal, this concept of nothing is simply contradictory. Secondly, if eternal God created the world *ex nihilo*, nothing is what is neither God nor the result of the creation act. Perhaps we could say that nothing is the residuum of God minus the created being. I do not claim that the explanation in this paragraph is entirely satisfactory from a theological or philosophical point of view, but it provides a convenient starting point for more analytic investigations.³ I will try to make things more precise in what follows.⁴

Let us agree that the word ‘something’ refers to being. More precisely:

- (1) a is something if and only if a is a being.

Consequently, we obtain by contraposition

- (2) it is not true, that a is something if and only if it is not true, a is a being.

The first approximation of nothing:

(3) a is nothing if and only if a is not being.

However, this is problematic because, it assumes that the word 'being' expresses a universal. Now, according to the theory of transcendentals, being is the most general concept. Thereby, there is no more general concept with being and not-being as its species. Thus, being cannot be classically negated and, hence, both sides of (2) cannot be transformed into ' a is nothing' and ' a is not being', respectively. This means that we should not use the expressions 'it is not true that a is something' or 'it is not true that a is a being'.

Being is understood in this fragment in the distributive sense, yet, due to the theory of transcendentals, it is a collection of objects, but being is not a set. We can eventually consider being as a proper class or category. This explains why some set-theoretical operations cannot be performed on being. An additional problem is that if we use classical predicate logic, a cannot be an empty set. Of course, various proposals can save this difficulty: elimination of names for definite descriptions, free logic, distinguishing many modes of being, for instance existence and subsistence (for instance, in Meionog's sense), etc. What happens if being is understood mereologically (collectively)? Being is the largest fusion of everything that exists with parts understood as particular objects. So we have:

(4) a is a being if and only if a is Being or is a part of Being.

An advantage of (4) consists in the admissibility of using empty names. Consequently, we have

(5) a is nothing if and only if a is not Being and a is not a part of Being.

On the other hand, neither strategy suggests any positive characterization of nothing. Roughly speaking, logical negation does not contribute to an understanding of nothing as it is understood in typical philosophical discussions. Philosophers have in their minds nothing in a metaphysical sense, even if they do not share the speculations of Hegel, Heidegger, or Sartre, and try to introduce a logical order into debates on nothingness.

Science suggests some definite understandings of nothing. In particular, we have

(6)(a) Mathematics (zero, the empty set);

(b) Physics (the vacuum, the void).

However, we encounter here a serious problem. Since mathematical and physical nothings are something, it is problematic that they can serve as

illustrations of metaphysical nothingness.⁵ (6a) and (6b) involve the normal logical negation. If we take the empty set as the primitive notion, a non-empty set is a set, which is not empty, if x is a non-zero number, $x \neq 0$, and the physical vacuum is not an absolute vacuum. All mathematical and physical nothings or vacua are relative in the sense that their definitions are formed by reference to something which is positive. Thus, (6a) and (6b) regard nothing as a negativum, On the other hand, non-being as defined in the theory of transcendentals is absolute and a privativum. Nothing is not the logical negation of being, but the lack of being as existing at all. Even if we introduce *privation* as a special kind of negation, its logic must be separately settled. Although we can say intuitively that everything is being or non-being (the ontological *tertium non datur*) and nothing is being and non-being (the ontological non-contradiction), these statements employ the negation words (non, nothing) as negativa. The combinations ‘everything is’ and ‘nothing is’ (the second is more important) suggest that they refer to something, not to nothing in the metaphysical sense. Thus, the metaphysical negation is still mysterious.

How and where should one look for the metaphysical nothing? Perhaps Parmenides’ *me on*, Lucretius’s *nihil* or non-being in the sense of the theory of transcendentals can be considered as initial examples.⁶ Thus, a natural question is this

- (*) Can mathematical and physical categories, like zero, the empty set, the vacuum, be considered as approximations of the metaphysical nothing?

A further analysis requires two points of reference, scientific and philosophical. Firstly, science and mathematics operate the “nihilistic” notions. The concepts of zero and the empty set are completely defined. The history of views about the physical vacuum is complicated, because *horror vacui* plagued not only metaphysics, but also physics. The real revolution happened when Torricelli succeeded in experimental realization of the vacuum. The further story comprises (among others) Newton’s empty space, ether (as a weapon against the fear of nothing), action at distance, relativistic space-time, gravitation, or the quantum vacuum. Although these ideas and related proposals were (and are) controversial, they have empirical and/or theoretical legitimacy inside physical theories.

