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The Structure of the Void

Edited by

Mladen Dolar, Gregor Moder, Aleš Bunta, Matjaž Ličer, Sašo Dolenc

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Mladen Dolar, Gregor Moder, Aleš Bunta, Matjaž Ličer, Sašo Dolenc

The Structure of the Void

The structure of the void is an interdisciplinary research project funded by the Slovene national research agency and carried out at the Slovenian Academy of Sciences and Arts and at the University of Ljubljana. Its aim is to bring together on the one hand the philosophical tradition of reflections on the void, from antiquity up to its contemporary developments, and on the other hand the problem of the void as it is posed in science, both historically and particularly in its present stage. There is the full recognition of the fact that the two languages, coming from the philosophical and the scientific side, are incommensurate, and the project doesn't cater for any easy synthesis; but neither does it consent to the dialogue of the deaf. New questions about defining the void are posed by science itself, and the new ways in which philosophy can treat this one of its ancient problems can be brought to the point of a mutual clarification.

The articles included in this volume of *Filozofski vestnik* can be seen as a result of the symposium organized as part of this research project in March 2013 in Ljubljana. The symposium, carrying the same title as the project itself, gathered predominantly philosophers, but the scientific concerns were also given attention and a platform. The starting point was asking the simple question 'What, if anything, is the void?' The wording points to the essential ambiguity, or the paradox, for the void is precisely not anything, but has to be accounted for as something, as a locus not simply empty, but in its emptiness generative of 'something', indeed of 'being' and universe. Looking at this paradox from the side of science the physicist John Wheeler famously put it: "No point is more central than this, that empty space is not empty. It is the seat of the most violent physics." Two monumental testaments to Wheeler's point are the two greatest scientific theories of 20th century: theory of relativity and quantum field theory. These theories have fundamentally transformed our view of the universe and they have done so precisely by substantially altering our notion of the most fundamental fabric of physical reality – the empty space.

The question has haunted the history of philosophy since the time of ancient atomists (Democritus and later Epicurus and Lucretius) who have been the first to claim that the void is endowed with a structuring function, that it has to be put on the par with the atoms as the indivisible particles of being and that it may well detain the key to the structure of the universe. The question of clinamen, the inherent swerving of the atoms, has to be addressed in its relation to the void; it produces a strange resonance with the questions posed by modern physics. Given that the ancient atomism was the first appearance of materialism in the history of philosophy, this entails the further question of the ways that the materialist stance in philosophy, throughout its history to the present day, has to take into account the void as the key element.

In contrast to ancient atomists, Aristotle, and the entire Aristotelian ontological paradigm after him, was largely trying to prove that the void did not exist, that it had no place. Still, when he defined the void as "place with nothing in it" (*Physics* 213b30), this formula brought together two concepts, *place* and *nothing*, which constitute paradigmatic objects of study in "physics" and metaphysics and produce a tension within the Aristotelian conceptual framework. The Aristotelian "expulsion" of the void was at odds with the Christian tradition, since prohibiting the existence of "vacuum" on the one hand implied limiting God's absolute power, which was unacceptable just as the existence of vacuum within Aristotelian natural philosophy, and on the other hand it brought in question the concept of *creatio ex nihilo* on which the Christian metaphysics was premised.

To bring this schematic brief survey to the modern times, the void was one of the key concepts in the philosophy of the 19th and 20th centuries (but one should be careful to make conceptual distinctions between nothing, void, lack, emptiness and zero – the terms may widely differ in different authors). To mention some key names: Democritus' model, based on the division between the element and the void, acquired a crucial strategic meaning with Hegel who saw in it the basic insight on which the dialectic theory can rest, thus presenting the matrix of dialectics. In his doctoral dissertation, the young Karl Marx contrasted Democritus' and Epicurus' theories of nature, which can shed light on the bases of modern materialism, going back to the early assumptions about the void. In a starkly different vein, Heidegger, in his famous essay *The Thing* (*Das Ding*), posited the void – seen as the essence of *the thing* – as the key to his opposition to scientific thought, which according to him operates with *objects*, thus unable to

contemplate the void. It should be noted that Heidegger's "antiscientific stance" is not primarily directed towards science itself, but towards its "metaphysical essence". Finally, Alain Badiou's central ontological point, which in some ways echoes Heidegger's critique of metaphysics, is the pure multiplicity of being itself. The One does not exist on the level of *being*, only on the level of *the presentation* of being, i.e. as an operation. As predicates are precisely the operators of the subsumption of a certain multiplicity under a certain One, we cannot talk of individual objects on the level of *being*, instead, we can only claim that being as being is the pure multiplicity, a multiplicity of multiplicities. Badiou designates this infinitely fragmented structure of multiplicities *inconsistent multiplicity – the void*. The Badiouean void is thus not the void as in the hollow *absence* of being, but being itself, free of all predication.

On the side of contemporary science, the emergence of relativistic quantum mechanics made it clear that physical vacuum could not be truly empty. Every quantum system possesses fluctuations in the quantum field and the energy they yield (i.e. zeropoint energy); otherwise the energy of the system would be precisely determined (it would equal zero), which would violate the uncertainty principle. The measurement of zeropoint energy is regarded as the first experimental confirmation of the then forming quantum theory. Through the quantum uncertainty principle on the one hand and the relativistic equivalence of mass and energy on the other, physical vacuum *evolved from the passive void into an endlessly complex and dynamic environment*. A similar process can be traced in the curious ways of the notion of aether in Einstein's relativity: completely abandoning the concept at first Einstein was forced to reintroduce it 10 years later as it became clear that even the most empty of spaces has an intrinsic structure that mediates what we perceive as gravity. Thus the physical study of the empty space today stands as one of the most basic components of the contemporary scientific understanding of the world.

These very rough cues serve as the starting point to address the question 'What, if anything, is the void?'

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Mladen Dolar*

The Atom and the Void – from Democritus to Lacan

How did the void come about? How did it become an object of philosophical reflection? What instigates one to consider the void as an object at all? Let me propose a first tentative thesis: philosophy started as the exorcism of the void, and its first move was perhaps to expel, drive out and banish the void. If I take, with all possible caveats, Parmenides' poem as the proper beginning of philosophy, then one can see that the first move hinges on a decision, a choice between two paths: "There is the way that it is and it cannot not be: this is the path of Trust, for Truth attends to it. Then there is the way that it is not and that it must not be: this, as I show you, is an altogether misguided route. For you may not know what-is-not – there is no end to it – nor may you tell of it." Let's leave the staging of this spectacular entry into philosophy aside, the fact that this first philosophical statement is put into the mouth of a goddess, with the celestial chariot and all, myth descending upon earth and thus turning into logos, as it were. The crucial fact is that there is an inaugural assertion of being as what cannot not be, and only this can pave the way to truth, but this assertion is made against a backdrop, it is not a description of the evidence of being, it is the defense against a threat, a pervasive and insidious threat of a void that might engulf us, a void that lurks as an unfathomable menace and a peril, or a lure, so we must hasten to hold onto being before the void might get us. Being is posited as an object of choice and decision at the crossroads, against the backdrop of the black pit of the void and non-being. There is an element of haste or, as in Lacan's take on logical time and its anticipated assertion of certainty, of asserting being before the other alternative might get us. One asserts being, one makes the decision and the choice at the point when one is put against the wall, under threat, in a state of emergency, with the void looming large. For this void, if one considers the other alternative, the other path at this crossroads is actually presented as an empty threat, a painted devil, for neither can it be nor can one know it nor can one say anything about it – so why the panic? The other choice, on the face of it, seems so implausible, logically and epistemologically void, that one can't imagine why anyone would be lured, tempted by it or feel

* Faculty of Arts, University of Ljubljana

threatened. The path of the void and of non-being is the path that one cannot possibly adopt and therefore one must not adopt it ('it must not be') – but why the prohibition since one cannot conceivably adopt it at all? Why prohibit something that cannot be anyway? So the assertion of being – the first assertion of being in western philosophy – is the matter of decision and emphatic choice to avoid the void, the precipice, the black hole, to exorcize it. The tacit presupposition of the first statement, its implicit assumption, is that one must act in favour of being to counteract a possible catastrophe, to abjure the void. One is on a battlefront, and being is a weapon one has to use against an unfathomable enemy. If we look at this predicament from the side of logos, which is to be asserted as pertaining to being as its proper mother-tongue, then one can surmise that this mother-tongue is treacherous, since it has the paradoxical capacity to name what is not, and thus to conjure up the specters of non-being, of absence, of nothing, the specters that induce the belief that they might be something when in fact they are nothing, so one has to assert logos and being against the very capacity of logos to induce negativity and non-being, the capacity to produce the void. Thus, in this light, being would be like a defense mechanism against the void, and by presenting being as a matter of choice and decision there is a disavowed primacy of the void as the lure, the temptation and the threat, lurking behind any talk about being, part and parcel with its logos. So how did the void come about? It came about as the discourse of being as the defense mechanism against the void.

Atomism is the first major philosophical stance to introduce the void not as the empty and proscribed alternative but as the path that necessarily pertains to being, and at the same time, by the same stroke, it is traditionally taken as the first appearance of materialism in the history of philosophy, as if materialism and the void belonged together. Atomism emerged as a reaction against the Parmenidian assertion of being, not accepting the choice and the alternative, but taking both paths at the same time, as it were. How is this possible if the two paths are posited as mutually exclusive? There is the conspicuous fact that atomism's claim to materialism doesn't rest on extolling the matter as the ultimate substance along with the claim that the spirit and the soul are equally material as nature, but in fact involves an operation which does far more than that, it introduces the void as the essential component of being.

Eleatic philosophy was based on two basic tenets: 1. that being is one and indivisible, and 2. that being is (it cannot not be) and non-being is not. Atomism adopted a sharply opposite view on both counts: first, that being is divisible by one, not indivisible as one. It posited the atom as the indivisible particle into which everything can be decomposed, thus imposing the simple count on the diverse and infinite facets of being. Atom can be counted as one, with no possibility of a further decomposition, and everything there is can be ultimately reduced to this 'count-for-one' into infinity. Second, the moment one posits this 'one' as the elementary particle of being, one posits, in the very same breath, the void which separates the atoms and which enables their movement, even more, which is the very principle of their movement. Thereby one posits the non-being at the core of being. The atomistic 'zero thesis' is: non-being is, and it is just as real as being. The whole complexity of being can be reduced to just two elements, the one and the void. If there is division in the atoms, then it pertains not to the indivisible particles, but to the void that surrounds them and which allows them to be counted for one at all. Thus we ultimately arrive at a split entity, an entity split into itself and the void. Hence, the Eleatic principle rests on One as the common denominator of all being, the one of totalization, of *hen kai pan*, while the atomistic one is the one of a split, a split one, the one as introducing a split, a crack into being, the one that cannot totalize being under the heading of one, but splits it into infinity and makes it non-totalizable.

Hegel, the supposed arch-idealist, was always enthusiastic about what he saw as the great speculative achievement of ancient atomism, namely that at the bottom we always have not a unity, but a unity split into something and a void, so that we have to include the void as 'the other half', 'the missing half' of the firm being of atoms. He comes back to it over and over again. The question of materialism is immediately at stake, for if one posits the problem in these terms, then this is obviously vintage idealism to Hegel, since clearly the atoms, the units and the void are 'ideal principles'. They are not something to be seen or experienced, nobody has ever seen, perceived, experienced an atom, not just in those days but at any time with the best equipment at hand. The atom is clearly an idea, the idea of one and division, the idea of void and non-being. "The principle of one is entirely ideal [*ideell*], it entirely belongs to thought, even if one wants to say that atoms exist. The atom can be taken in a material sense, but it is non-sensual [*unsinnlich*], purely intellectual." (TWA 18, p. 358) Atoms are invisible not only because of their minuscule size but also because "one cannot

see One [*das Eins kann man nicht sehen*], it is an abstract entity of thought. … The principle of one is entirely ideal, but not in the sense as if it would be only in thought, in the head, but in the sense that thought is the true essence of things [*der Gedanke das wahre Wesen der Dinge ist*]." (p. 358-9) So atoms are ideal first in the weaker sense, meaning they are in principle not a matter of perception, experience and senses, then in the stronger sense, in the paradigmatic Hegelian sense, meaning that these ideal entities in one's head do affect being. They are not opposed to sensual being but actually spell out its core. Hence Hegel's conclusion that this is "idealism in a higher sense, not a subjective one [*Idealismus im höheren Sinne, nicht subjektiver*]" (p. 359), for what is at stake is not a subjective idea in someone's head (rather, the subject itself is but an effect of this division). This is also in line with one of the Democritus' fragments (related by Plutarch), namely that atom is an idea, *atomos idea*.

Therefore the Hegelian bottom-line is that being and thought intersect, they are not to be opposed, and the point where they intersect is ultimately the split and the void. As Hegel states later in the *History of philosophy* (when debating Epicurus):

> This break [interruption, *Unterbrechung*] is the other side of atoms, the *void*. The movement of thought is such a movement that has in itself the break (thought is in man precisely what atoms and the void are in things, the inner [*das Denken ist im Menschen eben das, was die Atome und das Leere in den Dingen, sein Inneres*]). (TWA 19, str. 311)

This is vintage Hegel. So thought is the break of being, its *Unterbrechung*, its interruption, and what thought and its objects have in common is the break that interrupts objectivity, introducing a void. Thought and world intersect in the void, but this is the very access that thought has to being, the thinking interrupts being itself, it opens up being for us, or the other way around, thought is placed into a rift of being, and the two directions are indistinguishable to Hegel. It is not a question of whether atomism is a good theory, and Hegel will not endorse it in his own account of being, he will deem it insufficient and abstract, and the question is also not whether this is a good historic account of ancient atomism, and a lot of philological research has happened since. The question is that atomism includes a certain insight that Hegel sees as valid and far-reaching, namely that there is a principle of negativity which moves both thought and be-

ing, and that this principle forms the inside of both at their core, *sein Inneres*. To put it in notorious Hegelian terms, the way that substance and subject hang together should be pinned to this principle. We can see that the division between idealism and materialism assumes another proportion: it is not the question of whether matter precedes thought and ideas, matter posited as independent of them, but whether and in what way thought intersects with matter, or whether the division of matter is the very place where thought is inscribed. There is no materialism without espousing this paradox, otherwise matter becomes just another name for traditional substantiality. So the question is not which comes first, but how to think their rift, and hence their articulation.[1] The question of what comes first, matter or idea, already assumes a division that frames the question, but materialism and idealism rather differ in setting this frame.

Hegel comes back to this in the *Logic*, in the remark on atomism when introducing his own concept of One:

> The atomistic principle, with these first thinkers, didn't remain in exteriority, but apart from its abstraction contained a speculative determination that the void was recognized as the source of movement. This implies a completely different relation between atoms and the void than the mere one-beside-the-other [*Nebeneinander*] and mutual indifference of the two. [...] The view that the cause of movement lies in the void contains that deeper thought that the cause of becoming pertains to the negative. (*Logic*, TWA 5, p. 185-6)

In a way, the entire Hegel is there in a nutshell. By positing the one as the positive entity, one inevitably posits the void, the non-being, as the very element in which the 'one' can prosper. So what is indivisible to Hegel is neither the one nor the void, the indivisible is the division itself. However far we seek for a minimal element, we never arrive at a one as the minimal and the indivisible, but at the division. The void as the Platonic missing half of the element, as one answers this description by being indeed missing. Hegel's atom, his elementary particle, is thus the atom itself in this precise sense: 1. what cannot be divided any further is the division; 2. the negative is the inner condition of the positive;

[1] The Lacanian real – and if there is a Lacanian materialism, then it pertains to the notion of the real – is neither a thought, an idea, nor a being (nor matter for that matter), but something emerging precisely in their rift, something that gets lost in the subsequent self-evident division into being and thought and their opposition.

3. there is no unity but a split unity; 4. being and thought intersect in this split. The atom of Hegel's thought is the atom. Against the Parmenidian exorcism of the void, he takes up the atomistic espousal of the void as the way to address the basic matrix of being. Against the exclusion of the void, there is the inclusion of the void into each particle, the missing half of anything positively existing, of any manifestation of being, and this invisible missing half endows being with *Unruhe*, its unrest, its restlessness, its being ever propelled, the fact that it can only be addressed in its becoming, its production and its incompleteness. From panic, defense, exorcism to inclusion, domestication, using the enemy as the ally – but by enlisting the powers of the unfathomable, has one thereby nevertheless effected an exorcism of another kind? Hasn't one avoided the void by espousing it? The void can be seen as the way to make non-being manageable, to turn it into something countable, the very condition of count. But 'is' there non-being which cannot be quite accounted for by the binary couple of the one and the void?

The story of the introduction of the void may have inaugurated the story of atomism, but the subsequent fate of atomism was largely overshadowed by another story which links the void with the contingency as its 'positive expression', and which curiously led to something one might see as the strategy of counteracting the initial espousal of the void. The notorious story of *clinamen* (the term is used only once by Lucretius, *De rerum natura*, 2.292), as it is generally told, goes like this: the atoms, the indivisible particles, are endowed with weight as their principle of movement and they all fall with the same speed. So given their essential and minimal properties their movement can only be that of a parallel fall, like the raindrops ("*imbris uti guttae caderent inane profundum*", "all would fall downwards like raindrops through the profound void," 2.222). In this way nothing would ever emerge, "thus nature would never have produced anything" (2.224). So there has to be a declination, a swerve, a deviation from the downward movement which causes the subsequent encounters and collisions between the atoms, and hence the universe 'as we know it'.

Again, I must apologize for this very simplified account but will, however, remind you that Lucretius rather paradoxically maintains three things about *clinamen*. This declination first happens in no certain place and at no certain time, as he repeats no less than three times – it has no assignable locus or moment, it is dis-placed and dis-timed, as it were, it presents the out-of-jointness of space

and time. Secondly, it is absolutely minimal, "*nec plus quam minimum*", "not more than the least possible", (2.244). The declination is the slightest one one can conceive of, the difference beneath the threshold of any positive or observable difference – a difference different from all usual differences and conditioning them all. Lastly, Lucretius suddenly deviates from his cosmogonic argument (how did the world come about due to *clinamen*) without a warning and immediately plunges into an argument about free will. Cosmology suddenly and without transition shakes hands with anthropology, the causality of nature with the causality of culture, or rather a glitch in the natural causality overlaps with a glitch in the 'psychic causality'. Just as the atoms depart from their way, so does our will depart from the bonds of necessity, it breaks the decrees of fate, the will is wrested from the fates, which puts our *voluntas* and *voluptas* in one at stake, the will and the pleasure. It is not merely the fate of the universe which is at stake, but the fate of our own will and passion, desire and enjoyment – actually not the fate, but quite the opposite, the very possibility of breaking the fate. *Clinamen* (not the void, as in Hegel) is the point where cosmos and humanity overlap, the out-of-place and out-of-time point they share. So the natural causality and the psychic causality are one and the same for Lucretius, our soul being composed of atoms just as everything else, but one and the same precisely as a deviation, a declination of one and the same. One can venture the term 'ontological indifference', or a univocity of movements of the soul and movements of nature.

This story has met with ample and adamant resistance and harsh criticism, stretching from Cicero to Hegel, and sometimes to our days. The most adamant was Cicero, who set the tone for centuries and millennia:

> ... this is entirely a childish fiction ... on the one hand is this declination arbitrarily dreamed up ([Epicurus] says that the atom declines without a cause; for a physicist there is nothing more shameful [*nihil turpius*] than to say that something happens without a cause), and on the other hand he excepted the atoms without a cause from the natural movement of all bodies..." (*De finibus bonorum et malorum*, 1, 19) "Do they draw lots among them which one would decline and which not? And why do they decline by a minimal interval and not by a bigger one? ... This is wishful thinking, not an argument." (*De fato*, 46)[2]

[2] For these sources and for the general background I have drawn on Ernst A. Schmidt, *Clinamen*, Heidelberg: Universitätsverlag Winter 2007, pp. 53-60.

There is a lot more along these lines, and a lot more by a host of other authors, such as Plutarch, Plotinus, Augustine etc., up to Kant ("Epicurus was even so shameless that he required the atoms to decline from their straight movement without any cause so that they would be able to encounter each other")[3] and finally Hegel, who should have known better. Hegel, otherwise an enthusiastic admirer, nevertheless treated the notion of *clinamen* in the same vein with contempt. He says in the *History of philosophy* that for Epicurus the atoms deviate from the straight movement "in a curbed line [*in einer krummen Linie*] which somewhat departs from the straight direction, so that they collide with each other, thus forming a merely superficial unity [*eine oberflächliche Einheit*], not stemming from their essence." (TWA 19, p. 313) In the *Encyclopedia* he states roughly the same: for the atomists the atoms "are to be brought together by *chance* [*Zufall*, coincidence], i. e. the thoughtless [*das Gedankenlose*]. … something completely external [*etwas ganz Äusserliches*]." (TWA 8, p. 206, # 98 Zusatz) So *clinamen* stands for the thoughtless and the external, the absence of thought and of inherent conceptual deduction.

Here we come to the crux of the matter. What belongs to the essence of the atom? Is *clinamen* a merely superficial external addition that doesn't affect the essence? A swerving for no sufficient reason? Is it an essential or an external fate of atoms?

In opposition to this view, let me bring in Deleuze, not exactly a Hegelian, anything but, but who gives to this a very Hegelian twist, more Hegelian than Hegel himself. Thus in the appendix on Lucretius in the *Logic of sense*:

> *Clinamen* or declination has nothing to do with the slanting movement which would come to modify by accident a vertical fall. It is present since always: it is not a secondary movement nor a secondary determination of movement which would occur at a certain moment at a particular place. *Clinamen* is the originary determination of the direction of movement of an atom.[4]

To follow this line of thought against the grain of the dismissive tradition, *clinamen* is always already there, it is the disparity ingrained in the definition of

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3 *Allgemeine Naturgeschichte und Theorie des Himmels*, 1755, TWA 1, p. 234.

4 *Logique du sens*, Paris: Minuit 1969, p. 311. Similarly and briefly also in *Différence et repetition*.

the atom from the outset, its 'internal' disparity with itself. The atom is its own declination, the paradoxical unity not merely of the one and the void, but at the very same time the unity of the entity with its own straying away from itself, as it were. It is not a secondary fate which would befall the atom in itself and its supposed straight path – once there is declination from the path, one supposes the straight direction that must have preceded, but which doesn't exist in itself. The straying away retroactively produces the 'in itself', Hegelianly speaking. The temporal narrative which places things in a sequence – first the parallel fall, then the *clinamen* – is a necessary retroactive illusion. Declination inhabits the atoms from the outset, and it inhabits them permanently, at all times. Their out-of-placeness and out-of-timeness are part and parcel of their place and time. Atoms cannot be thought apart from their inherent swerviness, *clinamen* is their soul, if they had one. It is one with their oneness, hence their oneness is already a departure from one, a swerved one. But wasn't Hegel best placed to appreciate this? Is *clinamen* his blind spot, where he should have seen the necessary 'becoming accidental of essence', the way that the essence can only be itself by fully espousing contingency, or is it an inherent departure from his account of one and the void, something that he must have structurally missed?

Deleuze puts the essential point economically and well, but he had an illustrious predecessor in this. The very young Karl Marx defended his doctoral thesis in 1841 in Jena (the same Jena where Hegel wrote the *Phenomenology of Spirit* and where he watched Napoleon ride a white horse) on the subject, of all things, of *The Difference between the Democritean and Epicurean Philosophy of Nature*, where it appears that he first pinned the fate of his own enterprise precisely on *clinamen*. Although the main line of his argument is questionable, he nevertheless decidedly opposed the bulk of the tradition of harsh criticism of Epicurus on *clinamen*, maintaining precisely that *clinamen* is inherent and not external. So let me quote some Marx which is virtually never quoted:

> Cicero further bemoans … that the declination of the atom happens *without a cause*; and nothing more shameful, says Cicero, could befall a physicist. But, first, a physical cause such as Cicero wants would throw the declination of the atom back into the deterministic series from which it should precisely be lifted. *And further, the atom is not yet accomplished before being determined by declination*. [*Dann aber ist das Atom noch gar nicht vollendet, ehe es in der Bestimmung der Deklination gesetzt ist*.] To question the cause of this determination therefore

> means to question the cause which makes the atom into a principle – a question which is meaningless for someone for whom the atom is the cause of everything, therefore itself without a cause. (MEW Ergbd. 1, p. 282)

What is the cause of the cause? Does cause have a cause? What is required of a cause to be a principle? Can a cause limp? Marx's argument is basically that once we posit the atom as the principle there is no other cause which would affect it apart from the causality already inscribed in it, and declination belongs to its inner causality, not to its subsequent fate. It is equally uniform and univocal as weight, but precisely as the inner disparity of uniformity and univocity. The seeming straying away from causality brings the cause to the fore. It is the cause *de ce qui cloche* (Lacan), the limping cause, always co-present in any cause.

The materialism of *clinamen* runs counter some basic assets of the Aristotelian ontology, which one spontaneously and tacitly assumes. Atom is neither *hyle* nor *morphe*, neither matter nor form, it is precisely a principle evading such a division and all the intricate complications of Aristotelian hylomorphism. It is both matter and form 'in one', it doesn't require form as a separate principle to inform it, it is informed and propelled by itself, endowed in itself with its own impulse and impetus, equally in its straight and its swerving movement. This is where it is even more opposed to the notion of matter deriving from the Cartesian division in which matter is largely seen as inert and passive, ruled by mechanical laws. Atoms effectively blur the line between the animate and the inanimate as well as the line between matter and idea as well as the line between the physical and the psychic as well as the line between necessity and chance. The simple and the difficult thing to grasp in this atomism is its going against the grain of seemingly self-evident Aristotelian dualities, the way to circumvent them, to think the 'two in one', as it were, but in a one which can no longer be 'the One' nor one at all. Any one is the internal swerving of oneness which dismantles its oneness.

Undoubtedly, there is a problem there. Deleuze's and Marx's reading, insightful and lucid as it is in its speculative turn (now largely followed by the bulk of contemporary criticism), can easily turn *clinamen* into a non-concept, it can quickly become the ubiquitous key. At the worst, it is ideally suited to feature as the hero of the postmodern era, its fashionable catchword and password, conflating the developments in physics, Prigogine's 'dissipative structures', fractals, chaos

and quanta, with the devices of (post)modern poetics, where Jarry and Joyce, both keen admirers of Lucretius, have paved the way.[5] And there is but a small step to include Derrida's *différance-détournement* and Deleuze's *lignes de fuite*, Meillassoux's 'necessity of contingency' etc. in the general mix. One can easily imagine how *clinamen* can amply prosper in this way, a universal *passe-partout* in its seeming singularity, and reticence is in place if one has no stomach for such a prospect. But this flamboyant use doesn't disqualify the concept itself, which has produced intriguing offspring: most notably Althusser's idea of aleatory materialism, or the 'materialism of the encounter', is entirely premised on *clinamen*, but I cannot discuss it further in this scope.

Ultimately there are two possibilities: one either situates *clinamen* in the place of a constitutive exception, something that must have always already happened in order for the universe to emerge, occurring out-of-space and out-of-time with no place nor moment within space and time once they are constituted. Or else it can be an omnipresent 'quasi-universal' principle, which immanently derails any given one at all places and all times. It seems that Badiou, in his perspicacious treatment of *clinamen* in his *Theory of the subject*, roughly opts for the first solution:

> It is absolutely necessary that *clinamen* be abolished in its own turn. [...] Any particular explanation of any particular thing must not require *clinamen*, although the existence of a thing in general is unthinkable without it. [...] The atom affected by deviation engenders the Whole without any rest or trace of this affection. Better still: the effect is the retroactive effacement of the cause [...] the deviation, being neither the atom nor the void nor the action of the void nor the system of atoms, is unintelligible.[6]

Deleuze, on the other hand, opts for the second solution, and one could read his notion of the virtual as the inherent and immanent *clinamen*, swerviness, inhabiting every moment and entity. – Having in mind Lacan's formulas of sexuation one could well pose the question: is Badiou a man? Is Deleuze a woman?

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5 The first sentence of *Fineggans Wake* famously begins: "riverrun, past Eve and Adam's, from swerve of shore to bend of bay ..." There is the swerve right at the opening and some commentators have seen Lucretius there, and *clinamen* as the most appropriate kick-off of the novel which was to encompass the universe.

6 *Théorie du sujet*, Paris: Seuil 1982, p. 79-80.

In the first case we take it as an exception that never 'takes place', although it underlies every taking place as an out-of-worldly 'immanent transcendence'. In the second case we quasi-universalize the exception and make it immanent to any taking place and thus turn it to a universal swerviness of any universal, the out-of-oneness of any One (with the danger of providing a convenient and non-binding *passe-partout*). How to think together the One and the Other? Is there a third option?

So is the Hegelian speculative insight, with the far-reaching consequences that Hegel was to draw, the bottom-line of the story of atomism as materialism? The one, the void, the split, the negativity, the subject inscribed in the split? Or are we to espouse the *clinamen* story, which displaces the Hegelian story and circumvents the stark opposition and the split? – Let me, in conclusion, go back to Democritus and briefly look at an option that neither Hegel nor Marx considered, an obscure spot which was pinpointed as crucial by Lacan and where he saw something like the 'atom of thought and being', as opposed to the Hegelian atom. In a famous spot in *The Four Fundamental Concepts*, he says the following:

> When Democritus tried to designate it [the origin], presenting himself as already the adversary of a pure function of negativity in order to introduce thought into it, he says, *It is not the* meden [non-being] *that is essential*, and adds [...] *it is not a* meden, *but a* den, which, in Greek is a coined word. He did not say *hen* [one] let alone *on* [being]. What, then, did he say? He said, answering the question I asked today, that of idealism, *Nothing, perhaps?* – not *perhaps nothing*, but *not nothing*. (P. 63-4)[7]

So what, if anything, is *den*?

In the famous fragment 156 (in the canonical Diels-Kranz edition), Democritus enigmatically introduced precisely something that wouldn't fall on either side of the divide between the one and the void. He coined a term, *den*, which caused a lot of headache to the classical philologists because it is an improper word formation in Greek ("a coined word," says Lacan). The word stems from the negation of *hen*, one. *Hen* can be negated in Greek in two ways, either as *ouden* (ob-

7 *The Four Fundamental Concepts of Psychoanalysis*, transl. Alan Sheridan, London: Penguin 1979.

jective negation) or as *meden* (subjective negation), and they would both mean 'nothing' (although with a different shading), more accurately 'not one', or 'not even one'. *Den*, this malaproprism, means like 'less than one, but still not nothing', or pushing it a bit, 'less than nothing'. It presents a hard nut for translators. Diels translated this curious word by *das Ichts* (*Das Nichts existiert ebenso sehr als das Ichts*).[8] The English translation by W. I. Matson proposed 'hing', as opposed to the thing: 'Hing is no more real than nothing' or 'Hing exists no more than nothing'.[9] A more accurate rendition would have been 'othing', as a subtraction from nothing. Barbara Cassin, the formidable French scholar, proposed the French translation *ien* – not *rien*, nothing, but *ien*, precisely 'not nothing', as Lacan says (or alternatively *iun*, not one).

> By the peculiar amalgamation of the last letter of negation with the negated positivity it obliges us to understand that the atom not only is not an affirmation or a position, being or one, but furthermore that it is not their negation either, that it doesn't have the consistency of 'no-thing' or '*rien*': the atom is literally less than nothing, one has to call it '*ien*' [...] *Den* is the name of the atom insofar one cannot conflate it with the being of ontology nor take it as an elementary body of physics.[10]

So what is this entity, *den*? Not something, not nothing, not being, not one, not positively existing, not absent, not countable – is this not precisely the object that we are after? What is *den* the name of – object *a*? This is the point that Lacan singled out in our quote, although he couldn't quite escape negation: "*Nothing, perhaps?* – not *perhaps nothing*, but *not nothing*." It is not a negation, but rather like a decapitation of nothing, cutting off its head, turning no-thing into *Ichts, hing, othing, ien*. Or to use the Badiouean term: not negation, but subtraction. It is not a subtraction from being, introducing a void, nor is it a left-over of the negation of being which didn't quite succeed, but rather – and this is the mind-boggling speculative turn – a subtraction from non-being, as negativity effacing itself. There is a failure of double negation, a glitch in the Hegelian negation of negation. Something emerges in this imposition and failure of negativity, but

8 Hermann Diels & Walther Kranz (eds.), *Die Fragmente der Vorsokratiker II*, Berlin: Wiedmannsche Buchhandlung, 1935, fr. 156, p. 174. – I can add that in my own language the Slovene translator Anton Sovre followed this line by coining the neologism '*ič*', as opposed to '*nič*', nothing. *Predsokratiki*, Ljubljana: Slovenska matica 2002, p. 200.

9 W. I. Matson, "Democritus, Fragment 156", *The Classical Quarterly*, 13, 1963, pp. 26-29.

10 Alain Badiou & Barbara Cassin, *Il n'y pas de rapport sexuel*, Paris: Fayard 2010, p. 81.

not quite something, it has no positivity and no identity, yet such is the being of the atom.

Heinz Wismann, one of the greatest specialists in Democritus, doesn't shy away from this consequence:

> Actually, the 'real' evoked by the rudimentary term (*den*) forged by Democritus owes its existence only to the removal of negation (*me*) which is inherent both to the conceptual and to the lexical reality of 'nothing' (*meden*). Being, one could say, is just a privative state of non-being [*l'être … n'est qu'un état privatif du non-être*]; its positivity is a lure. It is a kind of subtraction operated on nothing [*soustraction opérée à partir de rien*, subtraction executed on the basis of nothing], atom can be thought as the avatar of the void [*avatar du vide*].[11]

This serves as the title of Wismann's book, *Les avatars du vide*, and here we have it, the basic move that I am trying to follow: from the inaugural exorcism of the void which is the flip side of Parmenides' initial gesture to the atoms as the avatars of the void, not simply as positive beings that entail the void as the consequence, but as being themselves nothing but the avatars of the void, the very verge of being and non-being.

If atom is *den*, then for Democritus it can have no weight, so there can be no parallel fall nor the problem of *clinamen*. It was only Epicurus who actually ascribed weight to atoms, being thus unwittingly prey to the Aristotelian ontology, unable to conceive of atom as not being a body. Atoms are not bodies, but mere trajectories producing bodies. There seems to be like an enactment in advance of the dilemma presented by modern nuclear physics: either the body or the wave, you can't have both, there is a parallax. If Democritus, unaware of any of this, opted for the waves (*rhysmos* was for him the basic property of atoms), then the Aristotelian ontology, including Epicurus, opted for the bodies.[12] Ontology and physics followed suit. – No wonder that Plato, so Diogenes Laertius tells

[11] Heinz Wismann, *Les avatars du vide*, Paris: Hermann 2010, p. 65.

[12] Democritus ascribed three properties to the atom: *rhysmos* – rhythm, wave; *diathigè* – touching upon, contact; *tropè* – return, twist. Aristotle translated them into his own terms as *schema, taxis, thesis*, which then in Latin rendition became *forma, ordo, positio*. One should note how all Democritus' descriptions are those of a movement, whereas Aristotle's refer to a state.

us, wanted to burn all Democritus' writings (but there were too many), and no wonder that when Democritus came to Athens nobody recognized him.

Den is like an ontological scandal. Lacan comes back to it in *L'Étourdit*:

> Democritus has made us the gift of *atomos*, of the radical real, with the elision of 'no', *me*, but in its modality whose demand requires consideration. In this way *den* was the clandestine passenger whose shell now forms our fate. In this he was no more materialist than anyone who has some sense [*n'importe qui de sensé*], for instance me or Marx. (*Autres écrits*, Paris: Seuil 2001, p. 494).

Den condenses our question in a minimal way. What is particularly striking with it is its inner connection with the Hegelian story, which I take to be the best account of the philosophical impact of atomism, under the bias of one/void, being/non-being. *Den* emerges literally in the same place, in the very division, in the midst of the split that Hegel took to be the spectacular clue. *Den* is co-extensive and at the same time incommensurable with 'one', the one that the atoms introduced as the count of being, and with the void as the flip side of the split one. One could say that it is the missing half of Hegel's atom, the one that was already split into the present and the missing half, with the co-belonging of being and non-being, of one and the void as the dialectical matrix – but *den* is the missing half of this split unity itself, exactly by not being quite missing nor being quite there, by not being in any dialectical relation to the foundational split of the atom. It is the pure surplus of the split, a (non)entity escaping the division yet not 'being' somewhere else, dwelling in the division itself. Not an originary presence or absence, not a foundational principle, a mere *hing* (or *othing*) derivative of the split (into one/void, being/non-being) and irreducible to it.

> *Den* can be thought only after the one, as a subtractive operation and not as a provenance, truncated or not. It cannot be submitted to dialectics precisely by not being a negation of negation, taken up and sublated, but a subtraction on the basis of negation [...] It is not an entry but an exit, a way out which makes the origin stumble and deviates the history of philosophy [...]. (Cassin, p. 83-4)

This is the crux of the matter (figuratively and literally): *den* comes not quite after 'one', but in the same package with one, yet without making either two or zero. It is the other of one by being neither the nothing of its negation nor

the multiplicity of its proliferation. It is recalcitrant to count, yet dependent on 'one', the cut of the signifier at its minimal.

The question of *clinamen* is indicative at this point. We have seen that Hegel spoke depreciatively of *clinamen*, siding with its numerous detractors, while praising the profound insight of the split into the one and the void as constitutive of the atom, a clue to substance, subject, negativity, being, nothing, dialectics. On the other hand, Deleuze made a great case of *clinamen*, ultimately precisely as a way of avoiding the one and the void: it is a move that enables circumventing the cut, negativity, lack etc. lurking in the atom, along with all the traps of the Hegelian dialectics, and this circumvention paves the way for the positivity of becoming. There seems to be like a parallax view when looking at the atom: either one sees the split, one/void etc. as Hegel did, or else one sees *clinamen*, the inner swerviness, torsion, declination, the immanent becoming not premised on the cut of negativity, relying on swerviness as the becoming without a void – where clinamen is taken as the exorcism of the void. It is as if seeing one part precluded seeing the other, one cannot make a compromise or a synthesis of the two.

Taking the cue from the happy Democritean invention of *den* maybe allows us to sidestep this parallax choice: it is only on the basis of 'one' and the cut that *den* can emerge, as a subtraction of negativity, not its exorcizing. This avoids positing *clinamen* as either a 'foundational exception' (Badiou) or a universalized virtuality (Deleuze). Thus one maintains both parts, 'one' and *den*, in their very incommensurability, as the very cleft of being, the place where both being and thought (e)merge. It produces a new object yet lying low since the dawn of philosophy as its clandestine passenger, an object with no identity and founding no ontology. This is perhaps the spot where psychoanalysis is to be understood as the heir to the Hegelian dialectic, not its abandonment, yet at the same time envisaging something that emerges within it and cannot be quite accounted for in its terms.

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Tzuchien Tho*

The Void Just Ain't (What It Used To Be): Void, Infinity, and the Indeterminate

"[Q]uae sane unica fuisset causa, ut veritas humanum genus in aeternum lateret; nisi Mathesis…"
Spinoza, *Ethics*, Book I appendix

I. Taming of the infinite, taming of the void

On the 4th of June 1925, David Hilbert famously announced to the Westphalian Mathematical Congress that "No one shall drive us out of the paradise that Cantor has created for us."[1] For more than a century now we can comfortably speak of a "modern mathematics", marked by the twin breakthroughs of Cantor and Dedekind in the last years of the 19th century, through which infinite orders of infinity (the transfinite), along with the field of irrational numbers, have become the mundane operable entities of mathematical and philosophical work. With this "taming of the infinite", can we also speak of a taming of the void?

In earlier historical contexts, the void-infinite formed a conceptual pair. In some of the earliest conflicts between the partisans of the void and those against, we find Aristotle's famous refutations of atomism. Typical among these rejections was Aristotle's direct association of the void with the indefinite. As he argues in the *Physics*, any locomotive event implies definite speed of such motion and, since the void is itself indefinite, it could not provide a criterion of measure for such motion. In other words, if locomotion exists, then the void does not."[2]

The Antique indefinite is of course not the "infinite" understood, across the many transformations of the concepts from the medieval and modern periods, either as the absoluteness of god or the various mathematical distinctions made

[1] David Hilbert, "On the Infinite", in *Philosophy of Mathematics*, 2nd ed., edited by Paul Benacerraf and Hilary Putnam, Cambridge: Cambridge University Press, 1983, p. 191.

[2] Aristotle, *Physics*, IV 8, 215a5-12; *The Basic Works of Aristotle*, ed. Richard McKeon, New York: Modern Library, 2001, p. 283.

* Centre International d'Etude de la Philosophie Française Contemporaine, Paris, France

on the infinite through these periods. At the same time however, it is this same, albeit ambiguous, indefinite-infinite that is irrevocably demystified with the advent of Cantor's transfinite. Along with Cantor, Dedekind can also be given some share of the spotlight here. The very idea of an "irrational" number co-extensive with something as fundamental as the Pythagorean theorem entertains legends of the poor Hippasus who was apparently murdered (by drowning according to Pappus of Alexandria) by the master Pythagoras himself for making exoteric what was the irrational esoteric secret within the cult. With Dedekind, irrationals come to share the same determinate status as any number whatsoever picked out from the "cut" of the continuous number line. Hence, if the irrational, infinite (indefinite), and other such terms (i.e. imaginary-complex) are no longer the conceptual mirror of the void, we see that the void itself has also, in this, been demystified. The couple void-infinite (indefinite) can only be sustained if the indeterminateness of the former can be imputed on the latter. To make a long historical story very brief (bypassing the long entanglements with the infinite across roughly two millennia), we are no longer in the position to conceive the infinite as indeterminate and thus equally denied the luxury of making this conceptual circuit between the infinite, indeterminate, and the void.

With the taming of the infinite, the void is thus also tamed. From without and within, the void should neither be thought as the abiding negative principle from which a structure of particular things is un-determined nor should it be an undetermined abyss immanent in each determinate being from which transformation spring forth. The conceptual power of the void is neutralized along with that of the infinite.

II. Atomistic Stratagem

Let us formulate this insight sketched above in the form of a critique of contemporary thought. As our reflections on the void and the infinite (in meta-mathematical terms) above are at a certain remove from contemporary philosophy, we bracket these reflections for the moment.

From thinkers as diverse as Rancière, Agamben, and Žižek, we find a common strategy for thinking with the void. These three represent at least three different traditions of thought, each one represented by some proper subset of Marxism, Heideggeriansm, deconstruction, psychoanalysis, and structuralism, and my

criticism against them cannot but remain far from addressing their larger contributions. Yet it is perhaps due to the diversity in this spectrum of thinkers that their commonality on the question of the void might indeed be striking. This common strategy is no doubt familiar to readers of contemporary continental theory. It can be briefly sketched in four steps. This might be named the "atomistic strategy".

> [1] The first step is to outline some quasi-total structure, regime, or framework of representation. This is to be identified as the political state (understood as the neo-liberal police-state, ideology, etc.), universal bio-political regime, global capitalism, or the like.
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> [2] The second step is to assert the structural difficulties in undermining or resisting such a quasi-total structure or regime in the terms of the structure itself. As such, the dissenting demonstrations of a citizenry or the contestation of labour unions are quickly absorbed by the structural forces and set to reproduce the structures that provoked such acts. The problem is that these resisting forces of the structure are determinate (though antagonistic) features of the structure itself. In other words, there is no non-work time in capitalism, outside the 8 hours of labour, there are 8 hours of rest and 8 hours of leisure (according to the famous slogan but now a tremendous luxury). Both rest *and* leisure are determinate parts of the 24 hour productive day.
>
> [3] The third step is to designate a *singular* abstract subject such as the proletariat, the commons, and the like, often allegorized in figures like Melville's Bartleby, the ignorant school-master (J. Jacotot), the *Tiananmen* protestors, or the Israeli Refusniks. These are singular figures insofar as their actions (or non-actions, not part of the circle labour-rest-leisure) have no valence within the coordinates of the quasi-total structure identified in point [1] and [2] above. These constitute a real challenge or danger to the given regime or structure, unlike those actions in point [2] above, precisely because they not only delegitimise such structures by rendering apparent the latter's arbitrariness or contingency, their actions also constitute an existent yet non-determinate resistance or nascent counter-power to the existent regime.

> [4] The fourth and final step is to generalize the status of these singular subjects (or in-actions) in order to make a general point about the relation between a regime or structure and the void. By identifying the singular subject above [3] with the void, we allow ourselves to schematize this structure-regime (power-aesthetic-representation) by identifying a "hole", "gap", "lack", or "blind-spot". Such figures of the void provide an "immanent-outside", which, because they are at once part of the regime and unrepresentable in the terms of said regime, allow us to delimit such a regime qua structure outside of the terms (the determinate identities) with which the regime itself operates. This figure of the void not only allows us to determine the contingent or arbitrary limits of any structure, it also allows us to determine the undetermined abyss via the figure of the singular subject that would be capable of undermining such seemingly impenetrable quasi-totalities as the police-state, bio-politics, and global capitalism.

Though far from disagreeing with such a general strategy in the analysis of contemporary politics, it is with the last of these "steps" sketched above that our present critique takes exception. It concerns itself with how this *singular indeterminate* subject noted above [3] should be understood. We see in the above sketch that the problem of the singular is conceptualized within a context of two other terms: a determinate order of representations (regime, state, etc.) and a determinate order of transformations within the order (dissent, contestations, etc.). The problem of the determinate order of transformation is that such a form of difference is not strong enough or radical enough to uproot the ruling order but, through integration or reform, only to recombine the already given group of identities or representations. The third term, that of the void, serves to disrupt such "reformism" precisely insofar as it plays no part in the operation of "normal transformation" within the given structure.

Here we might look at Ancient Atomism for the understanding of the strategy. We know that the Epicureans formulated a specific solution for a problem that arose in the attempt to account for being in terms of the twin principles of void and atom. The problem, posed in opposition to Aristotle, arose in the context of the genesis of physical reality. If all atoms (the indivisibles) fell in the void with the same speed, what would result in such a "rain" would be tantamount to being no reality at all insofar as it would lack in even minimal differentiability. At

least in Lucretius, a "swerve", "declination", or clinamen is necessary in "the first beginnings" in order to generate the eventual aggregations and interactions that will generate the physical world of differentiated things and forms.[3] As such, the determinate system of atomic interactions requires a principle of indetermination precisely because what is determinate can only be grasped from within the physical system itself. The origin of such a system would by definition be indeterminate, as Lucretius puts it, "at no fixed place and at no fixed time." It is in this sense that the final step of the four-step strategy described above is nicely illustrated by Epicurean atomism. The contemporary "atomistic strategy" identifies the void (qua indeterminate principle) and the *clinamen*. Such an approach to the indeterminate, found not only in the Epicurean school but also in the contemporary "atomistic strategy", suffer from a form of ersatz reification of that "something" required by the lacking "ground" for a desideratum of systematic consistency. We see here that the solution to the Atomistic problem can only take the form of a hypostasis, the reification of an indeterminate *clinamen*. If such an origin could be determinate, it would already have to be part of the physical system and hence we would require another, more original indeterminate principle (in a regressive account *ad infinitum*). In the contemporary context, it is the void that plays such a role as the reified repository for the indeterminate.

In philosophical terms, this way of thinking the "indeterminate" qua void is such that it renders it dependent on its relation with the determinate. As a figure of "abyss", "lack", or "hole", the signification of the void is coextensive with that for which it is "other"; dependent on the determinate, the total, the whole. It is here that the meta-mathematical reflection from which we started can provide some insight. In purely figurative terms, it is only within the assumption of a quasi-totalizing regime-structure-state that this conceptual connection between the void qua singular and the indeterminate-indefinite-infinite can constitute a circuit of terms. It is this very circuit between a global or universal state-regime of representations, its normal transformations of particular transformations-recombination, and the radical or singular void, that is the aim of this four-step program outlined above shared by a surprisingly divergent set

[3] Lucretius, *De Rerum Natura*, II 290-293; *On the Nature of Things*, trans. by W.H.D. Rouse and rev. by Martin F. Smith, Cambridge, MA: Loeb Classical Library, 2002, p. 119.

of contemporary philosophical tendencies. By rejecting the identification of the void with the indeterminate, it is also this very circuit that must be rejected.

