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VIRTUAL REALITY ACCORDING TO MICHAEL HEIM

WIRTUALNA RZECZYWISTOŚĆ W UJĘCIU MICHAELA HEIMA

Abstract

This article explores Michael Heim's concept of virtual reality, emphasizing the ontological status of virtual objects and their connection to the material world. Recognized as a foundational exploration of virtual reality, Heim's work identifies key features of virtuality, such as immersion, interactivity, and presence. Drawing on a rich philosophical tradition—particularly Plato's metaphysics and John Duns Scotus's concept of virtuality—Heim presents a multidimensional approach that integrates technical, cognitive, and philosophical dimensions.

The analysis highlights Heim's depiction of virtual reality as a subjective experience enabled by imagination and digital technologies, where virtual worlds emerge as *informational equivalents of things.* However, Heim does not definitively resolve the ontological ambiguity of virtual objects, leaving open questions about their material or immaterial nature and their interaction with the corporeal and cognitive dimensions of human existence. These unresolved questions underscore the complexity of virtuality as a category that transcends traditional metaphysical distinctions.

By situating Heim's framework within both classical and contemporary philosophical discourse, this study underscores the interdisciplinary nature of virtuality and its implications for understanding the intersection of technology, imagination, and reality.

Keywords: *virtual reality, Michael Heim, status of virtual objects, origin of virtual reality*

1. Introduction

Michael Heim is regarded as one of the pioneers in the field of virtual reality (VR), and his works, now considered canonical, have had a significant impact on the development of the discipline (Cooper, 1995; de Gorguette d'Argoeuves, 2010; Lovink, 2025; Novak, 2017; Meidan, 1995; Wilson, 1994). Heim is the author of the well-known book *The Metaphysics of Virtual Reality* (Heim, 1993), in which he analyses the history and evolution of VR, exploring its philosophical and cultural implications. In this publication, he focuses on various aspects of VR, from its technological foundations to the consequences of its applications. A particularly important chapter of this book is *The Essence of VR* (Heim, 1993a), where Heim systematises his research by presenting a range of conceptual and philosophical aspects of virtual reality, making this publication a key reference point for contemporary studies in the field. The reason why

Michael Heim's work is particularly distinguished in VR studies is that Heim was one of the first philosophers to comprehensively link the technological analysis of VR with deep philosophical reflection (referring in particular to Plato and John Duns Scotus). The key concepts he developed (immersion, interactivity, telepresence, simulation, artificiality) and the idea of ontological ambiguity of virtual objects have shaped the contemporary dominant way of understanding and practical use of VR in social technologies such as computer games, digital banking, social media, or the currently emerging Metaverse.

Another significant work by Heim is *Virtual Realism* (Heim, 2000), where he continues his analysis of virtual reality, focusing on the differences between virtual realism and fantasy. In this book, he considers how VR can be used to create realistic experiences and how these experiences influence the perception of reality. His other work, *Electric Language: A Philosophical Study of Word Processing* (Heim, 1999), although not directly focused on VR, examines the impact of digital technologies, including word processing, on language and communication, which is relevant to understanding virtual environments. Additionally, Heim is the author of *The Design of Virtual Reality* (Heim, 1995) which concentrates on the design aspects of virtual reality, considering both the technical and aesthetic dimensions of creating virtual environments.

Michael Heim's approach to virtual reality is characterized by its complexity, intertwining technical aspects with philosophical considerations, with a particular emphasis on the role of imagination. Heim argues that virtual worlds are *informational equivalents of things,* digital environments based on imagined rather than material reality. In his theory, imagination plays a crucial ontological role, enabling the creation of symbolic components into a coherent mental vision that transcends the limitations of physical reality, allowing the construction of worlds immersed in informational structures.

Heim emphasizes that the process of *anchoring,* in which elements of physical reality serve as the foundation for constructing virtual worlds, is essential. Without the active role of imagination, virtual environments could only represent perfect replicas of material reality. However, the use of imagination allows for the creation of *not-quite real* worlds, whose degree of reality diminishes as the intensity of imagination increases.