I take Leibniz’s famous question

- (**) Why is there something rather than nothing?

as a philosophical point of reference. The problem expressed by (**) has

bothered philosophers until now (see [8], [9], [11]). Some philosophers, such as Heidegger, regard this as the single most important philosophical problem. Leibniz did not claim that nothingness exists. Leibniz introduced the question (**) in the following way (*Principles of Nature and Grace*, tr. J. Bennett, section 7, <http://earlymoderntexts.com/assets/pdfs/leibniz1714a.pdf>)

[...] the first question we can fairly ask is: Why is there something rather than nothing? After all, nothing is simpler and easier than something.

Thus, for Leibniz, nothing is simpler than something, and if so, we need to ask why there exists a more complex world rather than an empty one. Leibniz never claimed that nothing (the empty set) really existed. On the other hand, we can consider the empty universe as one of possible worlds. Since it is a consistent object, it could be that there exists a perfectly empty world, that is, a world without being.

However, this argument is problematic. Take the empty set as an approximation of Leibniz's nothing. We can define the set \emptyset as such which does not possess elements (*pace* Leibniz this object is consistent). This definition assumes that the concept of an object (something) must be comprehended prior to the concept of the empty set. This means that something is simpler than nothing or both concepts are complex to the same extent. A more direct argument is as follows. Let X and Y be two disjoint sets. Consequently, X and Y have no common elements. Now, we can define \emptyset as $X \cap Y$ ($\emptyset = X \cap Y$). Inspecting this definition immediately shows that negation is involved in the concept of the empty set. Thus, if the empty set illustrates (or approximates) nothingness, the last concept is more complicated than that of something, which is positive and its understanding does not appeal to negation. This suggests that being is a simpler category than nothingness. The fact, however, that being has a more or less complex structure is irrelevant here. If we assume that from the logical point of view nothingness is more complex than being, then we should reverse Leibniz's question and ask: 'Why should there be nothing when there is something?' It is a surprising result but forced by an analysis of what is simpler – being or nothingness. My answer is the former.

Before continuing the further analysis of (**), let me return for a while to the theory of transcendentals which elaborates 'most common notions', such as (allowing for variations between the different scholastic schools) 'being', 'true', 'good', 'beautiful', 'one' or 'thing'. According to the most popular conception, originated by Thomas Aquinas, if t and t' are transcendentals, then their scopes are the same, so, for example, if something is a being, it is

also true, and if something is true, it is also a being (*ens et verum convertuntur* – ‘being and true are convertible’). The notion of being is singled out here insofar that the other transcendentals express some aspects of beingness, such as that every being is good and beautiful. Transcendental notions possess a certain peculiarity: they do not refer to genera, that is, to sets denoted by general names, such as ‘man’, ‘animal’, or ‘house’. In the light of traditional ontology, deriving from Aristotle, genera form a hierarchy, the levels (viz., the different genera) of which are defined using the method of the nearest genus and generic difference; for example, we define man as an animal (the nearest, or superior, genus) that is rational (generic difference). The nearest genus can be divided dichotomously: animals divide into humans and non-humans. However, being is, to repeat an earlier remark, the most general notion. This means that it has no superior genus. Consequently, there is no item that could be divided into being and non-being. Technically speaking, the complement of the class of beings is empty, but, once again, it is a result of using classical negation. There is, therefore, no non-being, and thus no nothingness. This part of Parmenides’ theory was preserved in the theory of the transcendentals. If we accept that there exist bad and ugly things, then we must assume that they have been created by God, since He has called everything into being. But this is contrary to His absolute goodness. The solution is to accept that if being, goodness, and beauty are co-extensional (identical in scope) with being, then their opposites – evil and ugliness – are nothing, due to the fact that it is logically impossible that God could have created nothingness. On the other hand, we need to explain the presence of things evil and ugly. The Schoolmen constructed the negation of the transcendentals as a lack (*privativum*). Non-being (nothingness) is a lack of being, evil is a lack of goodness and ugliness is a lack of beauty. Consequently, nothingness, evil and ugliness are not God’s creations but human faults. There are a lot of problems associated with the view that *privativa* of transcendentals are non-being. These questions pertain to God’s fundamental attributes such as omniscience or omnipotence. I will not discuss these issues.

