



Bodies in the metaverse: Is there “someone” out there?

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Abstract

The metaverse, enabled by technologies, such as virtual reality (VR), augmented reality (AR), and artificial intelligence (AI), challenges our traditional understanding of reality, identity, and corporeality. It offers immersive virtual experiences that blur the lines between the real and the synthetic, creating new opportunities for human interaction, expression, and self-exploration. In this paper, we explore (i) the technological advancements driving the development of the metaverse and its potential applications across various sectors; (ii) the avatar concept, a digital representation of oneself within the metaverse, and its implications for identity and presence; and (iii) the profound impact on our perception and understanding of reality and the complex philosophical and ethical questions it raises. The metaverse stands as a novel frontier in human experience, presenting both opportunities and challenges. It demands a critical reassessment of how we perceive embodiment, awareness, and identity in this digital era. While we embrace its potential to expand human capabilities, we must remain mindful of its risks and ensure its ethical and responsible social integration.

Keywords Metaverse · Avatars · Philosophy of Emerging Technologies · Virtual Ontology · Digital Embodiment

1 Introduction

Contemporary society is transitioning toward an information and experience-based way of life. This shift is influenced by factors, such as technological advancements, access to information, and changing cultural values, as predicted by Negroponte (1995, 4). We are witnessing a constant dematerialization of our experiences (Han 2022), lives, and even our possessions: many of the objects we own are not actually tangible, meaning that they lack materiality,¹ leading to a “post-materialistic” society defined by desires for virtual goods rather than concrete consumer goods (Belk 2013,

492). Consequently, digital platforms like social networks, streaming services, and online video games have gained popularity and become central elements of current life (Dhiman 2023). The ability to connect with people worldwide, access a wide range of content, and enjoy virtual experiences has led many to increasingly value these digital aspects of their lives. Driving the industry and academia to create mechanisms to obtain progressively immersive experiences, the metaverse is one of the promises seeking to revolutionize the experiential world (Ball 2022). In fact, we no longer speak only of the “metaverse” but of a “galaxy of metaverses” (Zallio and Clarkson 2022, 5), developed considering clear architectural and aesthetic criteria (Del Pizzo 2024). In these metaverses—which are not simply digital environments—we can “live” in an immersive way, generating experiences that can enrich and fulfill but also wear out, frustrate, or damage us. The conditions of possibility for this are their “habitability,” as well as our ability to immerse ourselves in these new environments through various technological devices.²

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¹ We do not use the verb “exist,” because virtual objects exist, in fact, under a different and specific form of material existence—see Valera (2021).

² Concerning this point, some reflections have been previously outlined in the recently published book *Cuerpos Vulnerables* (Valera 2024).

In what follows, we will question the habitability of the metaverse and analyze how to inhabit these environments through our avatars. The reflection we will undertake is mainly anthropological, aiming to understand the structure of the human person, mainly his/her being “bodily”³ in the emerging context of the metaverse. For this reason, the initial hypothesis of this paper is that, at the anthropological level, recent technological and digital developments force us to rethink our corporeality in a novel and original way. In fact, the famous philosophical ambivalence between “being a body” and “having a body” acquires new meanings concerning our new way of dwelling cyberspace with avatars, as we will show later. On the other hand, the paper’s thesis is that the way of dwelling the virtual—and, therefore, virtual ethics—depends on a new ontology of our corporeality and the new technologies themselves, as well as renewed hermeneutics of our immersive experiences.⁴ Ultimately, we need new words and concepts to define who we are in the current society⁵ and how we interact in the metaverse. Without them, any ethical reflection would fall short concerning emerging technological objects. In this sense, this paper would contribute to the scientific debate on the metaverse, clarifying the relationship between the ethics and ontology of the metaverse (and virtual bodies) from a philosophical reflection on our immersive experiences in these worlds.