Heim also considers the cognitive implications of virtual worlds, arguing that although they are not real in the ontological sense, they can function as sources of knowledge. The problem, according to Heim, lies in attributing reality or unreality to them in the existential sense. Virtual worlds, in his view, are unreal with varying degrees of unreality, depending on the strength of the imagination involved in their creation. He critically addresses ontological pluralism, asserting that the only foundation of reality is the physical world, which introduces a hierarchy between the real and virtual worlds. In his conception, anchoring can encompass both faithful reproduction of the physical world and creative imagination-based creation, but always with reference to physical reality, underscoring the dependency of virtual worlds on the real world.

The aim of the article is to verify the research hypothesis according to which Michael Heim's philosophical concept of VR, especially his thesis on the key role of imagination and ontological ambiguity of virtual objects, has shaped the currently dominant ways of understanding and applying virtuality in digital technologies and socio-cultural practices (computer games, social media, digital banking, Metaverse).

2. The Concept of Virtuality

In his work (Heim, 1993), Michael Heim meticulously describes and analyses concepts related to virtual reality, such as virtuality, virtual reality, and virtual environment or virtual world. Heim associates these terms with other concepts like virtual entities and the material world, or nature (primary world).

To present Heim's concept of virtuality, it is worth recalling the etymology of the term itself, which, according to him, derives from the Latin *virtus*, meaning virtue, strength, or courage (Wilson, 1994). *Virtual* in most contemporary philosophical contexts refers to *not existing in empirical reality but capable of existing, potential, possible.* The concept of virtuality, in its general sense, is associated with terms such as semblance, imaginability, and invisibility. The meaning of the adjective *virtualis* would correspond to today's adjective *potential,* meaning carrying the possibility of performing an action (both adjectives contain Latin roots signifying power and strength—*virtus* and *potentia*) (Pawłowski, 2013, p. 12).

The essence of virtuality lies in a particular mode of existence: a virtual object does not exist materially, yet it functions in a reality accessible to human senses. The virtual nature of an object means that one can perceive its image or the effects of its actions sensorially, but not the entity or object itself. With the advent and proliferation of computers, the term *virtuality* began to be widely used not in a philosophical context but in an informatic one. The concept became particularly associated with the development of so-called virtual memory. For instance, in a computer, virtual memory can be part of the RAM. Expanding memory in this way does not require additional space on the hard drive. A virtual disk can be used similarly to a hard drive but lacks its physical limitations. As computers developed further, particularly with the spread of the Internet, the term *virtuality* broadened its meaning. Analogous to the concept of a virtual disk, any entity or object is termed virtual when it functions in a way that is devoid of materiality.

The ontological consequences of this situation directed the attention of the author of *The Metaphysics of Virtual Reality*from informatics to philosophy, from which the term *virtuality* originates (Heim, 1993, p. 132; Biosca, 2015). In Heim's analysis, a particular emphasis is placed on issues central to the medieval debate over universals. As the author writes, the debate over the existence of a virtual nature permeates the entire history of philosophy, gaining particular significance in the writings of John Duns Scotus, whose views, following St. Augustine, responded to the system of Thomas Aquinas.

According to Heim, Duns Scotus developed the concept of virtuality (*virtualiter* in Latin), which is particularly important for understanding the medieval philosopher's theory of reality. In Duns Scotus's writings, it concerned the way in which form connects with the physical attributes of things (Scotus, 1987). Heim argues that it was not until the Renaissance that the exclusive status of reality was first attributed to things perceptible by the senses. However, modern science departs from such a conditioning of the definition of what is real, demonstrating that the components and foundations of reality include things and phenomena that are sensorially intangible, such as elementary particles or energy. Moreover, Heim's assertion is generally questionable, as the status of beings, or even super-beings or hyper-beings, has always been attributed to divine entities in various religious beliefs, which were then carried over into