Although implicit, this circuit of terms sketched above makes use of the identification of the void and the infinite qua indefinite-indeterminate. If, as we have argued, this couple void-infinite is no longer a viable one, how can we reconceive the singular? In other words, how can we conceive of the singular indeterminate outside of its subsumption within the co-extensiveness of the void and totality? What is at stake here is a different possible conception of the singular in the confrontation between philosophy and those singular figures at work in our time out of joint.

III. Zero divides into two

Badiou's long philosophical development, from his early interventions within the Althusserian-Lacanian journal *Cahiers pour l'analyse* in the late 1960s to his recent multi-volumed *Being and Event*, provides an alternative path to the "Atomistic strategy": call it a "formalist" alternative.[4] This approach, which draws from the actuality of a post-Cantorian meta-mathematical universe, commences from the key insight that the taming of the infinite entails a neutralization of the void. In order to isolate the key difference that this approach makes and to establish a paradigm for understanding this formalist alternative, we shall examine the theoretical conflict between Badiou and Miller, his colleague-interlocutor in his early essays in the *Cahiers*. It is in the context of the *Cahiers* that one can also glimpse a red thread of contention that will prefigure the many polemical episodes that will mark Badiou's work since the 1960s.

To grasp the context of Badiou's refutation of Miller, we must make a short detour into the problem of structuralism, which provides not only the background for Badiou's philosophical formation but also that of the speculative zero-degree for many participants of the *Cahiers*. From the work of Saussure, an answer is given to the question of how meaning is constituted in language through the internal organization of textual or phonemic signs. Against an essentialist account of how marks or sounds produce meaning, an alternative account is provided whereby sense arises out of the contingent distribution of semantic values

4 The *Cahiers pour l'analyse* will be abbreviated as *Cahiers* in what follows.

over a series of mutually distinguished signs. This *functional* account of sense or meaning then relies on the consistency of structure understood as a closed set of mutually distinguished variable-places over which values can be assigned. In turn, these variable-places, before any distribution of values over them, are neutral or without sense.

Such a structuralist account may serve the analysis of any given natural language, but it faces concrete limits in the investigation of the origins of the emergence of the series of signifying marks (textual or phonemic) themselves. In the later adaptation of the structuralist turn in the field of anthropology, Lévi-Strauss was clear to abstain from genetic accounts in his functional *analysis* of morphisms in kinship and mythic structure. On the question of genetic accounts, like Laplace before Napoleon, Levi-Strass notes that, "[I] shall now do no more than repeat that social anthropology has no need of this hypothesis."[5] Through long discussions with one of the most important mathematicians of the 20th century, André Weil, Lévi-Strauss borrowed heavily from the algebra structure of groups (group theory) in order to provide the dimension of a "neutral" or "identity" operator responsible for sustaining the internal consistency of anthropological structure.[6] This algebraic influence allowed Lévi-Strauss to make a further steps toward a functional analysis (whose contingency was always foundational) of the nature of social arrangements and myths precisely by delimiting structural analysis from a non-structural origin or genesis. Far from implying that there is no genesis of structure (linguistic, anthropological), the idea is that there can be no account of such a genesis from the structure itself. Here the tools of *analysis* require a field of determinate terms, and the indeterminate genesis of such a determinate structure is by definition outside of the field of analysis.

In full view of this problem of genesis in structuralism, both Lacan's "Science and Truth" and Miller's "Suture (Elements of the logic of the signifier)", their respective contributions to the inaugural volume (February 1966) of the *Cahiers*, provide attempts to treat this limit of causality of structure while preserving a

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5 Claude Lévi-Strauss, *The Elementary Structure of Kinship*, trans. by J.H. Bell, John Richard von Stumer and ed. by Rodney Needham, Boston: Beacon Press, 1969, p. xxix.

6 Cf. André Weil, "On the Algebraic Study of Certain Types of Marriage Laws (Murngin system)", in *The Elementary Structure of Kinship*, p. 221-230.

structuralist background framework.[7] In these texts, both Miller and Lacan provide a dynamic view of structure by reconceiving the problem of the causality of structure. Since genetic causality cannot be given within structure, this causality must be treated as the indeterminate "other" of the structure (understood in the structuralist framework as a closed system of mutually differentiated variable-places). Both Lacan and Miller provide a sophisticated handling of this problem. Although we have been speaking in a figuratively *chronological* way about genetic causality, both Lacan and Miller understand such a limit to structural analysis in a transcendental way. That is, the problem of causality need not be *chronologically* prior to structure, what is simply indicated is that, insofar as structure is limited by the contingent grounds of its internal consistency, one can retroactively or immanently attend to such an internal indetermination within a given structure.

This starts to look a lot like the "Atomistic strategy" above. Since the origin of physical interaction following the *physical* rules of "weight" and "trajectory" has an origin that cannot be accounted for within physics, an *exception* must be conjectured. This exception, understood in the Atomistic framework as the clinamen or "swerve", is the errant, contingent, and undetermined transformation that causally generates this closed structure of mutual effect at some indeterminate and retroactively posited origin.

Miller's important contribution to this historical line of conceptual constructions is in his explicit connection of such a structuralist problem and the problem of mathematical consistency. From the outset we see that the development of structuralism has followed in the path of mathematical formalization not the least with Levi-Strauss' early use of group theory, a tendency he will continue to exploit into the fields of topology in following works. Here, Miller seems to take the tendency to its extreme: the structural reading of Frege's *Foundations of Arithmetic*. But Miller was not only following an intellectual tendency but, as we shall see, developing the fundamental problem of the contingency in structuralism by the identification of the same problem within the *Grundlagenkrise* in mathematics.

7 All references to the *Cahiers pour l'analyse* are taken from the website of the project where original texts and a number of translations are available. <cahiers.kingston.ac.uk>.

Miller's structuralist approach to Frege addresses the problem of the *analytic* nature of the field of arithmetic entities. Much like the problem of structure, the entities of arithmetic provided Miller with the occasional cause to coordinate the problem of the indeterminate in structure with mathematics. This attempt was part of Miller's project of producing a "logic of the signifier" and constituted one of the key intended aims of the *Cahiers* project. Frege's aim was to move the foundations of arithmetic (and mathematics in general) away from the vicious circularity that had shrouded the transcendental character of mathematical foundations in the Kantian tradition which had been widely influential since the 18th century. Kant's definition of the foundations of arithmetic, put forward in the *Critique of Pure Reason* and in the *Prolegomena to Any Future Metaphysics*, attached counting, and, in turn, the successive iteration of numbers, to the intuition of time, the form of inner sense. [8] Arithmetic was then an *a priori* cognition based on the synthesis of units of time which might be reduced to a feature of consciousness: the intuitive self-representation of a unit of time, a moment. This approach relies on a pre-given notion of unity, a unit of time, pre-given in the cognitive faculty itself. What this implies is the synthetic nature of arithmetic: the combination of these represented units supplied by inner cognition. Yet we seem to be caught in a *petitio principia*. Arithmetic ends up being grounded by something that is already arithmetical. This is no grounding at all.[9]

The question of mathematical *Grundlagenkrise* was how to present a theory of arithmetic without already presupposing numerical concepts. Against the invocation of the "unit" in consciousness, Frege put emphasis on the idea that a certain sort of numericity was already operative in primitive logical relations. When we distinguish things by reference, a certain "number" of them are implicit in such a referentiality. A concept that picks out "featherless bipeds" already implies a certain number of these objects, its *extension*. Yet, in order to bridge this implicit feature of logic with an explicit and unique reference to numbers themselves, Frege has to first establish a univocal arithmetic series. In

8 Cf. Immanuel Kant, *Critique of Pure Reason*, trans. Werner Pluhar, Indianapolis: Hackett Publishing, 1996, B 14-17, p. 55-57.

9 Of course, there remained great mathematicians who attempted to re-articulate a "Kantian" approach to the foundations of mathematics. The Neo-intuitionists, headed by L.E.J Brouwer, developed an alternative not only to a Fregean-Russelian (logicist) approach in the domain of foundations, but also an alternative to set-theoretical analysis of the continuum. Nonetheless, this development was made in view of these historical reconfigurations of the standards and methods made standard in the wake of "modern mathematics".

order to do this, one needs to find a unique reference to the number "zero" as the first number. Instead of "featherless bipeds", the concept that Frege chose to express this was that which is "not identical with itself".[10] Frege, by reasoning that there is nothing that is not identical with itself, "x≠x", identifies a concept with no extension at all, since it does not refer to anything. In turn, with this unique referent in place, numbers would succeed as the re-counting of this empty referent.

Concept	Extension of the concept	Natural (counting) number
Not identical with itself (x≠x)	∅	0
Identical with ∅	{∅}	1
Identical with ∅, {∅}	{∅,{∅}}	2
Identical with ∅, {∅},{∅,{∅}}	{∅, {∅},{∅,{∅}}}	3
...	...	...

Unequivocal reference to the basic natural or counting numbers (0, 1, 2, 3,...) would proceed by reference to this concept. "One" would be the counting of this empty extension, "two" would be the counting of this counted empty extension, and "three" would be the counting of the counting of this empty set. This iterative procedure indeed returns to satisfy the iterative or successive structure of arithmetic progression. Once in place, the expansion of this basic procedure would allow us to map the successive, or iterative structure, generating the variety of other numbers (i.e. the evens, the rationals, the reals).[11]

[10] Gottlob Frege, *The Foundations of Arithmetic*, trans. by J.L. Austin, New York: Harper Torchbooks, 1960,p. 88. Frege duly notes that, "I could have used for the definition of nought any other concept under which no object falls. But I have made a point of choosing one which can be proved to be such on purely logical grounds; and for this purpose 'not identical with itself' is the most convenient...."

[11] Of course the structure of these numbers (natural, evens, rationals, primes) qua numbers is not the same. It provides a mapping and the basic iterative structure allows a minimal means to mark differences at the same time as showing a bijective function (isomorphism).

Natural	0	1	2	3	4	5	...
Even	0	2	4	6	8	10	...
Prime	2	3	5	7	11	13	...

Frege's foundational account for numbers requires a univocal reference to each number. Despite the fact that "featherless bipeds" and "words in this sentence" pick out referents that display a certain numericity, what is necessary for a foundational account is to distinguish a unique referent, such as a zero, a one, a two, and so forth. These references could then allow us to place the extension ("picked out" entities) of these different concepts in correspondence with this numerical ordering. The number of words in this sentence (the extension of "the number of words in this sentence") could thus refer uniquely to one of the numbers generated by this sequence of counting and recounting of the void set. The number is "38".

Miller's interpretation of Frege hinges on the artful minimalism of Frege's foundational argument. On the one hand, Frege's recognition of variation and extensive multiplicity in successful reference forced him to provide a unique referential scheme of numbers. On the other hand, this scheme carefully avoids the dangerous circularity of placing unity at its basis. It is through Frege's minimalism that Miller applies his notion of suture and brings together the content of Frege's grounding concept and the structural lack in his project for a logic of the signifier. Miller underlines that Frege's concept, "not identical with itself", only picks out an empty set when the assumption that all things are actually identical with themselves is in place. This assumes a determination about the world that is not actually accounted for within Frege's own system. This self-identity need not be ontologically basic. In turn, Miller underlines a certain exclusion of the non-identical as the creation, within a consistent system, of the twin poles of subject and object. He notes that,

> the impossible object, which the discourse of logic summons as the not-identical with itself and then rejects as the pure negative, which it summons and rejects in order to constitute itself as that which it is, which it summons and rejects wanting

> to know nothing of it, we name this object, in so far as it functions as the excess which operates in the series of numbers, the subject.[12]

In Miller's reading, a lack constitutes structure and guarantees the system of identities that, in being identical with itself, can be minimally differentiated within an immanent series of differences. At the same time, the circulation of this lack, the impossible object (x ∅ x), which is summoned and then rejected, is afforded the place of a mark ∅, the null-zero that circulates in the structure. The impossible object, marked as zero, produces the declination of positions in arithmetic succession, it constitutes the object, the zero, and the successive iterations made possible by this object, guaranteed by successful and unique reference. For Miller, this object would also be the subject, the excess of the structure, whose very content, "not identical with itself", calls upon a *suture* that extra-structurally correlates subject and structure (through the impossible object). In philosophical terminology we could understand this suture as the demonstration of the transcendental conditions of the consistency of the system. The inexhaustible variation of subjective apperception is more extensive and varied than what is schematized in a realm of organized and immanently consistent differentiations. This splitting of the transcendentally constituted knowing subject and the subject that underlies the transcendental determination itself is what determines the place of the subject. Miller's suture introduces a distinction wherein both sides of this determination can be grasped by a more general logic of the signifier. Suture distinguishes the active creation of the objective qua systematic consistency from inconsistency by means of exclusion, or repression. In this context, analysis is thus precisely what draws out repressed content. In this sense, Miller correlates the structural framework of psychoanalysis with the task of an epistemology of mathematics as the basis for a project for the logic of the signifier.

There are many reasons to criticize and remain sceptical of Miller's analysis of Frege, but there is no doubt that his use of Frege here is clear in outlining what his concept of suture is meant to do. In the most general terms, a consistent structure is constituted by repressing or excluding some impossible, inconsistent, object, which provides the grounds for a series of differential identities or variable-places as well as animates the repetition and iterative succession of

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[12] Jacques-Alain Miller, "Suture (Elements of the logic of the signifier)", in *Cahiers pour l'analyse*, Vol. 1, Feb. 1966, trans. Jacqueline Rose, <cahiers.kingston.ac.uk/pdf/cpa1.3.miller.translation.pdf>.

these mutually differentiated terms. The methodology prescribed by the concept of suture urges us to analyse this disavowed object (i.e. x≠x inconsistency) and thus gain clarity into the operation of the structure and its necessary limits. In this, a Freudian "repetition" continually covers over the repressed or impossible content of iteration. Over the course of the *Cahiers*, Miller and the members of the *Cercle d'Épistémologie* (the Althusserian students who formed the core editorial group the *Cahiers*) would take this general schema to the analysis of a variety of *repetition* themes from psychoanalysis, philosophy (and its history), to anthropology, literary theory, and political theory.

Badiou's critique of Miller is presented in the 10th and final volume (1969) of the *Cahiers*, entitled "*Mark and lack: on zero*".[13] This work provides a resumé of a series of ideas that would eventually constitute Badiou's early project of a "materialist epistemology" more fully developed in the *Concept of Model*, published in the same year.[14] While it is aimed at a critique of the more Millerian tendencies in the *Cahiers*, Badiou in fact sets down key elements from which we can glimpse some characteristic features of his later thought. I shall leave these later developments aside to concentrate on his critique of Miller.

Badiou's central critique strikes Miller's text at its central point. Badiou contests that Frege's use of the non-identical (x≠x) does not in any sense produce a "lack" and, in turn, there is nothing to suture. Badiou argues that the marks that enter into scientific practice such as formal logic or mathematics are generated without any repression of a fundamental lack. Badiou demonstrates this by his alternative account of the problem of structure in mathematics.

Badiou begins by distinguishing three "mechanisms" of the structure and eventually adding a fourth. I present all four together here.[15]

13 Alain Badiou, "Mark and lack: on zero", in *Cahiers pour l'analyse*, Vol. 10, Winter 1969, trans. Zachary Luke Fraser with Ray Brassier, < cahiers.kingston.ac.uk/pdf/cpa10.8.badiou.translation.pdf>.

14 Cf. Alain Badiou, *Le concept de Modèle*, Paris: François Maspero, 1969; *The Concept of Model*, trans. and ed. by Z.L. Fraser and Tzuchien Tho, Melbourne: re.Press, 2007.

15 Badiou, "Mark and lack: on zero", pp. 2-5.

[1] Mechanism 1 (M_1), concatenation: Badiou assigns a first level to sign production: an indefinite number of (chains of) mutually differentiable marks.

[2] Mechanism 2 (M_2), syntax: At a second level, he highlights the putting into place of syntactic rules which distinguishes well-formed and nonsensical expressions. In other words, at the M_2 level, arbitrary marks are formed into expressions and the mechanism makes a distinction between well- and ill- formed syntactic expressions according to any number of rules.

[3] Mechanism 3 (M_3), derivation: At the third level, a mechanism of inference-making allows us to distinguish which among the well-formed expressions are derivable and which ones are not. Of course, there are many well-formed expressions that are not derivable. In this M_3 "picks out" a subset from the number of well-formed expressions distinguished by M_2. The derivable are called "theorems" and the un-derivable are non-theorems of the system.

[4] Mechanism 4 (M_4): With the distinction between theorems and non-theorems, we can distinguish a fourth level, or a systematic level, which operates on the three previous levels to designate the structure, acting on the models constituted from M_1 to M_3, such as Zermelo-Frankel axiomatic set theory or any such *theory* (an indefinite number of such theories). This M_4 level would also be the place where Frege's arithmetic would otherwise be found, if it were not for Russell's famous and ruining critique of Frege's model of arithmetic, building on the latter's contradiction in the logic of predication ("a set of all sets"). In a footnote, Badiou underlines that this contradiction in Frege, pointed out by Russell in a 1901 letter, is internal to Frege's own system and independent of Miller's notion of repressed inconsistency. [16]

With these four mechanisms in place (M_1, M_2, M_3, M_4), Badiou explains that what Miller clumsy attempt to articulate was a treatment at the level of system (M_4) of something that is obviated at the level of derivation (M_3), that is, the fact that non-identity is non-derivable. Badiou reasons that,

[16] *Ibid.*, p. 9.

> for the inscription ~I(x,x) [ie. x≠x] does not occupy the place of anything else; nor does it mark the place of a nothing. As for the zero [...] [i]t is positively constructed by M_2. [...] The zero is simply an inscription accepted by M_2 and introduced, along with certain directions for use in M_4. [...] The zero marks in M_4 (in predicative form) not the lack of a term satisfying a relation but rather a *relation lacking* in M_3, it is *only insofar as it figures in* M_2.[17]

In other words, logical contradiction is an effect of the structure and not its repressed content. Yet, as Badiou carefully points out, non-identity is a well-formed expression (x≠x) and can be found in the previous stage (M_2). Indeed, the process of derivation draws its material precisely from the number of well-formed expressions that were first produced at M_2, a mechanism that in turn draws its material from the series of mutually differentiated marks produced in M_1. In turn, Russell's problem with Frege has little to do with the "zero" and, if we temporary overlook Frege's failure and treat it, as Miller does, as a consistent system, its consistency is not in the least sense guaranteed by a lack or the marking of the lack. Russell's problem concerns the scheme of predication and this issue of "inconsistency" is not that of the self-identity of marks in mathematical syntax.

In pointing out this misdirection in the critique of mathematical structure in Miller's work, Badiou forcefully generalizes his point:

> Accordingly, *there is no subject of science*. Infinitely stratified, regulating its passages, science is pure space, without inverse or mark or place of what it excludes. It is a foreclosure, but a foreclosure of nothing, and so can be called a psychosis of no subject, and therefore of all: universal by full right, a shared delirium, it is enough to hold oneself within it to no longer be anyone, anonymously dispersed in the hierarchy of orders. Science is the Outside without a blind spot.[18]

To fully analyse such a bold declaration would take us too far afield. We should simply underline that Badiou's exclusion of the subject in science, one that is exemplified in mathematical logic in the context of this article, entertains no concept of suture. As he argued earlier in the same article, "The logico-math-

[17] *Ibid.*, p. 10.
[18] *Ibid.*, p. 11.

ematical signifier is sutured only to itself."[19] This is indeed no suture at all. In this, while remaining clear that there is no subject-structure suture in science, Badiou partially agrees with Miller that it is in the context of the analysis of ideology that the analytic tool of suture can do its work. From this, there is no question that, at the level of scientific (mathematical) systems, an ideological treatment of science can no doubt take hold. Badiou will once again address this problem in the *Concept of Model* in the same manner that he addressed Miller, from a bottom-up concept of model that would disavow its ideological appropriation on the basis of model logic qua science.

This bottom-up approach to grasping mathematical or scientific reason through the "materiality of the signifier" places the opposition not between consistency and its necessarily excluded inconsistency but rather between two tendencies in treating the structural role of indetermination. The first tendency submits the scientific production of signs to a pre-given array of oppositions. Here, just as the consistency of a (physical) object is determined by its coordinates within space-time, an algebraic expression or a logical proposition occurs within its own logical space. However, especially in mathematics, scientific production constantly expands beyond its logical space. Rather than the attempt to secure this logical space, the second tendency understands scientific rationality precisely as the constant determination of new spaces of inscription. This is argued in another text of the same period of the 60s, the "Infinitesimal subversion", published in the ninth issue (1968) of the *Cahiers*. Here we should only highlight that Badiou argues that the supposed "irrationality" of infinite and infinitesimal, attested to in the history of the philosophical critique from Berkeley to Hegel and even Cantor and Fraenkel, of the infinitesimal calculus is made only on behalf of an idealized consistent "whole" of the unity of mathematics.[20] The whole drama of the epistemological obstacle of "infinity" only holds in taking too seriously this tendency of treating mathematics as a consistent whole. That is, it is only against the background of a commitment to finitude that the infinite appears subversive.

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19 *Ibid*., p. 6.

20 Alain Badiou, "Infinitesimal Subversion", in *Cahiers pour l'analyse*, Vol. 9, Summer 1968, trans. Robin Mackay with Ray Brassier, < cahiers.kingston.ac.uk/pdf/cpa9.8.badiou.translation.pdf>.

Let us then approach the positive stakes to be drawn from this refutation of Miller. When we reject the strategy of identifying the singular indeterminate as the contingent and excluded-included inconsistency of a given system, what remains of the indeterminate? The alternative that Badiou's early works provide is to see that the emergence of an "excluded", or obstacle, can only appear when the subversive terms have *already* been produced. Against the Millerian path or suture, and by extension, the "atomist path", we must reject the framework in which the break from a given structure is not the result of some repressed lack in the structure. In this, the "subversion" of the infinitesimal lies not in its engendering of an "irrationality" against some contrasted background structure of rationality. Science operates rather in the neutralization of this very opposition through the positive recasting of allegedly "impossible" spaces as new inscriptions. As such, it is in following through with the materiality of formalization and inscription, the literal production of marks, spaces, punctuation, and the like, that the "impossible" is demystified and drawn away from their subservience, as Badiou puts it, "to those constraining illusions whose salvation required an ideal guarantee."[21]

The strongest case that Badiou puts forth for this is Gödel's incompleteness proof. Given the four mechanisms that Badiou argues above, Gödel's proof amounts to a well-formed expression (M_2), say expression *g*, for which *g* is not a theorem but the negation of *g* is not a theorem either. The undecidable expression *g* is of course not a theorem (M_3), but systematically determines (M_4) what is indetermined within the system, a limit defined by the positive production of the system itself. As such it has nothing to do with either the suture or the place of the void as the point of suture. As Badiou argues, Gödel's incompleteness establishes, immanent within the system, a gap unmoored by the distinctions within the structure. This gap is precisely a singular and indeterminate expression constituted by the system but assignable within the system.

In philosophical terms, Badiou provides a notion of the indeterminate singular that does not rely on a meta-systematic *suture*. That is, it does not rely on a hypostasized extra-systematic circuit already presumed about the indeterminate and the determinate in order to account for the dynamics of the structure either conceived as iterative or otherwise.

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[21] Alain Badiou, "Infinitesimal Subversion", p. 16.

IV. Singular and indeterminate but not inconsistent

In retrospect it might be easy to see why Miller was so easy to refute. Miller's speculative suture of the problems within a psychoanalytic theory informed by structuralism to the foundation problem of modern mathematics leaves out the fact that there is "no unconscious in science". One might easily suggest that Miller's fault was in bringing these two fields together too hastily. After all, as Badiou himself agrees, suture may well account for the relation between the unconscious and language although it fails for mathematics and scientific discourse in general. Where are the *double entendres* or slips of the tongue in scientific discourse? This may or may not be the case; the point is indeed irrelevant for our purposes here. The stakes in this debate are different (if not higher). They concern how we are to understand indeterminacy, contingency, and rupture within structure. Taking one route, one which we have named the "atomistic strategy" and to which I have associated Miller, the indeterminacy or the contingency of any given structure is to be derived from a certain gap-to-be-sutured between a consistent structure and that inconsistent qua indeterminate term within the structure to which we designate "abyss" or void. Taking another route, that which I have named the "formalist path" and to which I have associated Badiou as one of its sole protagonists, we understand the indeterminate term as a product of the consistent structure itself. Badiou's insight here entails (at least) three philosophical tasks.

The three points, which I will enumerate below with more care, can be summarized by the use of the Pythagorean legend with which we began. The objectionable nature of the irrational (or incommensurable) root (i.e. $\sqrt{2}$) was only taken as such because of the prior assumption that all (geometrical) proportions should be commensurable. This framework allows us to secure the determinate borders of rational proportions in precisely the refusal to think through the terms of incommensurability on their own terms by throwing it together with the inconsistent (hence the name "irrational"). Yet in the positive formalization of the irrational, we do not witness the failure of geometry, but only its illusory representation (governed by the fiat of the master) according to some policing of the normativity of terms (i.e. that all proportions should be rational). The "new" form re-inscribes the space of the prior geometry in a larger logical and technical space and stratifies its determinations against this emergence of the singular indeterminate. This is already Euclid's innovation; banal by now. As such, first-

ly, the identification of indetermination and inconsistency (or irrationality) is *merely* an effect of the refusal to think the indeterminate on its own terms or, in other words, the refusal of its inscription in structure as a new form. Secondly, we see that the Pythagorean story is only one in a series of historical developments where it is clear that new forms are the result of the positive enlargement of the formal and the conceptual rather than arising from the supposedly immanent gaps, lacks, or "inconsistencies" in the system. As such the contingency of structure is anhypothetical, that is, independent from the inherent dynamics of the strata of structural determination. Thirdly, the philosophical task of thinking undecidability or incompleteness on their own terms is to render a positive (thought indeterminate) act whose valence can only be grasped on its own grounds rather than the pre-given dynamics of the structure.

Let us look at what is entailed by these three points:

> [1] Firstly, the figure of the void is to be separated from the singular indeterminate. If the void continues to be associated with the singular indeterminate, we continue to assert the co-extensiveness of the indeterminate as the necessary "other" of the determinate. This mystification of the void is nothing but the ambiguous stand-in for the gaps of structure. Like the Epicurean clinamen, a reified indeterminacy is posited only to answer for the undetermined origin of the determinate (the nature of atomic interaction). Qua indeterminate, the void remains a catch-all placeholder for an abyss that signifies the origin-genesis, contingency, rupture, for any given system. This reification of the *nihil* ironically does the opposite, insofar that, although by definition indeterminate and contingent, its characterization remains tied to what is determined and necessitated by the gap or gaps of structure. Against this, if the singular indeterminate is to have any role at all outside structure, we must pursue an understanding of the excessive multiplicity of structure rather than its supposed gaps or inconsistency. Like the infinite, the void should be taken as a mundane or neutral element of structure: determinate and equal in status with the standard terms of structure. In other words, the void qua zero in arithmetic is banal insofar as it is the neutral element of arithmetic: the neutral element that guarantees iterative generation of terms. The taming of the void unlinks it from the indeterminate and allows the latter to play a more decisive role in reconceiving any structural rupture.

[2] Secondly, with the void thusly separated from the indeterminate singular, the contingency of structure can be detached from the notion of the "virtual" or immanent possibility. This renders structural contingency anhypothetical. This may seem incorrect at first, but since the singular indeterminate is, within the atomistic strategy, always posited as the ambivalent included-excluded term of a structure, it always remained tied to the gap of that structure; the "other" of structure. As such the singular-indeterminate is always an exclusion that relies on the requirements of the structure itself; it remains an "other" of that structure. When detached from such a framework, the indeterminate singular, understood as the excess of the structure, stands for the non-totalizable nature of the structures. This non-totalizability not only undoes any need for a question of included-excluded inconsistent term but also designates the structural characterization of indeterminacy not as the finitude of structure (to which a lack or void is co-extensive) but rather the infinitude of (any) structure. As such the generalization of the indeterminate across structures does not rely on the terms of any particular structure. Again, undecidability is a feature of structures taken from the ground-up, not a term within an analytics of structure. As such, undecidability qua indeterminate is anhypothetical insofar as it does not rely on the analysis of a hypothetical or conjectural system. This anhypothetic status also means that the singular indeterminate is absolute (or functionally tends towards the absolute) insofar as it is not dependent on the constitution of any particular structural consistency.

[3] Thirdly, and perhaps most importantly, we can grasp the singular indeterminate not as irrational or an inconsistency but rather as the inscription of a new form. The reason why the indeterminate is understood as inconsistency results *only* from the prior assumption that the determinate organization of structure is founded on a closed circulation of terms. This quasi-totalizing representation of structure naturally leads to the privileging of the void as its supposed "indeterminate". By contrast, the formalist path, in eschewing such systematic totalization, is nothing less than the rejection of such prior assumptions of "completeness", figuratively speaking. As such, the singular is always the inscription of a new and positive formalization that, though indeterminate insofar as it has no determinate status within the strata of determinations that constitute

a structure, is not the failure of the structure but only the failure of the representation of the structure as total or complete.

V. Concluding remarks

The critique carried out above is one that attempts to extend a philosophical methodology that places thought under condition of the mathematical revolution carried out in the last century. This method is armed with the understanding that the conventional linguistic or logical conception of fundamental relations (i.e. part-whole, local-global, one-multiple) must undergo significant transformation in light of modern mathematics. This methodology can provide important lessons in its critique of contemporary thought. This is not because of any historical inheritance of the *mathesis universalis* or *more geometrico*; the certainty or univocity of mathematics (under the aegis of *judgment*). The formalist methodology labours under the condition of modern mathematics because of the speculative avenues that have been rigorously unfolded for more than a century.

In this examination, I have made use of the early work of Badiou. In tracing the first inklings of the formalist path, Badiou provides, in the late 60s, a powerful alternative to the significations of the void, then emerging from the Althusserian and Lacanian circles. Although Badiou would heavily revise the theoretical armature of this period in his later ontological work of the 80s, what remains continuous is his commitment to rejecting the occultation of the void. As such, in Badiou's later attempts to think the rupture of structure, we find him drawing, not from the power of the void, but rather on the constructive process of articulating an indeterminate yet self-consistent emergence of novelty, under the name of the event. The alternative developed by Badiou, in contrast with contemporary thinkers, would be that of a figure of novelty that would not be the "other" of structure (void or gap), but rather a generic existence which is inscribed through its self-grounding (generic) character.

We have, in the analysis of the identification of inconsistency and the indeterminate, underlined the stakes of the continuing hypostatization of the void as the repository of the contingent and the singular. The contending point is a rather simple one. With the neutralization of the infinite through the work of Cantor and Dedekind, the void is similarly neutralized. In the same stroke, the conceptualization of the indeterminate singular falls upon the problem of the

excess of structure rather than the indetermination of quantity. The problem is no longer that of infinite, or the indefinite abyss of the void, but that of the undecidable, or the incompleteness of structure. This formalist "subtraction" from the closed circuit of the everything-something-nothing allows us to think the indeterminate singular as a self-grounding multiplicity, a radical cut from the co-extensiveness of structure and its (supposed) gaps.

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Sašo Dolenc*

The Void of Quantum Reality

Quantum mechanics is probably the most successful scientific theory that has ever been created. It has profoundly changed our view of the world, extended the limits of our knowledge and is responsible for many technological breakthroughs that we use in our everyday life. But for all its success at the very essence, it remains a quandary that cannot be fully explained.

It is often said that no one understands quantum physics. At least that is a claim made by several distinguished physicists who have been awarded a Nobel Prize for their research on the quantum world. By this lack of understanding they normally refer to the unusual traits of quantum particles that are impossible to explain through any analogy with everyday life. Quantum particles are crazy, as Richard Feynman once remarked, but all to the same extent: all of them can at the same time travel along different paths, appear in different places, and possess incompatible characteristics; but that does not seem to disturb them at all.[1]

For a long time, physicists ignored the problem of "quantum weirdness" as something that cannot be approached scientifically. Especially in decades after the Second World War, philosophical questions concerning scientific theories became almost forbidden topics for scientists who wanted to pursue their academic careers.

> Thirty years ago, readers who were interested in the unsettled debates over the interpretation of quantum theory had to hunt in some out-of-the-way places. In 1979, some of the most extensive coverage appeared in an unpublished memorandum from the Central Intelligence Agency and a feature article in *Oui magazine*. The latter—no publication of the French embassy—was *Playboy's* answer to *Penthouse*. Both items focused on work by physicists at the center of this story.

[1] Richard P Feynman, *QED: The Strange Theory of Light and Matter.* (Penguin, 1990), p. 9.

* University of Ljubljana, Slovenia

> The porn magazine's discussion was by far the better researched and more accurate of the two.[2]

Regarding the problems of quantum mechanics the pragmatic approach "shut up and calculate" became the official ideology in most scientific departments at universities around the world.

> Most students are taught about quantum theory as though the conceptual and philosophical problems do not exist or are irrelevant to their understanding. Either by design or default they are fed the orthodox "Copenhagen" interpretation of quantum theory, originally developed by Niels Bohr, Werner Heisenberg, Wolfgang Pauli and their colleagues in the 1920s and 1930s. When faced whit theory's inherent non-understability under this interpretation, student are likely to blame themselves for failing to come to terms whit what is one of the most important theoretical foundations of modern physical science. This is a great pity, because this non-understability can, in fact, be traced to anti-realism of the Copenhagen interpretation. The theory is, quite simply, not *meant* to be understood.[3]

The foundational principle for quantum mechanics

Anton Zeilinger, one of today's most important quantum physicists, who spent a number of years working mostly on experimental quantum physics and studying quantum teleportation, quantum cryptography, quantum computers and interference experiments with multi-atom molecules, has dedicated the last couple of years also to writing about the interpretations of quantum physics, or in other words, the problems associated with this simple question: what does all this quantum nonsense even mean?

In 1996, he began critically examining the ways quantum mechanics had been written about, concentrating on how the pioneers of modern physics had discussed their work in their private correspondence. He gathered his findings in a concise article, which concluded that quantum physics needs a clearly formulated basic principle to sum up its essence.

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2 David Kaiser, *How the Hippies Saved Physics: Science, Counterculture, and the Quantum Revival* (W. W. Norton & Company, 2012), p. xii.

3 J. E Baggott, *Beyond Measure: Modern Physics, Philosophy, and the Meaning of Quantum Theory* (Oxford; New York: Oxford University Press, 2004), p. xv.

The basic principle of the theory of relativity is, in very simplified terms, that nothing can travel faster than light, that the laws of nature are the same for any observer and that we cannot separate gravity from acceleration. According to Zeilinger, quantum physics needs something just as simple, clear and universal. In 1999, Zeilinger published an article entitled *A Foundational Principle for Quantum Mechanics* in which he formulated the basic principle of quantum physics, using the principles of the theory of relativity as a model. His proposal for the basic principle of quantum physics is: The elementary system carries one bit of information.[4]

Naturally, these questions instantly arise: what is information and what is the elementary system? As he says himself: information is nothing else than the answer to the questions asked. The bit is the smallest piece of information that can still mean something. It is the smallest, indivisible unit of information. It simply states whether a statement is true or false. One could also say that it is the answer to a question which can only have two possible answers: yes or no. One bit of information can be represented simply as the presence or absence of a signal: a light turned on or off, the magnetization on a tiny piece of a hard disc, an indentation on the surface of a CD.

When Zeilinger was thinking about information in the quantum universe, he also asked himself the important question of the relation between the physical size of a system and the quantity of information that the system can carry. A system which is two times smaller than another will probably carry two times less information. If we continue to divide a certain system by two, we are bound to eventually reach a limit where our system can only carry a single piece of information, one bit. That is how Zeilinger defined the elementary system as the carrier of a single bit of information.

But at the level of basic carriers of information that cannot be further divided, problems emerge:

> What happens now when the light source is attenuated until finally only a single quantum of light – a photon – is transmitted? What should we expect when the

4 Anton Zeilinger, "A Foundational Principle for Quantum Mechanics," *Foundations of Physics* 29, no. 4 (1999): p. 631–643.

> switching process of a transistor is already triggered with a single electron? In quantum information science, quantum objects are used as carriers of information. [...] While there are only two possibilities "0" and "1" allowed for the classical bit, the quantum system can be in any state that results from a superposition of the two basic settings. [...] The value of the bit itself is therefore quantum-mechanically uncertain. Any observation will show one of the two values with the given probability as a result. Does this uncertainty not actually go together with a loss of information?[5]

As more and more physicists became interested in information problems in the quantum universe, the term quantum bit or qubit started to replace Zeilinger's elementary information carrier. The qubit is thus the basic carrier of quantum information. It is in a way an atomic element in quantum terms. Using this new term we could reformulate Zeilinger's basic principle into something like: one qubit can carry one bit of information.

However, the problem with qubits is that it is not possible to double them. A qubit cannot be cloned without destroying the original we wish to double. A qubit can also never be read with complete accuracy. If we discovered a process to multiply it, we could use the many identical copies to examine it thoroughly and precisely define it. As it is impossible to double it, one measurement of a qubit only reveals a single bit of information, and the essence of the quantum universe always remains invisible to a certain extent.

According to Zeilinger, all problems stem from the very fact that information is quantified. We simply cannot acquire less than one bit of information about the world. It is the absolute minimum, which at the same time means that the resolution of the world itself is limited to one bit of information. One qubit only gives us one bit of information. One qubit can only answer a single yes or no question. If we continue to question it via further experiments, its answers will not make any sense at all or will be, as Zeilinger puts it, objectively random. But at the same time we know that qubit has a structure that is more complex than that of a bit.

5 Harold Weinfurter, "Quantum Information," in *Entangled World: The Fascination of Quantum Information and Computation*, ed. Jürgen Audretsch (Wiley-VCH, 2006), p. 146.

The fundamental problem of quantum physics lies in the difference between the qubit and the bit. The qubit contains more regularities than we can see. Zeilinger says:

> So, what is the message of the quantum? I suggest we look at the situation from a new angle. We have learned in the history of physics that it is important not to make distinctions that have no basis — such as the pre-newtonian distinction between the laws on Earth and those that govern the motion of heavenly bodies. I suggest that in a similar way, the distinction between reality and our knowledge of reality, between reality and information, cannot be made. There is no way to refer to reality without using the information we have about it.[6]

Just as the special theory of relativity is based on the impossibility of differentiating between inert observers (the principle of relativity) and the general theory of relativity on the impossibility of differentiating between gravity and acceleration (the equivalence principle), quantum theory is supposed to be founded on the impossibility to differentiate between the real world and information about it: the laws of nature should not separate reality from information. It is impossible to differentiate between the real world and information we gather about that world.

Zeilinger's principle formulates something similar to what the Danish physicist and the author of famous Copenhagen interpretation of quantum physics Niels Bohr probably wanted to say when he wrote:

> There is no quantum world. There is only an abstract physical description. It is wrong to think that the task of physics is to find out how nature is. Physics concerns what we can say about nature...[7]

Bohr was convinced that humans, because of specific nature of cognition, perception and limitations of our language, could never picture the inner mechanisms of the atom. We cannot approach quantum reality in any other way than through information or through events in classical reality. But at the same time

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6 Anton Zeilinger, "The Message of the Quantum," *Nature* 438, no. 7069 (December 8, 2005): 743, doi:10.1038/438743a.

7 Jonathan Allday, *Quantum Reality: Theory and Philosophy* (Boca Raton, FL: CRC Press, 2009), p. 281.

we know that qubit is "something more" than a bit we can measure. The nature of this "surplus" at the very essence of qubit precisely is the main problem with the interpretation of quantum physics.

Quantum world doesn't exist?

New Scientist recently reported on a new version of the famous double slit quantum experiment. Scientists used a quantum particle in a state of superposition to open or close one of the possible ways a particle can travel through the measuring apparatus. However, the details of this experiment are not important for us at the moment, as we are only interested in a "philosophical" discussion on the results of the experiment that the author offers at the end of his presentation. He quotes one of the scientists who carried out the experiment:

> It's a notion that takes us straight back into Plato's cave, says Ionicioiu. In the ancient Greek philosopher's allegory, prisoners shackled in a cave see only shadows of objects cast onto a cave wall, never the object itself. A cylinder, for example, might be seen as a rectangle or a circle, or anything in between. Something similar is happening with the basic building blocks of reality. "Sometimes the photon looks like a wave, sometimes like a particle, or like anything in between," says Ionicioiu. In reality, though, it is none of these things. What it is, though, we do not have the words or the concepts to express.[8]

In this quote, quantum reality is interpreted as a kind of independently existing and fully constituted world that we just cannot approach directly. Quantum reality is presented as something that has full independent existence, but is inaccessible to us in any direct way. We can only see the shadows that quantum objects cast on the walls of the cave and this is the reason why we sometimes see the same quantum object as a wave and sometimes as a particle.

This interpretation of quantum physics in which quantum reality is presented as something existing independently but at the same time not fully accessible to us, is a typical example of how we cannot understand the philosophical implications of quantum mechanics.

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[8] Anil Ananthaswamy, "Quantum Shadows: The Mystery of Matter Deepens," *New Scientist*, January 5, 2013.

If there is a metaphysical conclusion that we can deduce from quantum physics, it is as follows: qubit as the essence of quantum strangeness cannot be interpreted as something substantial, or as the stuff the world is made of. Quantum description is not a mirror picture of "world down there", as it exists for itself. But at the same time quantum theory is also not just an abstract theory that says nothing about what the world is really like.

What is so subversive in quantum mechanics is the fact that experiments prove that there are events in the world that we just cannot interpret consistently using our common everyday notion of reality. There is something in the world that we can predict using mathematical equations, but at the same time this something does not have proper representation in our classical everyday understanding of reality.

> All the various measurement that we make on atoms and particles in the end come down to numbers read from dials (or similar) on measuring apparatus. [...] So we are caught in dilemma. The experiments we carry out should not only be capable of being described in, essentially, everyday language, but they *must* also be so to make science possible. Yet, when we try to gather the results of our experiments together to make a description of the atomic world, we find that the same everyday language and ideas start to fail. Photons seem to act as particles in some circumstances and as waves in others. We can find appropriate mathematics to describe the situation, but that doesn't help us visualize or speak about photons.[9]

We cannot interpret what goes on at the level of atomic particles without using concepts of everyday reality. Experiments are made using measuring equipment that displays results in a classical way. Everything we know about quantum reality we know through measurements that are made using concepts of classical reality.

We cannot approach quantum reality in any other way than through information or through events in classical reality. But at the same time we know that qubit is "something more" than a bit that we can measure. We can prove that there is something at the level of quantum objects that does not add up, and that the picture of quantum reality is in this regard incomplete.

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9 Allday, *Quantum Reality*, p. 291.

The point is that qubit has a structure that we know carries more information than just one bit we can get from one qubit. But once we extract one bit of information out of a qubit, it can give us no further information. Anything else we get after that is objectively random or completely without any meaning.

Status of irrational numbers in Pythagorean universe

We will try to understand the philosophical implications of quantum physics by using a famous anecdote from ancient Greek mathematics. It is well-known that Pythagoreans believed in a harmonious universe in which numbers were the basic elements of reality. By numbers they meant positive integers if we use today's mathematical language.

As the story goes, one day, a man called Hippasus discovered that there is something wrong with the diagonal of a square. He was able to prove that the diagonal and the side of a square cannot be expressed by any two integers. He constructed a proof that there is no common measure between the diagonal and a side of a square. Or expressed in today's words: he proved that the square root of 2 is an irrational number, meaning that it cannot be expressed by fraction of two integers.

It became obvious that one of the most elegant of all geometric shapes has in its very structure something that cannot be expressed in a relation of two integers and cannot be a part of the harmonious universe or reality as defined by Pythagoreans. Two well defined geometrical magnitudes did not have a proper representation in the harmonious universe.

The ancient story goes that Pythagoreans were so terrified by this discovery that they took Hippasus out to sea and threw him overboard. Later, even other Greek mathematicians that were not members of the Pythagorean sect were also so horrified by this discovery that they turned their backs on numbers and started doing mathematics using geometry instead. One of the sources of this legend is *The Commentary of Pappus on Book x of Euclid's Elements*:

> Indeed the sect (or school) of Pythagoras was so affected by its reverence for these things that a saying became current in it, namely, that he who first disclosed the knowledge of surds or irrationals and spread it abroad among the common herd,

> perished by drowning: which is most probably a parable by which they sought to express their conviction that firstly, it is better to conceal (or veil) every surd, or irrational, or inconceivable in the universe, and, secondly, that the soul which by error or heedlessness discovers or reveals anything of this nature which is in it or in this world, wanders [thereafter] hither and thither on the sea of non- identity (i. e. lacking all similarity of quality or accident), immersed in the stream of the coming-to-be and the passing- away, where there is no standard of measurement.[10]

For our purpose it is of no importance if the story is genuine. We just want to use this famous ancient mathematical discovery as a model to understand some of the problems instigated by quantum physics.

The essence of the Pythagorean problem regarding irrational numbers was in the following paradox: this kind of proportions should not exist in an ideal harmonious world, but at the same time it was shown that they should exist if we take the fundamental principles of this world seriously.

If rational numeric proportions were fundamental building blocks of reality, irrational proportions were something that could not be part of this reality. But there was proof that from within this harmonious vision of the world irrational proportions of this kind do exist.

It is important to be aware of the fact that irrational proportions are not something that is fundamental and exists independently of the harmonious view of the world. Their existence depends on the harmonious conception of the world. We have only obtained proof that some proportions don't have a representation in a system that by definition should cover everything. There are no irrational numbers existing on their own, at least not in the Pythagorean universe. They exist simply as an obstacle in the harmonious conception of the world, which prevents the Pythagorean model of the world from ever being complete.

The Pythagorean harmonious world cannot in this sense ever fully realize itself. It is always already not complete. We can always prove that there is something

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[10] Pappus of Alexandria, *The Commentary of Pappus on Book x of Euclid's Elements*, trans. William Thomson (Harvard University Press, 1930).

missing, but the element that is missing is nothing else than an obstacle, which prevents the world to be on the level on which it is supposed to be from within.

The structure of the void of quantum reality

Our thesis is that there are important similarities between horrors of irrational proportions within the Pythagorean vision of reality and problems instigated by the interpretation of quantum physics in our everyday vision of reality. In the same way as the Pythagorean vision of the world presupposes reality as harmony of numbers or rational proportions, our notion of reality presupposes certain way of understanding what the world is and how to comprehend it. Quantum physics has the same effect on our vision of reality as irrational proportions had on the Pythagorean reality.

The main problem with Zeilinger's fundamental principle of quantum physics is that it starts from naive understanding of division between the reality and information. His implicit understanding of reality is that it exists independently of the observer. He positions a gap between the knowing subject and the object--to-be-known, and then deals with the problem of how to bridge this gap. But one of the most important implications of quantum theory is the conclusion that we must, as far as quantum physics is concerned, abandon this common sense division between the fully realized objective reality as the substance of the world and subjective information we can have about this reality.

One of the ways we can understand the notion of "reality out there" in quantum physics is to interpret it as objective randomness or complete absence (void) of information that is one of the fundamental consequences of quantum theory. As Zeilinger formulated, in quantum physics, the problem is not that our capacities for understanding the diversity of the quantum universe are too limited, but the fact that inevitable randomness is inherent to the very structure of the world.

> The discovery that individual events are irreducibly random is probably one of the most significant findings of the twentieth century. Before this, one could find comfort in the assumption that random events only seem random because of our ignorance. [...] But for the individual event in quantum physics, not only do we

> not know the cause, there is no cause. [...] There is nothing in the Universe that determines the way an individual event will happen.[11]

One qubit only gives us one bit of information. One qubit can only answer a single yes or no question. If we continue to question it via further experiments, its answers will not make any sense at all or will be, as Zeilinger puts it, objectively random.