For these reasons, the paper is structured as follows: in Sect. 2, we will define the concept of the metaverse, identifying some characteristic elements and attempting to offer a hermeneutics of it; in Sect. 3, we will conceptualize the idea of “avatar” and delve into the experience of our corporeality in virtual worlds to define the form of our “presence” in them; in Sect. 4, we will focus on the mutability of human bodies in the metaverse and the need to redefine our experiences; finally, in Sect. 5, we will outline the new ontologies imposed by this novel way of virtual dwelling, that is to say, the metaverse. Finally, we will sketch out some possible conclusions and open questions about the topic of this paper (Sect. 6).

2 The concept of “metaverse”

In 1992, Neal Stephenson introduced the word “metaverse” in his novel *Snow Crash* (Stephenson 1992), representing a new concept related to virtual spaces and human interaction in digital environments. This concept is still under construction, and its definition has been somewhat elusive. However, it is possible to define the metaverse as a set of technologies that will allow total immersion, seeking the indistinction of a real experience from a synthetic or digital one (Russo and Marzullo 2023). Recent technological advancements are beginning to bridge the gap between external and internal bodily experiences in virtual environments. Interoception, the sense of the body’s internal state, is crucial to our emotional and physical well-being. By incorporating interoceptive feedback into VR systems, developers can create more holistic and immersive experiences that align closely with our physiological states (Riva et al. 2017). This integration can enhance the realism of VR simulations and open up new avenues for therapeutic applications, particularly in areas like stress management and biofeedback training.

To achieve full immersion, it is necessary to explore how to trick the brain into perceiving and experiencing a synthetic or digital experience as if it were real. This is achieved through the combination of various techniques and technologies.

One of the technologies aimed at this goal is virtual reality (VR). Computer-generated virtual environments, visualized through VR devices such as headsets or glasses, provide an immersive visual, movement, and auditory experience (Deitke et al. 2022). By presenting high-quality, photo-realistic 3D images, and spatial audio, VR seeks to make the brain perceive the virtual environment as real, generating a sense of presence and transportation to another place (Sun and Botev 2021). A number of experiments (e.g., Evrard and Krebs 2018) have shown that high-quality images in faithful representations of real environments, familiar to users, generate synthetic memories that are difficult to distinguish from real-life memories. This will allow the creation of a market for synthetic experiences not only in tourism (Go and Kang 2023) but also in psychological health, enabling patients to experience synthetic traumatic events to overcome their real-life phobias (Usmani et al. 2022). This technology is promising and currently the pillar of immersion; however, its development remains costly and complex.

This opens the door to other kinds of technologies that seek to leverage the best of analog reality and mix it with the best of the synthetic or digital world, creating a mixed or augmented reality (Speicher et al. 2019). Mixed or augmented reality involves overlaying digital elements onto the real world. Combining images and virtual objects with the physical environment, it creates the illusion that digital

³ To try to exemplify such issues, it is always interesting to look at science fiction TV movies/series that are anticipating such concerns, such as *Black Mirror* (e.g., the “Striking Vipers” chapter) or *Upload*.

⁴ Concerning this topic, please see Ihde’s (2002) book *Bodies in Technology*, in particular Chapter 1.

⁵ By the term “current society” we mainly refer, in this paper, to current societies advanced in technology (almost always supported by high-level economies—e.g., Upper-middle-income economies, High-income economies—for more on this, please see: The World Bank 2025).

objects truly exist in real spaces. This can create surprising fields of application, such as in driving, where signs or obstacles, which would not be perceived otherwise, are processed and augmented for the driver (Xu et al. 2023), in health, allowing real-time observation of muscle recovery in rehabilitation therapies (Lancere et al. 2023), or performing aircraft maintenance by assisting the technician step-by-step on how to disassemble and reassemble a component, increasing efficiency and avoiding human errors (Siyaevev and Jo 2021).

Additionally, advances are being explored in fields such as haptics and the simulation of other senses, like touch and smell, to provide an even more immersive experience (Wiederhold 2023). Haptics allow tactile feedback, such as vibration or resistance in controllers, to simulate the sensation of touching virtual objects. Smell simulation seeks to recreate specific odors associated with certain environments or experiences, adding another layer of realism to the immersion.