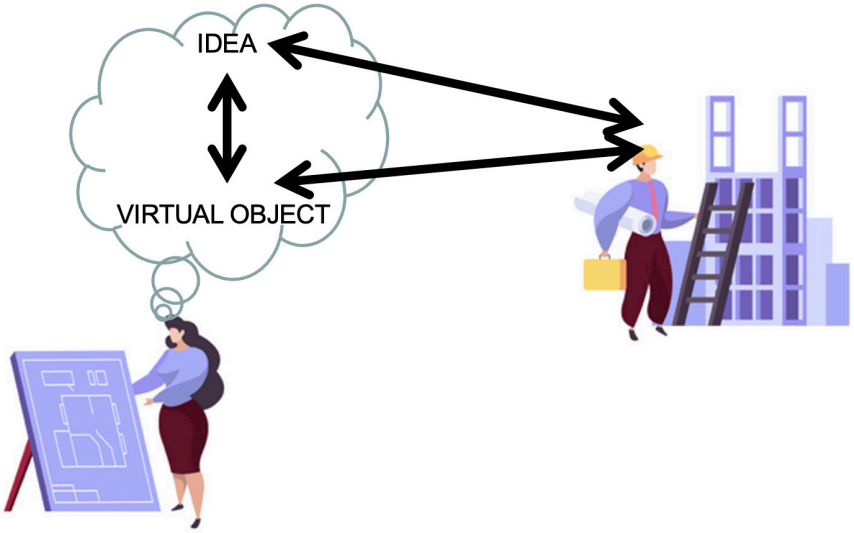
philosophy. Similarly, Platonic ideas, which hold the status of fundamental beings, are imperceptible by the senses.

Thomas Aquinas argued (Osborne, 2011) that from facts related to sensory experience one can infer the existence of non-sensory entities (such as God). On the other hand, Duns Scotus, who believed that philosophy should primarily address the generalized concept of being, maintained that knowledge of Non-Sensory Being can only be attained by bypassing the testimony of the senses and reason, through the direct understanding of the essence of this Being, which is infinite and calls into existence a universe of finite beings. In Scotus's view, being could refer both to God himself and to the universe of created beings (Heim, 1993, p. 117). Thus, for Duns Scotus, neither sensory testimony nor rational cognition could determine the designation of any object as a being or the denial of its existence. Unlike Aquinas, Scotus did not separate the concept of essence from existence, and his conception of being was broad – encompassing *everything that is not nothing,* which, according to Heim's commentary, includes everything that exists in any form, including in disembodiment, or virtually.

According to Heim, a distinctive feature of the contemporary understanding of the term virtuality is its specific interdisciplinarity. The concept originated within philosophy, then moved to computer science, and is now returning to philosophy. Therefore, it has at least two fundamental meanings, which, though in the language of different disciplines, seem to define the same phenomenon. Drawing on Plato's thought, particularly inspired by Duns Scotus's definition of being, Heim merges the philosophical and computational traditions of understanding the concept of virtuality and advocates for the designation of objects existing in virtual worlds as virtual entities (virtual beings). Broadly understood beings in his concept include all objects that can be registered as ontologically present or having an impact on the world (Heim, 1993, p. 151). Building on this definition, Heim then narrows it for the use of philosophical reflection on virtual reality. Beings that can be observed in this specific environment, which – as Heim emphasizes (Heim, 1993, p. 147) – do not have to reflect [Do they reflect, or simply exist in the material world (belong to the material world)? – MM, vide: Fig. 1] any existing beings in the material world, include all virtual objects (avatars, virtual visual representations,

the so-called agent, i.e., an autonomous software object active in virtual worlds and capable of spontaneously changing, evolving, or *learning*).

Figure 1. *The ontological relationship between the physical world, the virtual world and the role of imagination.*



Source: own study based on (Mazurek, 2020).

Virtual reality, according to Heim, is a *specific experience that gives the participant the impression of being in a different place than where their body currently is* (Heim, 1993, p. 147). It's important to note that Heim's definition, which suggests that virtual reality is entirely subjective and lacks the nature of being since it is only a (transitory) individual human experience, implies that it is difficult to speak of virtual reality in the sense Heim describes as reality—it is rather a subjective process occurring in the mind of an individual human subject.

Heim associates the issue of virtual reality with computer technology, viewing it as a realm where processes similar to those in empirical reality can occur, thanks to the use of three-dimensional digital graphics and electronic devices (Heim, 2000, p. 6). He presumably refers to devices such as: (1) VR goggles, which provide immersive visual experiences, allowing the user to immerse themselves in a virtual world. These head-mounted devices display

three-dimensional images that change based on the user's head movements, creating a sense of presence in the virtual world. (2) Another key component includes VR gloves and motion controllers, which enable interaction with the virtual environment through hand and finger movements, allowing the user, for instance, to grasp and manipulate virtual objects. Additionally, VR walking platforms enable physical movement within the virtual space, potentially simulating walking, running, or jumping. (3) Motion tracking systems form another group of devices playing a crucial role. These are advanced systems of sensors and cameras that track the user's full-body movements and translate them into movements in the virtual world, enabling more natural and intuitive interaction. (4) Finally, it is worth mentioning haptic feedback devices that provide physical sensations, such as touch or vibrations, corresponding to interactions in the virtual world, which may simulate the touch of virtual objects or the sensation of impact. Heim emphasizes that thanks to these technologies, virtual reality can mimic processes and experiences from empirical reality, creating rich, immersive environments that can be utilized across various fields, from education to entertainment and therapy.