> But the individual measurement result remains objectively random because of the finiteness of information. I suggest that this randomness of the individual event is the strongest indication we have of a reality "out there" existing independently of us. Maybe Einstein would have liked this idea after all.[12]

Objective randomness is defined as complete absence of any kind of information. In this sense "reality out there" that Zeilinger talks about is pure void of meaning or information.

But this kind of understanding of the "quantum reality" as a version of Kantian thing-in-itself is over-simplification. Qubits are not "atoms of being" or basic units of the fundamental substance of the material world, even if they are in a way beyond the grasp of our experience. There is no other "more real" quantum reality outside what is given to us through experiments and observations. What is important is not to interpret qubits as something that can exist independently of anything else.

The status of qubits is similar to that of irrationals in the Pythagorean conception of reality. They are real, but not real as independent of a system within which they originated. In the same way as irrational proportions are not primary, basic or fundamental units in the Pythagorean world, qubits as atoms of quantum reality are also not something that exists independently and "casts shadows" on our perceptive world.

The essence of quantum reality, or what is more in qubit that cannot be expressed in a bit of information, is from one perspective pure void, objective randomness

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11 Zeilinger, "The Message of the Quantum."

12 *Ibid*.

and nothing we can ever measure or experience, but from the other perspective it has a fully specified mathematical structure that we can present using the equations of quantum physics. The Pythagorean analogy can help us understand this unusual paradox of "the structure of the void of quantum reality".

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Matjaž Ličer*

The Concept of Aether in Classical Electrodynamics and Einstein's Relativity

In physics, the notion of empty space can be traced to two altogether different areas of thought which belong to (as of yet) quite separate sub-domains. On one hand, we have quantum field theories and its virtual particles (implying that space is never devoid of particles – or fields) while on the other hand we have Einstein's general relativity and its 'aether' as a signifier of an intrinsic metric structure of spacetime. Even though conceptualizations of aether were essential for what both mentioned theories turned out to be, the quantum field theory approaches will not interest us here. We will deal with the history of theories of aether in classical (non-relativistic) physics and with the strange ways of the notion of aether in Einstein's relativity.

The need for the modern scientific incorporation of the notion of empty space emerged very early on – with Newton's formulation of the law of universal gravitation, which implies that gravitation propagates through empty space instantaneously with infinite velocity. Force exertion over empty space – the so-called direct action at a distance – was a source of philosophical and theological dispute right from the start. Newton himself was uneasy about the introduction of action at a distance over empty space. It was hard to conceive how one body could possibly influence another body without contact and over vast empty regions of space, such as those spanning the Solar system. "Can a body act where it is not?"[1] As Einstein pointed out, people were used to conceiving everyday forces as consequences of contact between two bodies[2]. Since gravitational action at a distance seemed so radically different from contact forces of everyday life, physicists have set out to unify what they believed were only two different manifestations of the same physical phenomenon of force. Doing so, they could either reformulate *contact forces* as an incidence of action at a distance, or *vice versa* reformulate *action at a distance* as an incidence of a contact force. This

[1] J. Larmor, *Aether and Matter*, Cambridge University Press, Cambridge 1900, p. 24.

[2] A. Einstein, "Äther und Relativitätstheorie", in *Collected papers of Albert Einstein,* Vol. 7, Doc. 38, Princeton University Press 1920b, p. 309

* National Institute of Biology, Institute of Philosophy, CSR SASA in Ljubljana

latter treatment contains the hypothesis of the existence of aether: it implies that direct action at a distance only seemingly takes place directly over empty space, whereas the latter is not empty but filled with some sort of all-pervading substance, *the aether*, which is – either through its state of motion or through its elastic deformations – the true mediator of force between distant bodies[3].

As scientists discovered that light experiences diffraction, reflection and refraction (Grimaldi and Huygens), it became probable that light could have the nature of a wave. There were still some unsolved issues regarding this fact – straight paths of light rays, for example, seemed to substantiate the corpuscular theory of light (supported by Newton, among others) – but nevertheless the aether theory gained a lot of momentum[4]. As Reichenbach had put it: "If light has the nature of a wave and is, consequently, not a substance, but a phenomenon of motion in a medium – what then is that medium itself?"[5] Two choices seemed possible: the aether could be either fluid or solid (elastic). This issue was settled in 1816 by Fresnel and Arago: they showed that it was impossible to produce interference using two perpendicularly polarized light rays. This meant that light was a transverse wave. (Meaning that wave oscillations are transverse to the direction of energy transfer. The famous Mexican wave during a football match is an example of a transverse wave: the spectators stand up and sit down while the wave travels sideways.)

This was a fact of utmost importance. Since fluids can mediate *surface* transverse waves but not *bulk* transverse waves (as is the case with light) there was only one option left: the aether had to be a solid (elastic) substance[6]. This resulted in a large number of different solid aether models, each of them explaining a particular feature or phenomenon of light[7]. There existed no unified aether theory that could provide a theoretical framework for a consistent theory of light. It was, however, clear that there was a fundamental conceptual difference between classical mechanics and optics: the space of mechanics was empty,

3 Einstein, *ibid*., pp. 309–10.

4 *Ibid*.

5 H. Reichenbach, *From Copernicus to Einstein*, trans. Ralph Winn, Philosophical Library, New York, p. 38.

6 M. Born, J. Ehlers, M. Pössel, *Die Relativitätstheorie Einsteins*, 7th Edition, Springer, Berlin 2003, p. 92.

7 See also E. T. Whittaker, *A History of the Theories of Aether and Electricity, From the Age of Descartes to the Close of the Nineteenth Century*, Hodges, Figgis & Co., Ltd., Dublin 1910.

while the space of optics had been filled with aether. Light needed a medium to propagate and scientists were trying to resolve what its properties should be.

In the following decades of the 19th century groundbreaking research of Michael Faraday, James Clerk Maxwell and Heinrich Hertz led to the conclusion that light was nothing but electromagnetic radiation[8]. This implied that electricity, magnetism and optics were one and the same science. Maxwell developed a beautiful mathematical theory that tied together optics, electricity and magnetism. At the time, light, heat, electricity and magnetism were each thought to have their own respective aether. Due to Maxwell's work the aether of light merged with electric and magnetic ethers into one and the same substance[9]. This was a great simplification. As to the nature of this substance Maxwell was a firm believer in a mechanical aether[10], but he – or anyone else for that matter – wasn't able to formulate a Newtonian theory of mechanical aether that would explain all observed features of the electromagnetic field[11].

In Newtonian mechanics (that was thought to hold true for light and electromagnetism in general), the main mechanical principle, the Galilean principle of relativity, states that all uniformly moving reference frames are equivalent for the formulation of physical laws – and can be viewed as frames at rest. The first hypothesis about the kinematic state of the aether was therefore the simplest one: the light aether in outer space, far away from all material bodies, is at rest in an inertial (unaccelerated) system[12] : the aether was assigned a velocity vector, but its acceleration was set to zero. The aether velocity was proposed to be spatially uniform and one should somehow be able to measure it. Most relevant experiments prior to the emergence of Einstein's relativistic physics were therefore focused on establishing to what extent the aether was carried along with the Earth, if at all, as the Earth moved through space. There were seemingly only two possible options for the outcome of these experiments: George Gabriel Stokes proposed the aether at the surface of the Earth is completely dragged along by Earth, as if it were a viscous fluid: this implies that the relative velocity

8 J. C. Maxwell, *Treatise on Electricity and Magnetism*, Vol. 2, Dover Publications, 1954, p. 383., see also M. Born *op. cit.*, p. 163.

9 Maxwell, *ibid.*

10 *Ibid.*, Born, *op. cit.*, p. 164, Einstein, *op. cit.*, p. 310.

11 Einstein, *ibid.*

12 Born, *ibid.*

of aether to Earth's surface, "the aether wind velocity", is zero. Augustine Fresnel, on the other hand, proposed the aether outside refractive media is at rest (while inside moving refractive media it is partially dragged along in an elastic manner[13]): this would cause an "aether wind" with speeds of the order of Earth's orbital velocity 30 km/s at the Earth's surface.

Several ingenious experiments were built to decide between the two options, but their results seemed contradictory: stellar aberration, *i. e.* displacement of positions of fixed stars due to Earth's motion through space, was a well-known phenomenon discovered by James Bradley in 1727 (not to be confused with stellar parallax). It implied there is no aether drag[14]. This seemed to negate Stokes's and confirm Fresnel's hypothesis. The aether was not dragged by the Earth at all. Fizeau's experiment, set up in 1851, measured the speed of light in a moving liquid[15]. The result again seemed to confirm Fresnel's hypothesis: the speed of light in a moving liquid (with refractive index close to 1.0) was essentially the same as in the vacuum. Both experiments indicated that the aether wind at the surface of the Earth should be detectable. But Michelson's experiment, performed in 1881, established with unprecedented precision that there was no detectable evidence of the relative motion between the aether and the Earth in any direction. The speed of light was always measured to have the same constant value, regardless of the direction of Earth's motion through space. It was confirmed with high precision that light has the same speed in all reference frames. This fact is known as the law of constancy of the speed of light. In other words, no aether wind was detected – the aether seemed to be completely dragged along by the Earth. This negated Fresnel's and confirmed Stokes's hypothesis.

The null result of the Michelson experiment was extremely puzzling – it was in contradiction with the most fundamental mechanical principle: the Galilean or classical principle of relativity. This state of affairs indicated a serious conflict between classical mechanics and electrodynamics. Since classical mechanics was an established discipline, it seemed clear that Maxwell equations had to be

13 Pais, A., *Subtle is the Lord, The Science and the Life of Albert Einstein*, Oxford University Press, Oxford 2008, p. 118.

14 Born, *op. cit.*, p. 112. Einstein, *op. cit.*, pp. 245–7.

15 Einstein, *op. cit.*, p. 246.

wrong, electrodynamics had to be wrong[16]. But all the experiments were proving it wasn't. At this point the Dutch theorist Hendrik Antoon Lorentz entered the discussion. He struggled hard to reconcile contradicting results of otherwise impeccable experiments. He developed a new theory of aether and electromagnetism with several distinctive features: the aether did not interact with matter in any way whatsoever, it was merely a substratum of the electromagnetic fields arising from charged microscopic particles. It was completely stationary and completely rigid. Its role was to mediate electromagnetic fields which cause electromagnetic forces between charged bodies[17].

Using his stationary aether theory Lorentz managed to reconcile seemingly contradicting outcomes of Fizeau and Michelson experiments[18]. But this wasn't possible without an additional *ad hoc* postulate – the now famous *Lorentz contraction* (proposed by Lorentz in 1892, independently by Fitzgerald in 1889, and derived from basic principles by Einstein in 1905). The postulate claims that the bodies contract in the direction of motion through stationary aether. Lorentz demonstrated that if *all* the bodies moving relative to the aether contracted by a certain amount in the direction of the movement, then all effects of aether wind would be compensated. He was also trying to explain the contraction *dynamically* – by an influence the aether has on molecular forces that determine the shape of each body of matter.

This state of affairs was somewhat surprising: after several centuries of growingly elaborate aether theories, the most developed aether theory seemed like a substantial regression. Lorentzian aether was completely stationary, perfectly rigid and could not be detected by an experiment. Physics seemed to have traveled a full circle: Lorentzian aether had all the features of the classical Newto-

16 R. Feynman, Six *not-so-easy Pieces. Einstein's Relativity, Symmetry, and Space-time*, Basic Books, New York 2011, p. 53.

17 Born, *op. cit.*, p. 178.

18 H. A. Lorentz, "The Relative Motion of the Earth and the Aether", trans. Wikisource from De relatieve beweging van de aarde en den aether, Amsterdam 1892, p. 74. Accessed online on 12. 1. 2013 at: http://en.wikisource.org/wiki/The_Relative_Motion_of_the_Earth_and_the_Aether. H. A. Lorentz, "Michelson's Interference Experiment", trans. from "Versuch Einer Theorie der elektrischen und optischen Erscheinungen in bewegten Körpern", Leiden, 1895, in *The Principle of Relativity*, Dover Publications 1923.

nian absolute space. As Max Born put it: the aether theory has led in its highest development to the sublation [*die Aufhebung*] of its fundamental concept[19].

Elimination of Aether. The Special Theory of Relativity

Albert Einstein was the one to resolve the deadlock: he proved that the contradiction between the principle of relativity and the law of constancy of speed of light was only apparent. He managed to incorporate both as two cornerstones of a new physical theory: the special theory of relativity. The validity of the principle of relativity was, to Einstein, beyond doubt: the laws of not only mechanics but also of electrodynamics must and can retain the same form in all inertial reference frames. The law of constancy of speed of light was also correct: the speed of light is indeed the same in all uniformly moving reference frames. It was an experimental and also a theoretical fact. So what was wrong?

Mathematical aspect of the problem was as follows: classical transformation law, the Galilean transformation, is not universally valid. This has never been problematic from the point of view of classical mechanics. Scientists have been using Newtonian mechanics for centuries and it provided overwhelmingly satisfactory descriptions for essentially all known mechanical phenomena. Problems occurred only after they had tried to interpret the Galilean transformation as a universal principle and applied it to electrodynamics. To bring this fact to light, Einstein was led primarily by his firm belief in the principle of relativity and less by the outcome of Michelson's experiment. The conclusion was nevertheless the same: if the speed of light is the same in all moving reference frames, this means that light does not prefer a single reference frame. In other words, light does not prefer the *aether* frame – any other claim would, according to Einstein, introduce a perfectly unfounded asymmetry[20]. But if light prefers no specific reference frame – Michelson proved it experimentally and Einstein explained it theoretically – then one further step seemed just as obvious as it was necessary: there is no aether frame and there is no aether. The sole mechanical property that Lorentzian aether still obtained was its immovability, its frame – and Einstein was the one to dismiss it as fallacious[21]. The electromagnetic fields

[19] Born, *op. cit.*, p. 192.

[20] A. Einstein, "Äther und Relativitätstheorie", in *Collected papers of Albert Einstein*, Vol. 7, Doc. 38, Princeton University Press 1920b, p. 313.

[21] *Ibid.*

were no longer to be interpreted as physical states of some medium, but rather as independent physical entities like atoms of ponderable matter.

Special theory of relativity has thus dismissed an absolute reference frame along with the existence of classical aether to be able to achieve something much more meaningful: to remove an apparent contradiction between electrodynamics and mechanics, and unite both within a common framework. This unification would have been impossible without a new transformation law to replace the Galilean transformation. Although this new transformation law had already been discovered by Lorentz, Einstein was the first to derive it from the first principles. It is nevertheless called the Lorentz transformation. It was already shown by Lorentz that Maxwell-Lorentz equations retain their form if one uses Lorentz transformation law to pass between different inertial systems – the equations are said to be *Lorentz covariant*. Newton's laws however were not Lorentz covariant: the form of these equations changed if one used Lorentz transformations to pass between different inertial systems. Maxwell-Lorentz electrodynamics therefore needed no modifications, but it was necessary to modify Newton's laws to suit the principle of relativity and to obtain their Lorentz covariant formulation (this was done by Max Planck in 1906). Special theory of relativity further demonstrated that Lorentz contraction, Lorentz's ad-hoc hypothesis to save his theory[22], *does indeed occur*. The contraction is a direct consequence of Einstein's theory – but it is not caused *dynamically* by the aether exerting force on the molecules of matter, as Lorentz thought. It occurs *kinematically,* as a consequence of the fact that the measuring apparatus is *moving* relative to the object measured.

In 1907, Einstein was commissioned to write a review paper on relativity for the *Jahrbuch der Radioaktivität und Elektronik*. This paper[23] is nowadays regarded as one of the major milestones on the path from special to general relativity. At that time, most likely in November 1907, Einstein got the famous insight he later referred to as "the happiest thought of his life". He was the first to realize that the following simple observation has profound consequences: "...*for an observer falling freely from the roof of a house there exists* – at least in his immediate surroundings – *no gravitational field*. Indeed, if the observer drops some bodies then these remain relative to him in a state of rest or of uniform motion,

[22] *Ibid.*

[23] A. Einstein, "On the Relativity Principle and the Conclusions drawn from it", in *Collected papers of Albert Einstein*, Vol. 2, Doc. 47, pp. 252–311.

independent of their particular chemical or physical nature [...]. The observer therefore has the right to interpret his state as 'at rest'."[24] (Einstein's italics). Einstein's argument was as follows. Since all freely falling bodies in gravitational field accelerate at the same rate (in other words, since inertial mass of a body is equal to its gravitational mass), any freely falling (accelerated) observer has every right to judge that he is in an inertial system (i.e. in zero gravity). Therefore, Einstein realized in 1907, the special theory of relativity needs to be generalized to systems containing gravitational fields – there exist no physical grounds for privileging "the usual" inertial systems: free-falling systems in gravitational fields are fully equivalent to inertial systems. This principle later became known as *the equivalence principle* and it represents one of the conceptual cornerstones of general relativity.

Einstein developed a crucial and beautiful insight into what this equivalence means in his famous rocket-ship example[25]: imagine you're in a spaceship with no windows resting on the Earth's surface. Everything in the spaceship is at rest. If you drop a ball, it's going to fall on the floor with the acceleration due to gravity. A pencil will drop at the same rate. Every other body will drop at the same rate. You will claim, judging from these two experiments, you are in a gravitational field. Now imagine you are in the very same spaceship way out in empty space far away from all the other masses, practically in zero gravity. Now the ship turns on its engines and starts accelerating "vertically" with the Earth's gravitational acceleration. You are in zero gravity, using your spaceship engines to accelerate the ship. Everything in the spaceship is at rest. If you drop a ball, it's going to fall on the floor with the acceleration of gravity. A pencil will drop at the same rate. Every other body will drop at the same rate. Now compare it to the situation when the spaceship is safely resting on the surface of the Earth: everything is exactly the same (Feynman: 130). You will again claim, judging from these experiments, you are in a gravitational field. In other words, *there is no physical experiment that can distinguish whether a system is being at rest in a gravitational field or whether it is accelerating in zero gravity.* Dynamically

[24] A. Einstein, "Grundgedanken und Methoden der Relativitätstheorie, in ihrer Entwicklung dargestellt", in *Collected papers of Albert Einstein*, Vol. 7, Doc. 31, Princeton University Press 1920a, p. 265.

[25] A. Einstein, *Über die Spezielle und die allgemeine Relativitätstheorie*, Verlag Friedr. Vieweg & Sohn, Braunschweig 1917, p. 45. See also Feynman, *op. cit.*, p. 129.

both cases are fully equivalent[26]. Properties of motion in an accelerated system are the same as those in an unaccelerated system with the presence of gravity[27]. Gravity has only *relative* existence – it is merely an effect of the coordinate system we use to formulate natural laws. *This* is why any general theory of relativity must necessary lead to a theory of *gravitation:* one can produce effects indistinguishable from gravity by merely jumping to an accelerated coordinate system[28].

Einstein did not publish anything new on relativity until 1911. Pais attributes this fact, among other things, to Einstein's intense work on quantum theory[29]. Another significant contribution to relativistic physics was, however, published in 1908 by Hermann Minkowski, a mathematician at the University of Göttingen. In a nutshell, Minkowski reformulated Einstein's new kinematics into a 4-dimensional geometry (three spatial and one temporal dimension) with several highly advantageous properties[30]. To name just one: he was able to show that the 4-dimensional distance between any two spacetime events is a Lorentz invariant – it does not change as we pass between different inertial systems. Minkowski's formalism was an enormous formal simplification of the relativity theory. Roger Penrose stated that special relativity was not a self-contained theory until Minkowski rewrote it into its modern geometric form[31].

Einstein was at first reluctant to accept Minkowski's work as he was sceptical about all the abstract mathematics Minkowski was using. This reluctance was rooted in Einstein's admiration of positivistic philosophy of Ernst Mach, a famous physicist and one of the leading figures of the Vienna circle. But Einstein's doubts did not last long. By 1912 (at the latest), he came to fully appreciate the power of geometrization of relativistic physics. This epistemological shift was

[26] See also M. Jammer, *Concepts of Mass in Contemporary Physics and Philosophy*, Princeton University Press, Princeton 2000.

[27] L. D. Landau, E. Lifshitz, *The Classical Theory of Fields*, trans. M. Hamermesh, Butterworth-Heineman, Amsterdam 1987, p. 243.

[28] A. Einstein, "Die Grundlage der allgemeinen Relativitätstheorie", in *Collected papers of Albert Einstein*, Vol. 6, Doc. 30, Princeton University Press 1916b, p. 288.

[29] Pais, *op. cit.*, p. 188.

[30] H. Minkowski, "Space and Time", A Translation of the Adress delivert at 80th Assembly of German Natural Scientists and Physicians, at Cologne, 21 September 1908, in *The Principle of Relativity*, Dover Publications 1923, pp. 73–91.

[31] R. Penrose, *The Road to Reality, A Complete Guide to the Laws of the Universe*, Vintage Books, London 2005, p. 406.

most likely initiated by the following *Gedankenexperiment* which led Einstein to realize that the Euclidean geometry is invalid in accelerated systems. Imagine you're located in an accelerated system, for example, on a rapidly spinning wheel of a merry-go-round. You now take a ruler and measure the radius *r* of the wheel. Then using the same ruler you measure the circumference of the wheel. You would expect from the Euclidean geometry the ratio of circumference to radius to be 2π. If the wheel had not been rotating, this would indeed have been the case – but in the presence of rotation it is not. Due to Lorentz contraction, the ruler contracts in the direction of motion (in tangential but *not* in radial direction) so the circumference is actually *larger* than 2πr. The Euclidean formula is incorrect. This means, Einstein continues, that Euclidean geometry is not valid in accelerated systems. Or to put it in an equivalent manner: *the Euclidean geometry is not valid in gravitational fields*. Gravity changes the geometry of spacetime[32].

Resurrection. Relativistic Aether of General Relativity (1916-1924)

It was not yet clear *how* gravity changes the geometry of spacetime but it became obvious to Einstein that the geometric approach was unavoidable. The formalism of Minkowski was an absolutely necessary step on the path to the generalization of the relativity theory. Furthermore, the content of Einstein's project was now more precisely constrained: he had to find a general non-Euclidean geometry that allowed most general coordinate transformations that still retain the invariance of 4-dimensional distances between infinitely close events (local Lorentz covariance). One of many problems lay in the fact that in rotating frames Lorentz contractions differ for different points of spacetime within the *same* coordinate frame, depending on the point distance from the axis of rotation. Points along the radius of the spinning wheel have different velocities and therefore different Lorentz contractions. One could therefore no longer employ *one* ruler and *one* clock for the entire coordinate system[33]. A separate pair of rulers and clocks would be needed for each point along the radius. In other words, space and time – in any ordinary sense of the word– became physically insignificant parameters. Coordinate systems, in which space and time would be well defined, turned out to be an exceedingly limited subclass of all pos-

[32] Einstein 1917, *op. cit.*, §23.

[33] A. Einstein, "Die Grundlage der allgemeinen Relativitätstheorie", in *Collected papers of Albert Einstein*, Vol. 6, Doc. 30, Princeton University Press 1916b, p. 290.

sible coordinate systems. Einstein thus had to reformulate the laws of physics without referring to lengths and time intervals as measured *in any specific coordinate system of any specific geometry*. This seemed an impossible task at first. As he put it himself, describing physical laws without reference to a specific geometry seemed similar to describing our thoughts without words[34]. The equations had to retain the same form in all possible curved generalized coordinates. After years of hard work and some help from his friends – most notably Marcel Grossmann and Michele Besso – he succeeded. The final version of field equations of general relativity was published on November 25th 1915. One week earlier, he submitted a paper to the Prussian Academy of Sciences in which he correctly derived the anomalous perihelion precession of Mercury's orbit. This was a historic result, unexplainable within Newtonian dynamics. But the paper from November 18th contains another discovery: the first correct calculation of the gravitational bending of light. A light ray passing by the Sun should deflect by 1.7 arc seconds.

The first effect had been known for decades, while the second one was a theoretical prediction of general relativity. It was experimentally confirmed in 1919 and had very interesting consequences for Einstein's attitude towards the notion of aether. Since gravity bends light and shifts planet orbits, and since gravity is a manifestation of curved geometry of spacetime, it was no longer possible to describe spacetime as physically neutral, as a void lacking all physical features[35]. Field equations of general relativity were non-linear: gravitational field and matter (which is the source of this field) play equivalent roles. The gravitational field determines the distribution of matter, which determines the gravitational field, which determines the distribution of matter etc. This loop indicates a non-linearity, which ultimately paved the way for a shift in Einstein's position on the aether, but as noted by Kostro, Einstein was too engaged in getting rid of the old aether to introduce a new one immediately after the first consistent formulation of general relativity[36]. General relativity was perceived as quite controversial, and Einstein spent a lot of energy defending it in the next years. Only in 1918,

[34] A. Einstein, "How I Created the Theory of Relativity", the Address at Kyoto University 1922, trans. Yoshimasa A. Ono, in *Physics Today*, American Institute of Physics, August 1982.

[35] L. Kostro, *Einstein and the Aether*, Aperion, Montreal 2000, pp. 47–8.

[36] Kostro, *op. cit.*, p. 74.

in one of the replies to the German anti-Semitic scientist Phillip Lenard, did he finally clarify his position on the existence of aether[37]:

> There is no such privileged state of motion, as has been taught to us by the special theory of relativity, and that is why there is no Aether in the old sense. The general theory of relativity also does not know a privileged state of motion in a point, that one could vaguely interpret as velocity of an Aether. However, while according to the special theory of relativity a part of space without matter and without electromagnetic field seems to be characterized as absolutely empty, e. g. not characterized by any physical quantities, empty space in this sense has according to the general theory of relativity physical qualities which are mathematically characterized by the components of the gravitational potential, that determine the metrical behavior of this part of space as well as its gravitational field. One can quite well construe this circumstance in such a way that one speaks of an Aether, whose state of being is different from point to point. Only one must take care not to attribute to this *Aether* properties similar to properties of matter (for example every point a certain velocity).

In January 1920, he was even more specific[38]. He writes that in 1905 he was of the opinion that one is "no longer allowed to speak about the aether in physics. This opinion, however, was too radical"[39]. It *was* still permissible "to introduce a medium filling all space and to assume that the electromagnetic fields (and matter as well) were its states. But, it is not permitted to attribute to this medium a state of motion at each point, by analogy with ponderable matter. This aether may not be conceived as consisting of particles that can be individually tracked in time."[40]

He again emphasized that in general relativity gravitational potentials express physical properties of empty space (i.e. regions of space without matter and electromagnetic field). "Thus, once again "empty" space appears as endowed with physical properties, i.e., no longer as physically empty, as seemed to be

37 Interestingly enough the whole Nazi anti-Semitic campaign against Einstein culminated around the question of the aether. We refer to Kostro's book for further details (Kostro, *op. cit.*, p. 79.).

38 A. Einstein, "Grundgedanken und Methoden der Relativitätstheorie, in ihrer Entwicklung dargestellt", in *Collected papers of Albert Einstein,* Vol. 7, Doc. 31, Princeton University Press 1920a, p. 278.

39 Einstein 1920, *Ibid.*

40 *Ibid.*

the case according to special relativity. One can thus say that the aether is resurrected in the general theory of relativity, though in a more sublimated form. The aether of the general theory of relativity differs from the one of earlier optics by the fact that it is not matter in the sense of mechanics. Not even the concept of motion can be applied to it." In the new theory, geometry can no longer be separated from "true" physical facts, thus the concepts of "spacetime" and "aether" merge together. "Since the properties of space appear as determined by matter, according to the new theory, space is no longer a precondition for matter; the theory of space (geometry) and of time can no longer be presupposed prior to actual physics and expounded independently of mechanics and gravitation."[41]

As he became extraordinary professor at the University of Leiden, he wrote to Lorentz that he would lecture about aether in the theory of relativity. His inaugural lecture[42] was written before April 1920, but delivered in October 1920. He emphasized one more time that general relativity had once and for all banned the notion of empty space[43]. There is no empty space because there is no space without gravitational field, and therefore no space without curvature, no space without structure. Space without metric properties is unthinkable in general relativity. Herein lies also the main difference between gravitational field and electromagnetic field: no part of space can ever be without gravitational field while we can well produce regions of space without electromagnetic field. "The existence of gravitational field is directly connected to the existence of space."[44]

Conclusion

The aether of general relativity was thus reintroduced as a scientific concept by the same physicist who dismissed it more than a decade earlier. Let us summarize the course of events. The notion of aether was legitimized by the immovability and unresponsiveness of the Newtonian absolute space. Its further materializations were developed through progress in optics and electrodynamics. The problem culminated in the late 19th century as a series of inconsistencies in the explanations of physical experimental results. These implied that the basic

41 *Ibid.*

42 A. Einstein, "Äther und Relativitätstheorie", in *Collected papers of Albert Einstein*, Vol. 7, Document 38, Princeton University Press 1920b, pp. 305–323.

43 Einstein, *op. cit.*, p. 317.

44 *Ibid.*, p. 319.

principles of classical mechanics and electrodynamics were contradictory. The only way to reconcile these results with the existence of aether was to introduce a very sophisticated theory of stationary and non-interacting aether with all the features of Newton's absolute space. The contradictions were finally removed by Einstein's special relativity. This theory banned the notion of aether from contemporary physics. As Einstein was working on the generalization of special relativity, it became clear that space and matter might not be as independent as widely believed. In their final form the field equations of general relativity indicate, as John Wheeler famously put it, that matter tells space how to curve, and space, simultaneously, tells matter how to move. Empty space was found to be a dynamic medium – a new aether. A generalization of Special relativity, which forbade the notion of aether, ultimately led Einstein to its reintroduction.

In his inaugural lecture, Einstein continues with a remark that was to remain in the focus of his work for the rest of his life. As we understand today, he writes, the elementary particles are essentially nothing but condensations of the electromagnetic field. Contemporary physical explanations of the world rely on the existence of two quite different fundamental entities: gravitational field and electromagnetic field. In other words, Einstein writes, *space* (gravitational field) and *matter* (electromagnetic field). It would be a great step forward to succeed in unifying these two fields. The opposition between aether and matter would, again, be overcome, and physics would become a logically closed system of thought[45].

This unification of gravity and electromagnetism was something Einstein struggled for for the rest of his life. He never succeeded in making any real progress because, according to Pais (and others), he never accepted quantum theory (a theory he also laid foundations for) in its present form. But his imperative of unification of all interactions in one common physical framework has survived. One hundred years later Einstein's dream of a unified theory still represents a single most difficult and most important problem of modern physics. Physicists nevertheless made huge progress in the past century using relativistic versions of quantum mechanics, called quantum field theories. One such theory, called the Standard Model of fields and particles, has merged electromagnetic, weak and strong interactions in a single theoretical framework. Gravity, however, still remains well outside the scope of this unification. For now.

[45] Einstein, *op. cit.*, pp. 319–320.

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Miha Nemevšek*

Vacuum, Colliders, and Origin of Mass

Vacuum in particle physics

The notion of vacuum and its structure plays a fundamental role in particle physics, one which is not just conceptual but has profound and observable consequences. As we discuss below, the properties of the vacuum are directly related to the presence of symmetries in particle interactions and, in particular, to the concept of the origin of mass. It turns out that the masses of fundamental particles are not arbitrary static quantities, but instead come from a dynamical mechanism, one which we are starting to probe now, with the discovery of the Higgs boson.

In order to understand the nature of vacuum and how we define it in particle physics, let us review some basic principles of the underlying theory used to describe nature at shortest known distances. Current theoretical basis for understanding properties of elementary particles and their interactions is quantum field theory (QFT). This ontological framework was developed from quantum mechanics of the 1920's to incorporate relativity and describe multi-particle systems. It serves as the basic tool for modern understanding of all particle interactions (apart from gravity).

The necessity of using fields as basic constituents to describe particles came from Dirac's (Dirac, 1932: 60) prediction of anti-particles. His famous equation (Dirac, 1928: 610) predicted that for every observed particle with half-integer spin (called a fermion), such as electron, there exists a corresponding anti-particle with the same mass but opposite charge. Thus, anti-matter was predicted and in and the following year Anderson (Anderson, 1933: 491) discovered the anti-particle of electron, the positron, and thereby vindicated Dirac's theory.

The existence of anti-particles posed a challenge to quantum mechanics. By design, the standard theory described systems with a fixed number of particles.

* SISSA, Trieste and Jožef Štefan Institute, Ljubljana

On the other hand, if enough energy were available, a particle-anti-particle pair could be created, thus changing the number of particles in the system. The way QFT deals with this problem is that it assigns a field to each type of particle and then describes an individual particle as an excitation of this particular field from the ground state. For example, an electron field is postulated and, by applying a local excitation, a real electron is created.

The nature of vacuum in QFT

Once we embrace the QFT framework, an immediate consequence is a profound change of how we think about the vacuum. Classically, one would define vacuum as the absence of matter, a state without particles. In QFT, fields pervade entire space-time and one cannot do away with matter. Even if there is not enough available energy to create a real particle-anti-particle pair, such pairs can exist virtually for a very short period of time. Thus space is not completely empty of matter, at least not in the quantum sense. Therefore, an operational definition of vacuum is used. It is defined not as the absence of matter but as the state with the lowest possible energy, a ground state upon which excitations are created, interpreted as particles.

Such a definition of vacuum has interesting consequences. Vacuum can have physical properties which differ from one type of field to another. One such property is the value of the field in the ground state. Since QFT is designed to be a relativistic framework, relativity imposes constraints on the value of the field in the vacuum. In particular, the field in the ground state should not point in any particular "direction" that would break relativistic invariance. Therefore, the only field that can have a non-zero value of the field (so called vacuum expectation value) is one without an intrinsic direction. This obviously excludes particles with non-zero spin, such as fermions with spin 1/2 and vector bosons with spin 1. It leaves us with a unique option and the only field without an intrinsic compass, i.e. a scalar field with spin zero.

Symmetries and their breaking

The modern way to describe interactions between particles is to impose a special kind of symmetry on the equations of motion. In order for the equations to be symmetric, a set of interaction fields has to be introduced. These symmetries

depend on space-time coordinates and are historically called gauge symmetries while the corresponding interaction fields are termed gauge bosons.

Gauge symmetry is explicit in the Dirac equation when electrons interact by an exchange of photons. This interaction remains the same when a gauge transformation is performed. This modern description of the electromagnetic interaction within QFT, developed by Tomonaga (Tomonaga, 1946: 27), Schwinger (Schwinger, 1948:1439), and Feynman (Feynman, 1948:769), is called quantum electrodynamics. The key step of development turned out to be gauge symmetry. Experimentally, this interaction has a very long range, which requires the photon to have a very small mass, experimentally indistinguishable from zero.

The success of the Standard model (SM) of elementary particles is that the other two known interactions, the strong interaction responsible for nuclear forces and the weak interaction responsible for nuclear decays, can also be described using the same formalism of gauge symmetry. For each force there is a symmetry and a corresponding gauge boson. The gauge bosons of the strong interaction are called gluons, because they "glue" the constituents in the nucleus, while the weak interaction bosons have a less imaginative name, the W and Z. In contrast to the electromagnetic interaction, the weak force has a very short range, which requires the corresponding gauge bosons to have a large mass.

The development of the theory of weak interactions starts with Fermi's (Fermi, 1934: 161) attempt to formulate a theory, following the footsteps of Dirac. He imagined a point-like interaction to describe beta decay, the emission of an electron from a nucleus. This theory was known to behave very badly at high energies but it paved the way for a successful low energy description. The challenge was to find a well-defined theory of weak interactions at all energies.

Gauge theory of electro-weak interactions with massive gauge bosons was introduced by Glashow (Glashow, 1961: 579), extending the basic idea of his advisor Schwinger (Schwinger, 1957: 407). Glashow introduced the mass of the gauge boson by hand and thereby directly broke the gauge symmetry, hoping a way around this obstacle can be found. It was known that theories with massive gauge bosons lead to inconsistencies when quantum corrections are considered. Glashow was well aware of this problem, but chose to ignore it and constructed a physically viable model, which was not taken very seriously at the time. His

intuition was good and the problem of massive gauge bosons was solved in an unexpected fashion, by way of spontaneous symmetry breaking (SSB).

All the experiments so far confirm the existence of underlying gauge symmetries of particle interactions. But what about the vacuum? It is well known that the ground state may not necessarily have the same symmetric properties as equations of motion themselves. That is, a solution from symmetric equations with the least energy may not be symmetric. When such a situation occurs, one says that the symmetry is hidden or broken spontaneously. There are familiar examples of such breaking in many physical systems. An example of spontaneous symmetry breaking in a social context was given by Abdus Salam, one of the fathers of the SM. Imagine a dinner at the round table with symmetrically placed wine glasses. This situation is completely left-right symmetric and it is only when the most important (or thirsty) person decides on which glass to take and the others follow that the initial symmetry is broken.

The Higgs mechanism

The mechanism of SSB has been widely used in particle physics. Particularly important for the understanding of SSB were the contributions of Nambu (Nambu, 1960: 648) and Goldstone (Goldstone, 1961: 154). They showed that when a global symmetry is broken, a physical massless particle should exist. This Nambu-Goldstone theorem was very helpful in developing the theory of strong interactions, but it posed a problem for a consistent description of weak interactions. Experiments indicated that weak gauge bosons should be massive, which in principle could be described through spontaneous symmetry breaking but, since no massless particles corresponding to such breaking were observed, there seemed to be a paradox preventing the use of SSB to describe the weak interaction.

The solution to the paradox was the work of Anderson (Anderson, 1963: 439) Brout and Englert (Brout, 1964: 321), Higgs (Higgs, 1964: 508), and Guralnik, Hagen and Kibble (Guralnik, 1964: 585), now known as the Higgs mechanism. Anderson was the first to realise that when SSB was applied to a gauge symmetry the massless Goldstone boson disappeared. A relativistic particle physics model was constructed by Higgs, who showed this is indeed the case. If the potential of the bosonic field is such that the ground state is not symmetric, the

scalar field will get a non-zero value in the ground state. As a result, the gauge bosons acquire a mass, and the previously massless Nambu-Goldstone boson are now incorporated as an additional degree of freedom for the massive gauge boson (massless particles only have two degrees of freedom, or polarisations).

This result was of great importance. It opened the doors for a consistent description of massive gauge bosons and, more importantly, predicted the existence of a massive elementary scalar, the Higgs boson. Glashow's theory of weak interactions with massive gauge bosons could now be made consistent by employing the Higgs mechanism. This was precisely the work of Weinberg (Weinberg, 1967: 1264) and Salam (Salam, 1968: 367), who constructed a mathematically consistent theory of weak interactions that correctly described all the weak processes with heavy gauge bosons. It is only after their result that the interactions of the Higgs boson were predicted and one could start looking for it.

Origin of mass

After three years of running the Large Hadron Collider (LHC), two experiments, ATLAS (Aad, 2012: 716) and CMS (Chatrchyan, 2012: 716), both confirmed the existence of the Higgs boson nearly 50 years after its prediction, confirming the idea of SSB. It seems we really live in a universe described by symmetric equations and an asymmetric vacuum. Now that we are able to produce the Higgs boson, the particle excitation above this non-trivial ground state, we can start probing the physical properties of the vacuum and, in particular, the origin of particle masses.

Dynamical mass origin

The concept of mass we usually subscribe to is one of inertial or gravitational mass of everyday objects. The former describes the resistance of a moving object to an external impulse, and the latter refers to the response to the presence of other massive objects. Classically, we consider mass as a given static parameter, which can be measured but typically does not require an associated mechanism for its emergence.

With particles[1], the situation seems to be quite different. The Higgs mechanism transcends the static role of the mass as a given arbitrary parameter and provides a dynamical explanation of its origin. By this we mean that the size of particle mass, which we can measure as a response to an external field, is now related to a completely different process, which is the decay of the Higgs boson.

When we describe the interactions of any given particle with the Higgs field and the Higgs obtains a vacuum expectation value, this given particle will not only couple to the Higgs particle excitation, but also to the Higgs ground state, the vacuum expectation value *v*. This vacuum expectation value is the only explicit energy scale in the SM and sets the overall mass scale for all other particles. Any particle that receives its mass from the Higgs mechanism, will end up with its mass proportional to *v*, up to a constant where *c* differs from one particle to another.

This mechanism for providing the mass was used by Weinberg (Weinberg, 1967: 1264) to describe massive gauge bosons of Glashow (Glashow, 1961: 579), the W and Z. An attractive feature here is that the proportionality constant *c* is just the weak interaction gauge coupling. Moreover, the ratio between the W and Z mass is completely fixed by low energy experiments and was confirmed when W and Z were observed at the SPS collider in the early eighties.

A beautiful property of the SM is its minimality. Weinberg realised that, with a single Higgs field, one simultaneously provides a mass for the gauge bosons and also all the charged fermions. This can be done by coupling fermions directly to the Higgs field via the so-called Yukawa interaction[2]. To each charged fermion corresponds a unique Yukawa coupling and the latter's size determines the mass of the particle. The stronger it couples to the Higgs vacuum, the more massive the fermion is. At the same time, the bigger the coupling to a given fermion is, more often the Higgs boson decays into it and this is how the dynamical origin of fermion mass can be tested.

[1] Here we discuss the masses of elementary particles, such as electrons, and not composite objects, e.g., protons and neutrons, that are made out of elementary particles, quarks.

[2] Hideki Yukawa was the first to use the fermion-fermion-boson coupling in his theory of strong interaction, where the effective interaction between protons and neutrons is mediated by light bosons, called pions (Yukawa, 1935: 48).

Finally, even the mass of the Higgs boson itself is proportional to the vacuum expectation value. The proportionality constant here is the Higgs self-coupling, with four interacting bosons. Remarkably enough, it may well be that almost all the particles we know might share the same origin of mass, which follows from the non-trivial vacuum of the Higgs field.

Probing the vacuum

The method of physically probing the vacuum structure and the origin of mass is deceivingly simple. First, one should produce the Higgs boson, then observe its decays, and finally compare the decay channels to the predictions of the SM. In order to produce the Higgs boson, as for any heavy particle, one should have enough energy to excite it from the ground state. For this one needs a colliding machine with sufficient available energy. The problem with the Higgs boson is that its mass could not be predicted. This is in contrast to the W and Z gauge bosons, whose mass was bounded prior to discovery to a fairly narrow range by low energy data and other measurements, such as neutrino scattering via neutral currents (Hasert, 1973: 121). The predicted range was up to about 170 times the mass of the proton (m_p), and the SPS collider discovered both W and Z with masses around 90 m_p. As for the Higgs mass, the preferred value coming from a combination of many different experiments was around 110 m_p, but a precise upper bound was not known and it could have been as heavy as 800 m_p.

SPS collider that discovered the W and Z was not powerful enough to produce the Higgs and a new machine was needed. First hope for discovery was a large electron-positron collider (LEP), which came short in energy by a fairly small amount, as we now know. Later on, a proton-anti-proton collider, the Tevatron, started operating in '87 at Fermilab. Its energy was almost five times larger than SPS's and it managed to discover the heaviest known fermion in the SM, the top quark. Alas, it still lacked the energy to observe the Higgs. Finally, the LHC started colliding proton-proton beams in 2009. On July 4th 2012, both detectors, CMS and ATLAS, announced the discovery of a new fundamental scalar, most likely to be the Higgs boson, with the mass at around 134 m_p (CMS, 2012: www). The discovery of the Higgs boson required an extraordinary experimental effort. After building the most powerful microscope that ever existed, the experimental groups were faced with a task of discovering a needle in a haystack. Even worse, the Higgs boson is produced in only one out of ten billion events, a large

haystack indeed. Therefore, a lot of data needs to be collected. The detectors record and analyse several petabytes of data per second, but keep only the most interesting events and store them off-line for further study. With the amount of data collected after roughly three years of running, the LHC has produced around 10.000 Higgs bosons. Not all of these events can be used for analysis, since they may resemble the background too much, but they still provide us with enough statistics to make statistically sensible statements about the Higgs and its vacuum structure.

A particularly clean channel, now seen with great statistical confidence (6.7 σ) at the LHC (CMS, 2012: www), is the decay of the Higgs boson to a pair of Z bosons, shown on the left side of Fig. 1. This process happens at first order in perturbation theory with a fairly high rate; Higgs decays in this way around 3% of the time. It gives a very distinct signal when the two Zs decay and both detectors, CMS and ATLAS, measured it pretty well. Results agree with the SM expectations therefore the dynamical origin of the Z mass via the Higgs mechanism is now becoming apparent for the first time.

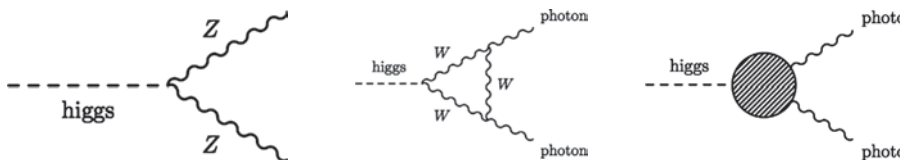

Figure 1: Decay channels of the Higgs boson. Left: tree level decay to a pair of Z bosons. Centre: a loop mediated decay to two photons through virtual W bosons. Right: additional possible contribution to the di-photon channel due to unspecified new physics.

Another channel which is conceptually important is the decay of the Higgs boson to a pair of photons, seen in the centre and right of Fig. 1. What makes this mode interesting is the fact that it does not happen in the first order of perturbation, but instead only proceeds through virtual contributions, i.e. it probes all the vacuum fluctuation that couple to the Higgs. One such contribution comes from the SM with the exchange of virtual W bosons, shown in the centre of Fig. 1.

The di-photon decay mode of the Higgs boson is now clearly seen and provides us with a direct probe of the vacuum structure. Any charged particle that couples to the Higgs boson will affect this process via quantum fluctuations as illustrated in Fig. 1 right, even if we have not yet observed it directly. Processes of this type, suppressed at first order and therefore sensitive to heavy particles, are particularly welcome since they can provide hints on what to expect in the future. At the moment, the SM prediction seems to agree well with the experiment.

Origin of fermion masses

The visible matter in the universe is composed of fermions, such as protons, neutrons, and electrons. The electron seems to be an elementary particle, while protons and neutrons are made out of constituent fermions, named quarks. Proton and neutron are made out of two types of quarks, called "up" and "down" quarks. Together with the electron neutrino, these four particles form the first generation (family) of fermions. However, this is not the entire story. We now know that there are two more generations of particles present in nature, exact copies of the first, except for their larger mass.

What is the origin of fermion mass? We are just starting to unravel the answer to this question, with the discovery of the Higgs boson. As we will see, the complete answer is still far from obvious. Although the general outline is becoming clear, it may take a long time, and a lot of theoretical and experimental effort, to get a clear picture of what is going on.

The relativistic equation for fermions was discovered by Dirac together with its prediction of antiparticles. The equation works beautifully for electromagnetism, even when the fermion masses are put in by hand. This is because the fermion mass respects the symmetry of electromagnetic interactions and allows for a self-consistent quantum theory. But, with new experiments, it became clear that the nature of weak interaction is such that a mass term for fermions will break the underlying symmetry of weak interactions. Like with gauge boson mass in Glashow's model, this is problematic when quantum corrections are considered.

The way out of this fermion mass problem was very elegant and was the culmination of works of Yukawa and Higgs et al., written down by Weinberg (Weinberg, 1967: 1264). As discussed above, Yukawa used a direct coupling of fermi-

ons to scalar bosons to describe strong interactions. The brilliance of Weinberg's work was to use this coupling for the electron with a different scalar, the Higgs boson. As the Higgs boson has a non-trivial vacuum after SSB, fermions couple directly to its vacuum expectation value and, therefore, acquire a mass. It is theoretically very pleasing to have such a minimal model with a single field providing mass to all other particles.