The theory of transcendentals, however, has to confront the problem of *creatio ex nihilo*. We can rephrase the dogma on creation from nothing in the following way:

- (7) God created being in the situation in which no being (except God Himself) existed (= was nothing except God).⁷

I will use Leibniz once again, although, as far as I know, he never mentioned the idea of *creatio ex nihilo*. He was interested rather in a logical question,

namely in the issue of how it is possible to explain the answer to (**). He looked for a principle allowing us to assert why there is something rather than nothing, that is, why we live in a non-empty universe. He appealed to the principle of sufficient reason (**PSR** hereafter). He introduced it in the following way (*Principles of Nature and Grace*, sections 7–9, *ibidem*; I repeat the fragment already quoted):

[...] for any true proposition P, it is possible for someone who understands things well enough to give a sufficient reason why it the case that P rather than not-P. Given that principle, the first question we can fairly ask is: Why is there something rather than nothing? After all, nothing is simpler and easier than something.

Also, given that things have to exist, we must be able to give a reason why they have to exist as they are and not otherwise. Now, this sufficient reason for the existence of the universe can't be found in the series of contingent things [...] and this must lie outside the series of contingent things, and must be found in a substance which is the cause of the entire series. It must be something that exists necessarily, carrying the reason for its existence within itself; Only that can give us a sufficient reason at which we can stop, having no further Why?-question taking us from this being to something else And that ultimate reason for things is what we call 'God'.

The principle **PSR** is expressed in the first sentence of the last quotation, and further assertions pertain to its role, particularly in tracing the question (**). Although Leibniz used **PSR** for proving God's existence, but not, in order to repeat once again, for explaining how He created being, this principle is frequently employed by theists in arguments in favour of *creatio ex nihilo*. My strategy consists in separating these two issues. Firstly, I will analyze the status of **PSR** and its role in arguing for God's (in Leibniz's sense) existence. Although the result of my analysis is negative, that is, I shall try to demonstrate that **PSR** does not prove what Leibniz intended to justify, a second step will be undertaken. Its aim is to show how **PSR** could be used for explaining *creatio ex nihilo*.

What is **PSR**? According to Leibniz's *Monadology*, §§33–38 (see also the passages from *Principles of Nature and Grace* quoted above) the following theses summarize the character of **PSR**:

- (8)(a) All sound arguments are based on the principle of contradiction and **PSR**;
- (b) No fact *F* is real (existing) if it has no ultimate reason determining that *F* has definite properties;
- (c) No proposition *A* is true without having an ultimate reason;

- (d) Ultimate reasons are usually unknown to us;
- (e) There are two kinds of truths: of reason (necessary; their opposites are inconsistent) and factual (contingent; their opposites are not inconsistent);
- (f) The reason for necessary truths can be found by analysis resulting in primitive truths (this is the way of mathematics);
- (g) Truths based on identity do not require any proof;
- (h) The sufficient reason must be present also in contingent truth;
- (i) The sufficient reason of contingent things must be outside the sequence of such objects;
- (j) The necessary substance (God) is the ultimate reason of (contingent) things.

An inspection of (8) shows that **PSR** has two interpretations: logical (roughly speaking, some propositions are reasons for other propositions; the natural case is that if B follows from A , the latter is a logical reason for the former) and ontological (see below).

Assume that the formula

$$(9) \quad \forall y \exists x (x \mathbf{R} y) \text{ (for any } x \text{ there is } y \text{ such that } x \text{ is a reason for } y).$$

provides a general scheme for **PSR** (see [12]). Dependently of how the scope of variables is understood, (9) obtains a logical or ontological interpretation (see [6], [7] for historical surveys concerning **PSR**).