3. Characteristics of the Relationship between the Subject and Virtual Reality

Heim expands upon his observation by conducting a detailed analysis of the characteristics inherent to virtual environments, proposing a key set of concepts that play a pivotal role in the structure of research on virtual reality. These terms include: simulation, interactivity, artificiality, immersion, telepresence, and full-body immersion, as well as networked communication (Heim, 1993, pp. 110-116). Heim emphasizes that these concepts do not constitute a closed set of definitional criteria. Their significance varies—some play a crucial role, while others are of lesser importance. Collectively, these concepts define interactive computer-generated simulations that enable shared experiences among numerous users, offering full sensory immersion and facilitating forms of telepresence that allow for communication, action, and interaction with the environment and other users. Although the listed features do not define every individual implementation

of virtual environments, they collectively outline the characteristics of this milieu. Each of these terms requires further explanation, as each contributes to the understanding of the essence of virtual reality to varying degrees.

Simulation is the process of recreating the properties of real objects in a digital context, involving the *creation of qualitative representations that shape form and enable expression, making them similar to or different from real phenomena.* Its primary objective is to mimic and render real events plausible within an artificial electronic environment. Simulation is a process that either fills or replaces real reality with virtual reality, leading to a point where the boundary between them becomes blurred (Ostrowicki, 2006, p. 24). Examples of simulation applications include flight simulators, truck driving simulators, musical instrument simulations, interior design systems, and three-dimensional computer game environments. It can be argued that the ideal simulation becomes a kind of reincarnation of the Turing test, examining the ability to distinguish physical reality from its simulated version. Gurczyński emphasizes that a perfect simulation does not allow the user to realize that it is a simulation, i.e., whether the object is a representation of physical objects or a computer-generated product of the creator's imagination (Gurczyński, 2013, p. 127). As computer processing power increases and graphics engines improve, it becomes increasingly difficult to distinguish between the representation of reality and its entirely simulated version. Heim draws attention to a similar situation with sound simulations. It often happens that simulated environments become attractive in themselves, regardless of their connection to physical reality. A good example of this phenomenon is computer games and other environments of pure virtuality, which create entirely new, previously unknown spheres of human activity. Their function is not so much to imitate the physical world as to create unique, computer-generated spaces based on the creators' imaginations and implemented into complex computational processes. The concept of *simulation* plays various roles in the context of virtual reality, reflecting its definitional flexibility (Ostrowicki, 2006, p. 26). In a narrower sense, simulation is perceived as an accurate recreation of the conditions of actual reality; however, not all virtual environments meet this criterion; many construct unique areas unrelated to reality. In a broader sense, simulation becomes synonymous with the term *computer-generated environment* (Heim, 1993, p. 112). An even more extended

understanding of simulation encompasses the recreation of the properties of a given object or phenomenon through a model, which can be implemented using analog tools, as well as abstract or mathematical methods. Simulation, though undoubtedly crucial in theoretical considerations of virtual reality and having significant practical implications, is not definitively defining for virtual reality as such. Therefore, it seems that understanding simulation in the context of virtual reality requires considering its various aspects and functions, which allows for a more nuanced and flexible interpretation of this term within the scientific discourse.

A virtual environment is defined as artificial in comparison to real reality, yet the traditional distinction between what is real and what is artificial is becoming blurred. In the context of increasing simulation, artificiality transforms into reality, and *the real begins to appear increasingly artificial as simulation reaches its perfect form* (Baudrillard, 2005, pp. 11-12). Our world, increasingly saturated with technology and infrastructure, becomes a synthesis of nature and human actions. An example of such integration is computer-based consumer preference analyses, which shape the arrangement of products in supermarkets—tailored to the eye level of children or adults. In his critique of contemporary technology, Jean Baudrillard highlights the darker aspects of the development of virtual environments. His theory of simulacra refers to the historical evolution of imagery—from simple reflections of reality to *pure simulacra,* which are entirely detached from any reality. In this way, artificiality is not only an essential feature of virtual reality, indicating its technological origin, but also serves as a starting point for criticism of technologies that may separate us from physical reality and shape our daily lives in ways that are not always desirable. The artificiality of virtual environments, closely tied to their computer-generated nature, may seem to have secondary significance in defining virtual reality. However, it is this very feature that allows for a deeper understanding and analysis of the impact of technology on human perception and interaction with the world. Simulation, in this context, not only blurs the boundaries between reality and its artificial counterpart, but also becomes a crucial tool in understanding and shaping new forms of digital existence.