These tools are amplified using Artificial Intelligence (AI). AI plays a significant role in the metaverse (Huynh-The et al. 2023) by enhancing the user experience and making the perception of virtual reality indistinguishable from tangible reality⁶ (Barroso 2022). AI is used to create more realistic and autonomous virtual characters capable of interacting with users more naturally (Sun and Botev 2021). These characters can have intelligent responses, emotions, and adaptive behaviors, contributing to a deeper sense of immersion and more realistic interaction in the digital environment by generating graphics and rendering them in real time (Partarakis and Zabulis 2024). Furthermore, AI can assist in creating procedurally generated virtual environments, meaning that environments are generated automatically and randomly (López et al. 2020). This allows for greater diversity and variety in virtual landscapes and scenarios, creating a sense of exploration and discovery similar to that of the real world.

These technologies are greatly strengthened in the socialization of these experiences, where social networks play a prominent role (Riva et al. 2024). Social media and communication platforms are essential for creating a shared experience in the metaverse. These platforms allow users to connect and communicate with each other (Wang et al. 2024), fostering social interaction in virtual environments. By providing real-time communication channels, voice chat, and social interaction options, social media and communication platforms create a sense of community and belonging in the metaverse, helping users immerse themselves and perceive the digital experience as closer to reality.

Finally, without a means of payment, it would not be possible to close the circle; hence, cryptocurrencies play a relevant role by allowing the ownership and exchange of virtual assets in a decentralized and secure manner. Cryptocurrencies based on blockchain (Al-Hawamleh et al. 2024), like Ethereum, have enabled the creation and trading of non-fungible tokens that represent unique digital assets, such as digital art, virtual goods, or characters in the metaverse (Radanliev 2024). This allows users to have a sense of ownership and control over their digital assets, which can increase immersion and emotional connection with the virtual environment.

While the metaverse has the potential to provide exciting digital experiences and new opportunities, it also carries certain risks (Dhiman 2023), including the threat of addiction (Bojic 2022) and mental health issues, as excessive immersion in the digital environment can lead to isolation and disconnection from reality. Manipulation and misinformation (Plangge and Campbell 2022) are also risks, as false and manipulated content can be easily created and spread in the virtual environment, affecting trust and the perception of reality. It also involves privacy and security concerns due to the collection and use of personal data, as well as possible cyberattacks and scams. Furthermore, the metaverse could perpetuate the existing inequalities due to a lack of access for certain people or communities, which could create a digital divide. Finally, there is the possibility of economic dependency and monopoly (Garon 2022), where a few companies control much of the infrastructure and virtual assets, limiting competition and diversity in the metaverse. In this sense, we can argue that the metaverse offers exciting possibilities to explore new horizons and realities but also poses risks that we must consider with caution, as they could open the door to unforeseen challenges.

From the elements outlined so far to describe the metaverse, we can now venture into a philosophical definition—or conceptualization—of it. As Valera (2022) proposes, to characterize new technologies, we could define the metaverse as an environment (*Umwelt*) (e.g., Kozicki 2023; Lecomte 2023)—that is to say, as a set of entities that, among other things, interact with each other, generating changes and perturbations of the equilibrium. The inherent characteristics of an *Umwelt* are, in fact, the possibility of interaction with other entities, a certain capacity for self-regulation concerning disturbances or changes, and the fact that it always surrounds living entities (or those capable of interacting)—as defined by Jakob von Uexküll (2001). Furthermore, the self-regulating nature of the metaverse, akin to any *Umwelt*, suggests that our actions and interactions contribute to the overall balance and evolution of this digital environment. In this sense, we can spend time and energy in the metaverse, as we can enter it—like any environment—and interact with other entities present.

⁶ On this topic, it is worth considering that ongoing work increases haptic and tactile interaction in XR, which feeds into the perceived reality of a virtual object being tangible (e.g., Billinghurst et al. 2015; Billinghurst et al. 2024). We thank an anonymous reviewer for this interesting insight.