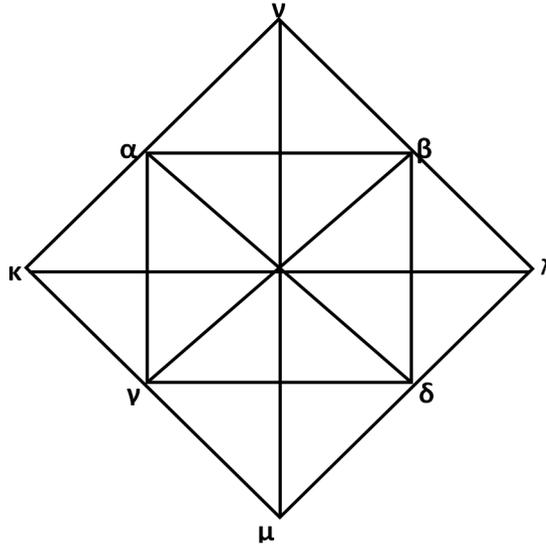
I will concentrate on the ontological interpretation of **PSR** as applied to contingent beings.⁸ Accordingly, if x is a contingent being, then its ultimate (and thereby sufficient) reason is the necessary being (for simplicity, I assume that there is only such an entity). Note that the adjectives ‘ultimate’ and ‘sufficient’ are not equivalent. For example, if x is a cause of y , the former is a sufficient reason for y , but it is not the ultimate reason.⁹ According to (8i), the ultimate reason of the series, say S , of contingent beings must be external with respect to this series. However, (9) is too weak in order to capture all intuitions recorded in (8). In particular, (9) does not imply

$$(10) \quad \forall y \exists x (x \mathbf{R} y) \Rightarrow \exists x \forall y (x \mathbf{R} y),$$

that is, the assertion ‘if every contingent being has its reason, then there is the reason of all beings’ is not a consequence of (9). Even if we assume that (10) is true, it does not imply that the ultimate sufficient reason appears as an necessary element and located outside the series S of contingent facts,

objects, things, etc. Consequently, something more is required to complete the analysis.

Since Leibniz's treatment of **PSR** essentially uses modal concepts of necessity and contingency, modal logic seems indispensable. I will take this route and supplement (9) and (10) by a quite modest amount of logic of modalities represented by the diagram (**D**) (see [14]):



The diagram (**D**) has many interpretations, for instance, alethic, deontic or epistemic. Modal ontological interpretation *de re* (it is relevant in the present context) is as follows (the letter *a* can be understood as referring to a particular being): α – *a* is necessary ($\Box A$); β – *a* is impossible ($\Box \neg A$, $\neg \Diamond A$); γ – *a* is possible ($\Diamond A$); δ – *a* is unnecessary ($\neg \Box A$, $\Diamond \neg A$); κ – *a* actual (real) (A); λ – *a* is not actual ($\neg A$); ν – *a* is necessary or *a* is impossible ($\Box A \vee \Box \neg A$); μ – *a* is accidental (possible and unnecessary; $\Diamond A \wedge \Diamond \neg A$). Contingency ($\Diamond A$) can be defined either as non-necessity ($\neg \Box A$) or accidentality ($\Diamond A \wedge \Diamond \neg A$). I adopt the second interpretation.

The logic of (**D**) includes the following logical laws:

- (11)(a) α implies γ ($\Box A \Rightarrow \Diamond A$);
 (b) β implies δ ($\Box \neg A \Rightarrow \neg A$);
 (c) α and β are contrary ($\neg(\Box A \wedge \Box \neg A)$);
 (d) γ and δ are complementary ($\Diamond A \vee \Diamond \neg A$);
 (e) $\alpha - \delta$, $\gamma - \beta$, $\kappa - \lambda$ are pairs of contradictories ($\neg(\Box A \wedge \neg \Box A)$, $\neg(\Diamond A \wedge \neg \Diamond A)$, $\neg(A \wedge \neg A)$);

- (f) μ implies γ ($\blacklozenge A \Rightarrow \lozenge A$);
- (g) μ implies δ ($\blacklozenge A \Rightarrow \lozenge \neg A$);
- (h) α or β or μ ($\Box A \vee \Box \neg A \vee \blacklozenge A$);
- (i) α implies κ ($\Box A \Rightarrow A$; what is necessary, is actual);
- (j) β implies λ ($\Box \neg A \Rightarrow \neg A$; what is impossible, is not actual).