The masses of fermions depend on the size of the coupling constant, the so-called Yukawa coupling. The bigger the mass, the bigger the coupling, and the more likely the Higgs boson is to decay into such a particle-anti-particle pair, as long as it is lighter than the Higgs mass. Therefore, the decays to heavier generations are easier to observe at the LHC. Both CMS and ATLAS are starting to gather enough data to obtain a statistically meaningful signal (CMS, 2012: www). The second and first generation fermions are significantly lighter, therefore, the rate at which they would appear in the Higgs final state is much smaller, and also the signal is more difficult to distinguish from the background. LHC may not be the right machine to resolve the origin of charged fermion mass for the lighter two generation, but perhaps the next generation collider will provide the ultimate answer to this issue.

Nevertheless, the LHC has provided an ultimate answer to one long standing question, that of the number of generations. By this we mean a strict carbon copy of existing families, which obtain their mass solely from the Higgs mechanism. As mentioned above, even if we cannot see the fourth generation directly, it would affect certain processes, in particular the decay to two photons. Since the observed rate is in good agreement with the three generations of SM fermions, an extra family is ruled out with high confidence.

Origin of neutrino mass

The discovery of the Higgs boson and its properties measured so far confirm predictions of the SM. But there is one clear prediction which turned out to be incorrect and that is the mass of neutrinos. At the time the SM was constructed, there was a prevailing belief due to absence of proof on the contrary, that neutrinos were massless. Following this line of thought, the model of leptons as written by Weinberg had such a structure that neutrino mass could not exist.

Gradually, the question of neutrino mass started to become acute in the following way. With the techniques developed by Ray Davis (see Cleveland, 1998: 505 for a review), it was possible to observe neutrinos and measure their flux. At the same time, it was known that the Sun should be producing a large amount of neutrinos in its burning cycle, due to the work of Bahcall and others. When measurements were compared to theoretical predictions, the numbers did not match, even when various uncertainties were taken into account, resulting in the solar neutrino puzzle.

An altogether different solution to the solar neutrino puzzle was put forward by Bruno Pontecorvo, an Italian physicist who was the godfather of most discoveries behind neutrino physics. He suggested (Pontecorvo, 1957: 549) that if neutrino had mass, then the neutrino produced in the Sun need not be the same as the one that arrives to the Earth. Instead, it would oscillate to a different kind, which could not be detected by the experiment. Although this was a very simple explanation, it was largely ignored due to the clear prediction of the SM (and other theoretical ideas developed at the time, such as some grand unified theories).

This issue persisted and intensified over the years, though many dismissed it due to the complicated solar model and experimental difficulties in measuring the neutrino flux. The final verdict came in late nineties from the Super-K experiment in the Kamioka mine. Although the initial aim of Super-K was to look for proton decay, it ended up measuring many neutrino events (Fukuda, 1998: 81). These neutrinos could not have been produced in the Sun, but came instead from the Earth's atmosphere. When cosmic rays hit upon the Earth, they produce a massive shower of particles, which in turn decay to neutrinos. This process is much better understood than the solar model and the results of Super-K could not have been explained by other means than neutrino oscillations. Once the oscillation explanation is accepted, all the results become consistent and the proof for massive neutrinos is now firmly established.

The existence of neutrino mass poses an obvious question. What is the theory of neutrino mass? Surely it is not the SM, as it predicted neutrinos to be massless. And what is the origin of neutrino mass, i.e. is it related to the origin of other charged particles, the Higgs mechanism? These issues remain unsolved to this day, although there are theoretical ideas about how to go beyond the SM and uncover the theory behind neutrino mass. To understand the enigma of neutrino

mass, let us go back to the ground-breaking work that still forms a theoretical basis in the field of neutrino mass.

Dirac or Majorana

The work of Ettore Majorana was a hallmark paper (Majorana, 1937: 171) that made a profound impact on neutrino physics. Shortly before his mysterious disappearance, Majorana wrote a paper on the possibility of describing fermions with only half the degrees of freedom that were usually employed.

In the SM, all the charged fermions obtain their mass by coupling to the Higgs field through the so-called Dirac mass. For this mass term to exist, fermions need to be described by a complete Dirac spinor, containing twice the degree of freedom a Majorana spinor can have. Historically, these are called left- and right-handed spinors. For a charged fermion, this is the only possible mass term that one can imagine without breaking the symmetry of the weak interaction. If both components need to be present, then there is a prediction that for every particle there exist a corresponding anti-particle. Majorana's contribution was to show that there exist a consistent way of describing truly neutral massive fermions with only a single component of the Dirac spinor.

His idea immediately found a place in neutrino physics. Neutrinos do not carry electric charge so it seems natural to describe them with a Majorana spinor. The basic point is that if we use the Majorana spinor, it turns out the mass term will break any symmetry associated with the neutrino, i.e. Majorana neutrino is a truly neutral particle. This is in direct contrast to the work of Dirac, who predicted the existence of anti-particles. His prediction holds true: for any existing charged particle there is a corresponding anti-particle. But if a neutrino were Majorana, it would be truly neutral and therefore equal to its anti-particle. So which is it for the neutrino, Dirac or Majorana?

The formalism developed by Majorana is not innocuous; it has an immediate physical consequence that can distinguish a Dirac fermion from a Majorana. The physical impact was realised by Racah and Furry (Racah, 1937: 322) shortly after the work of Majorana. They suggested a particular type of nuclear decay in which the Majorana nature of the neutrino could be tested experimentally. The majority of nuclei decay through an emission of a neutrino and an electron, the

so-called beta decay. There are rare occasions when this process is forbidden and the nucleus has to "jump" an atomic number to decay with a simultaneous emission of two electrons and two neutrinos at the same time. Maria Goeppert-Meyer was the first to realise that such double beta decay can take place at a very low rate – at the moment it is the slowest physical process we have ever measured. Following the work of Majorana, Racah and Furry realised that if neutrinos were truly neutral and massive, the double beta decay could occur even without the emission of neutrinos: a neutrino-less double beta decay.

One of the reasons why the Majorana nature of neutrinos and the search for neutrino-less double beta decay are important for physicists has to do with a certain type of symmetry. When a given process is very rare, physicists tend to assign a conservation rule, a symmetry. For example, in all the processes we observe, electric charge is conserved. Therefore, we are tempted to assign a charge number to all particles, and an opposite one to anti-particles, which is then conserved. The corresponding symmetry for electric charge is precisely the gauge symmetry of the electromagnetic interaction.

Suppose that instead of electric charge we assign a common charge to the electron and the neutrino, called the lepton number. Since all the experiments performed so far seem to conserve this number, lepton number conservation is a reasonable symmetry. But once we allow for a Majorana neutrino, its mass term will break it. This is because a Majorana neutrino, being made of a single spinor component, is a truly neutral particle, indistinguishable from its own anti-particle.

In the SM without neutrino mass, lepton number is conserved. With the unambiguous proof of neutrino oscillations from Super-K, it is clear that neutrino mass should be added once we go beyond the SM. In such a case, the lepton number could be broken and we should look for ways to test how good this symmetry really is (in any case testing fundamental symmetries is important in its own right). Neutrino-less double beta is an experiment designed to do this. It looks for a process in which one nucleus transforms to another without emitting neutrinos, only electrons. Therefore, the lepton number has increased by two units and the process clearly breaks the lepton number symmetry.

The search for neutrino-less double beta decay started almost immediately after the theoretical suggestion and has been going on ever since. Especially after the

discovery of neutrino mass by Super-K, the search has intensified and there are currently around six experiments looking for this process, with more under way. This line of research is complementary to collider searches. It does not require high energy machines, but instead demands a lot of patience and dedication to eliminate the unwanted background and search for the signal. It is remarkable that both colliders and low energy nuclear experiments can simultaneously probe the same type of physics from different ends of the energy spectrum.

Left-Right symmetry

The SM predicted neutrinos to be massless and the prevalent mood at the time of its creation was that this should indeed be the case. But after the discovery of neutrino oscillations, one of the central issues in particle physics became the quest for a theory of neutrino mass. Despite the success of the SM, people nevertheless thought about theories which focused on other aspects of particle physics but necessarily ended up with massive neutrinos. Such theories, where a complete framework is constructed in order to follow a certain physics idea, may be our best bet for the theory of neutrino mass.

From theoretical considerations related to left-right symmetry and grand unification came a beautiful idea of the see-saw mechanism, which provides a modern understanding for the lightness of neutrino mass and naturally incorporates Majorana neutrinos.

The original idea that led to the see-saw mechanism is the concept of parity restoration at high energies. In the mid-50's, two brilliant young physicists, Lee and Yang (Lee, 1956: 254), showed that weak interaction is very special and profoundly different from the electromagnetic and strong interactions. While the latter two behave the same way if we replace left with right (a symmetry called parity), weak interactions break parity in a maximal way. Their result came as a great surprise to the community. However, due the prevailing belief that parity should remain a fundamental symmetry of nature for all interactions, Lee and Yang added a short paragraph to their work. They offered a possible solution with mirror extra families, which would restore the parity symmetry and put all the interactions on the same footing. The solution suggested by Lee and Yang turned out to be another beautiful idea killed by the ugly facts of nature. As dis-

cussed above, even a simple fourth generation is ruled out, not to mention an entire mirror world envisaged by Lee and Yang.

Apart from mirror families, there exists another, perhaps even more intuitive way to restore parity, called left-right symmetry. Such a theory was first suggested in '74 by Pati and Salam (Pati, 1974: 703) who added a second weak interaction that also violates parity maximally, but in the opposite way, so that parity is eventually restored. Initially, it was thought that parity cannot be broken spontaneously, but the work of Senjanović and Mohapatra (Senjanović, 1975: 1502) showed that by using an appropriate version of the Higgs mechanism in left-right symmetric theories, this can indeed happen. Thus, parity could be a perfectly valid symmetry at very high scales, but the vacuum is asymmetric so we would perceive it to be broken at lower energies.

Neutrino mass and the see-saw mechanism

The way left-right symmetry works for fermions is that it treats both components of the Dirac spinor, called left and right-handed components, on the same footing at high energies – it is parity symmetric. But at low energies, this symmetry gets broken and weak interactions couple more strongly to one component of the spinor than the other and this is the source of parity violation.

The initial attempt to have a consistent left-right symmetry resulted in problems with neutrino masses, which turned out to be too large. If only Dirac type of masses were used, neutrinos would become heavy and with their mass would end up above the experimental limit. The way out of the impasse was provided independently by Minkowski (Minkowski, 1977: 421) and Mohapatra and Senjanović (Mohapatra, 1980: 912). The crucial point was the realisation that neutrinos can also have a Majorana mass. If this is allowed for, a beautiful solution emerges. One component of the neutrino spinor (roughly speaking a Dirac spinor is made out of two Majorana spinors) becomes very heavy, but as a result the other one is necessarily light – hence the name the see-saw mechanism.

A similar conclusion was reached in the context of grand unified theories (Glashow, 1980: 59), where all the different interactions are described by a single grand unified gauge symmetry. In this case, not only is a form of parity restored at high energies, all of the known interactions also merge into a single one. A

particularly attractive gauge group (mathematical term is *SO(10)*) is the one in which the entire generation of fermions is described by one large spinor and, as it turns out, this spinor automatically contains a heavy Majorana neutrino. Both parity restoration and grand unification started with a distinct theoretical concept but ended up predicting neutrino mass long before the experiment. They both arrive to the same appealing explanation for the lightness of neutrino mass via the see-saw mechanism and both contain Majorana neutrinos. But how do we test these ideas? An indirect proof would be the observation of neutrino-less double beta decay, but to really uncover the theory behind neutrino mass, we would like to "see" the heavy Majorana neutrino directly and this is where colliders are needed.

Neutrino mass and colliders

Weak interaction is mediated by an exchange of heavy weak gauge bosons W and Z and they couple only to one part of the Dirac spinor, historically called the left-handed component. At low energies, their effect is seen in nuclear processes like beta decay. But only when they were observed at the SPS collider, was the origin of weak interaction conclusively established.

In order to start probing the theory behind neutrino mass, one would like to observe the microscopic nature of neutrino mass directly in colliders. In left-right theories, another weak interaction is postulated with analogues of W and Z that are heavier (they better be, since we have not seen them yet), and couple only to the other component spinor, the right-handed one. If the energy scale of parity restoration were light enough, the LHC would be able to produce the right-handed gauge boson W_R. Once produced, it can decay into an electron and a heavy neutrino, as suggested by Keung and Senjanović (Keung, 1983: 1427). If the heavy neutrino is a Majorana particle, its decay will violate lepton number and it could decay into another electron and two quarks. So from the initial proton-proton beam at the LHC, we would end up with a final state of two leptons and two quarks. The initial lepton number was zero and at the end it is two, so lepton number would be broken by two units, just like in neutrino-less double beta decay. Observing this process would unambiguously establish the microscopic origin of neutrino mass.

The exact method of looking for heavy neutrinos depends on their mass. With early LHC data, the signal was re-interpreted (Nemevšek, 2011: 83) and dedicated searches for heavy neutrinos and W_R by both CMS (Chatrchyan, 2012: 261802) and ATLAS (Aad, 2012: 2056) collaborations were carried out. Should the signal be observed at the LHC, it would directly connect the lepton number breaking at colliders to many rare processes at low energies, including neutrino-less double beta decay (Mohapatra, 1980: 912 and Tello, 2011: 106).

To complete the picture and have an ultimate understanding of the see-saw mechanism, one should be able to unravel the see-saw mechanism. Only recently were we able to show that, in the minimal left-right model, this can be done (Nemevšek, 2013: 110). By measuring the heavy neutrino signal at the LHC (Keung, 1983: 1427), one would be able to determine in what way neutrinos (both heavy and light) couple to the Higgs vacuum. In this way, left-right symmetry becomes a complete theory of neutrino mass, just like the SM is for charged leptons. Once the masses are known, all the Dirac Yukawa couplings can be predicted and these predictions tested at the LHC or future colliders.

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Gregor Moder*

"Held Out into the Nothingness of Being": Heidegger and the Grim Reaper

Being, in the proper meaning of the term

There seems to be a general agreement among both critics and followers of Heidegger that he was a conservative existentialist philosopher of angst, guilt, and death. Especially in the English language literature, though not only there, this image is still the dominating one, even though it has been years, decades, since it was demonstrated that this is a very narrow, if not completely mistaken interpretation of his work. Carol White described two major reasons for the confusion among the Anglo-Saxon readership. Firstly, there is the problem of English translation which consistently pushes toward the reading of Dasein as a person or individual, even though Heidegger made it very clear that his project is to formulate the explicit question of being itself (White 2002: 337). She pointed out that one should always bear in mind that the term *Eigentlichkeit*, translated as authenticity, is etymologically close to the term *eigenst*. She writes: "Dasein is '*eigentlich*' or 'properly' or 'authentically' itself when it makes an issue of Being rather than taking the understanding of Being for granted. The etymological connection between '*eigenst*' and '*eigentlich*' should not be forgotten" (White 2002: 334). Even though the problem of the translation of Heidegger is overwhelming, the second reason for the confusion is even more devastating. As White claims, it was Heidegger himself who contributed to the ambiguity of his writing about death (White 2002: 336). In this, her reading is supported by many other researchers, such as Dreyfus and Wrathal who edited the Blackwell companion to Heidegger. They write: "Although there can be no question that death plays a central role in the architectonic of *Being and Time*, certain features of Heidegger's account of death make it unclear what exactly it is that 'death' refers to" (Dreyfus, Wrathal 2002: xv).

Indeed, it is the concept of being-toward-death that seems to justify the image of Heidegger, the conservative. This is because being-toward-death is usually and predominantly interpreted as the concept of human finality. After Heidegger, –

* Faculty of Arts, University of Ljubljana

or so this line of argument wishes to demonstrate – it is impossible to conceive human being as immortal or eternal, since the radical finality is inscribed in its very being. It is not only the body that is perishable, while in essence humans are eternal: human existence as such is final. Being-toward-death therefore designates existence which already involves the possibility of death; death itself is a part of human existence. Of course, a position of such radical finality contradicts the metaphysical tradition, in which final things and beings were considered ontologically secondary and scientifically less important than eternal beings such as gods. But on the other hand, and this is what I find to be the most obvious flaw of this reading, the idea of the human being as essentially mortal is far from revolutionary. In fact, the religious tradition that embodies one of the greatest sources of European metaphysics, Christianity, insisted, and to this day insists, precisely on the premise of human mortality. If Heidegger was to say something radically new, it would be better to say the opposite: that the existence itself is immortal. Indeed, in the reading I wish to present here, Dasein, in the proper meaning of the term, does not die. As counter-intuitive as it may sound, the concept of being-toward-death is precisely Heidegger's formulation of something undying that pertains to and persists within human existence, not of something eternal in the metaphysical meaning of the word, but of something un-dead nonetheless.

But first, I want to demonstrate the scope of the problem of the dominant readings of Heidegger. These readings tend to start from the proper ontological premises, but then, unfortunately, orient themselves toward a moral interpretation of those premises, or else toward some kind of psychology of existence. Charles Guignon, the editor of the Cambridge Companion to Heidegger, understands *Eigentlichkeit* as a question of an ethical demand for an authentic life: "It would appear, then, that authenticity is not so much a matter of the 'content' of a life as it is of the 'style' with which one lives" (Guignon 2002: 204). One is baffled by the ease with which Guignon replaces the ontological concept of *Eigentlichkeit* with the mundane distinction between the content and the style with which one lives. In another classic example of miscomprehension of the task at hand, the same author writes: "As being-toward-death, human existence is an unfolding movement *toward* the realization of one's identity or being as a person" (Guignon 2005: 395). It is fascinating how Guignon detects the importance of the wording "toward", but then completely fails to grasp its ontological status, which remains beyond any psychology or theory of identity.

Some readers, like Stephen Mulhall, are quite content with ascribing immense philosophical value to statements that don't properly belong to philosophy: "If anything, what [Heidegger] is more concerned to stress is that the non-relational nature of death highlights an aspect of Dasein's comportment to any and all of its existential possibilities; for in making concrete Dasein's being-ahead-of-itself, the fact that no one can die our death for us merely recalls us to the fact that our life is ours alone to live" (Mulhall 2005: 304). Thus the immense effort of ontological analysis is reduced to a profane wisdom; precisely what Heidegger warned us against. Mulhall concludes: "In short, an authentic confrontation with death reveals Dasein as related to its own being in such a way as to hold open the possibility, and impose the responsibility, of living a life that is authentically individual and authentically whole – a life of integrity, an authentic life" (Mulhall 2005: 306). The ontological considerations are thus translated into the moral category of integrity. Let me conclude this overview of the shocking state of affairs in Heidegger scholarship with this crown jewel, delivered by Hoffman: "When that actual state of affairs – that is, the true face of death – is brought out and articulated, the threat of death reveals itself as being indeed constant and all-pervasive. [...] Life matters only because I am aware that it can be snatched away from me by the power of death" (Hoffman 1993: 200). Did we really need Heidegger to tell us that life matters because it is fragile and that someday, death will take us? In fact, did we really need a philosopher for this, a thinker? Could not a simple country priest have done this job just as well?

The mistake that all these interpreters made was that they got stuck at certain phrases and statements that sounded familiar and therefore made sense; such as, for instance, the banalities about death. What they overlooked, apparently, is that these banalities were the starting point of Heidegger's analysis which sought to explain the ontological premises that allowed them as banalities, as vulgarities, in the first place. Let us consider, for a moment, the vulgar understanding of time as a sequence of nows. Was Heidegger trying to tell us that time is a sequence of nows? No, of course not! He attempted to provide an ontological analysis of the vulgar concept of time and thus open the possibility of transforming that concept. Let us now take a look at the vulgar understanding of death. Is Heidegger trying to tell us that we will all die someday, or that we all fear death, or that no one can die in our place? Of course not! His project is,

again, to expose the ontological structure of existence itself and thus open it to rethinking, to reinterpretation, to reformulation.[1]

But perhaps we should not judge these commentators too harshly, since it was already pointed out that it was Heidegger himself who allowed for an ambiguous reading of his concepts of *Eigentlichkeit* and being-toward-death. Perhaps we should go even further and say that even Heidegger himself read Heidegger naively and was thus the first who misunderstood himself. The misleading qualities of Heidegger's text itself, especially those that surround the concepts of *Eigentlichkeit* and *Uneigentlichkeit*, force us to introduce a provisional distinction between the authentic and inauthentic Heidegger, where the authentic Heidegger is faithful to his ontological task, while his own failings to do so are the workings of the inauthentic Heidegger. The inauthentic Heidegger is, in principle, a philosopher of death as the vulgar caricature, a philosopher of the Grim Reaper, and we must be very cautious not to succumb to his metaphysical charm.

Whether we ascribe the relapse to the vulgar or metaphysical understanding of death, time, and being to Heidegger himself or not, this is clearly a problem that transcends that of simple reading naiveté or accidental misinterpretation. We are dealing here with a specific resistance of metaphysics itself to the procedure of explicit analysis, not entirely unlike the resistance of Freud's patients to psychoanalytical treatment. Instead of starting with vulgar and banal knowledge and orienting ourselves toward ontological exposure and transformation of it, we end up doing precisely the opposite: we keep our metaphysical understanding and even reaffirm it, orienting our argument from the ontological structure of existence toward the average and closest vulgar wisdom. In short, traditional metaphysics is able to use Heideggerian phenomenology – designed as a tool of transformation of metaphysics into thinking – as an argument in its own favour. This is, then, the real reason why the vulgar understanding of death is so persistent in Heideggerian scholarship: because we have been trained for centuries in it and are very used to hearing and understanding certain "truths". Let me point out two rare cases of honesty in the long line of scholars who consistently trans-

[1] It is Catherine Malabou who most consistently and thoroughly argued for the utmost importance of the question of transformation in reading Heidegger. She writes: "what Heidegger thinks under the heading of ontology is the structure of transformation alone. Being is nothing but (its) transformability" (Malabou 2001, 73).

lated Heideggers's ontological endeavours back into metaphysical vulgarities. First is by Dostal, who writes from within the field of vulgar miscomprehension:

> What the future holds for any and every Dasein is death. Another definition of Dasein is therefore provided: being-toward-death. In the authentic moment, we recognize and accept our mortality. Heidegger's story of Dasein is, in this regard, not so unlike the Christian story of fallen human nature (though Heidegger denies that his story is just another version of original sin). (Dostal 1993: 169)

Isn't it marvellous, how Dostal recognizes that Heidegger did not want his story to be mistaken for the paradigmatic example of Christian metaphysics, and yet insists on reinterpreting it as such? I find this quote absolutely brilliant because it puts the finger exactly on what is problematic in the naive reading of Heidegger's concept of being-toward-death as the idea of human mortality: this idea is absolutely the same as the principle idea of Christian theology. If this is what Heidegger's philosophy leads up to, then we should discard it as just another attempt of the Western metaphysics to impose itself as something other than what it is. But it was none other than the famous John Caputo who made the most honest case in favour of the inauthentic Heidegger. He writes:

> The task of theology, armed now with the Heideggerian analytic of existence, is to deconstruct and demythologize the canonical Gospels in order to retrieve their *kerygma,* the living-existential Christian message, one of existential conversion *(metanoia),* of becoming authentic in the face of our finitude and guilt, a task that faces every human being. (Caputo 1993: 275)

Caputo makes it perfectly clear: the Heideggerian analytic of existence is an armament, a tool to be used in combat. If we fail to strictly follow Heidegger's ontological task and deconstruct the vulgar, metaphysical concepts that still guide the predominant discourse of truth, if we fail to point out the existential, ontological character that they nevertheless reveal in themselves, then all we did was provide theology with a powerful weapon; theology can *reverse* the orientation of the deconstruction and claim that Heidegger in fact only provided the fundamental ontological grounds for the beliefs and morals that it (theology) held in the first place.

Human, all too human

Let us now take a closer look at what Heidegger actually wrote. In *Being and Time*, the first reference to the concept of Dasein is in §2, where Heidegger analyses the formal structure of the question of being. He distinguishes three moments: first, the object of inquiry, second, the instance that is researched, the "interrogated", and third, the concept which is the result of the inquiry. Now, the object of inquiry is obviously being, and the concept which is sought is the meaning of being. Things get interesting when Heidegger determines the instance interrogated. He asks himself:

> In *which* being is the meaning of being to be found [...]? Which is this exemplary being and in which sense does it have priority? (Heidegger 1996: §2, 5)

The answer Heidegger provides to his own question is quite brilliant. Since an explicit concept is sought, the specific being that is to be interrogated about its being must be capable of an explicit analysis. Therefore, the specific being that must be interrogated is precisely the being that asks the question of being. Now, who or what is this being *par excellence*?

> This being which we ourselves in each case are and which includes inquiry among the possibilities of its being we formulate terminologically as Dasein. The explicit and lucid formulation of the question of the meaning of being requires a prior suitable explication of a being (Dasein) with regard to its being. (Heidegger 1996: §2, 6)

Who are "we ourselves"? A possible way to read these lines would be to say that, for Heidegger, the human being is a being with priority over other beings because it has, among other capacities, also the capacity to analyse, to explicitly ask, to inquire, – in short, because it has the capacity to *think*. Such reading would have much support in the entire oeuvre of Martin Heidegger; in this passage, precisely in the usage of the word "we".[2] However, this is not the reading I would argue for. What strikes me as remarkable in these lines is that they do not so much provide an answer to the question of which exactly is the being that

[2] Quite explicitly for instance in *Identität und Differenz* where he declares that thinking is a capacity of man (when elaborating on Parmenides' quote that it is the same thing to think and to be).

we should interrogate about its being, as they give a terminological formulation of the curious self-referential character of the question of being. Heidegger does not say that it is the human being that must be asked about its being; but rather, he declares that his technical term for the specific being that is necessarily, structurally involved in the question of being, is Dasein.

There are two details we can list in support of this reading. First, let's take a closer look at the second sentence. What exactly is the function of the parenthesis which holds only one word, Dasein? Does it provide some additional, more specific information to what was already said with the words "a being"? Or is the word in parenthesis a clarification which only supplies a different term? The reading I propose follows the latter option: what Heidegger lists in the parenthesis is nothing but the technical term for "a being", the very technical term he introduced in the previous sentence. The term Dasein, at this point of the analysis in *Being and Time*, does not yet carry any other meaning but this: it is a being (*eines Seienden*), to be distinguished from being itself (*das Sein*). Dasein is therefore not one being among other beings, picked out for its special characteristics; rather it designates the determinate existence in general. The formal structure of the question of being leads to this distinction, to the difference between Sein and Dasein, to the difference between being qua being and determinate existence. In the question of being, Sein and Dasein are separated just as much as they belong to one another.

This takes us directly to the second detail, to the Todtnauberg note, which reads as follows:

> Da-sein: being held out into the nothingness of being, held as relation. (Heidegger 1996: §2, 6 (footnote))[3]

First of all, in this note, Da-sein is spelled with a hyphen which underscores the self-referential character of the relation between Dasein and Sein; Sein is at the same time the same and not the same as Dasein. Secondly, the determination of Dasein as "being held out", *Hineingehaltenheit*, gives us an almost pictorial grasp of the relationship: Dasein is dipped or thrown into the void of being. But

[3] In German: "Da-sein: als Hineingehaltenheit in das Nichts von Seyn, als Verhältnis gehalten" (Heidegger 2001: 439).

this should not be misunderstood as if Dasein is first something independent of being and of its relation to it and only accidentally comes into relation with it; on the contrary, Dasein is only and precisely the "being-held-out", it is only and precisely this relation to being, this relation to the nothingness of being. Finally, and above all, the Todtnauberg note leaves no doubt that Dasein, essentially, has nothing to do with humans. At this initial stage in *Being and Time*, the humanness of "we ourselves" is reduced to the capacity of thinking, to be more precise, to the capacity to question, and even this capacity is relevant only insofar as it is explicitly bound to the question of being. Because of this, we must insist on the claim that Dasein is not human, even though it is true that it is humans who exhibit the possibility of holding a place for the question of being. Beside these two details one should also mention that Heidegger devoted an entire paragraph, §10, to the delimitation of the interest of his analysis in the fields of biology and psychology, but also in that of anthropology (Heidegger 1996: §10, 42–47). Furthermore, if we recall the famous *Letter on Humanism*, there should be no doubt that his project was not a humanist project. He wrote: "what is peculiar to all metaphysics, specifically with respect to the way the essence of the human being is determined, is that it is 'humanistic.' Accordingly, every humanism remains metaphysical" (Heidegger 1998: 245). For Heidegger's question of being, the entire history of philosophy as metaphysics is insufficient; or rather, it provides too many answers and by doing so avoids the question. All these anti-humanist references are important because they indicate that the problem of death that Heidegger inevitably links to Dasein at certain points has nothing to do with the grisly downfall of a human being, but rather, as I hope to demonstrate, with that *Hineingehaltenheit*, with being held out into the nothingness of being, with being dipped or thrown into the void of being. Again: even though thinking *is* the capacity of humans, Dasein is not simply an alternative and rather eccentric term for "human being"; rather, it denotes the capacity of thinking itself, as *capacity*, regardless of whether any one human being is actually thinking or not.[4]

[4] The notorious question, reopened some years ago by Meillasoux (2010), whether the world is independent of humans who think it, is thus rendered impertinent. Of course it exists independently of any one human being and of all of them, and it has existed before any human had the capacity to think it! However, any concept of world or time is already mediated by the category of thinking, even the basic idea of the existence of the world and worldly beings. And even the concept of the human being – as something other than the world – is mediated, determined and made possible by the category of thinking.

Let me make two brief asides, a Parmenidian and a Hegelian one. One of the most famous philosophical statements of all time is that of Parmenides, that being is the same as thinking. I believe this is precisely what is in question in the initial paragraphs of *Being and Time*; the self-referential, even circular structure of the question of being points to it. The capacity to inquire and analyse is the capacity to think; hence, the question of being is what binds being and thinking into oneness. The term Dasein is the mark of their belonging to each other. However, by the same structure of the question of being, thinking and being are also set apart. Dasein is the there-ness of being, the determinateness of being, not the being itself. The spelling Da-sein evokes this image of unity and separation, sameness and difference. Perhaps one could argue that one must think the sentence of Parmenides necessarily with such interplay of sameness and difference; Hegel, however, did not. In *Science of Logic*, Hegel declares that pure being, without any further determination, is a Parmenidian concept. But at the same time, he argues, Parmenides failed to see that pure being has already become pure nothingness. For Hegel, the sameness and difference of pure being and pure nothing is becoming; and what follows is determinate existence, in German: *Dasein*. We should read Heidegger's concept of Da-sein, spelled with the hyphen, as belonging to the same considerations of Sein and Dasein as were those of Hegel. The relationship between logical categories of being and existence (*Sein* and *Dasein*) is principally the same for Hegel and Heidegger: being is pure void, nothingness, while existence is the there-ness of being, its determinateness. This detour through Hegel hopefully underscores the logical nature of the relationship between being and Dasein that Heidegger renders explicit in his analysis of the formal structure of the question of being; there is no place here for the human stain.

Being in the world

Let us now proceed to the concept of being-in-the-world (*In-der-Welt-sein*), which Heidegger introduces as the fundamental constitution of Dasein. To start with, he proposes yet another formulation of the circular, self-referential relation between Sein and Dasein, between being and its there-ness, this time even more explicitly reducing the thinking being to its relationship with being itself.

> The being whose analysis our task is, is always we ourselves. The being of this being is always *mine*. In the being of this being it is related to its being. As the being

> of this being, it is entrusted to its own being. It is being about which this being is concerned. (Heidegger 1996: §9, 39–40)

The most important change in the terminology is the replacement of the "we" with the "I". In the introduction, Heidegger was referring to Dasein in a slightly more generalized way, claiming that its capacity to think was one capacity among others (*unter anderem*). Here, however, the self-referential character of being is underscored with the formulation, that it is being itself about which this being is concerned in its very being. The shift from "we" to "I" is an indicator of the reduction of Dasein to its minimal condition, to its proper formulation of the there-ness of being. So much so that Hedeigger invents the term *Jemeinigkeit* (translated as *always-being-my-own-being*). In another Todtnauberg side-note, Hedeigger even emphasized the "I", correcting, so to speak, the first sentence of the quote and replacing the "always we" with "always I". It is precisely the "I" who is always there in any thought. In philosophy, there is a well-known claim that it is the subject of thinking that is always present in any thinking whatsoever, that it is irreducible from it. But Heidegger is trying to make an even stronger case – otherwise, he could have simply used the term subject and not go through all the trouble with the term Dasein. It is not enough to say that the subject of thinking is irreducible in thinking. Heidegger's point here – at least in my reading – is purely logical, or if you prefer, Parmenidian: it is the being itself which is irreducible from the thinking itself. There is no thinking save from the thinking that is also the thinking of being. Thinking is always already thinking of being.

The general meaning of the concept of being-in-the-world can be explained with the help of the following joke. A man gets home from work early and finds his wife naked in the bedroom. He walks to the closet to take off his clothes, only to find his best friend there, naked. He says to him: "What are you doing here?!" The naked friend in the closet shrugs and says: "Well, you have to be somewhere." The naked man refers to the basic Heideggerian position, whereby existence is always already a determinate existence, an existence in some world. It is completely wrong to assume that originally one is, and then only later steps into the world; one only exists in some way, *somewhere*. On this level, being-in-the-world is a conceptual development of the *Da* of the Da-sein, of its necessary there-ness.

The entire first section of the book develops the theme of being-in-the-world. The theme opens with the concepts of *Entfernung* and *Ausrichtung*. The strat-

egy is breath-taking. These concepts obviously refer to distance and direction as qualities of space and immediately evoke the Cartesian and Newtonian understanding of space; but, at the same time, it is also obvious that Heidegger suggests a re-interpretation of these qualities. *Entfernung* is therefore not distance, but as *Ent-fernung* quite the opposite, it is de-distancing, it is the principle of making the distance go away. And *Ausrichtung* is not the direction in which an object moves in relation to point zero, but rather the principle of always already being oriented in the world. The general point is that Dasein does not move "in" space, according to spatial coordinates of length, width and height, but that it carries, in a manner of speaking, its spatiality and its orientation with itself wherever it goes (Heidegger 1996: 101). Perhaps this point needs further refining. Heidegger warns us not to understand this as subjectivism. The spatiality of Dasein is not explained merely by the change of the point of reference from Earth to the subject; we can't simply say that instead of the subject moving in relation to the Earth, the Earth and everything else moves in relation to the subject, which rests in its place. The mere change of the reference point does not bring about the change of the concept of space, which remains Galilean. What is at stake for Heidegger is the idea that existence in the proper meaning of the term cannot be abstracted from its place and orientation, that existence is always already existence in some place and in some way. This is, in principle, also the Spinozist understanding of existence. Spinoza famously distinguished between the one universal substance, infinity of attributes, and specific modes. And modes should be understood as modifications of the substance under some attribute. A mode is a way, a fashion in which the substance is there. In this sense, modes imply the there-ness of the substance. Perhaps we could go as far as to suggest that what Spinoza calls the mode of the substance is expressed, to an extent, with what Heidegger calls *Seinsart* or *Seinsmodus*. *Modus substantiae*, *Seinsmodus* – these concepts are not incommensurable. Of course, with Spinoza, there is always the question of the indifference of the substance: while modes are dependent on the substance, the substance exists independently of the modes – at least in the reading of Hegel and even in that of Deleuze. For Heidegger, however, it is clear that being is not indifferent to its factual understanding, to its there-ness.

Temporality of the …-toward-…

Let us proceed with the analysis of care as the being of Da-sein. Here, the theme of the void comes explicitly to the fore once again. Firstly, in order to grasp the

totality of Dasein as being-in-the-world, Heidegger proposes to examine the feeling of angst as the perfect starting point, because it expresses the world itself. He claims that in angst we are afraid of nothing in particular and the fear comes from nowhere. It comes from nothing and nowhere because in angst we are reduced to Dasein as the being in whose being its own being is at stake. Far from introducing the colourful clutter of humans and attaching it to the formal, logical structure of Dasein, Heidegger takes the most singularizing of all feelings and explains it as the structure of Da-sein, written with hyphen. This first step therefore repeats the gesture of the Introduction to *Being and Time*, where the question of being is explained as the question that binds being to its there-ness. The second step is the attempt to express the entire structure with one concept: care. He re-articulates the self-referential character of Dasein as its "being ahead of itself" (Heidegger 1996: 179) and concludes: "The being of Da-sein means being-ahead-of-oneself-already-in (the world) as being-together-with (innerworldly beings encountered)" (Heidegger 1996: 179–180).

The nothing and nowhere turn out to be the true place of Dasein. Of course, this nothingness is precisely the nothingness of being as such, the void of being into which Dasein is immerged. What is essentially new in the formulation of Da-sein as being ahead of itself is the implicit temporal dimension. There is Dasein ahead of Dasein. This redoubling reminds us of Hegel's formula of the beginning as identity of identity and non-identity (Hegel 2010: 51).[5] For Heidegger, however, the redoubling of the Dasein is not a purely logical one. The pure, unsubstantial difference that is inscribed in Dasein, the hyphen between its there-ness and its being, marks the fundamental temporality of Dasein. The reason why the idea of angst is insufficient to Heidegger is, in my opinion, because it doesn't involve temporality quite as clearly as the idea of care does.

In any case, the idea of care is the glue that binds the two sections of *Being and Time*, it is the bridge that connects the fundamental analysis of Dasein with the analysis of its temporality. With regard to the spatiality of Dasein, the point was that Dasein carries it with itself, that it is always already somewhere. It seems

[5] However, in Heidegger, the two moments of Dasein, Dasein itself and the Dasein which is ahead of itself, don't designate the same concept. The former is the concept of pure self-reference, the relation of the nothingness of being to itself. The latter, which is ahead of itself, is the concept of the there-ness of being, of the being-in-the-world.

most logical to conclude that Dasein's temporality is in the same way primordial, that Dasein is always already temporal.

This leads us finally to the concept of being-toward-death which opens the section on temporality. I think we should be able to anticipate, even before getting to the text itself, that the existential analysis will demonstrate that Dasein does not appear in time, just as it does not move in space, but that it always already exists temporally. Furthermore, this original temporality should not be mistaken for a determined length in time, just as its original spatiality does not imply a fixed area in space; rather the point is that Dasein as the there-ness of being is also its then-ness. And finally, we should not mistake the existential temporality of Dasein with subjectivism, we should not reduce it to a simple claim that the length of time is measured relative to the time of the subject. Instead, what is at stake is the idea that existence is always already temporalized.

But let us go to the text. The reason why death appears in the book in the first place is because Heidegger is interested in exposing the totality of the existential structure of Dasein and therefore demands a concept of an end: "The 'end' of being-in-the-world is death. This end, belonging to the potentiality-of-being, that is, to existence, limits and defines the possible totality of Da-sein" (Heidegger 1996: §45, 216). What Heidegger is concerned with is not the biological notion of death, nor is it the psychological, sociological, or anthropological one. The rituals of burial are no more relevant than the biological decay: all this pertains to human beings, yes, but must be strictly separated from the formal structure of Dasein. Death has something in common with the feeling of angst: they both isolate existence and force it to face itself and to recognize itself in the nothingness, in the void of its own being. Heidegger underscores the fact that death is eminently "our own". Immediately, we recall the vulgar wisdom that sounds so "true". This phrase seems to point to the individualizing, singularizing character of the phenomenon of death and is therefore especially beloved by metaphysicians. If an actor dies during a performance, they die their own death, not that of the person they are performing. If someone changes places with us and saves us from dying, they will still die their own death and we will still die our own at some later time. But … can anyone breathe in our place? Can anyone drink in our place? Can anyone urinate in our place? No? Does that make breathing, drinking or urinating singularizing phenomena, eminently "our own"? What Heidegger means by claiming that death is ours alone must be something completely different.

One of the most famous quotes from *Being and Time* goes thusly: "Da-sein is unable to bypass the possibility of death. Death is the possibility of the absolute impossibility of Da-sein. [...] Being-toward-the-end becomes phenomenally clearer as being toward [this] eminent possibility of Dasein" (Heidegger 1996: 232). The point is *not* that humans become what they are only in their death. Insofar as the concept of death explains Dasein in its being-ahead-of-itself, it is a structural moment of care and it brings us closer to the concreteness of the required concept of being-toward-the-end. I want to draw attention to the dialectical move that Heidegger makes here in explicating death as a positive possibility, even as a possibility *par excellence*: on account of it being the possibility of the absolute impossibility.[6] The most eminent, fundamental capacity of this being is its non-being. This is the crucial move of all Christian metaphysics and Hegel would have been proud to have claimed a phrase like this one. Heidegger's entire argument is oriented against the usual pathetic declarations about human finality and limitedness toward the explication of the formal structure of Dasein as being-toward-the-end. This demands that we understand death in the logical meaning (dialectical meaning, to be more precise) of the possibility of non-being. What makes this possibility an eminent one is that it is not a possibility among other possibilities, but possibility as such: potentially, Dasein *is not*.

Perhaps one may wonder how exactly this conforms to my previous declaration that Dasein is the there-ness of being. If the most fundamental possibility of Dasein is *not* to be, then how is it the concept of existence as such? I believe this question is very easily resolved. The *negation* of being, the *no* of the non-being, the *no* to all possibilities is precisely the nothingness of being itself, the void of being that Dasein is held out into. The original and authentic concept of Dasein can indeed be explained with an analysis of the phenomenon of death, because this analysis reveals precisely the structure of Da-sein, written with hyphen, the structure of the being itself and its there-ness.

But then, what was actually gained by the analysis of angst and death, if they only refer us back to the formal, logical structure of Dasein and away from the

[6] I call this a dialectical move since it is clear that, in basic analytical logic, this is a contradiction. See also Blattner's scrupulous analysis, where he finds a way to avoid it without actually resolving it (Blattner 2002). My own reading is much simpler, and I believe also much more honest: we must insist precisely on the fact that this is a contradiction, and resolve it with a dialectical move.

trials of human existence? What was gained was the further development of the idea of the unstable being of Dasein. What most commentators seem to overlook is that the concept of being-toward-death is not important because of the term death, but because of the term *toward*. The concept of being ahead of itself resonates in the term "toward" and gains an even more explicit meaning. We could say that the there-ness of Dasein (its "*Da*") is further explained as its toward-ness, as its "*zu*". Toward-ness implies not only the spatiality, but also the temporality of Dasein.

Let me briefly comment on another concept that Heidegger analyses: the call of conscience. Again, this concept sounds quite suspicious and moralistic. But far from dealing with articulated moral demands of such a call, and far from picturing the caller as a person or god (Heidegger 1996: 254), Heidegger is clearly interested in the call of conscience only because it reveals, in yet further terms, the formal structure of Dasein. The call of the conscience is wordless: "conscience speaks solely and constantly in the mode of silence" (Heidegger 1996: 252). This is because the one who is calling Dasein in the conscience, the caller, is Dasein itself. Again, it is the absence, the negation of utterances and words, it is the silence, which reveal the fundamental structure of Dasein, the structure of being dipped or thrown into the void of being. Being ahead of itself, calling itself, Dasein should fundamentally be grasped in its toward-ness, in its "*zu*".

This allows us to proceed to the final formulation of the temporality of Dasein in Heidegger's *Being and Time* – the future. It should be clear where all my reading leads: the primordial, proper temporality of Dasein is precisely the temporality of the toward-ness, of the "*zu*": it is the future as *Zu-kunft*. One must warn again that the future should not be misinterpreted as a specific temporality of what has not yet come to pass. It should be understood on the ontological level: as the coming into being, as the answering to the call of being, as being held out into the nothingness of being. This *Hineingehaltenheit*, this constitutional torsion of Dasein is finally revealed as temporality. The fundamental toward-ness of Da-sein, the hyphen between being and its there-ness, is revealed as time. The whole idea of the future as the primordial temporality rests on the understanding of the toward-ness of Dasein as time.

Teleiosis

To conclude, I would like to make a detour through Franz Brentano. In his *Philosophical Investigations on Space, Time and the Continuum* (2010), Brentano introduced two concepts to help explain his notion of the continuum: plerosis and teleiosis. Imagine there are two disks, one is a disk of completely blue colour and the other is a disk parcelled into four quadrants: white, blue, red and yellow. The centre of the sectored disk, if observed as the outer boundary of the blue sector, has only a quarter of the plerosis, compared to the full plerosis of the centre of the completely blue disk (Brentano 2010: 8). We may add that the geometer must decide whether the centre point is white or blue or red or yellow. This is because a point, for geometer, is completely independent of the whole it belongs to, and so one can easily either count it in or subtract it from the continuum. A Brentanian, on the contrary, can claim that the centre point is shared by all four sectors of the disk, with the stipulation that for each sector, the centre has only a quarter of plerosis, which is also differently oriented. This is why, in Brentanian geometry, we can draw not only one, but infinitely many straight lines between two points – but their pleroses are only partial and oriented differently (Brentano 2010: 8). The concept of teleiosis is even more interesting, insofar as it generalizes the idea of the variability of plerosis from the outer boundaries of a continuum to all boundaries, that is to say, also to the inner boundaries of a continuum. This is what really makes boundary the crucial determination of the continuum. Let us imagine a rectangle of gradual colour transition from blue on the one side to red on the other side (Brentano 2010: 15). Let us compare the colour of any of the horizontal lines (that is, lines that pass from blue colour to red) with the colour of the diagonal in the point of their intersection. From the abstract mathematical point of view, the colour of the diagonal and the colour of the horizontal line in their intersection is the same, since this intersection is exactly one point which is independent from the lines that intersect in it and is certainly of the colour identical to itself. But if we observe the intersection as the inner boundary of the diagonal and compare it to the intersection as the inner boundary of the horizontal line, then, in Brentanian geometry, its teleiosis is different. The diagonal is longer than the horizontal line, and therefore the grade of the colour transition is different: this is why the teleiosis of the intersection depends on the line it belongs to. And if we compare the blue vertical line of the beginning of the rectangle of colour transition to any vertical line of a completely blue rectangle, their teleiosis is also different. The outer boundary on the

blue side is not completely blue, just as the outer boundary on the red side is not completely red, as one may conclude on the basis of an abstract representation. For every vertical line of the rectangle of continuous colour transition we must assert that it is *in itself on the way* from blue to red.

Why are these little known Brentanian concepts important in the analysis of Heidegger's *Being and Time*? First of all, the strategy to understand the continuum from its boundary strongly resembles Heidegger's strategy to understand the totality of Dasein by examining it through its "end". Secondly, the concept of teleiosis, which carries the name "telos" in its core, is the complete geometrical correlation to Heidegger's concept of being-toward-the-end. Teleiosis as the concept of transition from one side toward the other expresses precisely the fundamental toward-ness of Heideggerian Dasein. In this sense, it is the perfect geometrical basis for the ontological analysis of Dasein. And thirdly, the concept of plerosis – of the fullness or plenitude of a boundary – is another geometrical tool to help us understand the structure of Da-sein. Brentano's concept of plerosis allows us to speak about a point in time when the movement begins: it belongs both to the continuum of movement *and* to the continuum of rest, just not with the full plerosis. Let us take the example of the temporal line of human life, stretched from the moment of birth to the moment of death – as indeed Brentano does. It is especially interesting to observe the end-points of this line. For Aristotle, the end-points of a line, its outer boundaries, are paradoxical. But with the help of Brentano, one can properly claim that both end-points belong to the line of existence – just not in full plerosis. The end-point is not fully there. Its plerosis is shared with the void. Or, to put it differently, the end-point somehow includes the nothingness from which it delimits. What I want to propose is the claim that Heidegger's Dasein is precisely the idea of the plerosis of the end-point. Dasein is held out into the void precisely in the sense of Brentanian geometry. Heidegger's ontology is properly explained with the help of Brentanian geometry.

It would be a terrible mistake to immediately try to suture thinking of pure being to everyday existence. To ask ourselves how fundamental ontology can help us resolve our everyday moral dilemmas is to completely misunderstand and fail the task of thinking. Fundamental ontology is transformative and has the capacity to produce morality; we should never demote it to a simple tool of justifying the existing morality, to an armament in the hands of the average and predominant understanding of being.