Interactivity in virtual reality constitutes a key feature, enabling users not only to observe but also to actively transform and create the virtual

environment. According to Michael Heim's description, interactivity in VR is not confined to the two-dimensional space of the monitor but penetrates the interface, allowing the user to immerse themselves in the three-dimensional space of a functioning, evolving environment. Interactive interfaces transform the content displayed on the monitor into spaces that can be tailored to the needs and preferences of the user, allowing for personal engagement and participation in the virtual world.

Interactivity in VR is gradable and depends on the type of interface and the ability to generate qualitative changes that can correspond to the user's intentionality. The example of a computer desktop with a recycle bin icon is a simple yet illustrative example of such interaction: the user can drag unwanted documents to the bin using the mouse, similarly to how they manipulate objects in physical reality. Thus, the computer desktop and virtual bin are used analogously to real objects (Heim, 1993, p. 111).

Heim defines interactivity as *the process of transforming or creating a virtual environment through an interface* (Ostrowicki, 2006, p. 25), which emphasizes the dynamic nature of VR, in contrast to the passive perception characteristic of traditional media such as radio or television. Interactivity in VR is often considered a necessary condition for virtuality, as it allows users to interact with objects in a way that mimics physical reality, thanks to advanced computational technologies. It is this possibility of interaction that distinguishes VR from other forms of representation, creating new opportunities for experiencing and perceiving the digital world (Stanovsky, 2004, p. 169).

Immersion in the context of virtual reality is a key feature that enables deep immersion of the user in a synthetically generated environment. As Heim notes, specially adapted devices, such as VR goggles, are essential for creating the illusion of being immersed in the virtual world, which forms the basis of immersion. This experience can vary and depends on the technology used and how effectively it isolates the user from external stimuli, providing only those generated by the media (Heim, 1993, pp. 112-114).

Immersion in VR is therefore a complex and multidimensional phenomenon that combines technological capabilities with psychological engagement, creating convincing and interactive experiences that transcend the boundaries of traditional perception of reality.

In the context of virtual reality, Heim uses the term *full-body immersion* (Heim, 1993, pp. 115-116), referring to an innovative system designed by Myron Krueger (Krueger, 1991). This system, based on a set of cameras tracking the user's movements and a computer adapting the virtual environment based on this data, eliminated the need for additional equipment. This approach paved the way for the development of popular VR systems for gaming consoles, such as Xbox and PlayStation, which were the first widely available systems of this type on the consumer market.

Network communication, although not essential to define virtuality, plays a crucial role in shaping virtual environments and communities. It transcends traditional boundaries of verbal communication and body language, introducing new, previously unknown forms of expression. Through computer-mediated communication, users can overcome spatial and temporal obstacles, benefiting from the global reach and immediacy of communication. The virtual space, filled with content and users, differs from material reality. Its characteristics include multilinearity, multi-layeredness, globality, and immediacy, which are the result of its inherent network properties. Communication in a virtual environment can be multimedia, making it more complex and richer than traditional methods of communication. The electronic communication environment integrates technical, semantic, and informational aspects, fostering a sense of continuous access, proximity, and community among users. Such environments become key spaces for interaction and information exchange, shaping modern digital communities that use advanced VR technologies to build complex and engaged forms of social interaction (Kluszczyński, 2001, pp. 96-98).