The most important fact for analysis of **PSR** is the relation between the sentences $\Box A$ and $\blacklozenge A$. Both are logically independent, that is,

- (12)(a) $\neg(\Box A \Rightarrow \blacklozenge A)$;
- (b) $\neg(\blacklozenge A \Rightarrow \Box A)$.

Although (12) shows that there is no direct logical link between necessity and contingency, it is too weak to provide an answer for the question whether S as a series of contingent beings must have a sufficient necessary reason. However, predicate modal logic does not justify

$$(13) \quad \exists y(\blacklozenge y) \Rightarrow \exists x(\Box x).$$

Assume that S is a sequence of contingent beings ordered by the principle of causality. If a is a cause of b , then the former is a sufficient reason of b . Since (10) does not hold on purely logical grounds, even if every being has its cause, this does not entail that the cause of all beings exists. Even if (10) has been proved, it would not be sufficient for (13). Furthermore, (13), if true, does not entail that x has properties of the ultimate reason in Leibniz's sense, in particular, that its location is outside S . If one would like to demonstrate that **PSR** behaves as it is prescribed in (8), one must refer to strong ontological premises. If matters look so, this principle cannot provide the intended answer to (**), namely that it is plausible that nothing could exist rather than something.

I return to the problem of *creatio ex nihilo*. The empty set is not a good approximation of nothing in this context. Perhaps empty space in Newton's sense can serve as the most proper approximation of nothingness. This space is lacking of all objects, and, is absolute and perfectly symmetric.¹⁰ In such a space material objects break the symmetry. Consequently, it is natural to think that the empty space becomes non-empty, due to the action of the being located outside the space. Independently whether Newton himself was thinking in this way, we can regard the above argument as an example of an application of **PSR**. Contemporary physics has a different conception of space (space-time, more precisely). Newton's idea that space is a container of everything is presently rejected, and according

to the relativity theory, space-time cannot exist without matter. However, the issue of symmetry is still important.¹¹ Assume that elementary particles exist in space-time. If it is perfectly symmetric, the mass of particles has to be equal to zero, but this is inconsistent with experience. On the other hand, every action of particles results in the breaking of symmetry. Anyway, the physical actuality can be characterized as consisting with spatiotemporal asymmetry.

Now we have three possibilities. Firstly, we can assume that the initial state of the universe was perfectly symmetric. Hence, the breaking of symmetry required an intervention from the outside. This conclusion is an application of a version of **PSR**. Secondly, one can argue that the perfect initial symmetry does not exclude an accidental break of symmetry, which was at the Beginning. Thirdly, one can claim that the actual physical space-time was never perfectly symmetric, but always, more or less (this is a question of mathematical models), full of disturbances that finally (or rather up to now) have resulted in such and such shape of reality. The two last possibilities do not need to appeal to **PSR**. Consequently, they cannot be models of *creation ex nihilo*. As far as I know, most contemporary physicists adopt the third view. They argue that all empirically known instances of the physical vacuum, for instance, the quantum void, are in fact approximations, similar to such constructions as the free fall of bodies, uniform linear motion or perfect rigidity. I do not claim whether the first view satisfies all the needs of theology (see note 10). The main problem is that perfectly symmetric space-time is something, not nothing (see above). Even if one claims that the perfect symmetry occurs in mathematical spaces only, such objects have properties and are something, not nothing. As far as the empty set is concerned, it can be used to define natural numbers (the so-called von Neumann numbers): assuming $\emptyset = 0$, $\{\emptyset\} = 1$ ($\{\emptyset\}$ means 'a set whose only element is the set \emptyset '), $\{\emptyset, \{\emptyset\}\} = 2$, $\{\emptyset, \{\emptyset, \{\emptyset\}\}, \{\emptyset, \{\emptyset\}\}\} = 3$ etc. Some mathematicians jokingly say that von Neumann's numbers are the only known example of a *creatio ex nihilo*, that is, the creation of nothing out of an empty set. This, however, is but at most a joke or metaphor with no actual mathematical meaning whatsoever. The literal meaning is that the empty set has such formal properties that by iterating constructions based on it, we can define a sequence of natural numbers, equivalently to other procedures, for instance, those generated by Peano's axioms.