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Katja Kolšek*

The Repetition of the Void and the Materialist Dialectic

The aim of this paper is to outline the core of the question of the continuation of the material dialectics after the structuralist turn, through the specific figure of the repetition of the void, which could serve as the basis of the materialist dialectic thought in three important contemporary theorisations after the structuralist turn in theory, namely, those of Louis Althusser, Alain Badiou, and Slavoj Žižek. The core of this question leads us back to the structure without a cause, or the so-called vanishing cause of the structure, with its main impasse: how to think the historical event within the structure or the transformation of the structure as such. The basic frame of this problem appeared in the face of the events of May 1968 in France, more precisely, of the revolts of workers and students, when the divisions among the theorisations of these events, between the Althusserian circle, the Maoist groups, and the circle around Jacques Lacan were deepening. On the one hand, there was Althusser's scepticism about the failed encounter between the workers and students, and Lacan's famous criticism of the student uprising in his famous prediction of their hysterical search for a new Master. On the other hand, there was Alain Badiou, who in his "Red years" defended the importance of this event on the basis of the theory of contradiction of Mao Zedong, firstly in *Le (re)commencement du matérialisme dialectique* (a review of Louis Althusser's *Pour Marx,* and *Lire le Capital* (1967), by Althusser et al.) and later, more consistently, in his famous work *Theory of the Subject* (1982). According to Badiou, Louis Althusser rejected this event since he failed to think of the subject of history within his writings on the overdetermination and contradiction in the materialist dialectic, enclosing the question of subjectivity completely within the realm of ideology. Therefore, he was unable to think the real change or transformation of the structure or the event as such. This caused Badiou to return to the question of the materialist dialectic by thinking about the change in time or history and to the question of how something new arises from the old, Mao Zedong's famous question from the Great Proletarian Cultural Revolution, (which, according to Bruno Bosteels, among others, henceforth became the most persistent question in his work as such), in short, with

* Science and Research Centre of the University of Primorska, Koper

the question of the production of the new truth. In order to avoid the impasses of structuralist rigidity as regards the question of the change or transformation, Badiou determined two important tasks in *Theory of the Subject*: the materialistic reading of Hegel's dialectic as the logic of scission,[1] but also, and this will be important for us here, the materialist reading of the work of Jacques Lacan, done as well in the name of the logic of the scission. Bosteels's interpretation of Badiou's work, contrary to that of Peter Hallward, states that there is no radical break between his *Theory of the Subject* (from 1982) and his monumental work *Being and Event* (from 1988). Namely, the relation between the being and the event in his work is always already dialectical in the way the subjective procedures of fidelity are always already based on the question of how and why the elements within the situation transform and change into the site of the event, which is most apparent in his last work, *Logics of Worlds* (2009).[2] We can therefore say that Alain Badiou's *Theory of the Subject* embodies the core of the theoretical dispute of May 1968, in its first attempt after the structuralist turn to join dialectical materialism and Lacanian psychoanalysis. And also from the point of view of Lacanian psychoanalysis, what Bosteels reproaches Žižek with is that in his general interpretation and criticism of Badiou he does not pay enough attention to *Theory of the Subject*.[3] But it seems that in his most recent work, *Less than Nothing: Hegel and the Shadow of Dialectical Materialism*, Žižek nevertheless returns straight to the core of the question of the materialist dialectic within Lacanian psychoanalysis. There we can find some further clues to the reopening of the debate on Badiou's assertion about the same question in *Theory of the Subject*, which is summed up in one of the sentences in the book: "From the real as cause to the real as consistency we can read a trajectory of integral materialism."[4]

Generally, we can say that all contemporary dealings with the materialist dialectic revolve around the question of the void of the so-called *clinamen*, the event of the primary and purely contingent swerve of the atom (the encounter) that

1 For Badiou's extensive work on the materialist reading of the Hegelian dialectic, see his work *Le Noyeau Rationnel de la Dialectique Hegelienne*, La Découverte, Paris 1978. In English translation: *Alain Badiou. The Rational Kernel of the Hegelian Dialectic* (ed. and trans. by Tzuchien Tho), re. press, Melbourne 2011.

2 *Cf.* Bosteels, B., "Alain Badiou's Theory of the Subject" in: *Lacan, the Silent Partners (Wo Es War Series)* (ed. S. Žižek), Verso, London 2006.

3 *Cf.* Bosteels, B., "Badiou without Žižek" in: *Polygraph 17* (2005).

4 Badiou, A., *Theory of the Subject*, Continuum, London and New York, pp. 227, 228.

creates the world (the structure) and the question of the repetition or iteration. We can find the main question of the pre-Socratic materialists in Althusser's latest work, in some of Lacan's seminars, and as well in Badiou's *Theory of the Subject*. Regarding this, we shall try to show how the works of Lacan, Althusser, and Badiou, each in their own particular way, display a certain kind of materialist dialectic of the internal scission in the form of the movement of a certain repetition of the void. This repetition has a consequence, the production of the supplementary element: *objet a* as a new knowledge/truth in the Real (in Lacan), a new truth (in Badiou), and a new kind of epistemological knowledge of the science of historical materialism (in Althusser), which could perhaps be considered as a kind of "consistency of the real" in Badiou's sense.

According to Badiou, the materialist dialectic is divided into two sides, two parts of the scission, the idealist and the materialist. The materialist character of the dialectic resides in the process of the division between the logic of places, which is the characteristic of the structure of places, on one hand, and the dynamic of the forces, on the other. There are two possible backlashes that are to be avoided in order to maintain the materialist character of dialectic. They are the idealist (rightist) deviation and the materialist (leftist) deviation. The rightist would simply accept the structuralist causality with the logic of places, with the void as its concept of the vanishing cause, "nothing will take place but the place," as Mallarmé put it and typical of the Althusserian circle, according to Badiou. On the other hand, there is the leftist deviation of seeing only the materiality of not not dialectically determined pure forces, typical of the so-called anarcho-desirers of the Deleuzian circle (materialism without any concept of the void). Badiou's basic idea in *Theory of the Subject* is that the structuralist dialectic implies the structural combinatory of places within a closed totality, but it doesn't incorporate the dynamics of force, which consequently blocks the possibility of thinking the change or the transformation of the structure. On the other hand, the force, if it is to be thought of dialectically, must be determined by the logic of places. We have the logic of the dialectic between the "*horlieu*" on one side, and the "*splace*" on the other. Badiou aims at the division of this complex whole in the algebraic side of the combinatory of places and the topological side of the working of the force back on to its own place within the structure: "Every force stands in a relation of an internal exclusion to its determining place," but, "if determination describes the dialectical placement of a force and its resulting division, then the whole purpose of the theory of the subject is to aim for the

rare possibility that such a force, though always placed, at times may come to determine the determination by reapplying itself to the very place that marks its split identity."[5] So what we basically have here are the two voids, the void of the so-called "*splace*" and the void of the so-called "*horlieu*," which overlap in a certain form of twist or torsion, which is another name for the subject. The crucial moment in Badiou's *Theory of the Subject* is therefore this symptomatic twist, or torsion of the subject back upon the impasses of its structural placement: "It is a process of torsion, by which a force reapplies itself to that from which it conflictingly emerges [...] Everything that is of a place comes back to that part of itself that is determined by it in order to displace the place, to determine the determination, and to cross the limit."[6] So, the terms of the historical life in the material dialectic are the determination and the limit, which are the terms by which the whole affirms itself without closure, and the element includes itself therein without abolishing itself. According to Bosteels, the first part of the dialectical movement in Badiou can basically be subsumed in the following sentence of Lacan: "The subject stands, as it were, in external inclusion to its object."[7] Badiou's main task was, first, to figure out how to understand the subject's and object's dialectical relation of the external inclusion.[8] Nevertheless, Badiou's theory of the subject

> consists entirely in confronting these two orientations of dialectical materialism: one, for which the act of subjectivization remains irredeemably anchored in the structural causality of lack, and the other, which seeks to map a subjective process onto the rare emergence – that is, onto the appearance of a new structure in which a subject not only occupies but exceeds the empty place in the old structure, which as a result becomes obsolete.[9]

According to the idea of the structural dialectic of the void as the vanishing cause, which Badiou believed had to be overcome in order to think the materialist dialectic between the divided poles of the structure and the subject, we must abandon the idea of the binary relation between the One of the structure and the

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5 Bosteels, B., *Badiou and Politics,* Duke University Press, London and Durham 2009, p. 81.

6 Badiou, A., *Theory of the Subject*, p. 12.

7 Bosteels, B., *Badiou and Politics*, p. 83. *Cf.* Lacan, J., "*La Science et la Verité" in: Cahiers pour l'analyse, Vol. 1,* Paris 1966.

8 *Ibid.*

9 *Ibid.*, p. 75.

Real, which according to him was still present in Lacan's early teaching. In order to achieve the proper materialist dialectic, we would, according to Badiou, have to split Lacan's oeuvre as such into Two, namely, the split between the structuralist teaching (the idealist pole) and his later topological teaching (the materialist pole). In line with Badiou's aims in *Theory of the Subject*, let us recall the two different elaborations of the Real as the void in Lacan's early and late period. Namely, the question of the void as the structuralising part in early Lacan, the Lacan of "the unconscious is structured as language" amounts to the "lack of being," the Real as the structuring element in the structure. However, the later Lacan of the topology, of the Real as enjoyment-*jouissance* (as *objet a*), is about the question of the ontology of the drive as the "the being of lack." The difference between the two kinds of void is best presented in the following two passages by Slavoj Žižek: "Therein lies the difference between desire and drive: desire is grounded in its constitutive lack, while the drive circulates around a hole, a gap in the order of being.[10] And further: "Following Jacques-Alain Miller, a distinction has to be introduced here between a lack and a hole: a lack is spatial, designating a void within a space, while a hole is more radical, it designates the point at which this spatial order itself breaks down (as in the 'black hole' in physics)."[11]

If we look at Lacan's oeuvre as such through the lens of Badiou's materialistic scission between the early logic of desire and the later logic of the drive, we have to presuppose a certain torsion of the latter upon the former. What we get there is a materialist dialectic at work in the passage, in the movement of the void from the lack to the hole, as a consequence of the repetition and the minimal difference between the two voids, between the void as the vanishing cause of the structure and the identity of the structure with the hole. Besides the kind of overlapping of the void of the Subject and the void in the Other, as the two stages of the subject of the unconscious, the stage of alienation and the separation of the subject of the unconscious, we could say that there is another kind of scission of the void as the object of the Real on a second level at work in Lacan's oeuvre. Returning to Badiou's theory of the destruction of the subject in his *Theory of the Subject*, this means that the action of the Lacanian Real as the objet a back upon the void as the Real as its place holder in the structure, which topologically curves the space of the structure, given that the destruction is

[10] Žižek, S., *Less than Nothing. Hegel and the Shadow of Dialectical Materialism*, p. 489.

[11] *Ibid.*, p. 496. See the entire chapter "From Repetition to Drive".

the attempt to think the movement of the gap (the minimal difference) between the failure of the aim of the structure to structuralise into the goal as the failure to structuralise as a structure, is a movement from the lack to the hole, from nothing to nothing, however, nothing with a surplus element. As Badiou writes: "And yet it is precisely this split between repetition and what is within repetition that is not yet actualized which defines the locus of the work of destruction in *Theory of the Subject*."[12] However, here the working of the void as the Lacanian hole back on to the void as the lack ending up in a kind of a repetition does not amount to complete destruction, but produces a remainder. In another lengthier passage Žižek explains in detail the crucial difference in the relation between desire and the drive as regards the question of the void:

> While, as Lacan emphasizes, the *objet a* is also the object of the drive, the relationship is here thoroughly different: although in both cases the link between object and loss is crucial, in the case of the *objet a* as the object-cause of desire, we have an object which is originally lost, which coincides with its own loss, which emerges as lost, while, in the case of the *objet a* as the object of the drive, the 'object' is directly the loss itself – in the shift from desire to drive, we pass from the lost object to loss itself as an object. That is to say, the weird movement called 'drive' is not driven by the 'impossible' quest for the lost object; it is a drive to directly enact the 'loss' – the gap, cut, distance-itself. There is thus a double distinction to be drawn here: not only between the *objet a* in its fantasmatic and post-fantasmatic status, but also, within this post-fantasmatic domain itself, between the lost object-cause of desire and the object-loss of the drive. This is what Lacan means by the 'satisfaction of the drives': a drive does not bring satisfaction because its object is a stand-in for the Thing, but because a drive, as it were, turns failure into triumph – in it, the very failure to reach its goal, the repetition of this failure, the endless circulation around the object, generates a satisfaction of its own. To put it even more pointedly, the object of the drive is not related to the Thing as a filler of its void: the drive is literally a counter-movement to desire, it does not strive towards impossible fullness and then, being forced to renounce it, gets stuck onto a partial object as its remainder – the drive is quite literally the very 'drive' to break the All of continuity in which we are embedded, to introduce a radical imbalance into it, and the difference between drive and desire is

[12] Bosteels, B., *Badiou and Politics*, p. 98.

> precisely that, in desire, this cut, this fixation onto a partial object, is as it were 'transcendentalized', transposed into a stand in for the void of the Thing.[13]

What happens in this repetition of the void of desire and the void of *jouissance*, in this movement from desire to the drive, is thus the minimal difference between the lack and the hole, which entails the splitting of the void, the specific scission (split) of the Real as the Void on the second level. The repetition of the void as the passage from the lack to the hole leaves us with a specific materialist remainder, something that Democritus as the first materialist called the *den*. In terms of the question of the Lacanian subject, which is the central question of *Theory of the Subject*, its torsion produces a double split of the subject, which, according to Žižek, in Lacanese translates into:

> This constitutive split of the subject (which precedes the split between subject and object) is the split between the void that 'is' the subject ($) and the impossible-Real objectal counterpart of the subject, the purely virtual *objet a*. What we call 'external reality' (as a consistent field of positively existing objects) arises through subtraction, that is, when something is subtracted from it – and this something is the *objet a*. The correlation between subject and object (objective reality) is thus sustained by the correlation between this same subject and its objectal correlate, the impossible-Real *objet a*, and this second correlation is of a totally different kind: it is a kind of negative correlation, an impossible link, a non-relationship, between two moments which can never meet within the same space (like subject and object), not because they are too far away, but because they are one and the same entity on the two sides of a Möbius band. This impossible-Real virtual object is not external to the symbolic, but its immanent impediment, what makes the symbolic space curved; more precisely, it 'is' nothing but this curvature of the symbolic space.[14]

This non-relation, this second split, is something which could be called the *den* and it is actually also the *clinamen* that interests all the contemporary theories of the materialist dialectic from Althusser, Badiou, and Lacan (and lately Žižek). This kind of split on the second level, the repetition of the void as the overlapping of the two, or the passage from one to another, produces an uncanny element.

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13 Žižek, S., *Less than Nothing*, p. 639.

14 *Ibid.*, pp. 958 and 599.

This uncanny element is, according to Žižek, the *objet a* as the Demokritian *den* as "more than something and less than nothing" and "more than one but less than two."[15] This establishes new criteria of the dialectic between the Symbolic and the Real in Lacan. And this also sheds new light on the question of the alleged anti-dialectical nature of the Lacanian death drive. Žižek's important move was to pose the question of the inconsistent ontology and the Lacanian take on the sexual difference. The repetition of the object cause of desire and the *objet a* as the surplus enjoyment of the drive in Lacan's work infers simultaneity, coincidence, or overlapping, and actually prevents the filling in of the lack with the lack as the object. In the mode of Badiou's materialist dialectic as scission and his reading of Lacan's oeuvre as the split between the algebraic and topological period, the period of desire and language and the period of the topology of the drive, we can thus say that Lacan's problem in the passage from the alienation of the subject to the separation of the subject lies precisely in the understanding of the parallax view of one and the same object, the gap or the minimal difference between the object of lack and the lack as object, desire and the drive, and the structure and its collapse. This gap can be understood similarly as the minimal definition of materialism in quantum physics by Žižek: "the irreducible distance between the two vacuums."[16] Regarding this gap as actually the minimal difference, the understanding of which is allegedly the object of dispute between Badiou and Žižek, we claim that the question of Bosteels's criticism of Žižek in his "*Badiou without Žižek*", regarding the anteriority of the negativity of the death drive as the minimal difference is redundant, because the minimal difference as *den* in Žižek can as well be understood as the simultaneous product of subtraction, a by product materialistic torsion between the *objet a* as drive and the object cause of desire, and not its anterior condition. And it therefore forms a new consistency. Bosteels sees the problem with Žižek's so-called "ultra-dialectic" in the following:

> Ultimately, the problem with this logic is its complete inability to conceive of the transformative power of an event other than as the effect of a structural reiteration, even though the indefinite repetition of mark and place generates a semblance of dialectical movement that claims to be more radical than anything: 'One could speak of a kind of 'ultra-dialectic', a theory of movement such that it

15 *Ibid.*
16 *Ibid.*

> becomes impossible not only to grasp but more radically to *determine* the movement itself.' At best, the passage from one term to another, when they are identical, only leads to a 'serial logic', that is to say, 'one and then the other as minimal difference.' Any attempt to turn the play of minimal difference into the greatest insight of Badiou's philosophy at the very least would have to come to terms with this profound criticism of the Hegelian or Lacano-Millerian logic, which Žižek for obvious reasons is only too happy to privilege in Badiou's *Le Siècle*.[17]

The contingent event of *clinamen* as the core of the materialist dialectic is therefore a double cut, an exponential cut. Or, the Figure of the irreducible Two, the minimal difference in Badiou's ontology, which in terms of the dialectics of One and the multiple represents the split into One and *den*. What is engendered in that pure dialectical repetition is therefore the Demokritian *den*, which has its own autonomous ontological status. Or in other words, in this lies the truth of a historical change in something called "the incomplete ontology." Žižek describes the parallax view of one and the same object, the division into waves and particles in quantum physics, which amounts to the materialist ontology of the *den*, in the following manner:

> This brings us on to another consequence of this weird ontology of the thwarted (or barred) One: the two aspects of a parallax gap (wave and particle, say) are never symmetrical, for the primordial gap is between (curtailed) something and nothing, and the complementarity between the two aspects of the gap function so that we have first the gap between nothing (void) and something, and only then, in a (logically) second time, a second 'something' that fills in the Void, so that we get a parallax gap between two somethings.[18]

Žižek further describes the *den* as the result of the passage from lack to hole, from the lack of being to the being of lack in Lacan's work as such:

> This is how 'there is something rather than nothing': in order to arrive at something, one has to subtract from nothing its nothing(ness) itself, that is, one has to posit the primordial pre-ontological Abyss 'as such;' as nothing, so that, in contrast to (or against the background of) nothing, something can appear. What

[17] Bosteels, B., "Badiou Without Žižek" in: *Polygraph: An International Journal of Culture and Politics, No. 17, The Philosophy of Alain Badiou (1 September 2005)*.

[18] Žižek, S., *Less than Nothing. Hegel and the Shadow of Dialectical Materialism*, p. 929.

> precedes Nothing is less than nothing, the pre-ontological multiplicity whose names range from Democritus's *den* to Lacan's *objet a*. The space of this pre-ontological multiplicity is not between Nothing and Something (more than nothing but less than something); *den* is, on the contrary, more than Something but less than Nothing.[19]

Without going into further discussion of the idea of the *den* as the minimal difference between desire and the drive and the materialist dialectic in Lacan, we shall rather conclude our paper with reference to presumably the same logic in Althusser's materialist dialectic, which allegedly in his last period completely disappeared in favour of the so called materialism of encounter as a naive version of ontology of the *clinamen*.[20] We believe that the dialectical relation between epistemology and ontology can also be seen as operative in Althusser's last work: if we perform Badiou's materialist scission of Althusser's work as a split between his idealist part (the work of the contradiction and overdetermination in *For Marx)* and the materialist, topological part – his work on the question of the *clinamen* and the materialist encounter of his last work – and see the culmination of it as a kind of repetition of the void and its scission. The object of Althusser's first theory was the void of the structuralist causality, which was forever elusive, and the locus of the absent centre of the dominant instances of the overdetermination and their impossible encounter with the economy as the determination of the last instance (of which the lonely hour never comes). This period could be compared to Lacan's structuralist period of the object of desire as the lack of being). Than we have the object of the theory of the materialism of encounter, or the aleatory materialism, the void of the *clinamen*, of the contingent swerve of the atom, the factor of the take (prise) of the aleatory encounter of instances and elements in the conjuncture, which is from the parallactic perspective one and the same object. However, this void of the *clinamen* is actually the result of the repetition and therefore scission of the void from "Contradiction and Overdetermination" of the materialist dialectic in *For Marx* and consequently actually the so-called *den*, or the remainder of the secondary split, the result of which is the parallactic object, which causes the incommensurability of his first epistemological period and last allegedly ontological pe-

[19] *Ibid.*

[20] See my article "The Parallax Object of Althusser's Materialist Philosophy" in: *Encountering Althusser. Politics and Materialism in Contemporary Radical Thought (ed. by Katja Diefenbach, Sara R. Farris, Gal Kirn, and Peter D. Thomas), Bloomsbury, London 2013.*

riod. What Althusser wanted to do with his theory of aleatory materialism was to repeat the materialist dialectic from his early period as a kind of transcendental materialism within Marxist historical materialism, similar to the idea of Žižek's transcendental materialism in quantum physics (this concept originates from Adrian Johnston).[21] The epistemological impasse of Althusser's theory of overdetermined contradiction is the parallax view of the inconsistency or "not-all" of the being as such. The parallax object, the *den*, is the product of the particular kind of repetition of the void within his work. Since the core idea of Žižek's transcendental materialism is the overlapping of the limits of our knowledge with the limits or inconsistency of the being itself:

> This formula is very precise: 'what is foreclosed to thought in the object' (the transcendent In-itself of the object inaccessible to thought) overlaps with 'what is foreclosed to the object in thought' (the immanence of the subject excluded from the realm of objectivity). This overlapping of the two 'foreclosures' (not to be confused with Lacan's forclusion) repeats the basic Hegelo-Lacanian move: the very distance which separates us from the In-itself is immanent to the In-itself, makes us (the subject) an unaccountable 'impossible' gap or cut within the In-itself. Insofar as, for Lacan, 'what is foreclosed to thought in the object' is the 'impossible' *objet a*, and 'what is foreclosed to the object in thought' is $, the void of the barred subject itself, this overlapping brings us back to Lacan's formula $ ◊ a.[22]

The *den* as the result of the torsion of two voids and the scission of the void of the subject of the unconscious should therefore be regarded as the new base of the contemporary materialist dialectic. As far as the famous relationship between historical materialism and psychoanalysis is concerned, their common ground should be taken to a higher level. We already know that historical materialism and psychoanalysis are related, because they both take the object of their undertaking (science) as being already split, or not-all in itself, and the limit of knowledge has to always already incorporate the limitedness of the real object, the place of the subject of the enunciation within the enunciation of scientific knowledge (the partisanship),[23] the field of the Symbolic as the production of the signifier. But, if we consider Lacan's work as a scission between the side of

[21] *Cf.* Johnston, A., *Zizek's Ontology: A Transcendental Materialist Theory of Subjectivity*, Northwestern University Press, Evanston IL 2008.

[22] Žižek, S., *Less than Nothing. Hegel and the Shadow of Dialectical Materialism,* p. 956.

[23] *Cf.* Žižek, S., *Hegel in označevalec*, Analecta, DDU Univerzum, Ljubljana 1980.

the lack of the subject and the Master signifier as a quilting point of the structure on one side, and *objet a* as the product of the separation of the object from the signifier, on the other, the new platform for the materialist dialectic could be the result of a certain materialist torsion of the latter onto the former. The task of the future work of the materialist dialectic could therefore be to see whether or not this material remainder as the parallax object as the result of this kind of torsion as the double twist could pave the way to new knowledge or a new truth. In other words, the historical materialism of the unconscious within the history of psychoanalysis, on one hand, and research of the unconscious of the history of the unconscious within Marxism, on the other.

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Henrik Jøker Bjerre*

Himself Nothing Beholds Nothing. On Schelling's Ontological Isomorphism

As Judith Norman states it quite clearly in the preface to her translation of (the second draft of) Schelling's *Weltalter* fragments, it will "undoubtedly strike the reader" that the methodological intent of the work is to interpret things "in terms of man". She refers to the bulk of these cases as "Schelling's conscious anthropomorphisms" (Norman 1997: 112). And indeed, Schelling himself does not hide that he is taking the human being to represent a kind of "microcosm" that expresses the general structure of the universe. A "system of times" will unfold, as he writes, "of which the human system would be just a copy, a repetition within a narrower space" (Schelling 1997: 121). Sometimes, his adherence to this principle is even quite casually stated, as when he says that "according to Hippocrates [everything divine is human], and everything human is divine", and if this is the case, "we can hope to approach the truth by relating everything to man" (*Ibid*.: 157). At other times, the familiar realm of human existence is offered like an excellent, and almost as if unexpected, solution to a great conundrum: How can we grasp the will that wills nothing, a nature that does not know itself?

> Think! – have you ever enjoyed those rare moments of such blissful and perfect fulfillment, when the heart desires nothing, when you could wish these moments to remain eternally as they are, and when they actually are like an eternity to you? Think of this and try to remember how, in just such moments, a will is already at work producing itself, although unbeknownst to you and without your effort – indeed, you could not prevent this production. This will soon pulls you back to yourself; it tears you away, back into the activities of life. Remember this, and you will have an approximate picture of what we are presently undertaking to describe (*Ibid*.: 136).

We are looking for a way to handle the structure of God's becoming God, and almost coincidentally, it seems, we stumble upon the human being that miraculously fits the purpose perfectly. Making the case of anthropomorphism against Schelling could therefore seem like running in open doors. There are striking

* Aalborg University, Denmark

similarities between the structure of God, inorganic life, organic life, and human life, and sometimes Schelling simply cites a familiar example from human life as if it was an argument for the structure of God and the world in and of itself. If by "anthropomorphism", however, is meant a projection of well known human qualities onto other forms of being, (like in some so called primitive religious mythology), then I would none the less maintain that the case is not so clear, and the main thrust of this paper will be to make a plausible case for another interpretation. A more precise term to describe the endeavour in *Weltalter*, I think, would be *ontological isomorphism*. The book is an attempt at thinking the structure of being as such, with the human being as one case among others, but the approach is not to project certain well known features onto for instance God (like in, say, "God also has a temper"), but much more to show how basic ontological features of the world can be found in human life in ways we might not have expected. Indeed, the entire enterprise of *Weltalter* in many ways is to uncover a knowledge that does not know itself, as it is almost literally called (*Ibid*.: 114-115), and thus a structure that is as *foreign* to the human being itself as to anything, it might "project it" onto. In other words: If anthropocentrism projects the well known unto the unknown, Schelling's approach is the opposite. He projects the unknown onto (what we thought was) the well known. It is this priority of the unknown that makes *Weltalter* such a painful experience to read (as Žižek has rightly pointed out (Žižek 1997: 4)), since its challenge of the well known does not end up in a kind of hermeneutic sublation, where we reach a new kind of understanding after a little bit of *Verfremdung*. The unknown remains in the heart of the well known as something unrecognizable in a quite literal sense that we shall return to.

What Schelling does do, undoubtedly, is that he blatantly violates the Kantian prohibition against stipulating anything of the Thing-in-itself. If any concept would be worthy of this Kantian name, it would certainly be the "schlechthin Erste" that is God's absolute indifference before creation. If you think that Kant represented a kind of "unvordenkliches" of modern philosophy, it is very difficult to read *Weltalter* without at least sometimes thinking that this amounts to some form of esoteric, pre-critical metaphysics. Nonetheless, this story as well can be told in another way. As Mladen Dolar and Slavoj Žižek have showed at great length, one of the crucial features of both Hegel's and Schelling's philosophy is that they insisted on thinking contradiction in a way that moved it from being an epistemological problem to *the* problem of ontology. In *Science*

of Logic, for instance, Hegel praises Kant for elevating dialectics to a level that no one before him had granted it, and for having established contradiction as a necessary determination of thought, while the presentation of dialectics in the antinomies of reason, however, "deserve little praise" (Hegel 1999a: 40). And in *Weltalter*, Schelling has a similar point: "... contradiction is not only possible but in fact necessary", and not only as the endpoint of dialectical logics in the Kantian sense, but much more as a starting point:

> Although men – in both living and knowing – seem to shy away from nothing so much as contradiction, they still must confront it, because life itself is in contradiction (Schelling 1997: 124).

Kant did "confront contradiction" in his antinomies, but it would also be fair to say that he shied away from it again in their resolution, when he denied any further access to things-in-themselves and concluded that reason must proceed as if there were no contradiction, out of "Zärtlichkeit für die weltlichen Dinge", as Hegel ironically said (Hegel 1999b: 84)[1]. In other words: Kant's concern for things was so great that he wouldn't impose contradiction on them and therefore let it apply only to reason itself, as its own ultimate horizon from within. Contradiction remains an inevitable outcome of a speculative reason that seeks the limit of its own capacities (does the world have a beginning in time, or has it always been – we will never be able to figure that out), but whether or not things-in-themselves could also be in contradiction lies outside the scope of human reason to establish. Contradiction remains on "our side" of the divide. The transcendental ideas, accordingly, can never have a constitutive use, but they nonetheless have an eminent and indispensable regulative use by providing a focal point ("focus imaginarius") to guide the use of the understanding, such that it avoids confronting contradiction in its normal proceedings. We must proceed as if the world was a meaningful and coherent whole, and as if each of our experiences makes sense within this whole. Without the regulative use of the transcendental ideas, we would, strictly speaking, become insane, for we would oscillate between contradictory definite answers to the questions of how things *really* are (see Kant 1974: B 672). The normal-neurotic workings of the under-

[1] I owe thanks to Søren Mads Mau for making me aware of this precise and quite wonderful formulation.

standing in its Kantian outlook could thus be described with a paraphrase of the well known prohibition from Fawlty Towers: "Don't mention the contradiction!"

Faktum der Vernunft

There is thus an element of fetishist disavowal in the Kantian solution of the antinomies of reason: We know very well that we have reached a point of the highest interest to reason – one which may or may not relate to fundamental characteristics of the thing itself – but nonetheless we proceed as if this problem has been overcome.

Schelling draws the opposite consequence: There is something in reason, which contradicts reason itself – reason thus already contains something other than itself, or at least itself as its own other. The other of reason is not something "out there", neither in the form of the so called "great outside", which reason may or may not be able to depicture or represent, nor is it the "in itself" on the other side of reason, which could be termed the absolute; it is something "in here", which is inherent to reason's own most fundamental characteristics. Kant did identify this inherent otherness of reason to itself, but instead of pursuing it, he found ways to cover it up, if you will. (It pops up, almost in a ghostly fashion, when he refers to "depths of the human soul that we may never apprehend" (*Ibid.*: B 181-182) and of course to the "I or He or It, the Thing, which Thinks" in the paralogisms (*Ibid.*: B 404)).

We could call this Schelling's version of the "Faktum der Vernunft": The fact is that reason itself contains something other; something more real (almost real in the Lacanian sense) than its regulative or practical use. You can pretend that it isn't there, but the fact remains. Kant's original "Faktum of Vernunft" was the undeniable awareness of the moral law, which every human being possesses. The "fact" of reason is something that reason "has made" (from the Latin: *factum*, *facere*); it is the necessary effect of reason itself. The moral law is there, beyond dispute, everyone with reason has access to it, because it is reason's own produce, and it unconditionally demands universalizable moral actions. Schelling's version of the *Faktum der Vernunft* would be another: It would emphasize reason *itself* as something that "has been made". The *Factum* of reason is that reason has a history that has made it possible and is still "within it", as its ground or essence. Indeed, "the unfathomable, prehistoric age rests in this

essence" (Schelling 1997: 114), and even if we don't know of it or don't want to know of it, it "slumbers within" and contains a "presentiment of and longing for knowledge [...] in that unknowing itself." (*Ibid*.: 115).

The historicity of reason is to Schelling not a hermeneutic question of narrativity, where the meanings of words gradually change and must be interpreted in due respect of the context of their enunciation, (this would probably count as something like a trivial fact to Schelling, at the most), but much more a question of reason as such as something that has a history, in the sense of *having come into being* at a certain point, and still containing this historicity as a fundamental part of its structure.

Reason thus contains a kind of longing for the unveiling of that which was before itself. Epistemologically speaking, this prehistory of reason cannot be recognized (*erkannt*), but it is nonetheless somehow known (*gewusst*), using the definitions from the opening lines of *Weltalter*:

> The past is known, the present is recognized, the future is divined (*Ibid*.: 113).

Maybe one could thus translate Kant's prohibition as a prohibition against claiming that something could be *recognized* about the thing-in-itself with the same means as those, we have at our disposal to recognize things from the "present", meaning that which can be a possible object of experience. According to Schelling, it is true that we cannot *erkennen*, what is the historically grounded otherness within us, but we nonetheless somehow *know* it. We have a knowledge of the otherness that we cannot recognize. This knowledge is a *Mit-Wissenschaft* (*Ibid*.: 114): a knowledge with something else or along something else or taking part in something else. Human being has a co-science of that in (human) itself, which is not itself, and it thereby has access to a structure of grounding that is a necessary dimension of everything that-is. It is in a way always already known, since the *Mit-Wissenschaft* co-constitutes the very way, we are and think as humans, but there are nonetheless different ways of (not) dealing with this knowledge. The Kantian way would be a form of disavowal, while Schelling's approach would be an attempt at acknowledging otherness as the only way of handling it and making it a potential creative force. Without dealing with this otherness, nothing ever really changes, and we continue to be led by the same, familiar structures that we pretend to have constructed by ourselves, as if out

of nowhere. (If the complaint against *Weltalter* is that it is "anthropocentric", Schelling might therefore reply that it is on the contrary Kant, who is "xeno-phobic"). The "ontological isomorphism" thus regards a logic of everything there is, such that it stands in a relation to its own ground in a way that human has a *Mit-wissenschaft* about:

> Drawn from the source of things and akin to it, what is eternal of the soul has a co-science/con-sciousness [*Mitt-Wissenschaft*] of creation (*Ibid.*: 114)[2].

The Mit-Wissenschaft is a co-knowledge of creation in the sense of the coming-into-being of something, where "something" means both anything in general and anything at all. (In Heideggerian: The human being has a pre-ontological sense of the question of why there is anything at all). The structure must fundamentally be "akin in all things":

> Even the smallest grain of sand must contain determinations within itself that we cannot exhaust until we have laid out the entire course of creative nature leading up to it (*Ibid.*: 121–122).

Everything that is has a history, in other words, and this goes even for the "primordial essence itself": even for it, "something had to be posited as a past before the present time became possible" (*Ibid.*: 122). For everything that is, in as far as it is a present, it must have (had) a past, and so even for God to be, he too must have (had) a past. The solution to the problem of that in us, which is not ourselves, is therefore not simply that it is God. This is otherwise a familiar figure. Take Kierkegaard's definition of the human being in *The Sickness Unto Death*, for example: Here, the self is defined as that which relates itself to itself and in relating itself to itself relates to an other, or to "something else" (Kierkegaard 1989: 10). The self is "a derived self," since it has not established itself, and that which has established it, at least in Anti-Climacus' description, is unmistakably God (*Ibid.*: 13). Relating to one self means acknowledging an otherness in oneself, which is the conditioning force that is not oneself, and this force is God. God himself, however, is not having the same problem. The radicality of Schelling's isomorphism is that not only is there something in us, which is

[2] "Co-science/con-sciousness" is Norman's translation of Mitwissenschaft. I think especially the latter of the two is rather dubious, precisely because the knowledge of the past is not conscious in the sense of recognition.

not ourselves, but there is something in God himself, which is not God himself. In Schelling, much more explicitly than in Kierkegaard, who is otherwise the thinker of the Paradox, there is really no Other of the Other.

> ... people have appealed long enough to the idea that God is the ground of his own existence. Is this notion of "ground" just an empty word, or does it denote something real? If it is just a word, then let us be more accurate and not allow ourselves to use senseless words. [On the other hand, if the ground is something real,] then people must themselves acknowledge that there was something before the existing God *as such* that did not itself exist because it is only the ground of existence (Schelling 1997: 149).

God himself has a past, and it is this past that in a few more steps will bring us to the subject of nothingness. There is, namely, another way of saying how Schelling respects the impossibility of speaking of the thing in itself. If God has a past, this past is inexpressible. The coming to be of God himself must have relied on some repressed origin, which cannot be grasped (recognized) in the language of the present: "We can therefore see that in the very moment when the Highest is supposed to express itself, it becomes the inexpressible" (*Ibid.*: 170). To Schelling, the question of ancestrality, which is much debated these days, could maybe be termed as one of the ground that the human being (and like it all isomorphically similar beings, like God) carries with it or within it, but the ground itself cannot be put into words on the same conditions as what-is (*das Seyende*). The analytical language of "propositional content" therefore entirely fails to handle the question of the ground in Schelling's vision. His critique of the "form" of philosophy in his time is of course directed at Kantian philosophy, but reminds strikingly of the even more rigid form of contemporary Anglo-Saxon linguistic philosophy:

> Why was it, or has it been, impossible until now that philosophy – which is history with respect to its name and content – be history with respect to its form as well? (*Ibid.*: 114).

The form of a philosophy that takes its relation to history in the Schellingian sense seriously must in some way transmute into forms of evoking, indicating or isomorphically exemplifying that which has become inexpressible through its expression of the expressible. There is, in other words, a difference between how to express that, which can be stated in the language of the present, and that,

which cannot. In order to approach the question of the past, philosophy must reconsider the relation between that which can be said (in the language of the present) and the preconditions of its being said. *Weltalter* has its own theory of enunciation, which is in fact, I believe, not that different from a more contemporary structuralist one: The expressing (*das Aussprechende*) is that which expresses, but has itself thereby become inexpressible (the position of enunciation); the expressible (*das Aussprechliche*) is that which *can* be expressed; and the expressed (*das Ausgesprochene*) is that which has been expressed (the enunciated). What has been expressed is, for instance, what we are, but the expressing of our way of being expressed cannot itself be expressed. Or even more pointedly: The expressing (*das Aussprechende*) is posited as the expressing only *through expression*. Thereby, the only approach we have to the expressing (the position of enunciation) is as that which *has been made* (our) past through expression.

As Žižek has shown, this model fits quite nicely with the Lacanian conception of the structure of enunciation in its most basic form: "... the speaking agency is the Spirit qua $, the substanceless void of non-Nature, the distance of Nature toward itself" (Žižek 1997: 44). The "speaking agency" here refers to Schelling's "das Aussprechende", the expressing, which must be posited as the barred subject of the enunciation, in order for there to be enunciated: "... when I contract myself outside myself, I deprive myself of my substantial content" (*Ibid*.: 39). The expressing of myself as a human being with such and such qualities, abilities, values and interests, happens by way of an expressing that posits a subject, which is then represented by a signifier (for another signifier). But the subject itself is the pure enunciation and not a thing that-is (*ein Seiendes*). The price for becoming a subject is to be alienated in language.

Similarly with God: The "Highest" is bigger than God or it is before God, in the sense that it is God in his expressing of himself. If God is his own ground, as it was claimed, then it means that he, "the really existing God" (as in "really existing socialism"), is the expression of something that he is not (anymore): "Wisdom was by the Lord. But who is the *Lord*? Indisputably, he is that will which rests *within* being [*Seyn*, HJB] and what-is [*Seyende*, HJB], the will through which alone being can actually be being and what-is can actually be what-is: the will that previously willed nothing" (Schelling 1997: 166). Being and what-is, in their pure form, are the expressible (das Aussprechliche), and in their expression the expressing becomes their past.

God himself, the really existing, is only the expressed of that which he *previously* was. There is something in him, therefore, which is bigger and higher than himself, namely the will that willed nothing: The "immovable will that wills nothing is the Highest" (*Ibid.*: 134), and "this very will is above God" (*Ibid.*: 135). Maybe we could call this the ultimate prototype of the position of enunciation: the no-longer-actual and inexpressible will that wills nothing. This will does "rest within him", but as that which previously willed nothing. It has expressed, and therefore has been moved out of its pure state of absolute indifference, but it remains within that which has been expressed as its history.

The absolute indifference is "das schlechthin Erste". It is the past of the world, where there is no subject and object, no grammar and no enunciated content of anything. Schelling's myth of creation now says that everything that is (expressed) came into existence initially because of the transition from the will that wills nothing to a will that unconsciously *wanted to remain* in this state of blissful indifference. In other words, the will that wills nothing becomes the will that wills nothingness itself as such. This is what he calls contraction: "If we could say that the resting will is the First, then we can also say that an unconscious, tranquil, self-seeking will is the Second" (*Ibid.*: 137). This unconscious longing produces itself *in* eternity, in other words there is an almost unnoticeable slide from the will that wills nothing to willing nothingness as such. It is a minimal difference, but of immense consequences. If there is something in Schelling that could be called "less than nothing", it must be this: the will that wills nothing contracts into something less than itself and thus creates the necessity of an outwards expansion[3]. Schelling's illustration of this passage was quoted in the introduction, but it is worth repeating in this context. Imagine for instance lying on a green lawn on a beautiful summer's day, with no care or concern:

> [T]ry to remember how, in just such moments, a will is already at work producing itself, although unbeknownst to you and without your effort – indeed, you could not prevent this production. This will soon pulls you back to yourself; it tears you away, back into the activities of life. Remember this, and you will have an approximate picture of what we are presently undertaking to describe.

[3] American comedian Louis C.K. has provided another version of less than nothing: When he discovered that his bank account was in minus, he realized that he couldn't even afford things that are for free. Maybe taking away something from someone who has nothing is the first moment of a revolution.

Wanting to stay in the condition of blissful indifference effectively is a negation of this condition. It is like when two people are lying together in perfect harmony, and one of them says: "Isn't this just wonderful?" At that precise moment, the harmony is ruined, and you might as well get up and get started. The next step is therefore also already inscribed into the first: "One and the same will is activated as the will that wills nothing and is also activated as the will that wills something (life and actuality)" (*Ibid.*: 177). The secret longing for itself that was the unconscious negation of the will that willed nothing thus turns into a will that wants itself as something. It first contracts and then expands – in one moment. This is what Schelling calls the "highest contradiction" (*Ibid.*: 169): "... one and the same will = x is two wills: one determinately negating and the other affirming" (*Ibid.*) Without this highest contradiction, there is no creation and no freedom, for it is only through it that the possibility exists to effectively change a situation and make one's condition different. To Schelling, this means to create oneself a past. The principles of contraction and expansion together form the precondition of becoming something else than one was.

> The man who cannot separate himself from himself, who cannot break loose from everything that happens to him and actively oppose it – such a man has no past, or more likely he never emerges from it, but lives in it continually (*Ibid.*: 120).

Real deeds "which make a man genuinely himself" (*Ibid.*: 181) are moments of both contraction and expansion. Without this double negation (the negation of indifference and the negation of the contraction into its opposite) nothing ever begins – and this goes even for decisions in human life: a real decision does not consist in weighing the arguments for and against, but in the moment of rupture of what ultimately counts as for and against. The first moment is the contraction ("all life begins with contraction" (*Ibid.*: 179)), and the second is expansion ("a positively negating will... that does not will nothing but rather wills something" (*Ibid.*: 169)) but the two can only be analytically discerned, they are not separate engulfed events that proceed one after another: "... did you honestly take factors into consideration, engage in deliberation and reach a decision, when you grasped yourself for the first time and expressed yourself as who you are?" (*Ibid.*: 175).

Creation is the moment where the will that wills nothing is made into the past of that which is expressed. The two contradictory forces of contraction and ex-

pansion must, however, somehow be kept in balance, if creation is not going to propel directly and immediately into its own destruction. Take cancer as an example: here, the principle of expansion that is behind all life and activity (in biological life as the production and division of cells) runs amok and starts producing cells beyond any viable measure and purpose and soon threatens to terminate life as such, if it is not kept in check. Or take revolution: If it doesn't find a new *modus vivendi* after overthrowing power, it will degenerate into chaos (expansion) or maybe create some paranoid normalcy which more and more closes in on itself and "eats its own children" (contraction). The two forces must balance each other, and the name of this balance is spirit: "... when two conflicting wills are present – one affirming and one negating – spirit is already called for as well" (*Ibid*.: 169). Wolfram Hogrebe has illustrated this balance as the right speed of a film reel in a movie theatre: If the reel goes too fast, we just see a blur of colours; if it goes too slow, we see only isolated images without any sensible connection (Hogrebe 1989: 100).

The externalization or expression of the will that wills nothing thus leads to a contractive-expansion, which must again be balanced by spirit. It is almost as if creation is God's losing control of himself, and the history of the world as spirit is his cleaning up after the mess that he had produced. Spirit is thus the real, unifying force that relates the expressed to the expressing; it takes part in eternity by engendering the kinds of balance that keep the different and differentiating forces in check:

> This entire life, after all, originated in the first place out of the longing of eternity for itself. In searching for itself and yet not being able to find itself, the will produced itself in an urgent manner, desiring eternity and seeking contact with it. Through progressive increase, this will has now constructed a series of steps by which it can ascend to eternity. For spirit – or the highest unity produced through its desire – is by nature one with indifference or eternity. For this reason spirit is not only the unity of the opposites, as was assumed until now; it is at the same time the link between eternity and the life built up from below, a life that already presents itself ever more clearly as the instrument of eternity (Schelling 1997: 146-147).

The will that wills nothing is our past, but in a spiritual effort we nonetheless partake in it, when we succeed in balancing the contradictory forces of nature in a way that allows a kind of tranquil contemplation. In times of unrest and

threats, spirit could be the serene overview that allows one to remain calm and make the right decisions. "To be as if one were not, to have as if one had not; that is in man, that is in God, the Highest of all" (*Ibid.*: 133).

To Schelling, there is an ascension in the spiritual development of the world, which mirrors the eternal being, by restoring the kind of "blissful balance", if you will, which could not be maintained in creation: "Now that the spirit of nature wants to be the link between eternity and nature, it strives to express actually in matter – as material that is subordinated to it – what is contained only as possibility in eternal being" (*Ibid.*: 154). Another way of saying this could be that spirit is coming to itself through the gradual sublation of the relation between ground and existence. (And to push the point: In an eschatological reading of the entire project of the *Weltalter*, the future could be seen as the sublation of the world as such; spirit as the premonition of this sublation).

A mind of winter

Before I close with some remarks on the issuing concepts of nothing, I would like to preempt some of the main points via Wallace Stevens' 1923 poem "The Snow Man" (Stevens 2001) – which has also provided the title of this paper. Stevens here, is my suggestion, could be seen as Schelling's allied in the cause of ontological isomorphism, and he gives a rather refined approach to the concept of nothingness which will allow us to distinguish between two overall conceptions of nothingness in *Weltalter*.

The Snow Man

One must have a mind of winter
To regard the frost and the boughs
Of the pine-trees crusted with snow;
And have been cold a long time
To behold the junipers shagged with ice,
The spruces rough in the distant glitter
Of the January sun;
and not to think
Of any misery in the sound of the wind,
In the sound of a few leaves,

Which is the sound of the land
Full of the same wind
That is blowing in the same bare place
For the listener,
who listens in the snow,
And,
nothing himself, beholds
Nothing that is not there and the nothing that is.

One must have a mind of winter and have been cold a long time in order to really grasp the junipers shagged with ice; and it is an effort not to think of any misery in the sound of the cold wind that is blowing in the same bare place. One must in a way tune in on the isomorph structures of other forms of being (*Seyendes*), in order to do them justice and contemplate their participance in creation. The listener is himself nothing – he is not a humanistic self-relying, non-alienated subject, and (in virtue of that) he beholds nothing that is not there, which could mean that he does not make up fictions of angels or unicorns in order to describe what-is or to generate some emotional response to the icy wind in the same bare place. In order, precisely, to *avoid anthropomorphism*, one must be strictly precise and describe nothing that is not there.

