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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?’