I do not suggest that the category of nothingness be dropped. But it is hard to accept that nothingness as construed by Parmenides and Leibniz (particularly in **PSR**) has any special significance for ontology. It is possible to speak about nothingness, but relatively to a specific domain

of objects. Let us call such nothingness relative (see [13]). Scientific vacua well illustrate the point. The number zero was introduced to make certain arithmetical operations universally executable. For example, for the operation of subtraction of two numbers to be always definite, it was necessary to assume that $n - n = 0$. The next step was to assume that $n \cdot 0 = 0$ and $n + 0 = n$ (the colloquial wording of the last equation is ‘adding 0 to an arbitrary number adds nothing’). The empty set is nothing relative to non-empty sets, and, physical vacua are nothing relative to non-vacuous objects. Moreover, 0 and \emptyset evoke certain associations with nothingness. For example, when I want to say that I have repaid my debt to Mr X, I may put it so that our balance is zero (nothing). The size of a debt may be expressed as a negative number and a positive balance as $n > 0$, while zero expresses the lack of either a positive or negative balance. An even stronger sense of nothingness is suggested by the empty set for one can say that if he or she has no children, the class of his or her children is just empty. On the other hand, to repeat once again, 0 and \emptyset are certain objects, namely 0 is a number and \emptyset is a set. According to the traditional view expressed by (1), if a is something, a is a being. Thus, if 0 and \emptyset illustrate nothingness, it is only in relation to other numbers or non-empty sets. Their relativity consists in that they are not beyond being but are like holes or gaps in being. They are inscribed into being (the mathematical or physical reality in the examples above) as its special places. In particular, \mathbb{I} is an algebraic structure, although very peculiar, because with the empty relation as the only definable in the empty set.

The notion of relative nothingness is encountered all the time. In 1993, I visited New York and viewed the World Trade Center towers. In 2009 I went to the same place and said, ‘This is where the WTC towers used to stand and now there is nothing, except perhaps for a heap of rubble’. But it is also the other way round. When I came to New York in 2013, I found that a new building had been constructed at the former WTC site and the place was no longer the vacuum it had been just after September 2001. In *4'33"*, a piece by John Cage, the soloist and the orchestra do nothing for 4 minutes and 33 seconds. In this case, we are tempted to speak of a ‘performance’ rather than a performance. The score is a standard five-line, but the only signs in it are horizontal strokes. Whereas an ordinary music piece consists of sounds, *4'33"* consists of silence, that is, the lack of any sound. Aesthetically, the piece is a radical exemplification of an attitude known as *amor vacui* (love of void, emptiness). Cage could have placed one or more chords in *4'33"*, say, at 2'16" or any other moment. Reverse procedures are also possible. But without introducing suitable conventions,

the question of when vacuum turns into plenum (or vice versa) cannot be answered.

Relative vacua are bound up with certain ontological questions. Let us take for example a hole as a kind of void (see [4]). We may ask whether it has any structure, whether its boundaries belong to it or are part of the surroundings. Similar issues can be pondered with regard to other kinds of vacuum. Let us assume that every year Cage would have written a piece of finite length, but always a minute longer than the present one. Would then the structure of, say, 6'33" be the same as that of 4'33"? Relative vacua are empirical objects and each of them illustrates a general notion of relative nothingness, although sometimes arises the problem of whether we still have to do with a vacuum or already with a plenum (or the other way round). For instance, Cage's vacuum 4'33" filled with sound in 33 percent better approximates normal musical plenum than the same vacuum filled in just 10 percent. It is actually possible that Cage would have protested calling 6'33" (or a silence of any duration other than 4'33") 'Cage's vacuum'. He might insist that the duration of precisely 4 minutes and 33 seconds just determines a special aesthetic value. That relative vacua can remain in approximate or illustrative relations is not very surprising, for they are fully legitimate empirical objects, possessing quite a definite structure and such boundaries. Even the empty set is a mathematical structure, although very peculiar, reduced to an empty relation. In any case, relative nothings differ fundamentally from absolute nothingness. The latter, let me stress once again, has neither a structure nor boundaries, for the reason that it does not exist. Thus, considering Newton's absolute space as a model of nothing must be considered as inaccurate, because this space has several important properties, for instance, symmetry. In fact, speaking about the relative nothing does not require using the term 'nothingness', because such words as 'vacuum', 'silence', 'hole', 'void' or 'emptiness' (perhaps with some adjectives or reference to a context) capture contents that we want to express. The absolute nothingness has an irreducible semantic factor as in the case of *creatio ex nihilo*, Parmenides *me on*, non-being as a *privativum*, or the ideas of Sartre and Heidegger. Formally speaking, the negation in the case of the relative nothing is always classical (or fully explicated inside a logical system), the negation related to the absolute nothingness is always mysterious, not expressible as in Parmenides or Leibniz (there is no hint in his works as nothing should be understood, privative as in the Schoolmen, dialectical as in Hegel, etc.). Perhaps Heidegger's and Sartre's linguistic extravagancies, like 'nihilation' or 'neantization' well illustrate various troubles with the (absolute?) Nothingness.