But maybe the "nothing that is not there" could also strike the chord of the problem of the ultimate status of the will that wills nothing. If this will is the past of creation, a state of blissful indifference that nonetheless contains the propensity towards an unconscious longing for itself that turns into contraction-expansion, it is in fact, I believe, difficult not to see it as what Žižek has called "a positively charged void" – the "schlechthin erste" that contains being and what-is as the expressible, but is now, within the history of the world, itself *not there* (anymore). The spiritual effort of the beholder, in this reading, makes this void nonetheless "there to behold", as something "known" [*gewusst*], rather than something recognized [*erkannt*]. The word "behold" could be rendered in this way also – it derives from the Old English *behealdan*, that can also mean "to hold, have, occupy, possess, guard", etc. (and not just "to see"). Spirit is the beholding, guarding of the void of the past. This interpretation threatens to take Schelling in the direction of a mysticist and conservative version of the void – but it is one, which I think one must admit that there are ample justifications of

in the *Weltalter*. Behold the nothing which is not there: Be aware of the past that resides in every present being.

A second version of the "nothing which is not there" would, however, appear from asking Schelling a question, which would take the interpretation in another direction: What if spirit is all there is, or what if the nothing, which is not there, is not a prehistoric *condition*, but a retroactive positing of the beginning? This version would insist on the purely formal aspect of the relation between the expressing and the expressed. The expressing would be nothing but the empty point of enunciation (a nothing which is not there), seen from the perspective of spirit that contemplates the contractive and expansive forces of nature in itself and in everything else that exists. The "schlecthin erste" would in this sense only be there retroactively, and spirit would be alone, without a positive void to refer to in its endeavor to balance the forces of the world. On the bright side, the will that wills nothing would then be spirit's own accomplishment – it would not "partake" in something *higher*, when contemplating the world, but simply represent an unfolding of history as such. This interpretation would risk taking Schelling too much in the direction of Hegel, and Schelling might reproach it with the words from early on in the *Weltalter*: "All science must pass through dialectic. But is there *never* a point at which it becomes free and alive, as when a historian, representing an image of past times, no longer thinks of his investigations?" (Schelling 1997: 118).

Finally, neither of these two interpretations excludes the thinking of contradiction as real and as pertaining to everything there is. Everything carries its own past within it, and everything there is, is the result of a beginning, as well as a kind of balanced equilibrium, that remains an expression of both contraction and expansion. "The highest contradiction" concerned the two wills that are both opposites and the same: the negating will and the affirming. These two remain, regardless of the interpretation of the status of the will that wills nothing, and they resonate in the principles of being (*Seyn*) and what-is (*Seyende*) that are also, like contraction and expansion, described as two contrary principles that one and the same thing might be at the same time.

So, one last round with the snowman: He beholds, besides the nothing that is not there, the nothing which *is there*, which might be interpreted along the lines of Schelling's description of the what-is-not (*das Nichtseyende*), which is "un-

graspable only insofar as and to the extent *that* it is not; to the extent that, as what-is-not, it nonetheless *is*, to that extent it is indeed graspable and comprehensible" (*Ibid*.: 142-3). The what-is-not is certainly not "the nothing" pure and simple (*das Nichts*), Schelling emphasizes (*Ibid*.: 141), but rather, in fact, Being (*Seyn*). Being is what-is-not, but nonetheless something that can be beholden in relation to what-is. It is as the negative "only latent in what-is, while what-is, or the positive principle, is revealed and active" (*Ibid*.: 142). I risk this interpretation: What-is-not can be grasped and comprehended to the extent that it is the what-is-not of something what-is. Take for instance a lecture room with chairs and boards and various types of equipment: The what-is-not for it is that which allows it to be what-is. The room is not filled with water or one massive bloc of impenetrable being. In its condition of being what-is, it is granted its being by what-is-not. A table, for example, is something that is, only to the extent that it is being granted by that which is not, otherwise in wouldn't have any limits or shape. Being grants that-which-is its existence by withholding itself. And this what-is-not (*das Nichtseyende* of the table, which allows it to be a table) can be called the nothing which *is there*. This is graspable, although you only see it as that which is *not* in relation to a what-is.

Back to the ground

So, what is the ground of existence – and in which way(s) does it regard the void? I think *Weltalter* offers at least a couple of different interpretations of this, which might be summarized as in the following, on the face of it going in each their own direction.

The ground is being. A book, like any other object, contains two principles that are somehow held in check; the *Seyende*, the what-is, as its positive, confirming moment, and *Seyn*, the what-is-not, as its negative, contrary moment. One might emphasize simply the what-is-not as the ground of that which-is; the necessary flipside of things that are, which is nothing "in itself", but can nonetheless be beholden as the what-is-not of what-is. The nothing that is is the ground, meaning the what-is-not as the precondition of that which is. (Against this interpretation speaks the understanding of the expansive force, in for instance cancer, as itself part of the ground).

The ground is the contradiction of contraction and expansion latent in a spiritual balance of what we perceive as objects. One might instead see both of these contradictory forces, contractive and expansive, as the ground and the book itself as a kind of spiritual miracle that keeps these two forces in check. The existing things, objects, like a book, would thus be said to contain within them two contradictory principles as their ground, and both of them could potentially "run amok", either annihilating the existing thing in a contractive movement or exploding it in an expansive movement. (Against this interpretation speaks the questionable status of that which is: If that which we call a book is not the positive, expansive principle kept in check by its contractive counterweight, then what is it? Is it a Kantian *Erscheinung* with two inherent, contradictory principles that apply to it only when considered as a thing-in-itself?).

The ground is the will that wills nothing as the past of that which has been expressed, i.e. even of the contradictory forces of contraction and expansion themselves. Finally, one might emphasize the will that wills nothing as still resting within both being and what-is as part of the ground or maybe even the ground of the ground, or the *Ungrund*, as it is later called. God as his own ground would mean that the past of God is his ground; that which is prior to both contraction and expansion is the ground even of these.

In the first version, the ground is, so to say, merely the flip side of existing things. In the second, it is a more fundamental characteristic of things that are – they contain some contradictory forces "underneath" the surface, which sometimes burst out. And in the third, there is a pre-historic grounding of everything, pure and simple, including any forces inherent in actually existing things.

Without claiming to be able to resolve this tension, I think it is at least possible to read these three options as more closely related than presented above, and thereby hopefully tie some of the discussions in this article a bit together.

Everything that is, is and is not. A book relies on both its expansive and contractive dimension in order to appear, and sustain itself, as a book. It is both. In other words, the two dimensions co-exist in things. Their contradictory nature means that they simultaneously apply to the same thing, through which they are being expressed. Even though the what-is of a thing can thus be described as

its "positive", expansive side, it is nonetheless the what-is *of a thing* that is thus described, and similarly with its "negative" side.

> It is clearly impossible for what-is, as such, ever to be being, as such, and vice versa; it is also impossible for opposites as such to be one. We do not need to insist on these points, since to claim the opposite would be to do away with common sense, with the possibility of expressing oneself, and indeed, with the contradiction itself. Yet it is surely possible that *one and the same* thing be both what-is and being, affirming and negating, light and darkness, good and evil. (*Ibid*.: 130).

The book, furthermore, relies on its own emergence as a book in the combined expression of the contraction-expansion that was its creation. In other words, it has a past. In its absolute sense, this past evades description. It must be posited as the mere expressing of everything that is, or it must be thought as the will that previously willed nothing. If spirit partakes in this will (or if there is only spirit, and the will that wills nothing is a retroactive presupposition of spirit) then we may conclude that there are two forms of nothing in Schelling's *Weltalter*: a nothing that is and a nothing that isn't. The first is the contractive force of everything that is, in its grounding relation to a counterforce of expansion, both of which are not beings, but the fundamental, contradictory forces of all beings (and could probably be compared to the void and the atom), and the second is the original precondition of the spiritual force that upholds this balance, in as far as it is sustained; itself related to a nothing that is not there, but which nonetheless exerts its effect.

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Aleš Bunta*

Antinomy of the Void

Where are we, if not in the midst of the void? The sheer fact alone that this question has in a way become rhetorical seems to render obsolete what throughout the Middle Ages was one of the most important and fiercely debated theoretical questions, namely the question of whether the void *existed* or not; a question, which – in a general dispute – joined together philosophers, theologians, early scientists, and even juridical authorities, who were eventually called upon to find a suitable compromise between the battling factions.[1] The apparent certainty that no dilemma regarding the existence of the void remains – which is considered both as the massively predominant presence in the Universe, the all-enveloping final frontier, as well as the necessary inner element of atoms and thus of matter itself – is nevertheless all too hasty and deceptive. And even though from today's point of view, this God-like decision-making as to whether something apparently so evident (though *in itself* unthinkable) as the void exists might appear almost a childish game, it is nevertheless necessary to state that this same conceptual decision-making regarding the existential status of the void, albeit in an essentially modified form, is still a key issue of modern philosophy, while combining the philosophy of nature with the fundamental question of ontological difference.

What is at stake now, in this modified question, however, *at least at first glance*, no longer appears to be the question, "Is there any void?", but rather, is there anything *apart* from the void. The reason for stressing the phrase *at first glance* is not that this was not in fact a true dilemma, but rather to point out that another, slightly more complex aspect of it will be discussed later. It is important to note immediately, however, that even contemporary scientific claims, such as

[1] We obviously refer to the famous 'Paris trial', taking place in 1277, when the Bishop of Paris, Stephen Tempier, banned or at least limited the Aristotelian thesis on the absolute non-existence of the void, since it supposedly limited God absolute power to create the void by moving the World in a straight line. The sentence was a compromise since it still alowed for the non-existence of the void within the sublunar World itself.

* Institute of Philosophy, CSR SASA in Ljubljana

the physicist John Archibald Wheeler's notorious statement that "empty space is actually not empty, but rather the seat of the most violent physics", do not necessarily imply that the void does not exist. On the contrary, the void *does* exist, and exactly *as such, that is, void*, it is also the "seat of the most violent physics", which perhaps makes it non-empty, but not necessarily non-existent. What is at stake here is not the existence of the void, but rather how we define it, and philosophy is not called upon to start deciding again whether the void existed or not *strictu sensu*, but rather to redefine it in a way that can re-compensate for the loss of what was its seemingly most certain property, total emptiness. Or to put it in more philosophical terms, what science perhaps really challenges is not the existence of the void, but its being pure non-being. It must be aid however that the reason why questioning the sheer existence of the void remains crucial is still, nevertheless, purely philosophical, although it might, as in Badiou, involve mathematics.

In a way, this complicated intertwinement has also become a complicated knot of philosophical names, or perhaps more precisely, a question of unusual cross-historical alliances. We will therefore try to discern the logic beneath the seemingly very unusual fact that perhaps the most prominent philosopher of the void today, Alain Badiou, endorses Aristotle, who claimed that 'the void is not', and subscribes to Aristotle's struggle against the atomists, who claimed that the void necessarily exists; meanwhile, on the other hand, his arch-rival, Gilles Deleuze, usually considered the most 'anti-void' philosopher of recent times, actually takes the opposite path by praising Epicurus' and Lucretius' struggle to include the void in being. Since Mladen Dolar has recently presented a number of exhaustive and original analyses of Deleuze' elaboration of Lucretius' concept of *clinamen*, the present paper tries to complement his effort by emphasizing Badiou's seemingly paradoxical insistence on Aristotle (who claimed that there is no void); the insistence, which seems to display – in terms of Badiou's view of Greek philosophy – a fairly unusual view, according of which there is indeed *something that can be grasped* (although in an inverted form) about the (unthinkable) void, *only insofar as the latter is denied or presumed impossible*.

However, this paper does not focus on Badiou's own arguments, which have after all been thoroughly discussed already, nor does it present a systematic study of the history of philosophy that scrutinizes in detail scarce documents on early atomists' (Democritus, Leucippus) claims, or analyze well-known arguments

raised against their theories by Aristotle in *Physics*. Its main purpose is a purely conceptual analysis, which aims at developing a critical insight into Classical conceptions of the void and non-being, and tries to assess the importance of these concepts for contemporary philosophy (and, perhaps, science).

1. Reversed transcendentalism

The basis of this critical approach is embedded in a type of atypical skeptical attitude to the void. This attitude is not based on the standard skeptical argument whereby the void – insofar as it lacks any positive differential characteristics – cannot be thought at all and as such is non-recognizable: a useless concept, which is in itself 'void'. Philosophy has found elegant ways of capturing this skeptical argument and turning it against itself by arguing that the mere fact that the void is unthinkable also makes it (at least) undeniable. Quite the contrary, the atypical skeptical attitude for which the present paper argues, tries to show that the real epistemological problem of the void is actually *not* that it is unthinkable, but rather that it is *somewhat 'too easy' to be thought of necessarily*. More precisely: *although* the void "in itself" is in fact *strictu sensu* unthinkable, a certain spontaneous logical necessity nonetheless exists, which in any attempt to ontologically conceptualize *matter* qua matter compels us to think of the void either as necessarily *present*, or as necessarily *identical to matter* itself. The first obvious problem of this supposed forced choice is, of course, that both of these spontaneous assertions, which posit the void either as *a necessary being,* or as *the true matter,* are highly problematic. This, however, does not mean that we *assume* they are wrong, or that our priority is to prove them inconsistent. Obviously, we will point to their internal contradictions and use them in a way. But the source itself of the critical attitude is *not* primarily based within an attempt to reveal how both of these exclusive alternatives form a quasi-antinomy; the source of skepticism is rather the *necessity itself* by which they are thought. 'I doubt it, because I am unable *not* to think it (almost over-consistently)': this is the essence of our view, which is perhaps best encapsulated by the following formula: *the non-existence of the void is as equally unthinkable as the void itself.*

So what we are basically trying to say – not in complete disagreement with Badiou, for that matter – is that there is in fact some sort of a *double*, not just single, *epistemological barrier* or impasse at work around the void (perceived of as an object of thought): not only is the void unthinkable (which obviously makes

it quite difficult to think of); it is also impossible *not* to think of it (as necessary); and the greatest danger here perhaps is not to remain unable to subsume it to a clear concept, but rather to succumb to this necessity and start thinking of the void as if it were *something* one can actually think of.

Or more precisely, the void is *non-thought* in two different ways. One is that the void is not thought, because it is unthinkable, and this is obviously also the general reason for the void remaining non-thought. Nonetheless, this option leaves open at least one route, which is *to think of the void as of the 'unthinkable'*. The second option, however, does not allow even for this thin possibility, since within the second version of non-thought, the void, driven by the necessity with which it is actually thought of, *disappears within the perfect clarity of its presentation*. So, in both cases, the void obviously remains non-thought because it is unthinkable; the difference between the two is that the first option at least allows for the void to be thought of *as* the unthinkable, while in the second option, the void is completely devoured by the thought itself that is necessarily thinking it. So the second option is indeed even 'worse' than the first. On the other hand, however, the *sheer existence* of this paradoxical twisted gradation within which *to think the void* actually means to *think it even less* than *not to think it at all,* the sheer existence of this inner difference within the non-thought, this shift in the 'normal' rules of thinking, clearly testifies to the opposite, namely to the fact that the void determined as the unthinkable *affects thinking*.[2] Eventually it is possible to say that the 'void' – the singular point which is at the same time unthinkable, thought of necessarily and lost within the necessity of its thought – is perhaps after all pinned to some minimal thought, a mere affection, which, however, emerges only on the flip-side of thought as a paradoxical shift in the positions within the way it is non-thought.

This obviously does not mean that we claim to have reached some sort of 'great Outside'; we still cannot decide whether something like, for instance, the atomist 'void' exists or not; we simply lack the necessary epistemological tools to do so. The *only* two things that actually *can* be said about the void from a strict epistemological perspective are, first, that the void is unthinkable; and second,

[2] There are clearly some parallels to be driven with Deleuze' concept of *cogitandum*, which he presents in *Difference and Repetition*. The scope of this paper, which is mostly dedicated to the concept of the void itself, forces us however to postpone a more elaborate comparison, both to Deleuze as well as to other comparable theories.

that – since its 'opposite', namely, the non-existence of the void is as equally unthinkable as the void as such – one is (via the exclusion of the speculative possibility that the void is indeed matter) compelled to think it *necessarily*. However, this necessary thinking of what is correctly supposed unthinkable gives way to the paradoxical shift between the two possibilities of *how the void can be non-thought*: to have a clear thought or to have a clear concept of the void, suddenly means to think it even less than not to think it at all, for to think of the void (necessarily) clearly means *not* to think it (at least) as the unthinkable. This peculiar gap within non-thought, nonetheless, clearly indicates that the 'void', marked by the *absolutely minimal negative determinations* in terms of being simultaneously unthinkable and what is impossible not to be thought of, does affect thinking, and that is all. It is *not the Void itself* (we have not yet even introduced any of its concepts) that has this effect of changing thought into the most radical form of non-thought; it is merely that its two negative determinations have this effect, which, however, even most determined of skeptics must concede, since they are, after all, her *own* determinations of the void that produce it.

One could thus say that the double aspect of the epistemological problem of the void in fact merges the two poles of Kant's critique (analytics and dialectics) into a single issue: not only is it necessary to posit conditions according to which the void can be (or cannot be) subsumed to a concept (analytics); at the same time, and correlative to the first effort, it is also necessary to find a way to cope with the fact that every thought that *actually does subsume it to a concept changes* the void into some form of "transcendental appearance" (dialectics). In order to actually think *something* about the void, it is necessary *not* to think it *as something*, and this *non-thinking* itself seems to present some sort of additional 'transcendental' condition of its thinking. For it is only within non-thought or within the paradoxical difference between the two ways of non-thinking the void that the minimal pinning of the void to a thought occurs in the form of this same internal change within the order of thought itself caused by the disarray between its two necessary minimal negative determinations. Thus in terms of its methodological approach, the present paper could be described as some sort of 'reversed transcendentalism', because in contrast to Classical transcendentalism, which posits what has to be thought of *as necessary* in order *for anything to be thought of at all*, 'reversed transcendentalism' actually 'deactivates' a thought (or a concept) by *proving its necessity*, while positing this same non-thought as the additional transcendental condition of thinking.

The central problem this paper faces, then, lies in the fact that *all* existing historical philosophical *concepts* of the void (in its relation to matter or space) – similarly to the case of the 'ontological proof of God' – in fact *do imply its necessary existence* (not a small paradox for something that is actually nothing), and thereby form some sort of presentation of the void that is simultaneously its negation. They all represent the second version of the non-thought within which the void is even more lost than by not being thought of at all; they all belong to the sphere where thinking of the void becomes measured by negative numbers, as it were. However, difficult as it is, this no longer seems to be a completely insurmountable problem. We will try to show that the epistemological situation – which has been discussed only abstractly thus far – in some way repeats itself within 'matter' itself. Key importance in this quest will be bestowed on a concept which was at least implicitly developed by Plato, the concept of 'false nothing', i.e. a concept of nothing that not only does not exist (which seems rather plausible), but which is also false.

2. The antinomy

Such has become our certainty that the void not only exists, but is even to be considered both the largest and the smallest element of space, as well as both the all-enveloping and the most-inner element of matter, that one could easily be tempted to rephrase the slightly worn-out paraphrase of the Leibniz's notorious statement regarding the point of absolute certainty, which supposedly inaugurates philosophical speculation and thus philosophy itself. The one thing we seem to know – beyond any doubt and beyond any epistemological dilemma – is that there is '*something*' rather than nothing; this 'something', however, being predominantly void, is nonetheless, in all of its ontological features, closer to *being nothing* rather than something. So, yes, there is something rather than nothing, but the problem, as well as the additional cause of philosophical wonder, seems to be that this 'something' that marks the primacy of being over non-being, *is* either *fundamentally* or *entirely* nothing, with any third option seemingly excluded.

Obviously one element of nature seems to shatter the equation; one reminder of the pure indeterminate 'something' that seems to resist the void, which is of course matter *qua* matter. We shall see, nonetheless, that in its relation to the void, that is, under the anti-Aristotelian supposition that the void *is* – matter

qua matter can be conceived ontologically in only two ways, which in a way also coincide with the two different ways of defining *being qua being* itself. Either matter is – which is the case in all atomistic models – submitted to a certain *topological* as well as *ontological* primacy of the void, or matter *qua* matter is conceived of as consisting of the void *exclusively* and thus, necessarily, merely *appearing different* from the void of which it consists entirely. This second option could perhaps be associated with some Buddhist dialectical systems; in more recent philosophy, it is mostly associated with Badiou, who tries to relate it also to Aristotle.

To formulate this antinomy more precisely: either, do we consider matter and void as fundamentally different, which will finally result in the thesis that the void – as the *exclusive location* of matter's presence in the Universe, which itself exists independently of matter – is the *unconditioned condition* of matter's 'being there'. Or do we – and this seems to be the only remaining solution except the first one – grasp them in their indifference, which will necessarily result in the thesis that matter qua matter is merely a certain type of presentation of the void. The question seems to be, of course, why it is necessary to exclude the opposite (or third) speculative option, i.e. that the void is merely a certain appearing of matter? The general answer to this question would be that in fact it has become incomprehensible – on a general level – to think of any *dynamic system* or *system of change* which would not – in one way or another – include a minimum of the void, either as an integral component, or as its 'motor'. The *non-existence* of the void is as equally unthinkable as the void itself, which implies that the void, although unthinkable, is at the same time thought *necessary*, as well as necessarily *thought*. However, it is also important to note immediately that the same argument that for us 'moderns' almost indisputably proves the existence of the void, namely the perception according to which the void was the *sine qua* of all movement or change, and in fact in its reversed form was the basis of Aristotle's argument that the void is not. That is, Aristotle claimed that movement and void actually exclude each other, and since one cannot deny the existence of movement perceived as the presentation of nature, the void cannot exist.

With the third option thus excluded as supposedly unthinkable, one is obviously stuck with the two alternatives that clearly form an antinomy. Nonetheless, they have something in common. In both cases, we clearly stumble on a certain *ontological primacy of the void*: either the void is *the being* of matter's *Dasein*, or

matter *qua* matter is *fundamentally void*. However, it is nevertheless clear, and important to note, that the second speculative option, that matter consists of the void exclusively – again – already indicates that the void *qua* void cannot be regarded simply as empty space.

So, let us first focus on the first alternative of this forced choice: the atomist concept of the void. Although it presents a very basic, almost spontaneous model of thought, the atomist concept of the void is built on a series of paradoxes. These paradoxes nonetheless also constitute its essence. The atomist concept of the void is in fact *meaningful* only insofar as it is paradoxical: without being paradoxical, the atomist concept of the void would become meaningless. Perhaps this is the reason for its enormous appeal and beauty: despite its simplicity, it already harbors and incorporates some of the key problems of Classical (as well as contemporary) philosophy; despite being 'void' – since it was first conceptualized – the void has been buzzing with all kinds of constitutive paradoxes that form its essence. This could be one possible way to answer to Wheeler's challenge.

The first and the most basic of these paradoxes is that the void is *at the same time* defined as the *exclusive location* of *all that exists*, as well as, *absolutely empty*. The paradox, however, does not reside in this seemingly obvious contradiction, but rather within the fact that there *is no contradiction* between the two determinations; or perhaps even more precisely, it lies in the fact that *the void is itself* this contradiction, which the two determinations express. The void can, in fact, constitute the exclusive location of matter *only insofar* as it is empty, and moreover, there has to be some *excess of the empty void over matter* to allow atoms to move. So the void is not only essentially empty; it also has to *exist as such*, because nothing can move through a sphere of absolute density. So the basic atomist claim could be expressed as follows: void must exist *within nature*.

Or to put it from yet another perspective: simultaneously (generally and essentially) defined as the *exclusive location of matter*, and – for that same reason – (locally and ontologically) defined as the *absolute absence of matter*, the void, in terms of its relation to matter, constitutes *the existing negation that unilaterally conditions the existence of that which it negates*. Now, this is the crucial paradox. Not only since it proves that the atomist conception of the void necessarily implies the *existence of nothing* within nature, but also, and even more importantly, since the void itself if perceived in this way also constitutes a spectacular juncture

of *a being and Being itself*. Void not only necessarily exists as a localizable presence, but also unilaterally conditions the existence of matter, and this *unilateral conditioning of the existence (of all 'there is')*, is in fact one of the possible ways of defining being qua being itself. Not only does the atomist conception of the void necessarily imply the existence of a certain surplus of the void over matter – void qua void must exist to facilitate the movement of atoms – which implies that some sort of *appropriate space of nothing* within space exists (although it is not strictly localizable); the atomist conception also spontaneously posits this exceptional surplus being of the void as the necessary (pre)present condition of matter's *Dasein*, which stands in absolutely no inner relation to matter, with the later standing in complete dependency on this outer principle: without the void, matter cannot move; without the void, matter has no structure; without the void, matter cannot *be*. Not the void, but *Being* (in the form of nothing) has never been thought of so *consistently*; however, this also seems to be the key problem if one tries to look at the atomist void from the opposite perspective.

In contrast with the void of the ancient atomists, the other alternative of the antinomy has the advantage of being associated as well as advocated by one of the contemporary world's best philosophers. First of all, it has to be noted, however, that Badiou's 'void' has almost nothing to do with the void perceived as a *natural or physical phenomenon*. It is defined only as the "*proper name*" for the *inconsistency* of being qua being. As such, the void is obviously also not perceived through its supposed relation to matter, but similarly to Hegel, through its negative relation to the abstract concept of one; with the obvious difference that in Hegel's famous theory of repulsion, one and the void (at least for a moment) coincide within some sort of principle of multiplication, while in Badiou's theory, the void, determined as the proper name for the inconsistent multiple, is more or less perceived as the direct consequence of the non-existence of the one. So, Badiou's void is not thought through its relation to matter. Nonetheless, it is also true that Badiou does directly state the following: "If there are 'atoms', they are not, as materialists of antiquity believed, a second principle of being, the one after the void, but compositions of the void itself, ruled by the ideal laws of the multiple whose axiom system is laid out by ontology."[3]

[3] Alain Badiou, *Being and Event*, Continuum, London & New York 2005, p. 58.

Badiou's rejection of the atomist void rests primarily on his thesis that in terms of a "natural situation" – which is obviously the type of situation we are concerned with here – the void can never appear as a "term" or "place" of a particular presented situation. Defined as the inconsistency of being qua being, the void is non-presentable within the order of the count-as-one that orchestrates the perfect consistency of every presented situation. As the 'basis' of presentation, the void cannot appear within presentation, since presentation as such is possible only insofar as the void remains '*what* is presented', and thus, as it were, stays hidden on the 'down-side' of presentation. Within the presentation of a "natural situation", void or nothing can become distinguished only by acknowledging the fact that "every situation implies the nothing of its all", that is, it is only distinguishable as some sort of a "phantom of inconsistency" that eludes the consistent order of presentation, *without leaving a single trace* within the situation from which it was discerned.[4]

> The only thing we can affirm is this: every situation implies the nothing of its all. But the nothing is neither a place nor a term of the situation. For if the nothing were a term that could only mean one thing: that it had been counted as one. Yet everything which has been counted is within the consistency of presentation. It is thus ruled out that the nothing – which here names the pure will-have-been-counted as distinguishable from presentation – be taken as a term. There is not a-nothing, there is 'nothing', phantom of inconsistency.

It is easy to notice the principal contrast: not only does the atomist void present a natural phenomenon; it also presents the exclusive platform *of all there is within* presentation. On the other hand, Badiou's void – in terms of a natural situation – *presents* itself by constitutively remaining *outside* the order of presentation – within which it is discernible only as pure nothing. So although it is perfectly plausible to say that the atomist void already presents a way of thinking of the void as being qua being, it is also clear that the atomists' and Badiou's theories of the void also represent diametrically opposed conceptions of being qua being itself: in atomist theory, if one tests it at its limit, being qua being can be (at least) discerned as the unilateral conditioning of existence emerging within the void (thus becoming nothing). In Badiou, on the other hand, being qua being is, purely and simply, the inconsistent basis of presentation that itself

4 *Ibid*., p. 54, 55.

cannot be presented (even though it is the only 'thing' that is actually being presented) in order for the presentation itself to occur.

It is also easy to recognize that the atomist' concept of the void for Badiou cannot be anything else but a result of the various effects of the One: on one hand, the void is defined in relation to the atom, which bears the name of the Enemy, and shares its definition of being 'indivisible'; on the other hand, also the void itself, perceived as the margin of all-encompassing totality of being, is necessarily one. So, not only is Aristotle correct (for whatever reasons of his own) that the void, perceived in such a way, does not exist; for Badiou, it also has to represent (or at least, it should have represented) *a false type of nothing*. This is quite an interesting constellation, which is, however, (in contrast to Plato) not in Badiou's vocabulary: something that not only *does not exist*, but is, *furthermore*, also a *false nothing*, a simulacrum of nothing.

Our assertion that the epistemological impasse of the void is actually double, internally contradictory (not only is the void unthinkable, but also dangerously easy to be thought of necessarily), is thus obviously not in general contradiction to what Badiou is saying. It nonetheless significantly shifts the perspective. "To set off in search of nothing" is for Badiou a "pointless" effort, which he associates with poetry, while stressing that this romantic search for a "lacuna" that supposedly eluded the order of presentation is in fact what makes "poetry complicit with death".[5] Now, although Badiou's thesis might be perfectly correct (we certainly do sympathize with it), we still claim that the real problem of this 'search for nothing' or void is not that it is *necessarily unsuccessful*, but *rather that it is made suspicious by its all too frequent success*. And the medium of this successful 'taking possession of nothing' would certainly not be presented by the weary poet's search for eternal repose, but rather by a much more aggressively influential sphere of human agenda, namely, by the *mystical core* of almost any religion. It is in fact quite surprising that Badiou in general, almost systematically, and in all possible aspects, neglects the influence of mysticism, and the fact that within all of its branches, ranging from the mystical aspects of Taoism, Hinduism and Buddhism to the heavily influential concept of *kenosis* in Christian mysticism, we encounter numerous testimonies according to which,

5 *Ibid*., p. 54.

by means of methods that elude 'ordinary' rationality, the void (or the Absolute) has in fact *has been attained*.

In any case, it seems all to come down to the question of how nothing appears within presentation, to the question of whether a falsified nothing exists. And this finally also brings us to Badiou's unexpected allegiance to Aristotle, and even more so to Plato. We will try to show that Badiou's void, while being rather independent of the atomist concept, is nonetheless modeled on Plato's non-being, at least in one absolutely crucial feature. So, if there was a precursor to Badiou's 'void' in antiquity this is certainly not presented by the void itself, but rather by Plato's non-being.[6]

3. Non-being vs. the void

One could say that the ancient Greek philosophy has left us with a heritage of three major developments regarding the void.

1) The first development is certainly Anaximander's empirical discovery, as early as the sixth century before the Common Era, that the Earth was after all not positioned on a back of a giant tortoise, to borrow Roberto Nobbio's slightly sarcastic but historically accurate metaphor, but that is in fact a rock floating in empty space. It is important to note that what is arguably to be considered the first step in science was, in fact, so closely connected with the discovery of the void. And this is in fact a discovery, not in the sense that it would tell us something essential about the void itself (after all, what the void represents here is in a way no more than a substitute for a turtle) but rather in the sense of answering directly our initial question: where are we? We are *somewhere* in the *nowhere*. And if there is any meaning to the void that I would really put beyond any suspicion, it would be precisely the constant scientific progress of finding us more and more lost somewhere near the non-existent centre of the void, which is in

[6] Before proceeding, it is very important to note that the way in which we interpret Aristotle bears absolutely no relation to Aristotle's own intentions. We are well aware that the type of reading we propose, measured in terms of the history of philosophy, is evidently wrong. So again it needs to be recalled that the emphasis of this paper is on a purely conceptual analysis that tries to test various concepts of the void at their limits, as it were. However, this remark does not apply to the analysis of Plato's inclusion of non-being in being. That is, in Plato's case we do (or at least try to) follow his argument.

this sense completely beyond the dilemma, whether it is empty or not. For in this sense, the void is only a kind of a non-substantial marker of a gradual loss of any natural horizon.

2) The second major development regarding the void is, however, the development of two of its concepts, namely that of the atomists and Aristotle's. Now, although Aristotle actually only borrows Democritus' conception of the void, termed in Aristotle as "a place with nothing in it", in order to submit it to a critique that will eventually end in denying the void's existence, the two concepts are actually *far from identical*. By which I mean, that what is at issue here is not merely a matter of two diametrically opposed conclusions based on the same definition, and obviously on the background of two completely different ontological visions of what is now arguably called matter; it is not merely a question of atomism versus Aristotle's substance. The problem we face is also and primarily a problem of two different definitions, despite the fact that these are nominally the same.

The prime reason for this is that Aristotle' conclusion that the void does not exist is not to be considered only as a conclusion, but also as an *integral part of the definition itself*; thus, Aristotle's complete definition would be: a place with nothing in it, which as such does not exist. From the perspective we are proposing, however, this additional clause is not to be considered so much as an ontological marker, but as a conceptual tool. The inclusion of the decision on the inexistence of the void in its definition has as its result the effect of a crucial topological shift or subtraction. It consists of subtracting the void from being thought of in triangular frames of its relation to matter via the mediation of non-being, with the void itself being conceived of as both the *local* non-being of matter and its exclusive *location*, and submitting it instead by means of seclusion to a very different constellation of thought, whereby the void, firstly, no longer appears primarily conceived of as the space or *topos* of matter, but is rather instead being explored in *its own relation to what it supposedly was*, that is, in its relation to the *concept* of *topos* or place. And secondly, the void appears no longer defined by its immediate identity with the non-being-of-matter, but is rather itself being conceived *as* the *possible presentation* of nothing, and thus, consequently, being thought *through* its *difference* with nothing (and no longer in its identity to non-being), or even, *as* the *inner difference* within nothing itself. So – in obvious contrast to what Aristotle himself would have to say on this mat-

ter – our argument would be that by deciding that the void is not, Aristotle in a way secludes the void from its relation to matter or substance, which gives rise to two perhaps even more fundamental questions: the question of the relation between void and space, and the question of the relation between the void and nothing. Or more precisely, by secluding the void into non-being, or by subtracting it from being, Aristotle, firstly, *breaks the immediate identity between void and empty space*, which, in the atomist constellation proves necessary, since the void *is* the exclusive space of matter, and forces us instead to think of the void through its inner relation to the concept of *topos* or place as such. And secondly, by the same gesture, and even more importantly, Aristotle also renders it possible *not to think* of the void appearing in its immediate identity with the non-being-of-matter, and rather instead opens the possibility of thinking of the void – not in its immediate and local being-nothing – but rather as of the possible *presentation* of nothing, which clearly implies a minimal difference between the two concepts. However, before clarifying argument further, it is necessary to present the third Classical development in which the void is involved.

3) The void is namely also, and from the philosophical perspective, *predominantly*, one of the two competing and almost contemporary versions of the inclusion of non-being in being that mark the departure from Parmenides' monism. The story goes that Plato was so jealous of Democritus that he ordered all of Democritus' scripts to be burned. The story is obviously unreliable, as it is uncertain that Democritus was actually one of the protagonists in Plato's dialogue *Rival Lovers*. The personal love-hate relationship thus remains blurred. Nevertheless, it is clear that from Plato's perspective the atomist concept of the void could not have been seen as anything more than an unprecedented vulgarity. Not because it constituted a rupture with Parmenides, one much more radical than Plato's own, but because the concept of the void as conceived by Democritus does not really touch on the point of *pure nothing*, and thus does not really live up to the expectations of *being* non-being.

Plato's inaugural critique of Parmenides and his followers consisted of the idea that they wrongly presupposed non-being to be the *opposite* of being, which necessarily led them to the unsustainable conclusion that non-being as such is not. On the contrary, Plato says that non-being is not to be conceived in terms of a negation of being, but only in terms of being *other* than being. "It seems that when we say *that which is not*, we don't say something contrary to that which is,

but only something different from it".[7] So one could say that Plato's first gesture is precisely to construe a *false nothing*, some sort of 'transcendental appearance' of nothing; a nothing that seems to be thought of all *too consistently by those who at the same time deny it* (namely Parmenides and his followers). And in a way, the whole of Plato's procedure constitutes a delimitation from this false nothing, perceived as *the existence of the opposite of being* within (the presentation of) being.

It has to be admitted that from, the – as it were – 'physical' aspect, Plato's own theory on the inclusion of non-being in being may seem quite banal, and arguably might even have been dismissed as a type of naïve paralogism of the senses: for instance, "movement is the non-being of standstill", and conversely, standstill is the non-being of movement. From the metaphysical point of view, however, his solution is, nevertheless, brilliant, perhaps unsurpassable. Movement is the *nothing* of standstill only insofar as *movement exists*; it *is* nothing (of its other) only insofar as it is *not* nothing; this finally brings us to the general conclusion that *non-being as such*, conceived in terms of being *other than being*, has in fact no other place but its own other, that is being, within which it disappears. The presence of non-being in being *is actually null*, *nada*, nothing. As in Hegel, also in Plato, nothing can truly be grasped only insofar as *it is actually understood as pure being*: the only form in which nothing can exist is in the form of its Other; movement, or, anything that can be placed in a 'negative' relation to something else, is thus, in all of its positive banality, the exclusive location of non-being in being, the existence of which is thus equal to zero. However, this obviously does not mean that non-being is not; after all, Plato's claim is precisely that non-being *is*; quite the contrary, it only means that *non-being is actually equivalent to a certain order within existing things*; instead of presenting a dark horizon or the calling of the deep, non-being's presence can be marked only by a certain, for that reason empty, +1 equivalent to +0. Non-being exists, it is included; it is nevertheless present only as (pure and simple) nothing. The similarity (to say the least) with Badiou is evident: a certain surplus being exists in the form of non-being, a certain surplus that haunts the consistent order of presentation, which is, however, merely distinguishable in its disappearance, while remaining strictly delimited from any type of *existent nothing* within presentation.

7 Plato, *Sophist*, 257b. Quoted from: *Plato Complete Works*, Hackett Publishing Company, Indianapolis/Cambridge 1997, p. 280.

From this perspective, it becomes all too clear that the competing form of inclusion of non-being to being, the one presented by the atomist conception of the void, not only appears over-dramatic from Plato's point of view, but also purely and simply fails to meet Plato's conditions for being non-being. The void is neither generated in the order of existing "others", which would arguably mark 'the plane of immanence' in Plato's thought, nor, even more importantly, does it ever reach the point of being absolute nothing, since it not only *is*, but is also necessarily presupposed as a spatial presence in which matter appears.

It is clear that what Aristotle presents as the definition of the atomist void in fact applies only to the point of the void's necessary excess over matter: although it is true that also for the atomists the void *as such* is determined by the complete absence of any matter, it is, however, at the same time, *and as such*, the exclusive spacing of matter's presence. The basic paradox of the atomist void is obviously that the void is simultaneously the *existing negation of matter* and its *exclusive location*; *its own existence that negates matter is at the same time the condition of matter's appearing*. That is what makes of the void, which *exists* only insofar as it *exists independently* of matter, (although one would usually find them in the same spot), the condition of matter's appearing, which is in itself unilaterally unconditioned; this is why all attempts to grasp matter and void in their difference end in the impossibility *of not thinking* of the void as of the *existent being of matter's 'being there'*. Or, in other words, the void's existence that negates matter, which is, however, at the same time, the unilateral condition of matter's appearing, is why the void is necessarily thought of as the presence of presence.

From the 'metaphysical' point of view, Plato is, or would be, correct in rejecting the void as a worthy rival to his own operation. However, this only proves clear, via Aristotle, although perhaps involuntarily, refocusing the conceptualization of the void from being thought of in its immediate identity with non-being to the speculative possibility of the void being thought of as the presence of nothing. Namely, the concept of the void indeed implies a certain difference that is perhaps even more fundamental than the difference between the void and matter itself, namely the difference between nothing and the void, which, however, really *becomes discernible precisely insofar as the void is simultaneously grasped as equal* to nothing.

What is at stake here is clearly a certain difference of the same, or a difference in nothing, which can be, however, only attested in terms of *existence*. Although the void *is* nothing, both in the sense that void is clearly not-a-thing, as well as in the atomist sense that the void appears as the existent negation of matter, it also holds that the void necessarily exists, and is thus, apart from being nothing, also not-nothing. Or more precisely: although the void is not something other than nothing – as a matter of fact, it can be conceived of only as a form of nothing – it is also not-nothing, *since in order to be nothing, it has to exist*. Namely, exactly insofar as the void marks *the presence of nothing*, it is not-nothing, and cannot be conceived of as pure non-being. And from this perspective, Plato would be completely correct. And although the logic seems to be the same as in the case of his own inclusion of non-being in being, it is actually not.

In Plato's case, it is true that a particular form of non-being, such as movement-being-the-non-being-of-standstill, in fact implies that non-being can actually intervene as non-being only in a form of a being. This would be the Platonist version of Deleuze's famous "negativity of the positivity itself", which he attributes to Nietzsche. It is nevertheless clear that for exactly the same reason, *non-being as such* is present in the world only as pure nothing, or as *nothing that is also the nothing of itself*. In the case of atomist' void as mediated by Aristotle: is true again that non-being *is* in fact non-being only insofar as it exists. In order to *present* nothing, the void cannot be 'nothing', and although void *is* nothing, it is at the same time *its existing presence*, and is thus space rather than nothing. Exactly insofar as the void marks the presence of nothing, it is not-nothing. Either way, both in the case where we perceive of the void as different from nothing, or when we perceive it as nothing, we actually end with the same result: the void cannot touch upon the point of being pure nothing, and is thus, from the metaphysical point of view at least, an implausible form of inclusion of non-being in being. And I think this is the place where the decision needs to be made: either to stick with the atomist chirurgical incision, with the high drama of there being a mysterious presence which conditions what it negates, or to side with Badiou, and claim that the history of the void has been written by those who claimed that it was not.

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Oxana Timofeeva*

Imagine There's No Void

We have been naught, we shall be all.
(The International)

The world consists of borders. Without borders, there is no world. Not only are borders in between all worldly things, but also everything that *is* potentially meets its own border in everything else that *it is not*. In turn, every *something* is itself the border and the edge of the other and for the other, which it delimits, but also shapes. Every body borders another body, being itself the border beyond which there is the other-than-itself. This is the structure of the world, which operates according to the law of the border, the law of difference.

The world, as pictured by the physicist, is a world of material bodies. But, in trying to find a perfect physical body, the particle of particles, the indivisible, science encounters the flexibility of matter and finally arrives at an infinitesimal reality as much material as metaphor, from oscillating neutrinos to superstrings or quark flavours with their strangeness, charm, beauty, truth, topness, or bottomness. In this material world, as we know it, boundaries are never fixed, since even the rocks are moving, and even within crystals there is motion and change.

The world as pictured by the mathematician is a world of numerical or geometrical bodies. In his dialogue *Timaeus*, Plato outlines his theory of the universe, and claims that everything is made of triangles. These archaic, tiny triangular Platonic bodies are to be identified, without any bias, as a kind of subatomic particle, and are sometimes linked to quarks in contemporary physics. One might say that the three legs of each triangle are the borders beyond which there already lie other triangles.

Although they have borders, both quarks and tiny triangles cannot exist separately or autonomously, but only as constitutive elements of bigger and more complex structures. They do not have any internal structure themselves, or, to

* Institute of Philosophy of Russian Academy of Science, Moscow

put it simply, they do not have any consistent inside. Elementary particles – prima materia – *do not consist of anything*, but, instead, everything consists of them. Are they not imperceptible pieces of nothing, each being a border between nothing and thing, nothing and something, nothing and everything? Pure Being and pure nothing are the same, Hegel says.[1] What then is the elementary particle, which contains nothing, if not the border of these two, the border of the same, where all difference is produced?

The world as pictured by the biologist is a world of living bodies, which consist of cells. Cells – elementary living bodies – are complex. The borders of their internal structures are cell membranes, and sometimes (in particular, in the case of plants) even cell walls. The world as pictured by the nationalist politician consists of countries, between which there are frontier guards and border controls, whereas the world of the political activist implies borders between classes, powers, privileges, etc. The world as pictured by the sexist or the feminist is made of gendered bodies, where the walls between men and women are to be either built or destroyed. The world as pictured by the humanist consists of humans and other animals, or non-humans (including plants, monsters, vampires, zombies, and aliens), and the boundaries of the human can be either open or closed towards what they call non-human.

The ensemble of borders of the world seems to be all-too-multiple and heterogeneous. However, to put it bluntly, there are three essential kinds of borders:

1. The border between something and something *similar* – between one and another triangle, one and another cell, one and another country, one and another man, one and another grey cat, one and another clone, etc. These are borders within a certain continuity or homogeneity, within a certain dimension or a certain genre, where we rather deal with differences in degree.
2. The border between something and something *different* – between different dimensions, between man and woman, animal and man, dream and reality, organism and mechanism, light and darkness, allowed and prohibited, sacred and profane, external and internal, life and death, good and evil, poor and rich, etc.

[1] *Hegel's Science of Logic*. London: Routledge, 2002, p. 82.

3. The border between something and *nothing*. Not easy to imagine or represent, this border goes beyond representation or imagination, towards the particle made of nothing (which cannot be really observed, but only scientifically, mathematically, philosophically deduced from observation of some larger entities captured in certain processes). At this border, one potentially faces the ultimate *edge of the world*.

Things can be measured by all three kinds of borders, in various ways. Thus, in the dimension of morals, on the first level of borders we can think that we choose between different goods, or between the better and the best, but we can also seek for the lesser of two evils. On the second level we encounter what is supposed to be the border between good and evil. And then, there is still another borderline: to cross it means to go beyond good and evil.

We say "borderline" as if it were really possible to draw lines between something and something alike, something and something unlike, or something and nothing. But, in a way, a line as border, such as the side of a triangle, is not anything but the pure in-between of two planes, surfaces, places, bodies, or territories. A borderline consists of nothing, but, nevertheless, has two sides, one shifting into the other. In some spacious reality, there is no line between a window and a cat sitting on it – where the cat ends, the window begins: in between them, there are some mixtures of infinitesimals, belonging either rather to the cat or rather to the window. There is never a proper line.

A borderline of the second kind – between cat (as animal) and man – seems even less perceptible and even more abstract (although every line is abstract), but nevertheless something very serious goes on here in between. A dialectics of exclusion and inclusion envelopes this site where a human being either recognizes or does not recognize, either accepts or rejects her own animality and appropriates her own humanity: no less a process than anthropogenesis runs along this line. In this process, the human being creates borders – not only between herself and the animal others, but all borders of all kinds: borders are a human way of positing a difference.

Animals do not know borders, do not respect them, or do not take them into account. However, they can provide us with some striking knowledge regarding what borders are. Thus, borderlines of the second kind can be seen as pass-

ing through different multiplicities, series, or packs. Each pack, according to Deleuze and Guattari, has its anomalous or exceptional individual who runs alongside the pack. It can be a loner, or the leader of a pack, or an outcast, someone who inhabits the edge of a certain whole (like Moby Dick for whales, or the Wolf Man, or sorcerers, who live between villages or at the edge of fields and woods), being itself "neither an individual nor a species," but "a phenomenon of bordering":

> If you change dimensions, if you add or subtract one, you change multiplicity. Thus there is a borderline for each multiplicity; it is in no way a center but rather the enveloping line or farthest dimension, as a function of which it is possible to count the others, all those lines or dimensions constitute the pack at a given moment (beyond the borderline, the multiplicity changes nature). [...] The elements of the pack are only imaginary "dummies," the characteristics of the pack are only symbolic entities; all that counts is the borderline – the anomalous. [...] In any event, the pack has a borderline, and an anomalous position, whenever in a given space an animal is on the line or in the act of drawing the line in relation to which all the other members of the pack will fall into one of two halves, left or right: a peripheral position, such that it is impossible to tell if the anomalous is still in the band, already outside the band, or at the shifting boundary of the band.[2]

Exceptional individuals create alliances or blocks of becoming, heterogeneous combinations of the becoming-animal, through which an infinite production of difference is operating. As Catherine Malabou has noted, their "role is to mark out the end of a series and the imperceptible move to another possible series, like the eye of a needle of affects, the point of passage, by means of which one motif is stitched to another."[3] This super-flexible world of multiplicities and series, where, through the eyes of needles of affects, the anomalous are bordering, is measured by intensities of becoming.