Telepresence, defined as the ability to participate in events remotely, in a virtual manner as if we were physically present, is a key concept in the context of virtual reality (VR). According to the definition, telepresence enables the reception of stimuli through devices such as cameras and microphones, as well as the manipulation of objects and problem-solving in real-time, despite the physical absence in a given location (Heim, 1993, p. 13). Jonathan Steuer emphasizes that telepresence plays a central role in defining VR, pointing to two main elements that determine it: plasticity (the ability to manipulate and adapt the environment) and interactivity. In his model, virtual reality, as the medium with the highest degree of plasticity and interactivity, is positioned at the top of

the Cartesian coordinate system (Steuer, 1992). Telepresence also has significant practical applications, particularly in fields such as medicine, where it enables remote surgeries using computer-controlled tools. This allows for less invasive procedures and access to specialized medical care, even if the physical presence of a specialist is impossible. Examples include telerobotics and remote operations in extreme environments, such as deep-sea or outer space. Telepresence also provides new forms of communication, such as video conferencing, conversations through internet communicators, or e-universities, which facilitate remote teaching and collaboration. The ability to achieve telepresence through virtual environments underscores its importance in today's world, where remote interactions are becoming increasingly common (Heim, 1993, p. 115).

In the context of VR, telepresence is not a defining feature of all virtual environments but is a key element in those that enable interactive and immersive experiences. Understood in the way Steuer presents it, as equivalent to mental immersion, it can serve as a complement to more fundamental terms defining virtuality, such as immersion or interactivity. In this way, telepresence plays a crucial role in the development and understanding of VR technology, both from theoretical and practical perspectives.

4. Conclusion

A shortcoming, or to put it more cautiously, a limitation in Heim's considerations is that, despite providing a detailed characterization of virtual reality and the objects within it, he seems to shy away from making a definitive statement about their mode of existence. It remains unclear whether, according to him, virtual objects are indeed material (although there are strong indications that he does not consider them to be so). If the supposition of their immateriality is correct, it raises the question of what specific ontic status these objects hold, to which reality they belong, where and under what conditions they exist or become present, and how they interact with humans. At this point, however, it is important to explicitly acknowledge a philosophical assumption underlying this discussion: the assumption of an immaterial (dualistic) nature of the human mind. Although such a perspective—assuming a clear separation

between the corporeal body and an immaterial mind—is frequently encountered in philosophical discourse (and Heim himself seems to be open to such interpretations, cf. Heim, 1993, pp. 88 et seq.), it is nevertheless a highly debated and controversial standpoint. The exact nature of the human mind remains unresolved in contemporary philosophical and scientific debates, thus this assumption should be understood as a provisional starting point rather than a definite conclusion.

These and other issues that arise here cannot be resolved using the philosophical tools that Heim introduces. On the one hand, Heim invokes the complex and rich metaphysics of Plato, but on the other, he adapts it only minimally to the understanding of virtual objects. The issue is that referring to Plato—without making significant modifications to his position—would suggest that virtual objects are somewhat akin to Platonic ideas. However, this is merely a suggestion (implied by Heim's not entirely unambiguous statements), and one that immediately invites objections: for example, a cardinal difference is that virtual objects are created by humans using computer software, whereas Platonic ideas are eternal, impersonal, and not grounded in anything. Additionally, there is the issue of the genesis of virtual reality, which, unlike Platonic ideas, is rooted in the subject (Cooper, 1995; Morse, 1999).

The analyses carried out confirmed the research hypothesis stated in the introduction. Heim's concepts indeed constitute the basis of contemporary technological and social practices, while leaving open philosophical questions regarding the ontological status of virtual reality.

The following key conclusions emerge from the analyses and literature review: (1) First of all, it should be emphasized that Michael Heim played a fundamental role in shaping the contemporary, philosophically rooted understanding of virtual reality. His works not only combined metaphysics with developing digital technologies, but also provided conceptual tools that enabled us to understand the nature of virtual worlds and objects. (2) The category of imagination plays a special role in his concept – according to Heim, it is this category that allows not only to overcome physical limitations, but above all to create information realities, detached from materiality, but functionally *present* in the user's experience. (3) It is also worth noting that Heim identified a set of key features defining VR, such as immersion, interactivity,

telepresence, simulation, and artificiality. These elements have become the basis for the development of modern technologies today – not only in entertainment, such as computer games, but also in education, online banking, social communication, and in the concept of the Metaverse. (4) Heim's concept of virtuality – although based on philosophical foundations – has far-reaching practical and technological consequences. (5) At the same time, however, the ontological status of virtual worlds and objects remains open. Heim avoids a clear answer to the question of whether virtual entities can be considered real in the same sense as material entities, which makes his approach not only inspiring but also requires further development in the light of current philosophical debates and technological advances.

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