Appendix

Heidegger's dictum (see note 1) *Das Nichts nichtet* has various English translations, for instance, 'Nothing nothings', 'Nothing nihilates' or 'Nothing nots'. All are strange from the point of view of ordinary English (similarly is in other natural languages). Clearly, Heidegger took advantage of lexical peculiarities of the German language consisting in the possibility of forming the verbs (*nichtet*) from nouns (*das Nichts* in the case); the reverse operation is also possible in German. Anyway, all quoted examples fall under the structure

(#) a is P ,

where a is a proper name and 'is P ' is a predicate. If we use classical logic the referent of a must exist (empty proper names are excluded in classical predicate logic), and, moreover, a has a property P . Heidegger using the noun 'nothingness' in (#) tacitly reified the word *das Nichts* and its equivalents in other language. More importantly, he also reified Nothing understood ontologically, contrary to the intuition that 'Nothing' if regarded as a noun is empty, that is, does not refer to anything. Rudolf Carnap (see [3]) pointed out that Heidegger failed to recognize the logical form of (#), because he confused logical and grammatical subject. The correct translation of 'Nothing nihilates' into logical language is

(##) there exists such x that x nihilates,

and is false, because the predicate 'nihilates' is empty (for Carnap, (##) is meaningless). We do not know which logic was used by Heidegger, because he did not take care to explain this matter. Since he considered his statement as very deep, he probably would not agree that it expresses the banal thought that nothingness does not nihilate, because there is no nothingness. In any case, Heidegger's conviction that logic fails at the deepest regions of being is premature, and his discussion of nihilation by nothingness suggests that he actually did not understand logic.

NOTES

¹ The qualification 'in analytic philosophy' is essential. In my further considerations I almost entirely neglect the ideas of Hegel and Sartre. As far as Heidegger's views on Nothing (the capital is justified here) are concerned, I shall make only marginal remarks in the main text, but see Appendix at the end for an attempt to apply logical tools to Heidegger's famous dictum *Das Nichts nichtet*.

² Quotes indicate that I use a metaphor – the word 'complement' does not refer to a set-theoretical operation.

³ I skip the problem of the existence of mathematical objects. Some philosophers maintain that they exist in God's thoughts and are eternal, others – that they are His creation, but this question is not relevant in this paper.

⁴ I use in this paper some material from [15].

⁵ I will not take into account non-being understood as fiction, for instance, in literary works.

⁶ According to Heidegger no-thing (no-being) nihilates things (being). Thus, *das Nichts* seems more primitive than *das Sein*, and, moreover, the former is equipped with the disposal to be active. I will not continue this topic, although Heidegger's view can be taken as an illustration of the metaphysical nothing (see also Appendix).

⁷ This formulation allows us to ignore a confusing question related to the word *ex*. In fact, it is very difficult to explain in ordinary terms what it means that something was created from nothing.

⁸ Let me note that the logical version of **PSR** raises several interpretative problems (see [16]). This principle very frequently is included into the group of so-called highest principles of thought, next to the principles of identity, contradiction, and the excluded middle. However, if this view is adopted, **PSR** should be a metalogical theorem. But it seems that it is not. If, *pace* Leibniz, the principles of identity and contradiction are regarded as the ultimate principles (axioms) of all correct arguments, one can easily demonstrate that its real role in deductive inferences is rather restricted. For instance, they do not occur in typical axiomatic foundations of logical calculus.