The ultimate borderline of the third kind – the edge of the world – would be, however, the most problematic at this point. How is it possible, if possible at all, to think of bordering on finitude? How is it possible that on one side we have

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2 Gilles Deleuze and Félix Guattari, *A Thousand Plateaus: Capitalism and Schizophrenia*, trans. Brian Massumi. Minneapolis: University of Minnesota Press, 2005, p. 245.

3 Catherine Malabou, "Who's Afraid of Hegelian Wolves?" in *Deleuze: A Critical Reader*. Oxford: Blackwell Publishers, 1996, p. 128.

something, but on the other side there is nothing? The third borderline has only one side. This ultimate edge of the world is nowhere, since the nothing cannot be anywhere, cannot really occupy this or that place: everyone knows that only things occupy places – there is stuff everywhere. But if things, surrounded by their borders, occupy all the places, how then is change ever possible? How can one ever shift from one series to another? In the world, which is so packed, how can a pack change its nature?

The paradox is that, in the last instance, everything consists of that which does not consist of anything. As Žižek puts it, "For a true dialectician, the ultimate mystery is not 'Why is there something rather than nothing?', but 'Why is there nothing rather than something?': how is it that the more we analyse reality, the more we find a void?"[4] Is it not that each elementary particle itself, having neither internal structure nor autonomous existence, but oscillating between various combinations, is a kind of bordering anomalous, which faces nothing and makes an alliance, if not a secret pact, with it? As captain Ahab says about Moby-Dick (quoted by Deleuze): "'To me, the white whale is that wall, shoved near to me'. The white wall. 'Sometimes I think there is naught beyond.'"[5]

But if this is the structure of the world, then what about the structure of the void we border? The void is the void because it does not consist of anything. To be more precise, such an exemplary piece of void as an elementary particle does not have an internal structure. However, one could say it has an *external* one. What would this structure look like? Matjaž Ličer comments:

> The external structure of an elementary particle is a multiplicity of multiplicities of other particles born from the energy of its field. This external multitude is the particle itself. The particle can only be itself via the detour of its own externality, which constitutes, once more, the particle itself. There is nothing on the particle that makes it what it is. Everything that it is, it is through its surroundings. The corpuscular punctuality, the singularity, the condensation that is the particle, has been transformed by quantum field theories to a pure relation. Nothing that was postulated as an intrinsic quality of the particle is self-subsisting.

4 Slavoj Žižek, *Less than Nothing: Hegel and the Shadow of Dialectical Materialism*. London; New York: Verso, 2012, p. 925.

5 Gilles Deleuze and Félix Guattari, *A Thousand Plateaus*, p. 245.

> The particle mass, the most substantial property of physical substance, has been transformed by the Higgs mechanism to a pure relation. The singularity of matter, a particle, had been nothing but the way it couples to its surroundings, which it structures. Particle mass, treated as a substance, used to be conceptualized as a product of two infinities, infinitely large (its density) and infinitely small (its volume), which results in a well defined finite value. Quantum field theories have set strict constraints on such claims, but not by affirming the true radical singularity of the old days, but by taming it, renormalizing it, regularizing it. Substance is no longer subsisting, it has been transformed into its own externality, to a relation.
> But a relation between what? What are the terms of this relation? The particle is a relation between something and nothing, between a finitude, a tamed singularity, and an infinity of infinities of virtual particles, emerging from the field of the central particle. A particle is nothing BUT this relation. It is a singularity bordering on multiplicity, which is, again, the singularity. The multiplicity of multiplicities of virtual particles is what screens the central singularity and normalizes it back to finitude. Without this multiplicity the singularity would remain divergent, unthinkable in the scope of physics. All the structure that the particle has, it owes to its surrounding cloud of virtual particles. All its properties are set and emerge through interaction with the cloud that the particle itself generates.[6]

While an external structure of an elementary particle looks rather *soft*, like a cloud of virtual multiplicities, that of some living organisms, namely, some invertebrates, is *a hard one*. This completely different kind of external structure is called an *exoskeleton*[7]. It supports and protects an animal's body, in contrast to the internal skeleton (endoskeleton) of, for example, a human or other mammal. In popular usage, some of the larger kinds of exoskeletons are known as "shells". Examples of exoskeleton animals include insects such as grasshoppers and cockroaches, and crustaceans such as crabs and lobsters. The shells of the various groups of shelled molluscs, including those of snails, clams, tusk shells, chitons, and the nautilus, are also exoskeletons. Mineralised exoskeletons first appeared in the fossil record about 550 million years ago, and their evolution is considered by some to have played a role in the subsequent Cambrian explosion

6 These three paragraphs are written by Matjaž Ličer as a commentary on my paper, resulting from our productive dialogue around the void.

7 The metaphor of exoskeleton was suggested by Rasmus Ugilt, who was commenting on the first draft of this paper.

of animals, or, as it is also called, *a skeleton revolution* (the relatively rapid appearance of most major forms of animal life as we know it[8]).

Indeed, as applied to the void, this metaphor may seem very rough, since here the shell is the shell of something, and a lobster is definitely not nothing; however, it gives us a certain idea of an external structure – the shell constitutes the border of a lobster. It is living there, within its own borders; it *inhabits itself* as the sole citizen of its lobster-land, and at the same time through its border it comes into relation to the other-than-itself – to the other lobster, to the other-than-a-lobster, but also to the nothing. After all, we remove the shell and devour the lobster, similarly as those beasts from Hegel's "Phenomenology of Spirit", which, just like initiates of the Eleusinian mysteries, desperately negate things by devouring them[9].

But imagine there is no lobster. Is it not that, in a way, a void can hide itself in a shell, too? Furthermore, what if everything that *is* is either a virtual cloud, or a shell of the nothing: the multiplicity of being as an external structure of the void? And, finally, can we remove the shell and devour the void, as we devour the lobster? This last question would bring us to the notorious logic of the commodity, the logic of the little nothing as a surplus on top of the use-value of what we consume. However, the void cannot be reduced to a commodity. Commodity-void is just a small part of an entire void-complex. In the large, I propose to consider at least three essential kinds of void:

1. The void as *substance*;
2. The void as *subject*;
3. The void as *universal*, or *real*.

In order to approach the first kind of void – the void as substance – I will refer to one example from recent Russian literature, namely a book by Victor Pelevin entitled *Chapaev and Pustota*[10] (which was translated into English as *Buddha's Little Finger*). This book was written in the 1990s, the time of the onset of gallop-

8 See: http://en.wikipedia.org/wiki/Cambrian_explosion.

9 G.W.F. Hegel, *Phenomenology of Spirit*, trans. by A.V. Miller. Oxford University Press, 1979, p. 65.

10 In Russian, "pustota" means "void".

ing capitalist development in Russia. The protagonist of this novel, whose name is Pyotr Void (Pustota), is a patient at a psychiatry clinic. He identifies himself with Petka, an assistant of Chapaev.

Vasily Ivanovich Chapaev was a celebrated Russian soldier and Red Army commander during the Russian Civil War. After the Soviet Union had been established, Chapayev was immortalised by Soviet propaganda as a hero of the Russian Civil War in a popular book by Dmitry Furmanov and in a 1934 movie by the Vasilyev brothers. In later years, Chapayev became a recurring character in numerous Russian anecdotes. Pelevin's book is set in two different times – right after the October revolution and in modern post-socialist Russia. In the post-revolutionary period Pyotr Pustota is a poet. He meets a strange man named Vasily Chapaev, who is some sort of an army commander, but also a kind of a Buddhist guru. Pustota spends his days drinking home-distilled vodka, sniffing cocaine, and discussing metaphysical questions with Chapayev. Here is one of their dialogs, in which Chapaev persistently interrogates Pustota about what he thinks he is:

> What do you call "I"? – Clearly, myself. – Can you tell me who you are? – Pyotr Voyd. – That's your name. But who is it bears that name? – ...If you have no objection, then I regard myself as ... Well, let us say, a monad. In Leibniz's sense of the word. – Then just who is it who goes around regarding himself as this gonad? – The monad itself... – ...Tell me, where's it live, this gonad of yours? – In my consciousness. – And where is your consciousness? – Right here," I said, tapping myself on the head. – And where is your head? – On my shoulders. – And where are your shoulders? – In a room. – And where is the room? – In a building. – And where is the building? – In Russia. – And where is Russia? – In the deepest trouble, Vasily Ivanovich.[11]

A little later in the same episode Pyotr manages to give a properly correct answer to Chapaev's question "Where are you?" – "Nowhere".[12] The void is not only the name of a protagonist, but also a central category of this novel, whose main characters are in search of a kind of inner void within the shell of a deeply pathological, disturbing, and annoying post-Soviet reality. This book by Pelevin

[11] Viktor Pelevin, *Bhudda's Little Finger*, trans. by Andrew Bromfield. Penguin Books, 2001, pp. 139-140.

[12] Ibid., p. 144.

is one of the major examples of Russian postmodern prose of the 1990s, the background and entire paradigm of which is quite clear: after the collapse of the Soviet Union the ideological structure of society is changing so fast that the subject cannot grasp even the shadow of the core of some consistent external reality. The idea that it hardly exists at all actively penetrates consciousness together with different new-age ideas, Buddhism, and other, say, oriental wisdom with its essential search for a void.

At the same time, the previously forbidden French philosophy of the twentieth century finally enters Russian culture and takes there a paradoxical twist. Phenomenology, post-structuralism, deconstruction, the entire combination of anti-totalitarian struggles, resistances, and reflections labelled as the thought of May '68, and what Benjamin Noys now characterises as the affirmationist consensus or even as the affirmationist doxa (with its hostility, first of all, to negativity, dialectics, subject, truth, etc.)[13], together with the aforementioned oriental wisdom, are investing in the widespread nihilism of a nascent Russian capitalist society.

In this context, the void is represented as a kind of positive *substance* – albeit the inner self as an empty place, deprived of any content, or an external reality that does not deserve to be believed in (like Russia in trouble), or an ideal utopian place, where there is only a void as a permanent condition of happiness, satisfaction, or nirvana. It is a reversed dialectics of the *subject becoming substance*. The subject seeks for the void of his inner self, which will finally allow it to be absorbed by the outer emptiness of the Universe.

Of course, Russia is not the only place where one can find numerous examples of such voids as the ultimate capitalist wisdom. They can be found everywhere. What capitalism attacks, what it cannot tolerate, is the other kind of void. This, I would say, negatively active void appears only in retrospect. This other void is perfectly resumed in a formula from The International: "We have been naught, we shall be all." Capitalism replaces this void to fulfil it with the abundance of commodity behind which the subject is seeking the thing and enjoyment: in the shell of commodity, capitalism sells us an *unlobster* to devour. We devour

13 See: Benjamin Noys, *The Persistence of the Negative: A Critique of Contemporary Continental Theory*. Edinburgh University Press, 2010.

the void, but are never satisfied, never become full – and the void devours us. The emptiness of the new-age utopia is one of those commodified objects that pretend to be the substantial *all* of the world. Thus the ideological emptiness clothes itself in the mantle of an ontological completeness.

Let me now continue with the second kind of void – the void as *subject*. This kind of void can be described not as emptiness, but rather as *loss*. One can easily recognise here the language of contemporary psychoanalysis, which still provides us with one of the most convincing and advanced theories on the subject. Thus, one of the principal stakes of *Less than Nothing*, as well as of the rest of Žižek's recent work, is its proclaimed materialist account of subjectivity, which emerges from the encounter of Hegelian and Lacanian subjects to find its determination in a profound indeterminateness – as a constitutive rupture, a cut, a split, or a void in the chain of a certain determinate reality or certain processes. The Žižekian subject is a monstrous creature of both Hegelian negativity and the Freudian death drive.

In Žižek's broader ontology and philosophy of nature, all material reality the subject deals with seems to constitute itself through the void. The more material and bodily is the Žižekian subject, the more it faces and borders nothing. Now, through the mediation of the void, the substance becomes subject. It is not that thought just intervenes into being with the mediation of nothing, but it is the void of being itself that is opened up by the gap of the subject. As Žižek specifies, "This nothing is not the Oriental or mystical Void of eternal peace, but the nothingness of a pure gap (antagonism, tension, "contradiction"), the pure form of dislocation ontologically preceding any dislocated content."[14]

To return to the aforementioned capitalist commodity, what it proposes to us is a fetish that promises in vain to fulfil the void opened up by this gap, the void that the subject experiences as the loss of the thing itself, and which capitalism sells her in the shell of the thing. It attempts to close the negative void as subject with a void as a positive substance. The void as subject depends on this idea of the lost and forgotten, and at the same time unforgettable, since an experience of this loss constitutes the subject's very being, and the very being thus shows up as the void.

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14 Slavoj Žižek, *Less than Nothing*, p. 35.

Joan Copjec, in her great feminist account of Lacan's ethics of psychoanalysis, in the book called *Imagine There's No Woman*, emphasises the affinity of this experience to the loss of a primordial mother and the primordial enjoyment attached to her.[15] But, of course, it can also be the loss of a primordial father, which makes the absent law absolutely repressive and opens up a kind of ultimate injustice and the arbitrariness of it, etc. In brief, the subject of psychoanalysis is an orphan child. A Lacanian subject is always in a lack, missing something essential, the thing itself, the enjoyment itself, and even if we hand him the entire world on a silver platter, he will never get any happier, because he knows that the world is *not all*. On the other hand, one can say that he is overwhelmed with the too-much-ness of the not-all of the world: it is always too much, but it is never all.

But what about the void of being itself, introduced by the orphan subject? I can only schematically approach this third kind of void, the void as *universal*. Think about Joan Copjec's title. In the introduction to her book she explains why she chose it by referencing Lacan's quotation from Alfred Jarry's *Ubu Roi*: "Long live Poland, for without Poland there would be no Poles!"[16] According to Copjec, "Lacan is recommending a new ethical imperative: 'Imagine there's no Poland!'."[17] This formulation runs across his essay "Kant with Sade", where the Père Ubu quotation plays a decisive role. In his *Encore*, Lacan, as Copjec emphasises, rephrases the imperative to counter Ubu's as "Imagine there's no woman!" Here no less than universals are at stake. Of course, there is no woman as such, but only particular women, but how is the existence of these particular women ever possible without *the* woman herself? Copjec explains:

> Lacan does not argue that there are no universals, only particular things; rather, he maintains that *universals are real*. To limit one's observation only to appearances, to particular things, is to overlook the existence of the real, which is precisely what makes an all of being impossible. In other words, if there are only appearances in their particularity, this is due to the fact that the real, a by-product or residue of thought, detaches itself from thought to form its internal limit. This limit has both a synthesizing function that universalizes by causing thought to revolve around it and a detotalizing function, since it subtracts itself from thought.

[15] See: Joan Copjec, *Imagine There's No Woman: Ethics and Sublimation*. Cambridge, Massachusetts, London, 2002, p. 32 and elsewhere in the work.

[16] *Ibid*., p. 1.

[17] *Ibid*., p. 4.

> This subtraction, in turn, "establishes a fracture, a bi-partition, a splitting" in the order of being as appearance.[18]

Let us borrow from Žižek another example of a universal as real. In the chapter of his *Less than Nothing* "The Animal that I Am" he develops his critique of Derrida's deconstruction of the distinction between human and animal. I must point out that his paper on the same topic, which has been presented elsewhere,[19] was entitled "The Animal Does Not Exist". This title shifts from Derridean to Lacanian mode and actually brings the same formula: "Imagine there's no animal!". On Derrida's general dismissal of a binary logic presupposed by this distinction, Žižek replies in Hegelese:

> It is not only that, say, the totalization effected under the heading "the animal" involves the violent obliteration of a complex multiplicity; it is also that the violent reduction of such a multiplicity to a minimal difference is the moment of truth. That is to say, the multiplicity of animal forms is to be conceived as a series of attempts to resolve some basic antagonism or tension which defines animality as such, a tension which can only be formulated from a minimal distance, once humans are involved.[20]

Going back to the idea of commodity, at this point Žižek recalls the Marxian elaboration of the general equivalent from the first edition of the first Volume of *Capital*:

> It is as if, alongside and external to lions, tigers, rabbits, and all other actual animals, which form when grouped together the various kinds, species, subspecies, families, etc., of the animal kingdom, there existed in addition the animal, the individual incarnation of the entire animal kingdom.[21]

Žižek asks: "Does not this image of money as 'the animal' romping alongside all the heterogeneous instances of particular sorts of animality that exist around it capture what Derrida describes as the gap that separates the Animal from the

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18 *Ibid*., p. 3.

19 It was presented at the conference *Human Animal* in Berlin in December 2011.

20 Slavoj Žižek, *Less than Nothing*, p. 408.

21 Karl Marx, *Value: Studies*, trans. Albert Dragstedt, London: New Park, 1976. Quoted from: http://www.marxists.org/archive/marx/works/1867-c1/commodity.htm.

multiplicity of actual animal life?"[22] What he is interested in is precisely this gap, since "what man encounters in the Animal is itself in the oppositional determination: viewed as an animal, man is the spectral animal existing alongside really existing animal kinds."[23] In its alongsideness, *the* animal borders the nothing. It hardly exists, but it embodies the border between the void and the multiplicity of existing animals, being at the same time a kind of inexistent element of this very multiplicity.

Let us now take a turn from this inexistent element of a multiplicity to an anomalous, which runs alongside each pack and, being not at all representative of this multiplicity or pack, nevertheless forms its border. This brings me back to one of my initial points: *prima materia* consists of elements which do not have autonomous existence, the elements which are themselves the borders of the void and which constitute its external structure. The *prima materia* is like a sorcerer, who, as they say, does not have a backside, because it literally sits upon the void of nothing.

Is it not that this totally imperceptible one-sided borderline is a grain of freedom, which withdraws every piece of matter from the void? If so, then the edge of the world is everywhere. Insofar as we border not only something, albeit something similar or different from us, but also nothing, which opens up our horizon of similarities and differences, we are the edge of the world. All of us – particles and antiparticles, men, cells, cats, windows, Poles, women, subjects, bodies, lobsters, sorcerers, triangles, and others – are involved in this risky bordering, where actual movements and potential changes are at stake. Of course, the anomalous animal of the universal void appears only in retrospect, when we are supposed to withdraw it from the shell of things which are. But imagine there's no nothing! A world with no nothing would be nothing but a world with no borders and no difference, ruled by an ideology of the false emptiness to devour, where any motion brings the same back to the same, and where Russia will remain forever in its deepest trouble.

[22] Slavoj Žižek, *Less than Nothing*, p. 408.

[23] *Ibid*.

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Pietro Bianchi*

The Lack(anians)

Use and misuse of a concept between psychoanalysis and science

The Lacanians vs. Science

A spectre is haunting the current theoretical debate in psychoanalysis – the spectre of techno-science. It has become almost a cliché in Lacanian circles to portray the contemporary domain of science as a "foreclosure of the subject of desire."[1] What does it mean? Science, or better its contemporary neoliberal offspring, techno-science – as they like to say – at the peak of its social power and recognition, would be responsible for reducing human experience to a transparent and calculable object.

The Lacanian psychoanalytic *doxa* seems to be concerned with the pretension of contemporary cognitivist-influenced psychology to posses the "objective data." The latter's "compulsive drive toward measurement" and its overuse of quantitative statistical models in order to "control," "categorize," and "channel" the patient would represent a model of cure where the psychic sufferance is reduced to "a void of knowledge that has to be filled with information from the therapeutic Other."[2] It is nevertheless surprising how in the majority of cases from a comprehensible ideological critique of the contemporary dominant medical apparatuses we are suddenly thrown into an utter rejection of scientific rationality. As stated by a prominent Italian psychoanalyst, Fabio Tognassi (sadly exemplary of a common conviction in the Lacanian community):

> The discourse of science – the discourse oriented toward absolute knowledge – aims at revealing the quote of rationality embedded in the Real; it aims at covering with the veil of the signifier – the veil of causality (*causalità*) – the realm of the unexpected (*casualità*). And in doing so it gets rid of what by definition is

[1] Massimo Recalcati. *L'uomo senza inconscio. Figure della nuova clinica piscoanalitica*. Raffaello Cortina Editore, Milan 2010.

[2] Fabio Tognassi, "Soggetto e sapere: la misura dell'Altro," in *Psico-Pratika*, no. 26, 2006.

* Scuola of the Lacanian School of Psychoanalysis, Milan, Italy

> destined to remain outside of the domain of the Other: *Das Ding*, i.e. what is impossible to be assimilated to knowledge.[3]

The discourse of science would be responsible for a complete reduction of the Real to the domain of the signifier. Its normativity would constitute a typical example of human ὕβρις: the rejection of the limits imposed by the Real on human experience. Moreover, science would erase the ethical status of the unconscious trying to reduce it to a fully constituted ontological (and because of that, symbolically intelligible) object.

> Experience demonstrates this: a form of analysis that boasts of its highly scientific distinctiveness gives rise to normative notions that I characterize by evoking the curse Saint Matthew utters on those who make the bundles heavier when they are to be carried by others. Strengthening the categories of affective normativity produces disturbing results.[4]

In more appropriate Lacanian terms, the fundamental accusation can be summarized as follows: the image of nature addressed by the discourse of science is characterized by the rejection of sexuated subjects. The Lacanians accused scientific formalization of reducing the sexuated dimension of *parlêtre* to silence. According to this view, the *parlêtre* would expose the impossibility of the realm of the signifier (the Other of scientific discourse) being able to write a formula of *jouissance*. In other words, there is a *singular* relationship to *jouissance* rejecting any pretension of universalization and structurally excluded from the realm of the Symbolic.

Thus far we have been addressing the Lacanian *doxa*. But how incorrect is it to accuse the Lacanian *field* as a whole (that is, the field opened up by the teachings of Jacques Lacan and not necessarily inherited by his offspring nor directly imputable to Lacan's seminars) of subscribing to this naïve and unacceptable representation of scientific endeavour? If we say that scientific rationality operates a systematic erasure, or foreclosure, of the subject of desire, are we subscribing to a fundamental Lacanian proposition or are we rather incorporating (*perniciously* incorporating, we are tempted to claim) an ideological rejection of

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3 *Ibidem*.

4 Jacques Lacan, *The Seminar of Jacques Lacan, Book VII. The Ethics of Psychoanalysis 1959–1960*, W.W. Norton & Co., New York, 1992, pp. 133-134.

science that has nothing to do with the psychoanalytic field itself? Is it correct to say, as Miller seems to believe in *Clarification*, that the task of psychoanalysis is to bring back to the surface what science forecloses from its discourse? That psychoanalysis is, in a sense, the reversed side of science? Is psychoanalysis destined to play the part of the analysis of the formations of the unconscious of scientific discourse? Is not science – the ideological Lacanian would claim – perhaps full of slips of the tongue, symptoms, unsuccessful concealments of the singularity of the scientist? Is not its presumed imaginary universality full of traces of the subject of the unconscious who makes it possible while at the same time being rejected from its field (*suture*)?

Our thesis will rather go in the opposite direction: science does not represent the successful concealment of the subject of the unconscious, but rather the most blatant proof of its existence and productivity. If we define the expression "subject of the unconscious" deprived of all the inevitable (and hard to die) imaginary and ideological representations and we reduce it to the core of its objectivity, we will have nothing but a practice of de-imaginarization. We used the term "practice" because the subject of the unconscious is not a substantialized entity that we need to approximately approach with increasingly accurate clinical knowledge, but rather a hypothesis that orientates a never-ending process of de-imaginarization and creation of non-imaginary thought. The term "objectivity" (rather than "productive illusion," for example) should be understood in all its anti-empirical stance: it is "a conquest and a task, which means that its progress recalls a common root between the theoretical and the ethical."[5] If psychoanalysis and science has such a common root, it relies on a counter-intuitive and anti-imaginary form of thought that equals the subtractive action of separation from the imaginary with the creation of the New.

The crude simplifications that characterize the contemporary Lacanian *doxa* are not simply a sign of misunderstanding or inaccuracy in the reception of the Lacanian text. They rather indicate, sometimes even in a symptomatic (that is, contradictory) form, a hesitation that characterized Lacan's teaching from the very beginning until the end. As if the relationship between psychoanalysis and science had followed different paths that never reached a satisfactory synthesis.

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5 Jean Petitot, *La filosofia matematica di Albert Lautman*, in AA.VV. *Enciclopedia Einaudi*, vol. 15, pp. 1034-1041.

When faced with such a crucial epistemological problem, we are left with attempted yet unresolved paths which allow for many different Lacanian projects (both clinically and theoretically) that sometimes feature very few elements in common until they barely resemble each other. The unacceptable equation of science with the foreclosure of the subject of the unconscious coexists with the Cartesian subtractive definition of the subject itself; the statements about science as a paranoiac pretension of reducing the Real to the signifier are followed by an endless endeavour in order to never separate psychoanalysis from the project of formalization; the accusation addressed to science of it being ideological is accompanied by a procedure of transmission of psychoanalysis which is very reminiscent of the process of the axiomatization of formal knowledge. In the following paragraphs we will try to delineate some of these paths in order, primarily, to elucidate how the missed encounter between science and psychoanalysis might have ever occurred. It is our conviction that a critique of the misappropriations and simplifications of scientific rationality by the Lacanian community can be addressed and partially resolved via the internal conceptual resources of the Lacanian field itself. It is an indication – we hope – of another possible alliance of Lacanian psychoanalysis and science which is as necessary today as it was almost fifty years ago when the attempt of the *Cahiers pour l'analyse* group went largely ignored by the followers of Jacques Lacan, remaining so through the following years and up until today.

The Cartesian subject of the unconscious

If we consider only the interventions directly made by Lacan himself and not the contributions of many of his pupils, colleagues, and collaborators, the epistemological question in psychoanalysis has been addressed primarily (and almost exclusively) in the last text included in the *Écrits*, arguably one of the most important of the entire collection: *Science and Truth*. The article was specifically written as an *overture* for the first issue of the *Cahiers pour l'analyse* and was meant to give a significant orientation for the development of the journal. Lacan nevertheless decided to read the article at the first session of Seminar XIII, *The Object of Psychoanalysis*, on 1 December 1965, in what was to become probably *the* year when he dealt most profoundly with the relationship between psychoanalysis and science.

In this crucially important article Lacan does not make a direct pronouncement concerning psychoanalysis's vocation as a science. Contrary to what Freud struggled for during his whole life, at this point of his teaching Lacan does not put much faith in the possibility of formalizing psychoanalysis according to a scientific protocol. He rather underlines that "the subject upon which we operate in psychoanalysis can only be the subject of science."[6] It is important to stress such a preliminary remark, without which there is only confusion in the relationship between science and psychoanalysis. Even though the debate regarding the Freudian project of a scientific expression of psychoanalysis does not seem to have ceased even nowadays – many psychoanalysts underline the necessity of psychoanalysis being formalized in a scientific manner – Lacan takes a different path. He rather states the crucial importance of the relation of psychoanalysis to the *field* constituted by modern science – not to science itself – and he claims that without that field any form of psychoanalysis would not be possible. It would be meaningless to ask under which conditions psychoanalysis can be considered a science; what does matter for Lacan is how the *field* constituted autonomously by science creates the conditions of possibility for psychoanalysis.

> This is why it was important to promote firstly, and as a fact to be distinguished from the question of knowing whether psychoanalysis is a science (that is, whether its field is scientific), the fact that its praxis implies no other subject than that of science.[7]

As claimed by Jean-Claude Milner:

> With regard to the analytic operation, science does not play the role of an ideal – possibly infinitely distant – point; strictly speaking, science is not exterior to psychoanalysis, it structures in an internal manner the very matter of the object of psychoanalysis.[8]

6 Jacques Lacan, *Science and Truth*, in Id., *Écrits*, W. W. Norton & Co., New York – London 2006, p. 729.

7 *Idem*, p. 733.

8 Jean-Claude Milner, *L'Œuvre claire: Lacan, la science, la philosophie*, Seuil, Paris 1995, translation in English (by Oliver Feltham) of Chapter 2 in Jean-Claude Milner, "The Doctrine of Science," in *Umbr(a): Science and Truth*, no. 1, 2000, p. 35.

Instead of dealing directly with an epistemological question regarding psychoanalysis itself, Lacan here establishes the common ground that coordinates what is nevertheless a separation between science and psychoanalysis. Lacan rather underlines that in the field inaugurated by modern science, identified here with the figures of Galileo and Descartes, it is possible to deduce a particular figure of the subject, which is the same subject upon which psychoanalysis as a practice operates. What is it?

Lacan identifies modern physics with a specific operation: the elimination of every contingent quality of existents in the description of the world. Therefore, a theory of the subject of science repeats the same gesture. The characters of the particular individual, be they psychic, somatic or intellectual, are stripped down. As Milner puts it, the subject of science "is neither mortal nor immortal, neither pure nor impure, neither just nor unjust, neither sinner nor saint, neither damned nor saved"[9]: it does not have consciousness, interiority, or reflexivity. Science carries out a cut in order to *separate* the subject from the individual. All the qualitative contingent determinations are erased in order to isolate a pure *non-specific* core. This is what the *cogito* makes possible: it is an operation of minimal subtraction from every positive attribute. Lacan, following Koyré, designates the historical moment when this act of *coupure* emerged for the first time in Descartes. Such is the scope of the Cartesian doubt: the suspension of the certainty of every identifiable particular in order to make the void place of enunciation emerge in all its clarity.

But the eliminativist gesture is only the first movement of the *cogito*, the other – which is specifically Lacanian – is the identification of this subtracted void with thought. Lacan's postulate claims that there is an unbridgeable distance between thought and knowledge. They belong to two completely different fields. Thought appears only when all the positive qualities of knowledge are stripped down. While the *cogito* is "the defile of a rejection of all knowledge."[10] Lacan's original re-interpretation relies on its equation with a thought without qualities: a pure void act of subtraction. The gesture of thought is not the positive correlate of an imaginary consciousness, but the erasure of any positive determination until what remains is only the subtractive clarity of a generic *place*. It is in this

9 Jean-Claude Milner, "The Doctrine of Science," op. cit., p. 38.

10 Jacques Lacan, *Science and Truth*, op. cit., p. 727.

precise point that Lacan traces the continuity between the gesture inaugurated by modern science and the birth of psychoanalysis with Sigmund Freud. If the subtractive subject of science appears at the moment when the positivity of knowledge is cast into doubt, psychoanalysis represents the path *par excellence* in order to be faithful to this groundbreaking discovery. What do we have in the symptoms if not an act of castration of the positive certitude of consciousness's knowledge? If there is a thought in the dream, in the *wiz*, in the slip of the tongue, is it not it at the expense of every positivity of imaginary knowledge?

In order to develop the conviction of the subtractive dimension of the unconscious, it is mandatory to accept a preliminary remark: as we assumed the separation between knowledge and thought, we also have to accept *the complete separation between knowledge and the unconscious*. The unconscious does not have anything to do with positive knowledge. To put it in simple terms, the unconscious does not know anything.[11] Against a widely diffused opinion, for example very popular in Jungian-influenced circles, the unconscious is not an archive of past experiences, nor an archaeological storage of traumas, nor an accumulation of hidden and repressed images and tropes (which when brought to the collective level necessarily become archetypes). This is the reason why Lacanian-oriented clinical psychoanalysis is never based on the *interpretation* of the unconscious. Lacan was utterly clear in claiming that psychoanalysis does not have anything to do with hermeneutic interpretation, i.e. the practice of bringing the surface of a symptomatic formation to the deep causes of its emergence. If this were possible, it would be necessary to postulate a positive substantialized stratum of intelligible causes that could be reconstructed through the analytic process. Unconscious would in this case be a hidden positive articulation of causes, images, repressed elements, etc. It would be *something*, and not a pure void, as the Cartesian/Freudian subtractive gesture suggests. Psychoanalysis would be the clinical act of unveiling this hidden secret core and the end of analytic therapy would be the successful appropriation of *something* deposited in the profound of one's own personality.

[11] "Witness [Freud's] break with the most prestigious of his followers, Jung, as soon as the latter slipped into something whose function can only be defined as an attempt to reinstate a subject endowed with depths (with an "s"), that is, a subject constituted by a relationship—said to be archetypal—to knowledge." (Jacques Lacan, *Science and Truth*, op. cit., p. 728.)

We will see on the contrary that Lacan will develop a very different theory of the end of analysis far from any "correspondence" with an already existing hidden stratum of causes (knowledge) and consequential to the definition of the unconscious as a subtractive void. Psychoanalysis is not about "knowing the secret of oneself." But if the unconscious is void and deprived of any positive determination, what would be the Lacanian understanding of the clinical "experience of the unconscious"? How would it be possible to have the experience of the "rejection of all positive knowledge"? Lacan's answer is that if psychoanalysis is not an experience of knowledge, nor a reconstruction of a hidden past, it cannot but be an experience of *truth*. In which sense?

We will address this point in the following paragraphs. For now let us recapitulate once again the Cartesian-Lacanian definition of the subject as derivable from *Science and Truth*: if the hypothesis that there is a subject of science and that it emerged with modern science and that it is identified with a subtraction from every positive determination of knowledge is correct, then this subject is the unconscious. And conversely, *in the unconscious there is thought*. Psychoanalysis is an experience of thought as truth, separated from the acquisition of positive knowledge.

As rightfully synthesized by Alain Badiou:

> What *still* attaches Lacan [...] to the Cartesian epoch of science is the thought that the subject must be maintained in the pure void of its subtraction if one wishes to save truth. Only such a subject allows itself to be sutured within the logical, wholly transmissible, form of science.[12]

Jean-Claude Milner – letter and contingency

In order to unpack the rather elusive remarks on the ensemble of these concepts (subject, science, truth, thought, and the unconscious) we will now refer to two historically important Lacanian contributions not directly made by Lacan on this topic. Both of them were highly influential in the way the relation between psychoanalysis and science has been thought and developed over the last thirty years within the Lacanian community. They are: Jean-Claude Miller's

[12] Alain Badiou, *Being and Event*, Continuum, London – New York 2005, p. 432.

work *L'Œuvre Claire*, published in 1995, wherein the Lacanian legacy of Koyré is analysed in all its consequences regarding the relationship between mathematics, the letter, and contingency; and Jacques-Alain Miller's early piece *La Suture: Éléments de la logique du signifiant*, published in 1966 in the first issue of the *Cahiers pour l'analyse,* wherein the question of the relation between subject and science is analysed.

Jean-Claude Milner, in a commentary on *Science and Truth* in chapter 2 of *L'Œuvre Claire*, derives some more consequences from the preliminary identification of the subject of science with the subject of the unconscious. According to Milner, in the famous Galilean aphorism – "The great book of the universe is written in mathematical language and its characters are triangles, circles, and other geometric figures."[13] – the accent should be put on the written dimension of language. The discipline that constitutes a point of reference for modern science is philology, not mathematics:

> In Galileo's eyes, mathematics and measure were the means [...] that would allow humble physics to one day equal what the prestigious philology, through the science of language (via grammar), and through the science of written documents, had, long ago, accomplished.[14]

The ideal precision of modern science, for Milner, was therefore linked to the idea of translating the empirical object with its equivocal confusion into a *literal* and precise entity. The Cartesian subtraction is equated with a reduction to a pure literal expression. What is interesting here is not so much the reductive reading of Galilean science operated by Milner, who reduces the object of science to the "set of what exists empirically,"[15] but the way through which the *letter* is surreptitiously put at the ideal centre of a scientific endeavour. Galilean science becomes, for Milner, an indefatigable search for precision in order to elevate the empirical object to the level of the letter. Only a literal science can be a precise one. The technical instrumentation is aimed at extracting from the empirical equivocity of reality the clear precision of the letter. They are the instruments for reducing science to the model of philology.

[13] *Il Saggiotore* §6 cited in the edition of C. Chauvire, *L'Essayeur de Galiée*, Annales Litter. Franche-Comte, Paris 1980, p. 141.

[14] Jean-Claude Milner, "The Doctrine of Science," op. cit., p. 42.

[15] *Idem*, p. 41.

But according to Milner, the discontinuity created by modern science in reducing the world to the letter requires some further clarifications. Psychoanalysis cannot limit itself to being dependent on the established common ground between its clinical practice and the field opened up by scientific modernity. Is psychoanalysis, after all, only a secondary-degree discipline, subject to the domain of modern science? And even more, is it possible to link psychoanalysis to a historical event such as the contingent emergence of modern science?

According to Alexander Koyré, Galilean science can be understood only historically, that is, negatively when put in a relation of opposition to and difference with the ancient episteme of the Greeks. The latter, modelled on an understanding of mathematics as a necessitated series of demonstrations, was devoted to isolating from the empirical world that object which, in all necessity and for all eternity, cannot be other than what it is. It was an epistemology according to which a complete science would thus be the science of the most eternal and necessary object, i.e. the celestial bodies. This necessitates a conflicting and unresolved dialectic between a mathematical demonstrative practice entirely devoted to logical necessity, and the realm of the empirical, which in all its diversity and equivocity is intrinsically rebellious to mathematics. The realm of Being, in the Milnerian/Koyrean understanding of the ancient Greek episteme, would be divided, ontologically not less than axiologically, in different degrees of perfection: from the contingency of bodily existents, to the Supreme incorporeal Being of God (necessary, perfect, eternal).

Galilean modernity is defined by an epistemological break from such an epistemology. Modern science can spell out all the empirical without concerning itself with any hierarchy of being, and it can do so with the *letter*, i.e. via a calculation practice. While for the Greeks mathematics guaranteed direct access to the eternal, modern science makes use of a completely different mathematics which – as *letter*, insists Milner – it is able to grasp the diverse in its quality of being incessantly other. The empirical is not degraded as a lower form of being, but rather literalizable *as* empirical. The defining feature of Galilean science is thus not the fact of it being mathematical, or at least not more that it already was with the ancient episteme ("in certain regards, modern science is even less so"[16]). The discontinuity is represented by the emergence of a *particular* dimension of

[16] *Idem*, p. 47.

mathematics: its being a *letter*. From a mathematics based on demonstration, modern science is defined by calculation. But what is even more important is that while the Greek episteme was aimed at elevating the equivocity of contingent beings to the heights of celestial bodies, modern science is completely lacking any axiological preoccupation ("one thing [...] is sure: if ethics exists, science has nothing to do with it"[17]). The letter is able to grasp the empirical as empirical; it looks at the contingent as contingent.

Milner's problem is the nature of the difference between mathematics as necessitated demonstrative practice and mathematics as a literalization of contingency. As a strenuous structuralist thinker, he cannot accept that the break of modernity is merely a historical event. And it is at this precise point that his path distances itself from Koyré. According to him, Lacan in *Science and Truth* is still too indebted to a Koyrean historical concept of discontinuity, a mistake that will be corrected only a few years later with the theory of discourses. In order to purify his reflection on science and psychoanalysis, Lacan needs to develop a non-chronological articulation of the concept of the break.

> Undoubtedly, the emergence of a new discourse, the passage from one discourse to another (what Lacan terms the "quarter turn"), in a word, the change, can be an event; these events are an object that historians attempt to grasp in the form of chronology. But they are not what historians say they are. [...] In itself, the quarter turn has no need to inscribe itself in a historical series.[18]

Once Lacan has been able to develop a non-chronological theory of the break, it is possible for Milner to derive a non-chronological theory of the epistemological break of modernity without relying on any specific historical event. The science of the letter is just a figure of the possibility to grasp contingency as such. The problem is not the passage from the Ancient episteme to modern science, but how science, far from being an instrument for reducing the empirical to the same, is in fact an instrument for grasping what can be infinitely other than what it is.

But what then, according to Milner, is the specific relation of the letter with contingency? And why would the letter be able to grasp the infinite mutability

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17 *Idem*, p. 49.
18 *Idem*, p. 51.

of contingency? In its invariability, the letter, in fact, may look similar to the eternal idea of the ancient episteme. But the opposition should be searched for somewhere else. Milner claims that the immutability of what, like the letter, *has no reason* to be other than it is, is different from the immutability of what, like the celestial bodies, *cannot*, without violating reason, be other than it is. There would thus be a substantial nonconformity between the necessity of the laws of science and the necessity of the Supreme Being, even though at the imaginary level it is nowhere to be found. Is it not in fact true that the laws of nature as described by the empirical sciences may look like necessitated and eternal laws, as if they were expression of a Supreme and Eternal Being?

Science operates on an equivocity of the empirical that at any time and at any point can be infinitely other than it is. Nevertheless, when the letter intervenes, it fixes it as it is,[19] and it may give the impression that the empirical cannot be other than what it has become. In other words, science fixes the contingency of the empirical in a necessitated law, even though the condition of the second moment relies on the infinite possibilities of the first. Paraphrasing Mallarmè's *Coup de dés*, Milner claims that in order for a point of the universe to be manifested as it is, "requires the dice to be thrown in a possible universe wherein this point would be other than it is."[20] There is therefore a specific intertwining between contingency and necessity. Necessity constitutes the operation that science conducts on the infinite possibilities of contingency.

But here Milner suddenly clarifies his own thesis: in the interval of time when the dice tumble before falling there is "the emergence of the subject, which is not the thrower (the thrower does not exist), but the dice themselves insofar as they are in suspension." At the moment when the mutually exclusive possibilities face themselves, the impossible emerges as a figure of contingency in the flash just after the fall of the dice when the number cannot be another one. The passage from contingency to necessity has a vanishing mediator, which is

[19] It is on this point that the much more convincing reflection of Quentin Meillassoux on the meaningless sign diverges from the relation between letter and contingency in Milner. For Meillassoux, the letter of formal languages (which he takes care to differentiate from the letter of everyday language) has the ability to grasp the hyper-chaotic contingency *as* contingency: that is, without converting it into the actualized necessity of the laws of natural sciences. See Quentin Meillassoux, *Iteration, Reiteration, Repetition: A Speculative Analysis of the Meaningless Sign* (unpublished paper).

[20] Jean-Claude Milner, "The Doctrine of Science," op. cit., p. 54.

the tumbling of the dice, i.e. the subject. When the letter fixes contingency in a necessity, it imposes the erasure of these infinite possibilities, marking them as impossible. Necessity takes the place of contingency as much as impossibility takes the place of infinite possibilities. Science fixes this point and it forbids the return to the contingent. Psychoanalysis and science here deviate from each other: according to Milner, the former constitutes the persistent contestation of contingency against its own erasure by the laws of the latter. The letter is fixed, but at the same time it refuses to be subjugated to the regime of the Same as in the ancient episteme. The famous Freudian statement according to which the unconscious does not recognize that time should be understood in these terms: the unconscious does not recognize the conversion of contingency into necessity as operated by the fixing of the letter by science.

Jacques-Alain Miller addressed the same point regarding the well-known paradox of contingent futures.[21] Sophism explains the conversion of contingency into necessity as follows: from the point of view of today, an event may or may not take place tomorrow (*possibility*). Tomorrow, in the eventuality that it does take place, it will always have been true that it took place. And it will be *necessary* that it has always been true that it took place (*impossible that it did not*). Miller underlines how the conversion of the possible into the necessary is an effect of retroaction, and psychoanalysis is concerned precisely with this backward temporality of past signification. In the temporality of the unconscious, contingency does not cease to haunt its conversion into necessity. According to Miller, the linear time of science is the time of the transformation of possibility into actuality, but there is also the retroactive temporality where the impossible (what has not taken place) refuses to be completely excluded ("foreclosed," Lacan would have said) and is still effectively operative *as impossible*. Psychoanalysis constitutes the objection against the exclusion of the impossible from the realm of the necessary. Or in other words, the subject of psychoanalysis constitutes the *exception* of the linear progression of the temporality of science.

The erasure of this retroactive temporality of the contingent subject of the unconscious from the fixed letter of science has some specific consequences in the relation between psychoanalysis and science. While Lacan claims that science

[21] Jacques-Alain Miller, "Introduction to the Erotics of Time," in *Lacanian Ink 24/25*, Winter/Spring 2005, pp. 18-19.

was responsible for opening up the field for the emergence of the subject, it seems that it also closes it down with the prescription of the inopportunity to return to the contingent. *Science and Truth* bears the trace of this double movement that also exposes the uncertainty and hesitation in Lacanian thinking of the doctrine of science. Later in the text, Lacan reiterates the conviction that something in the status of the object of science "remained unelucidated since the birth of science."[22] This object is none other than the pivotal element around which the theory and practice of psychoanalysis revolves: the notion of *objet petit a*, i.e. *the causal dimension of truth*. Lacan is not afraid to define it "the breaking point"[23] where the path of science and psychoanalysis diverge ("the truth as cause being distinguished from knowledge put into operation"[24]). Science allows the delineation of the crack between knowledge and truth, but at the same time it keeps it veiled and it persists in the illusion of joining them together. Science should thus be blamed primarily for forgetting: forgetting the trace of the infinite contingency that the letter fixes, but also for forgetting the dimension of truth that psychoanalysis applied in its practice. "The radicality of this forgetting – Milner claims – is what Lacan called foreclosure."[25] But since the subject is what emerges in the tumbling of the dice at the instant when contingency is about to morph into necessity, and since the subject-as-lack is what is at the core of truth as a cause in scientific endeavour, "suture and foreclosure are necessarily the suture and foreclosure of the subject."[26]

Jacques-Alain Miller and Suture

The Lacanian argument according to which scientific rationality structurally involves a misrecognition/erasure of the function of the subject – i.e. a foreclosure – can be found, skilfully argued, in an early text by Jacques-Alain Miller from the mid-1960s. First presented as a paper at the 9th session (24 February 1965) of Lacan's Seminar XII (*Crucial Problems for Psychoanalysis*), *La Suture: Éléments de la logique du signifiant*, "the first great Lacanian text not to be written by Lacan himself,"[27] constitutes the perfect completion of *Science and Truth* in addressing

22 Jacques Lacan, *Science and Truth*, op. cit., p. 733.
23 *Idem*, p. 737.
24 *Idem*, p. 738.
25 Jean-Claude Milner, "The Doctrine of Science," op. cit., p. 54.
26 *Ibidem*.
27 Alain Badiou, *Number and Numbers*, Polity, Cambridge 2008, p. 25.

the complex relationship between Lacanianism and science. The term suture, investigated by Miller in the text, was mentioned by Lacan several times during Seminar XI in 1964, but never thoroughly theorized. It was therefore Miller's task in this article, also included in the first issue of the *Cahiers pour l'analyse*, to rigorously define the concept.

With the term *suture* Miller understands "the relation of the subject to the chain of its discourse."[28] With this text he wants to conceptually ground the act of cancellation that the discourse of science operates on the subject of the unconscious and at the same time to generalize this very procedure in the way any subject relates to the signifier chain. As in the erasure of contingency in its conversion into necessity, the *punctum* of the enunciation of the subject (the "trembling of the dice") is at the same time the fundamental operational gesture for setting the machine of science into motion and that element the forgetting of which is inevitable once the discourse of science is established. Why is there this apparent contradiction for an element that is at the same time necessary and rejected? Because the cancellation act is never entirely successful, and it cannot be: some remainders, some symptoms, some stains, will always hijack the discourse of science, exposing its proclaimed universality to the contestation of the formations of the unconscious. The subject of the unconscious is thus always operative; the discourse of science, though, refuses to recognize its truth and therefore rejects it while not wanting to know anything about it.

In order to prove his argument, as an object of analysis Miller takes the scientific discourse of Gottlob Frege's *Foundations of Arithmetic*. His thesis is that in Frege's theory of the constitution of the series of natural numbers "in the genesis of progression, the function of the subject, miscognized, is operative."[29] Let us see what Miller's argument is regarding this specific scientific discourse.

Frege's logicist system tries to found the sequence of natural numbers: faithful to his anti-empiricism, he deals only with concepts deprived of any external referent. It is an autonomous construction of logic through itself. He therefore cannot not rely on a primacy of a thing that then has to be subsumed by a concept (i.e. like counting an external already existing object). The first problem is that

[28] Jacques-Alain Miller, "La Suture: Éléments de la logique du signifiant," in *Cahiers pour l'analyse*, no. 1, 1966, p. 39.