⁹ It seems that Leibniz's view on the relation between these qualifications is not quite transparent. In particular, explanations in (8) can suggest that the properties of being ultimate and being sufficient are co-extensional. A more plausible thesis is that every ultimate reason is sufficient, but the reverse implication does not hold.

¹⁰ There is a theological problem of the relation between God and absolute space. I do not feel competent to decide whether this space is in God or outside Him.

¹¹ I am indebted to Prof. Andrzej Białas for a consultation concerning the role of symmetry in physics; see [2] for a short summary. However, I am not sure whether he would agree with my conclusions.

REFERENCES

- [1] Barrow, J. *The Book of Nothing*. Random House, New York 2000.
- [2] Białas, A. Fizyka wkracza w metafizykę (Physics Enters Metaphysics]. *PAUza Akademicka* 78 (2010), p. 1.
- [3] Carnap, R. Überwindung der Metaphysik durch die Logische Analyse der Sprache. *Erkenntnis* 2 (1932), pp. 219–241; Eng. tr. The Elimination of Metaphysics through Logical Analysis of Language, [in:] *Logical Positivism*, edited by A. J. Ayer, Glencoe, Ill., The Free Press.
- [4] Casati, R., A. Varzi. *Holes and Other Superficialities*. The MIT Press, Cambridge, Mass. 1994.
- [5] Close, F. *Nothing: A Very Short Introduction*. Oxford University Press, Oxford 2009.

- [6] Engfer H.-J. *Principium rationis sufficientis*. [In:] *Histoprisches Wörterbuch der Philosophie* herausgegeben von J. Ritter und K. Gründer, Band 7: P-Q, pp. 1326–1336.
- [7] Genz, H. *Nothingness. The Science of Empty Space*. Perseus Book, Cambridge, Mass. 1984.
- [8] Pruss A. S. *The Principle of Sufficient Reason. A Reassessment*, Cambridge, Cambridge University Press, Cambridge 2006.
- [9] Rundle B. *Why there is Something rather than Nothing*, Oxford, Oxford University Press 2004.
- [10] Weatherall, J. O. *Void. The Strange Physics of Nothing*. Yale University Press, New Haven.
- [11] Wojtysiak, J. O zasadzie racji dostatecznej (On the Principle of Sufficient Reason). *Roczniki Filozoficzne*, LIV(1), 2006, pp. 179–216.
- [12] Wojtysiak, J. *Dlaczego istnieje raczej coś niż nic? Analiza problemu w kontekście dyskusji we współczesnej filozofii analitycznej* (Why is there Something rather than Nothing? An Analysis of the Problem in the Context of the Discussion Conducted in Contemporary Analytic Philosophy). Towarzystwo Naukowe KUL, Katolicki Uniwersytet Lubelski Jana Pawła II, Lublin 2006.
- [13] Woleński, J. Metalogic and Ontology. [In:] *The Courage of Doing Philosophy. Essays Presented to Leszek Nowak*, edited by J. Brzeziński, A. Klawiter, T. Kuipers, K. Łastowski, K. Paprzyckia and P. Przybysz, Rodopi, Amsterdam 2007, pp. 337–351.
- [14] Woleński, J. Applications of Squares of Oppositions and Their Generalizations in Philosophical Analysis, *Logica Universalis* 2(1)(2008), pp. 13–29; reprinted [in:] J. Woleński, *Essays on Logic and Its Applications in Philosophy*, Peter Lang, Frankfurt am Main 2011, pp. 255–269.
- [15] Woleński, J. Nothingness, Philosophy and Keret's House, [In:] *Przestrzenie pustki / Void Spaces*, Fundacja Polskiej Sztuki Nowoczesnej / Foundation of Polish Modern Art., Warszawa 2013, pp. 23–39.
- [16] Woleński, J. Status zasady racji dostatecznej (The Status of the Principle of Sufficient Reason) *Przegląd Filozoficzny – Nowa Seria* (25(4)(100) (2016), pp. 439–450.