[29] *Idem*, p. 40.

even before a concept can subsume an object, it has to be explained how the object is transformed into a unit. In order to become numerable, the object as an empirical referent has to disappear. Frege defines the unit with a redoubled concept of identity ("the number assigned to the concept F is the extension of the concept 'identical to the concept F'") by borrowing Leibniz's definition of identity: *eadem sunt quorum unum potest substitui alteri salva veritate* (those things are identical of which one can be substituted for the other without loss of truth). Leibniz's *salva veritate* thus rests on the concept of *self*-identity: truth can be said only of things that are identical to themselves, and conversely, the confirmation of self-identity preserves truth.

According to Miller, Frege's system relies on a performative contradiction. On one hand, if a thing is not identical to itself, the whole logical edifice collapses (truth is not saved), on the other hand, non-self identity has to be evoked, even for an instant, in order to found the redoubling of self-identity. Truth is thus founded on a simultaneous invocation-and-exclusion of the non self-identical. In other words, if we supposed that an object were not self-identical, it would entirely subvert truth given that the principle 'A is A' is the law of any possible truth. No object should thus fall under the concept "not identical to itself," which is therefore void. In order for this very principle of not-self-identity to be rejected, it must first have previously been posed. Miller's fundamental argument, which will constitute a fundamental building block for the Lacanian logic of the signifier chain, regards the foundation of the logical edifice thusly:

> in the autonomous construction of the logical through itself, it has been necessary, in order to exclude any reference to the real, to evoke on the level of the concept an object not-identical-with itself, to be subsequently rejected from the dimension of truth.[30]

Miller wants to keep the anti-empiricist stance of Frege's logicist system with its refusal to presuppose any extra-logical real, while at the same time highlighting the point of *internal* exclusion that founds this very system (following the model of the Möbius strip). Zero is the number that will be at the same time present and absent. Or better stated, it will be *counted as absence* ("the first non-real

[30] *Idem*, p. 45.

thing in thought"[31]). Referring to a category with no members, zero is by definition void; nevertheless it is *a* category, and in being such it can effectively be *counted*. With such an operation the number 1 is produced, and through the repetition of the same procedure, also all the other natural numbers. In this movement, the *mark* of the non-self-identical forms the foundation of the signifying chain of numbers.

Miller concludes by establishing a logical priority of 0 over 1. Self-identity has as its origin a mark of non-self-identity. But in order for self-identity to emerge, while preserving the consistency of truth, it is necessary for the non-self-identity to not only be elided, but actually *repressed*. Miller here applies a short circuit between the active causality of the non-self-identity in founding the sequence, and its disappearance in the progression of the natural numbers/signifying chain. The *truth* caused by the action of a lack (*truth-as-lack*) is reversed in a rejection of the dimension of truth from the scientific discourse (*the lack-of-truth*). The subject of the unconscious is that non-self-identical lack, which the discourse of science summons and rejects, wanting to know nothing of it:

> To designate [this operation] I choose the name suture. Suture names the relation of the subject to the chain of its discourse; we shall see that it figures there as the element which is lacking, in the form of a stand-in [*tenant-lieu*]. For, while there lacking, it is not purely and simply absent. Suture, by extension – the general relation of lack to the structure – of which it is an element, inasmuch as it implies the position of a taking-the-place-of [*tenant-lieu*].[32]

In delineating the concept of suture Miller establishes what will become a Lacanian canon: from now on, the relation that the subject-as-lack entertains with the signifier chain (and if we follow the definition of science as a reduction of the Real to the realm of the signifier, also with the discourse of science in general) will be understood as follows. The subject-as-lack is the hidden and repressed causality of the signifier chain that is nevertheless always operative in the dialectic of substitution and permutations of the elements. The never ending slipping of the chain is none other than the causality miscognized but nevertheless *not-absent* of the lack. The subject may thus seem absent: the chain of scientific

[31] *Idem*, p. 44.
[32] *Idem*, p. 40.

signifiers seems to be perfectly self-sufficient. But it is all an ideological mystification. In fact, if we look closely – the Lacanian would say – we are able to see that the subject is far from being absent: it is just *stitched* in the very progression of the chain with the always different stand-in (*lieu-tenant*) that presentifies its presence-as-absence (its being-counted-as-absence). The subject is therefore neither present nor absent: it rather constitutes the *truth* of the signifier chain. It is *sutured* at the chain.

This triplet of terms – lack, subject, and truth – constitutes a dimension of incompatibility with the discourse of science. Lacan concludes *Science and Truth* with an unambiguous claim regarding science's rejection of the dimension of truth:

> [O]ur science's prodigious fecundity must be examined in relation to the fact, sustaining science, that science does-not-want-to-know-anything about the truth as cause. You may recognize therein my formulation of *Verwerfung* or "foreclosure," which forms a closed series here with *Verdrängung*, "repression," and *Verneinung*, "negation," whose function in magic and religion I have indicated in passing.[33]

As Lacan says earlier in the text: the "point [of truth] is veiled in science."[34] Such a rejection of truth must place science in the field of an imaginary ideology, structurally ignorant of the causal dimension of lack. The transmission of its knowledge is reduced to the level of communication. In this field where contingency is forgotten, where there is a blind miscognition of the presence/absence of the subject, where the Real is arrogantly proclaimed to be reduced to a perfectly transmissible sequence of signifiers, psychoanalysis cannot but play the role of analysis of the symptoms of science with a very unappealing conceptual consequence. Science in the arguments of Milner, Miller, and Lacan's *Science and Truth* is a field that is not able to recognize where its *foundation* actually lies: that is, in the causal dimension of truth-as-lack (or as subject). The scientific discourse cannot be self-sufficient if not as an ideology, because its foundation lies in what it is rejected from its field. Miller's analysis of Frege is in this regard a straightforward argument in favour of a foundational theory of science by the subject of the unconscious: the 0 – the non-self-identity, i.e. the subject – is *primary* and *foundational* regarding the 1 of self-identity. Following this line of

33 Jacques Lacan, *Science and Truth*, op. cit., p. 742.

34 *Idem*, p. 738.

thought, psychoanalysis ends up placing itself in a position of mastery toward science: no matter what its concepts or propositions are, science will never be able to generate truths. Truth and science are on two separate planes that never cross each other: they rather lie intertwined in a Möbius strip, as Lacan loves to say. The problem is that the three-dimensional point of view able to theorize on the relation between science and truth is firmly occupied by psychoanalysis as a theory: in this case, weirdly close to what Lacan always forbade it from being. A metalanguage.

The axiomatization of psychoanalysis

If we follow the elaboration of the previously discussed Lacanians regarding the relationship between psychoanalysis and science, it seems that we have arrived at a cul-de-sac. In what risks being a portrait painted with excessively dark tones, there might be an alternative route, which while not resolving the issue might at least help reformulate the problem in a more productive way. While the concept of *suture* risks reducing the field of scientific practice to a mere imaginary foreclosure of the causal dimension of truth, what might assist in a reconsideration of the problem is none other than the minimal definition of the subject of modern science developed by Descartes and re-proposed by Lacan in the first half of *Science and Truth*.

It is not difficult in fact to note a shift from the subtractive gesture of the Cartesian *cogito* to the theory of the productivity of the lack in the causality of the structure. While the former movement is characterized by a rejection of any positive knowledge in order to isolate a void, in the latter we have a lack that lies at the base of the productive machine of positive knowledge. While the Cartesian subject is a *nothing* that has to be produced through the practice of the de-imaginarization (or de-ideologization) of a positivity (in Althusserian terms, an epistemological break), the action of the lack is an underlying, yet apparently rejected, hidden cause that founds, through a short-circuit between a level and a meta-level, positive – and by definition ideological – knowledge. The problem of the relation between psychoanalysis and science cannot evade the question of whether the object of a scientific endeavour is the positive construction of knowledge, as is ideologically claimed by Miller and Milner, or rather the productive isolation of a thought through a procedure of subtractive formalization. The consequences of such a problem are pivotal for a theory of the subject of

science, deprived of the confusion that the term "subject" and "science" might engender when not carefully defined, as is in the case of the Millerian theory of suture. The difference between the two definitions of science is that in the first case the subject is a logical presupposition that lies at the core of all already existing knowledge: it is the truth-as-a-foundation that provides the conditions of possibility of every proposition and every object. In the second case, which can be called Cartesian, the subject is a hypothesis, or even better a *task* that has to be effectively rendered operative through a series of operations of de-imaginarization and de-ideologization.

Alain Badiou, in *Marque et manque: à propos du zéro*, an article from 1969 from the last issue of *Cahiers pour l'analyse*, gives a compelling and convincing critique of the Millerian understanding of the concept of suture in not dissimilar terms. According to Badiou, the relation that a subject entertains with the chain of its discourse can be called *suture* only when these discourses are not genuinely scientific. In a dialectic between ideological closure – when the subject appears as a *cause* of the scientific chain in the typical Lacanian short-circuit between level and meta-level – and a scientific rupture which operates a constant de-suturing,[35] Badiou coherently defines an ideal universal science as an autonomous machine completely deprived of any cause, and therefore of any subject:

> *There is no subject of science*. Infinitely stratified, regulating its passages, science is pure space, with neither reverse nor mark nor place for what it excludes. A foreclosure, but one of nothing, may be called a psychosis of no subject – and therefore of all: universal by full right, a shared delirium, it is enough to hold oneself within it to no longer be anyone, anonymously dispersed in the hierarchy of orders. Science is an Outside without a blind spot.[36]

Here Badiou understand the term subject in the ideological (or Millerian) sense: as the alleged structural lack of the scientific discourse that ends up constituting the foundational cause of it. Science, on the contrary, is the progressive operation of de-ideologization and de-imaginarization that excludes the ideological operator of *subject* from its field until the regulative-ideal point of an "infinite

35 Zachary Luke Fraser, *Introduction* to Alain Badiou, *The Concept of Model. An Introduction to the Materialist Epistemology of Mathematics*, re.press, Melbourne 2007, pp. xiii – lxv.

36 Alain Badiou, "Marque et manque: à propos du zéro," in *Cahiers pour l'analysie*, no. 10, 1969, pp. 161-162.

stratification," a "pure space," or a "psychosis": a point where science would be completely free from any ideological recuperation (a "machinic universalism," as Zachary Luke Fraser defines it[37]). But if we understand the term subject not in the imaginary or ideological sense, but in the subtractive and Cartesian sense, we see that this very act of an epistemological break is none other than the process of the reduction of the positivity of ideological knowledge to the productivity of the pure void. In other words, it is the process of questioning the positivity of the Imaginary in order for the subtraction of the pure thought-as-void to emerge. Psychoanalysis has too often been crudely reduced to the practice of hermeneutical analysis of an already-existing subject of the unconscious ("it is down there, we just have to dig into the psyche in order to take it out") as if it were a homunculus placed inside of a human being. But the subject of the unconscious, if we follow the subtractive, non-substantial, and Cartesian definition given by Lacan, is not something that is already there from the outset; it rather has to be *produced* during the experience of analysis. At the beginning of an analysis it is necessarily a hypothesis. In this sense, psychoanalysis could be coherently defined as a machine in order for the pure void of the unconscious – the subtraction from any ideological positivity of knowledge – to emerge: at the *end*, not at the beginning. It is a technique for helping the rigorous counterintuitive de-suturing operation of the scientific machine. Psychoanalysis is not a technique for giving a series of enigmatic signifiers a positive signification, but it is rather a way to get rid of any pretension of signification: to isolate the pure subtractive gesture of the *resistance to positive signification*.

The problem of the subjective experience of psychoanalysis is rather that the tendency to reduce the pure *nothingness* of the surface to the deepness of meaning is extremely strong; and it is precisely what concerns the intricacies of the register of the Imaginary. A formation of the unconscious can only be partially reduced to a certain interpretation during psychoanalysis. An analytic interpretation is by definition always insufficient (and this is the reason why Lacanian analysts have the tendency to remain silent and to avoid giving a meaning to a symptom), but the sequence and the multiplicity of wrong interpretations session after session expose in a progressively clear way the fact that there is something that cannot be reduced to interpretation: something which remains

37 Zachary Luke Fraser, *Introduction* to Alain Badiou, *The Concept of Model. An Introduction to the Materialist Epistemology of Mathematics*, op. cit., p. xlix.

stubbornly on the surface. What happens when, after many years of analysis, an analysand starts to be able to circumscribe the kernel of the symptom that is reluctant to be reduced to a meaning is none other than the tiring acceptance of a *nothingness*; or in better terms, the personal construction of this *nothingness*. Many Lacanians define the circumscription of the un-analysable kernel of an analysis *sinthome*, borrowing a term used by Lacan in his seminars of the late Seventies. But this term, which had a certain function within the progression of Lacan's teaching, has been almost unanimously taken as an ultimate (and singular) proof of a re-substantialization of this void in what became a bizarre version of a materialism of *jouissance*.

The contribution that science can make to psychoanalysis is precisely the rigorous conceptualization of this gesture of subtraction from knowledge. Science, and in particular mathematics, is in fact able to provide transmissible constructability to this *nothing*. While psychoanalysis (in this sense, closer to politics than science) is able to de-ideologize and de-imaginarize the stubborn tendency of the individual to rely on a sequence of positive signification and to isolate the kernel of ultimate resistance to meaning, science is actually able to construct a sequence of thoughts and concepts on this nothing. Mathematics is the proof that the *nothing* that we isolate at the end of an analysis is not the ultimate word of psychoanalysis: this is the reason why until the end of his life Lacan never gave up on the question of the transmissibility of the unconscious. That gesture of subtraction cannot end with an individual (or subjective, there is no difference at this level) conglomerate of bodily *jouissance*, defined as *sinthome*. This cynical outcome – which unfortunately became dominant in a Lacanian community progressively hegemonized by the primacy of a clinic which increasingly resembles the primacy of the "cure" – cannot contemplate the fact that upon this very *nothingness* something can still be done and still be constructed. Science maintains the promise of a possible collective outcome for the – otherwise unjustly accused – individuality of the experience of analysis. The *void* at the end of analysis is not a therapeutic goal, but rather a starting point for constructing an edifice of concepts. Psychoanalysis is, in a word, a propaedeutic for a de-ideologized science.

The concept of *axiom* can be an appropriate way to explain how concretely a re-framing of the question of the relationship between psychoanalysis and science, thought and knowledge, subject and ideology, subtraction and positivity

can look. The *axiom* indicates a procedure according to which a spontaneous (i.e. ideological) definition of a certain object is progressively deprived of any intuitive presuppositions and reduced to a minimal group of properties which are the ones given by the chosen system (and not more). Contrary to the Euclidean model of axiomatization, which started from the self-evidence of a certain ensemble of concepts (e.g. line, point, etc.), the formal axiomatic does not rely on any spontaneous or ideological presupposed definition. It actually produces its own elements and concepts by itself. Here we can see how the Badiousian stratification of a scientific machine with no outside, as was addressed in *Marque et manqué*, might look. But how it is possible to clean the spontaneous understanding of certain concepts in order to arrive at a formal axiomatization? Gabriele Lolli explains it in this way:

> At first, you take some rough analogies from already known domains, like physics: for example, in order to refer to the topological notions invented by Cantor, what might the word "dense" suggest when referring to the distribution of the points of a set? Does it mean that the points "touch" themselves? But the points cannot touch themselves even if they are very close. We can say that there are many of them in a small space, but in fact we should say that there are infinite points. And that is not even enough. If we take an example from everyday life and from the distribution of populations: to explain the density we can think of the inhabitants of a neighbourhood, but that is not enough; we can think of the roommates of an apartment, but that is not enough; we can think that in every room there is at least one person, but that is not enough; we can think that in every square meter there is at least one person, until the area tends to zero. After a certain point we have to abandon the analogy with real populations. Infinity imposes conditions that go beyond any confrontation with the finite world.[38]

Little by little, when the conditions start to become more and more precise through a formal sequence of operations, they become sufficient to make the properties explicit. When we reach this point, the spontaneous ideological definitions of the elements are no longer taken into consideration. A notion is formed from and depends *only* on the explicit characteristics and not the ones that are alluded to or not mentioned. The same thing happens with the definition of the concept *set* in set theory: maybe at first we have to define it as

[38] Gabriele Lolli, *Dagli insiemi ai numeri*, Bollati Boringhieri, Torino 1994, p. 23.

a collection of different elements, but then it becomes clear that the elements belonging to a set are a set themselves, and the primary definition of what a set is must be abandoned. What a set is – at that point – will no longer be a primary definition, but an internal production of the axiomatic system itself. As if the set were a *creation* of the axiomatic system.

This procedure, according to which a formal element is first considered in its analogical relation with something external to itself and little by little this definition is abandoned when the properties of the system become clear, is none other than the procedure of de-ideologization and de-imaginarization. The relation between psychoanalysis and science relies precisely on this common operational status: in order to arrive at a pure mathematical machine we have to get rid of any presumption of signification and relation to an external referent (we have to subtract from any empirical referent). But while psychoanalysis arrives at the point where the subtractive production of a *nothingness* is guaranteed with a technical procedure of de-imaginarization, mathematics is actually able to make *something* out of this *nothingness*: the creative invention of concepts and thoughts. One of the characteristics of modern mathematics is that mathematical entities are introduced by creative definitions that are not linked to any external or empirical given. But in order to reach this domain of subtraction from the empirical realm, we have to undergo a procedure of elimination of the pretension of the Imaginary to reduce the surface to meaning and signification. As Alain Badiou once said at a conference[39]: "the problem of mathematics is not that is too difficult, but rather that is too simple. It is only letters. It is too much on the surface." The problem is rather: how to inhabit this surface? How to eliminate the ideological profundity of the Self in order to isolate that *void* that can help us to creatively inhabit the domain of thought? Psychoanalysis is a historical model (certainly open to ameliorations and emendations) for concretely posing this question. Or better stated, psychoanalysis is the political way to produce the subject of the unconscious that is the same as the subject of science.

[39] Alain Badiou, *Lacan & Philosophy*, University of California – Los Angeles, 27 May 2010 (accessible online at: http://ect.humnet.ucla.edu/video).

Notes on Contributors

Pietro Bianchi was awarded a Ph.D. in Film Studies from the University of Udine-Gorizia (Italy), with his dissertation entitled *Can Images Be Thought? Jacques Lacan and Film Theory: Imaginary, Gaze, Materialism*. He was a researcher at the Theory Department of the Jan Van Eyck Academy in Maastricht in 2009/2010. He works as a film critic for the magazine *Cineforum* and the webzine *Le Parole e le Cose*. Since 2012 he has been a member of the Lacanian School of Psychoanalysis in Milan.

Aleš Bunta, Ph.D., is a researcher at the Institute of Philosophy of the Scientific Research Centre of the Slovenian Academy of Sciences and Arts, and at the Institute of Criminology at the Faculty of Law, Ljubljana, Slovenia. Main Publications: *Uničiti nič?*, Analecta, Ljubljana 2007; *Magnetizem neumnosti*, Analecta, Ljubljana 2010, *Magnetizam gluposti*, Ljevak, Zagreb 2012.

Henrik Jøker Bjerre, Ph.D., is an Associate Professor of Applied Philosophy at Aalborg University, Denmark, and a member of the philosophical collective Centre for Wild Analysis. Main publications: *Kantian Deeds*, Continuum, 2010; *The Subject of Politics* (with Carsten Bagge Laustsen), Humanities Ebooks, 2010.

Mladen Dolar is a Professor at the Department of Philosophy, University of Ljubljana. He has published a dozen books in Slovene, dealing primarily with the Hegelian legacy, psychoanalysis, and French structuralism. His most recent book in English is *A Voice and Nothing More* (MIT 2006).

Sašo Dolenc is a physicist and philosopher by training, and is currently employed at the University of Ljubljana, Slovenia. He has written several books, including *The Man Who Counted Infinity and Other Short Stories from Science, History and Philosophy* (Kvarkadabra, 2012).

Katja Kolšek is currently employed as a postdoctoral researcher at the Science and Research Centre of the University of Primorska in Koper. In 2013, her article "The Parallax Object of Althusser's Materialist Philosophy" has been published in the collection of articles Encountering Althusser. Politics and Materialism in Contemporary Radical Thought (ed. Katja Diefenbach, Sara R. Farris, Gal Kirn, and Peter D. Thomas, Bloomsbury, London 2013). She was co-editor of the collection of articles "*Prihodnost znanosti: neoliberalizem, univerza in politika sodobnega znanstvenega raziskovanja*" [The Future of Science: Neoliberalism, University and the Politics of Scientific Research] (Goga, Novo mesto 2012).

Matjaž Ličer was awarded a Ph.D. in theoretical physics from the University of Ljubljana. He works as a researcher at the National Institute of Biology and at the Philosophy Institute of the Scientific Research Centre of the Slovenian Academy of Sciences and Arts.

Gregor Moder works as a researcher at the Philosophy Department of the Faculty of Arts, University of Ljubljana. His main focus is on German idealism, philosophy of art, and theory of ideology. His doctoral dissertation was recently published in German under the title *Hegel und Spinoza. Negativität in der gegenwärtigen Philosophie* (Vienna and Berlin: Turia+Kant, 2012).

Miha Nemevšek is a postdoctoral fellow at SISSA, Trieste, and affiliated with Jožef Stefan Institute, Ljubljana. He is primarily working on the origin of neutrino mass, beyond Standard Model physics, and grand unification.

Tzuchien Tho is an associate researcher at the Centre International d'Etude de la Philosophie Française Contemporaine and the Berlin-Brandenburgische Akademie der Wissenschaften. He has published papers on the intersections of mathematics, ontology, and natural philosophy in the 17th and 20th centuries.

Oxana Timofeeva is a Senior Research Fellow at the Institute of Philosophy of the Russian Academy of Sciences (Moscow), a Humboldtian fellow at Humboldt University of Berlin, a part of the artistic group "*Chto Delat*?" (What Is To Be Done?), an author of the books History of Animals: *An Essay on Negativity, Immanence and Freedom* (Maastricht: Jan van Eyck Academy, 2012), and *Introduction to the Erotic Philosophy of Georges Bataille* (Moscow: New Literary Observer, 2009).

Abstracts | Povzetki

Mladen Dolar

The Atom and the Void – from Democritus to Lacan

Key words: atom, void, clinamen, den, Democritus, Epicurus, Lucretius, Hegel, Marx, Deleuze, Lacan, psychoanalysis

The paper considers the problem of the void through the theories of the early atomists. Philosophy began with the Parmenidian assertion of being, which can be read as a thesis premised on an exorcism of the void. With the atomists, the first to oppose the Parmenidian foundation of philosophy, the void made its entry as part and parcel of the atom. If the atom was to be counted as one, the void separating atoms was the very condition of such a count. Hegel saw this as the profound insight that negativity was the condition of positivity, hence the one and the void as the matrix of being. – The second twist in this atomist story is that of clinamen, a contingent swerve which befalls atoms, and hence something that inherently departs and undermines 'the one and the void'. The clinamen theory was much criticized and ridiculed by the great philosophical tradition, including by Hegel. A very young Karl Marx, in his dissertation, defended the crucial value of clinamen, and in recent times Louis Althusser and Gilles Deleuze followed in his footsteps. – The third significant aspect is that of *den*, a curious neologism introduced by Democritus, which perhaps undermines both stories at the outset. For if atom is *den*, then it is not a body, not an entity, not one, not being, but also not non-being. It is a paradoxical departure from the bulk of ontology, an ontological scandal, obfuscated by the subsequent Aristotelian paradigm. Jacques Lacan took it up as a clue to his notion of the *object a*, the object of psychoanalysis.

Mladen Dolar

Atom in praznina – od Demokrita do Lacana

Ključne besede: atom, praznina, clinamen, den, Demokrit, Epikur, Lukrecij, Hegel, Marx, Deleuze, Lacan, psihoanaliza

Tekst se loteva problema praznine skozi teorije antičnega atomizma. Filozofija se je začela s parmenidovsko zatrditvijo biti, ki jo je mogoče brati kot tezo, ki je osnovana na eksorcizmu praznine. Z atomisti, ki so se prvi postavili po robu parmenidovskemu izhodišču filozofije, je praznina nastopila kot filozofski objekt kot inherentni del atoma. Če je atom mogoče šteti za eno, potem je praznina, ki loči atome, predpogoj takšnega štetja. Hegel je v tem videl globoki uvid, da je negativnost pogoj vsake pozitivnosti, tako da eno in praznina tvorita matrico biti. Drugi obrat te atomistične zgodbe je povezan s *clinamen*,

kontingentnim odklonom, ki zadeva pot atomov, in ki spričo tega inherentno odstopa od 'enega in praznine' in ju od znotraj spodkopava. Teorija o *clinamen* je doživela hudo kritiko in posmeh s strani velike filozofske tradicije, vključno s Heglom. Zelo mladi Karl Marx je v svoji disertaciji stopil v bran *clinamen* in se zavzel za njegovo ključno vrednost, tako kot v novejšem času po njegovih stopinjah Louis Althusser in Gilles Deleuze. – Tretji ključni aspekt predstavlja *den*, nenavadni neologizem, ki ga je uporabil Demokrit in ki nemara subvertira obe prejšnji interpretaciji. Če je atom *den*, potem ni niti telo niti bitnost niti bivajoče, vendar tudi ne ne-bit. Je paradoksni odmik od glavnine ontologije, ontološki škandal, ki ga je prekrila poslejšnja aristoteljanska paradigma. Jacques Lacan pa je vzel *den* za ključ do pojma objekta a, torej objekta psihoanalize.

Tzuchien Tho

The Void Just Ain't (What It Used To Be): Void, Infinity, and the Indeterminate

Key words: void, singular, indeterminate, atomism, Frege, Miller, Badiou

In this paper, the author diagnoses and criticizes the use of what he calls the "atomistic strategy" in contemporary philosophy in order to understand the indeterminate and the singular. Borrowing from Antique and Hellenistic Atomism, the "atomistic strategy" makes use of the opposition between the void and atoms to theorize how transformations that are not accounted for in determinate structures arise in these very structures. As such, the void stands in as the repository of the radical and subversive negative powers that give rise to the singular indeterminate. Following the work of Alain Badiou, the author argues not only against the coherence of such a strategy, but also for an understanding of the singular indeterminate as self-grounding rather than founded on its negative relation to structure. In order to do this, he argues for the deflation of the purportedly subversive nature of the void by treating it as a stable element in structures. In doing so, he affirms the generic and subtractive character of the singular indeterminate and treats radical structural transformation as the correlate of ontological incompleteness rather than that of inconsistency.

Tzuchien Tho

Praznina prav ni (kar je bila): praznina, neskončnost in nedoločeno

Ključne besede: praznina, singularno, nedoločeno, atomizem, Frege, Miller, Badiou

V članku avtor diagnosticira in kritizira uporabo tistega, kar imenuje »atomistična strategija« v sodobni filozofiji, ki skuša razumeti nedoločeno in singularno. Iz antike in grškega atomizma si »atomistična strategija« izposoja nasprotje med praznino in atomi, da bi podala teorijo o tem, kako transformacije, ki jih v določenih strukturah ni mogoče pojasniti,

vzniknejo v slednjih. Praznina kot takšna zastopa odlagališče radikalnih in negativnih moči, ki povzročijo nastop singularnega nedoločnega. Sledeč delu Alaina Badiouja avtor zagovarja ne le koherenco takšne strategije, temveč tudi razumevanja singularnega nedoločenega kot samo-utemeljujočega, ne pa kot temelječega v svojem negativnem razmerju do strukture. Zato, da bi bilo to mogoče, se zavzema za zmanjšanje domnevno subverzivne narave praznine, tako, da jo obravnava kot stabilni element v strukturah. Pri tem afirmira generični in odtegnitveni značaj singularnega nedoločenega, radikalno strukturno transformacijo pa obravnava kot korelat ontološki necelosti, ne pa nekonsistenci.

Sašo Dolenc

The Void of Quantum Reality

Key words: quantum physics, ontology, information theory, irrational proportions, Pythagoreans

Zeilinger's fundamental principle of quantum physics is presented and discussed in connection to the metaphysical implications of quantum theory. Similarities between problems of irrational proportions within the Pythagorean vision of the universe and problems instigated by the interpretation of quantum physics in our everyday vision of reality are investigated.

Sašo Dolenc

Praznina kvantne realnosti

Ključne besede: kvantna fizika, ontologija, teorija informacij, iracionalna razmerja, Pitagorejci

V članku predstavimo Zeilingerjevo temeljno načelo kvantne fizike in ga obravnavamo v povezavi z metafizičnimi implikacijami kvantne teorije. Preučimo tudi podobnosti med problemom iracionalnih razmerij v okviru pitagorejske vizije univerzuma in težavami, ki jih povzroča interpretacija kvantne fizike v našem vsakdanjem dojemanju realnosti.

Matjaž Ličer

The Concept of Aether in Classical Electrodynamics and Einstein's Relativity

Key words: history of general relativity, theories of aether, classical electrodynamics, relativity principle, relativistic aether

The paper sketches the impact the concept of aether had on the historical development of relativistic physics. It depicts how and why the concept of aether was at the core of

a seeming contradiction between the Galilean principle of relativity and the law of the constancy of the speed of light, which implied a fundamental discord between classical electrodynamics and Newtonian mechanics, and was a major topic throughout 19th century physics. We note some of the consequences of Einstein's formulation of special relativity, which represented a synthesis of both mentioned theories within one common theoretical framework. It also led Einstein to ban the notion of aether from physics. The paper describes Einstein's development from special to general relativity and shows how the latter eventually influenced his reintroduction of the concept of relativistic aether to accentuate the dynamic properties of general relativistic spacetime.

Matjaž Ličer

Pojem etra v klasični elektrodinamiki in Einsteinovi relativnosti

Ključne besede: zgodovina splošne relativnosti, teorije etra, klasična elektrodinamika, načelo relativnosti, relativistični eter

V tekstu orišemo vpliv, ki ga je pojem etra imel na zgodovinski razvoj relativistične fizike. Pokažemo kako in zakaj se je pojem etra znašel v samem jedru navideznih protislovij med Galilejevim načelom relativnosti in zakonom o konstantnosti svetlobne hitrosti, ki so nakazovala fundamentalno neskladje med klasično elektrodinamiko in Newtonovo mehaniko, ter so predstavljala enega velikih problemov fizike 19. stoletja. Omenimo nekaj posledic Einsteinove formulacije posebne teorije relativnosti, ki je predstavljala sintezo navedenih teorij v nov skupni teoretski okvir, ter vodila Einsteina k opustitvi pojma etra. Opišemo Einsteinov razvoj od posebne do splošne relativnosti, ter pokažemo, kako je Einstein na podlagi splošne relativnosti ponovno vpeljal v fiziko pojem etra, da bi tako izpostavil dinamične lastnosti splošno-relativističnega prostora-časa.

Miha Nemevšek

Vacuum, Colliders, and the Origin of Mass

Key words: Quantum field theory, vacuum, spontaneous symmetry breaking, Higgs boson, collider physics, neutrino mass, left-right symmetry

Quantum field theory provides a theoretical framework for understanding the interactions and characteristics of elementary particles. They are described as local excitations above the state of lowest energy, the vacuum. For most fields, the average value of the ground state is zero, the only exception being a scalar field, which may develop a global non-zero vacuum expectation value. This is understood as a consequence of spontaneous symmetry breaking, i.e. the Higgs mechanism. In the context of the Standard Model of elementary particles, such breaking leads to a dynamical explanation of the origin of the masses of nearly all known particles, which can be tested by observing decays of

the Higgs boson. The recent discovery of a new boson at the Large Hadron Collider sets the stage for verification of this concept. It also highlights the need to understand the remaining missing pieces, such as the unknown nature and origin of neutrino mass, which remains one of the central unsolved issues in particle physics.

Miha Nemevšek

Vakuum, trkalniki in izvor mase

Ključne besede: kvantna teorija polja, vakuum, spontana zlomitev simetrije, Higgsov bozon, nevtrinske mase, levo-desna simetrija

Kvantna teorija polja nudi teoretični okvir za razumevanje interakcij in karakteristik osnovnih delcev. Ti so opisani kot lokalne eksitacije nad stanjem z najnižjo energijo, vakuumom. Za večino polj je povprečna vrednost v osnovnem stanju nič, edina izjema je skalarno polje, ki lahko razvije globalno pričakovano vrednost različno od nič. To razumemo kot posledico spontane zlomitve simetrije, to je s Higgsovim mehanizmom. V kontekstu standardnega modela osnovnih delcev, ta zlomitev vodi do dinamične razlage izvora mas za skoraj vse delce, ki jo je možno testirati z opazovanjem razpadov Higgsovega bozona. Nedavno odkritje bozona na velikem hadronskem pospeševalniku postavi temelje za preverjanje tega koncepta. Prav tako poudari potrebo po razumevanju preostalih manjkajočih delov, kakor je neznana narava in izvor nevtrinskih mas, ki ostaja ena glavnih nerešenih zadev v fiziki delcev.

Gregor Moder

"Held Out into the Nothingness of Being": Heidegger and the Grim Reaper

Key words: death, Dasein, end, time, void, future

The paper presents a reading of *Being and Time* that challenges the widely accepted image of Heidegger as a philosopher of conservative, moralist, and existentialist overtones. The core concept at stake is the concept of death. While almost every reader agrees that it is an ambiguous concept that should be understood as a fundamental existential disposition of Dasein, the majority of readers nevertheless reduce it to a tragic question of facing personal, individual mortality. To counter this, a radical ontological reading is attempted, one that implies, to an extent, also a reading of the Heidegger of the fundamental ontology against the Heidegger of a type of "existentialist theology". The author consistently pursues the idea of reading the key concepts of angst, end, death, and time by analysing them as concepts that enable us to see the nothingness, the void at the core of existence. The conclusion of the paper underscores this formal ontological orientation

of the book with the help of two little known concepts developed by Franz Brentano in the course of his studies of the continuum.

Gregor Moder

»Nagnjenost v ničnost biti«: Heidegger in starka s koso

Ključne besede: smrt, tubit, konec, čas, praznina, prihodnost

V članku predstavljeno branje *Biti in časa* oporeka uveljavljeni podobi Heideggra kot konservativnega, moralističnega in eksistencialističnega filozofa. Pri tem je v ospredju koncept smrti. Skoraj vsi bralci se sicer strinjajo, da gre za dvoumen koncept, ki ga moramo razumeti kot fundamentalno eksistencialno razpoloženje tubiti, vendar ga večina kljub temu zreducira na tragično vprašanje o soočenju z osebno, individualno smrtnostjo. Avtor v nasprotju s tem zagovarja radikalno ontološko branje, ki do neke mere domneva branje Heideggra fundamentalne ontologije proti Heideggru nekakšne »eksistencialne teologije«. V skladu s tem avtor predlaga dojetje osrednjih konceptov kot so tesnoba, konec, smrt in čas z analizo, v kateri se pokažejo kot koncepti, s katerimi je mogoče zagrabiti nič, praznino v osrčju eksistence. Nazadnje avtor poudari formalno ontološko usmeritev knjige še z dvema manj znanima konceptoma, kot ju je v kontekstu raziskave kontinuuma razvil Franz Brentano.

Katja Kolšek

The Repetition of the Void and the Materialist Dialectic

Key words: materialist dialectic, void, repetition, symptomal torsion, desire, drive

The article discusses the question of the relationship between the void and repetition as the basis for the continuation of the discussion of the materialist dialectic in the light of the events of May 1968 in France and the exchange between Lacanian psychoanalysis, the Althusserian circle, and the work of Alain Badiou as regards the question of the cause of the structure. It presents the question of the minimal difference within the repetition between the lack and the hole, which according to Slavoj Žižek equals the virtual *objet a* as the basis of the parallactic change in the structure. On the foundation of the matrix of Badiou's materialist dialectic as the logic of scission, it interprets the work of Althusser as a materialist dialectic repetition of the overdetermination in the aleatory encounter, which retroactively produces the third and new possibility of the continuation of the materialist dialectic.

Katja Kolšek

Ponovitev praznine in materialistična dialektika

Ključne besede: materialistična dialektika-praznina-ponavljanje-simptomska torzija-želja-gon

Članek obravnava razmerje med praznino in ponavljanjem kot osnovo za nadaljevanje mišljenja materialistične dialektike v luči dogodkov maja 68' v Franciji in diskusije med lacanovsko psihoanalizo, althusserjanskim krogom in delom Alaina Badiouja v zvezi strukture in njenim vzrokom. Predstavi vprašanje minimalne razlike ponovitve med mankom in luknjo, ki je po interpretaciji Slavoja Žižka, enaka virtualnemu objektu a, na podlagi katerega nastane paralaktična sprememba v strukturi. Na podlagi Badioujeve materialistične dialektike kot logike cepitve interpretira Althusserjevo delo kot materialistično dialektično ponovitev naddoločenosti v materializmu srečanja, ki retroaktivno proizvede tretjo, novo možnost za nadaljevanje materialistične dialektike.

Henrik Jøker Bjerre

Himself Nothing Beholds Nothing – On Schelling's Ontological Isomorphism

Key words: Schelling, *Weltalter*, nothing, ground, Wallace Stevens.

In Schelling's *Weltalter*, there are (at least) two different concepts of nothing: A nothing that is there (and is called being), and a nothing that is not there, but nonetheless exerts its effects. In this article, I propose a reading of *Weltalter* that circles in on these two different conceptions by moving from a Schellingian critique of Kant to a discussion of the implications of Schelling's alternative. Kant identified the ultimately contradictory nature of reason, but he shied away from drawing the full consequences from this. Instead, contradiction must be embraced, according to Schelling, and by doing this, one is forced to think the concepts of ground and nothingness in much more realist terms than Kant did: Reason, like everything else, carries its own ground within it. *Weltalter* should therefore not, as is often believed, be read as an anthropomorphism, but much rather as what I call ontological isomorphism. Wallace Stevens's poem "The Snow Man" is invoked to illustrate this position and to link it to the two issuing conceptions of nothing.

Henrik Bjerre

Sam nič se drži niča – o Schellingovem ontološkem izomorfizmu

Ključne besede: Schelling, *Vekovi sveta*, nič, temelj, Wallace Stevens

V Schellingovih *Vekovih sveta* obstajata (vsaj) dva različna pojma niča: nič, ki je (in se imenuje bit), ter nič, ki ga ni, vseeno pa ima učinke. V članku avtor predlaga branje *Vekov sve-*

ta, ki kroži okoli teh dveh različnih pojmovanj, tako da se od schellingovske kritike Kanta premakne k razpravi o implikacijah Schellingove alternative. Kant je identificiral temeljno protislovno naravo uma, a se je iz tega zbal potegniti polne konsekvence. Namesto tega je treba sprejeti protislovje, pri čemer smo po Schellingu prisiljeni misliti pojma temelja in ničnosti v veliko bolj realističnih terminih od Kanta: Um, tako kot vse ostalo, sam v sebi nosi svoj temelj. *Vekov sveta* tako ne bi smeli, kot se to pogosto počne, brati kot antropomorfizma, temveč prej kot tisto, kar avtor imenuje ontološki izomorfizem. Pesem Wallace Stevensa »Snežak« lepo ponazarja to stališče in se navezuje na omenjeni pojmovanji niča.

Aleš Bunta

Antinomy of the Void

Key words: void, antinomy, atomism, 'reversed transcendentalism', non-thought, Badiou, matter

The paper commences by trying to articulate what is arguably the key *epistemological* deadlock of the void. The first hypothesis of the paper is namely that the epistemological problem of the void is not merely encompassed within the traditional argument that the void *in itself* is unthinkable. Apart from being *unthinkable*, and in seeming contradiction to its first determination, the void is also *necessarily thought* of *as* necessary. This necessity is linked to the concept of matter. The more precise way of articulating the deadlock is namely this: although the void "in itself" is indeed unthinkable, a certain spontaneous logical necessity nonetheless exists, which in any attempt to ontologically conceptualize *matter* qua matter compels us to think of the void either as necessarily *present*, or as necessarily *identical to matter* itself. This is what we term the antinomy of the void. The antinomy can be at least partially resolved, though, by an approach that we term "reversed transcendentalism". This approach consists of finding a solution to the deadlock at its abstract level by showing that the two seemingly contradictory *negative* determinations of the void (unthinkable as well as necessarily thought of), can be reversed into some sort of proof that a minimal pinning of the void to a thought does exist. In the remainder of the paper the focus shifts to the more concrete aspects of this antinomy, which entail elements of the philosophies of the Greek atomists, Badiou, Aristotle, and Plato.

Aleš Bunta

Antinomija praznine

Ključne besede: praznina, antinomija, atomizem, »sprevrnjeni transcendentalizem«, ne-mišljenje, Badiou, materija

Članek skuša na začetku artikulirati tisto, kar je nedvomno ključna *epistemološka* zagata Praznine. Prva hipoteza članka je namreč v tem, da epistemološki problem praznine ni

zgolj vsebovan v tradicionalnem argumentu, da je praznina *sama na* sebi nemišljiva. Poleg tega, da je *nemišljiva*, in v navideznem protislovju s prvo določitvijo, je praznina tudi *nujno mišljena* kot nujna. Ta nujnost je povezana s pojmom materije. Podrobnejši način artikulacije zagate je namreč naslednji: čeprav je praznina »na sebi« dejansko nemišljiva, pa obstaja določena spontana logična nujnost, ki nas pri vsakem poskusu, da bi ontološko konceptualizirali *materijo* kot materijo, prisili misliti praznino bodisi kot nujno *prisotno* ali pa kot nujno *identično* sami *materiji*. To imenujemo antinomija praznine. Kljub temu lahko antinomijo vsaj delno razrešimo s pristopom, ki ga imenujemo »sprevrnjeni transcendentalizem«. Ta pristop sestoji v najdenju rešitve za zagato na njeni abstraktni ravni, tako da pokaže, da dve navidezni protislovni negativni določitvi praznine (nemišljiva, nujno mišljena) lahko sprevrnemo v neke vrste dokaz, da obstaja minimalno pripetje praznine na misel. V nadaljevanju se članek posveti konkretnejšim vidikom antinomije, ki vsebujejo elemente filozofij grškega atomizma, Badiouja, Aristotela in Platona.

Oxana Timofeeva

Imagine There's No Void

Key words: void, borders, particles, animal, subject, structure, change

The first part of the paper addresses the ontological problems of the border. Among others, three kinds of borders are indicated: the border between something and something *similar*, the border between something and something *different*, and the border between something and *nothing*. The ultimate borderline of the third kind – the edge of the world – is the most problematic, and the second part of the paper is dedicated to its analysis. How is it possible that on one side we have something, but on the other side there is nothing? How is it possible to think a borderline that has only one side? Here the question of the structure of the void arises. The example of an elementary particle in contemporary physics shows that it does not have an internal structure (it does not consist of anything). However, it has a kind of external structure, which demonstrates its relational character. Respectively, one can indicate three kinds of void: the void as *substance*, the void as *subject*, and the void as *universal* or *real*. The paper investigates these three kinds of borders as applied to politics, ideology, psychoanalysis, and science.

Oksana Timofeeva

Predstavljaj si, da praznine ni

Ključne besede: praznina, meje, delci, žival, subjekt, struktura, sprememba

Prvi del članka je posvečen ontološkim problemom meje. Naznačene so, med drugimi, tri vrste mej: meja med nečem in nečim *podobnim*, meja med nečem in nečim *različnim*,

meja med nečim in *ničem*. Temeljna zamejitev tretje vrste – rob sveta – je najbolj problematična, in drugi del članka se posveča njeni analizi. Kako je mogoče, da imamo na eni strani nekaj, na drugi pa nič? Kako je mogoče misliti mejo, ki ima eno samo stran? Tu se postavlja vprašanje strukture praznine. Primer delca v sodobni fiziki nam pokaže, da delec nima notranje strukture (ne sestoji iz ničesar), pa vendar ima zunanjo strukturo, ki dokazuje njegov relacijski značaj. Podobno lahko naznačimo tri vrste praznine: praznino kot *substanco*, praznino kot *subjekt*, in praznino kot *univerzalno,* ali realno. Članek raziskuje te tri vrste mej in jih aplicira na politiko, ideologijo, psihoanalizo in znanost.

Pietro Bianchi

The Lack(anians): Use and Misuse of a Concept between Psychoanalysis and Science

Key words: Jacques Lacan, science, psychoanalysis, lack, Jacques-Alain Miller, subject, truth, René Descartes, Jean-Claude Miller

The concept of *lack* in Lacan can be understood as a clinical concept and as being one of the fundamental conditions of the *parlêtre* and one of the privileged ways in order to conceptualize subjectivity as a desiring *manque à être*. As we can see from the debate that occurred during the years of the *Cahiers pour l'analyse*, though, *lack* can also acquire a more formalized meaning: in Jacques-Alain Miller's seminal article *La suture: éléments pour une logique du signifiant* published in 1966, it becomes a building block in order to address "the relation of the subject to the chain of its discourse." Miller believes that *lack* serves the purpose of conceptually grounding the act of cancellation that the discourse of science operates on the subject of the unconscious; an argument that will be echoed in Lacan's text *La Science et la vérité* of the same year. The consequences of such an understanding of *lack* has been extremely burdensome in the way Lacanian psychoanalysis has addressed its relationship with science for many years up to the present. In this intervention, we discuss the importance of such a concept for psychoanalysis and why it is a symptomatic point through which the relationship between psychoanalysis and science is articulated.

Pietro Bianchi

Manko(lacanovci). Raba in zloraba koncepta med psihoanalizo in znanostjo

Ključne besede: Jacques Lacan, znanost, psihoanaliza, manko, Jacques-Alain Miller, subjekt, resnica, René Descartes, Jean-Claude Miller

Pojem *manka* pri Lacanu lahko razumemo kot klinični pojem in kot enega temeljnih pogojev *parlêtre* ter kot enega izmed privilegiranih načinov za pojmovanje subjektivnosti

kot želeče *manque à être*. Pa vendar, kot lahko vidimo iz razprave, ki je nastopila v času revije *Cahiers pour l'analyse*, lahko manko privzame bolj formaliziran pomen: v prelomnem članku Jacques-Alain Millerja *Šiv: elementi za logiko označevalca*, ki je bil objavljen leta 1966, postane temeljnega pomena za lotevanje »razmerja subjekta do verige njegovega diskurza«. Miller je prepričan, da *manko* služi temu, da konceptualno utemelji dejanje zaprečenja, ki bi ga diskurz znanosti izpeljal na subjektu nezavednega; gre za argument, katerega odmev najdemo tudi v Lacanovem spisu »Znanost in resnica« iz istega leta. Konsekvence takšnega razumevanja manka bodo izjemno obremenjujoče za način, na katerega lacanovska psihoanaliza razume svoje razmerje do znanosti vse do danes. V pričujočem članku razpravljamo o pomembnosti tega pojma za psihoanalizo in o tem, zakaj je simptomatična točka, skozi katero se artikulira razmerje med psihoanalizo in znanostjo.

INFORMATION FOR CONTRIBUTORS

Manuscripts and correspondence should be addressed to: FILOZOFSKI VESTNIK, P.O. Box 306, SI-1001 Ljubljana, Slovenia (fax: +386 1 425 77 92; e-mail: fi@zrc-sazu.si). Manuscripts in Slovenian, English, French and German are accepted.

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Citations should be presented as follows:

1. Gilles-Gaston Granger, *Pour la connaissance philosophique*, Odile Jacob, Paris 1988, p. 123.
2. *Cf.* Charles Taylor, "Rationality", in: M. Hollis, S. Lukes (Eds.), *Rationality and Relativism*, Basil Blackwell, Oxford 1983, pp. 87–105.
3. Granger, *op. cit.*, p. 31.
4. *Ibid.*, p. 49.
5. Friedrich Rapp, "Observational Data and Scientific Progress", *Studies in History and Philosophy of Science*, Oxford, 11 (2/1980), p. 153.

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