Building on this conceptualization, it becomes clear that the metaverse is not just a digital playground but a complex ecosystem where virtual and physical realities converge. Thus, one of the fundamental characteristics of the notion of environment (from the Latin *ambiens*) is accomplished: it is something that constitutes itself around someone, that is, an active subject (Uexküll 2001). We could argue that when a subject enters a metaverse, it immediately reconfigures this environment, as novel and creative interactions are generated. The focus then shifts from the metaverse to the subject who “dwells” it, that is to say, who lives in it. The interesting philosophical question—which also guides any ethical reflection—is how to dwell these environments: in the metaverse, we enter with a body that, while not identified with ourselves, we could say is properly “ours.” Hence, it is essential to discuss the notion of the avatar in the next section.

3 Bodies in the metaverse: the avatars

According to what has been said before, we can already deduce the notion of an avatar is not merely a digital representation but an extension of the self, capable of engaging in meaningful interactions within this digital *Umwelt*. This raises significant philosophical and ethical considerations. For instance, the way we present and conduct ourselves through our avatars can impact our sense of identity and social dynamics within the metaverse.

To start any reflection on the avatar, it is necessary to wonder: In what sense *am I* my avatar? In what sense *am I* my image? To these questions, we should add another one: if I am that image that belongs to another world, how do I relate to it? And finally, how do I move and act through it?

The first issue to clarify is the following: I do not coincide with my avatar. The avatar is not “my ego” in another world but rather an (unfaithful) copy of my perceptions (or perhaps my desires) about myself. In this way, “in the virtual world, I am not my body, but I am represented by an objective corporeality, conceived as a mere container that does not even belong to me and which I am not able to experience in the first person” (Trilles Calvo 2009, 432). Here, the essential ambivalence between being and representing, between the individual and the double emerges.

Nevertheless, we need to make a previous “distinction between ‘avatar’ understood as a playable character (or persona), and ‘avatar’ understood as a vehicle through which the player is given some kind of embodied agency and presence within the gameworld” (Klevjer 2012, 17). In this paper, we will only focus on the second meaning presented in the previous quote, namely, an “embodied presence” of the real subject in the virtual world.

Such presence in virtual environments can be perceived as “real” due to the fact that the interaction between avatars and immersive environments is fundamentally different from other forms of interface, such as a mouse cursor, which does not situate the person in the environment in the same way (Klevjer 2012, 18). This emergent kind of interaction can be understood through the concept of “prosthetic agency,” where the avatar functions as an extension or prosthesis of the personal body (Klevjer 2012, 19). This concept highlights the distinction between “actual embodiment here” and “re-located presence there” (Klevjer 2012, 21). The prosthetic nature of the avatar reconfigures our corporeal “ecology” in terms of Gibson’s (1977) thought. By altering our bodily space, the avatar extends into the screen space, bridging the material divide and creating a new field of affordances and perceptual ecology (Klevjer 2012, 28; Gibson 1977; Norman 1999). This extension does not merely transport our physical presence into the digital realm but serves as a stand-in or replacement for our objective body, acting as a proxy on our behalf (Klevjer 2012, 28).

Through the lens of the “phenomenology of perception,” indeed, we can analyze this phenomenon and conclude that our embodied self is not just interacting with but is being re-located and transported into the screen space (e.g., Klevjer 2012, 32; Glöss 2024). This re-location implies a significant shift in how we experience our presence and agency within virtual environments. The avatar becomes a critical medium through which we engage with digital spaces, offering an extension of our physical capabilities and a new mode of interaction that blends the boundaries between the real and the virtual. An interesting issue, in this sense, is the kind of perception I may have of my body in a virtual environment—and of the feedback I may receive about my body from this environment (Piryankova 2015). Ultimately, it is a matter of finding out whether a real embodiment is possible in a virtual world (Boellstorff 2011).

In essence, the avatar acts as a conduit for our presence, redefining our sense of self in the context of the digital environment. This prosthetic extension allows us to navigate and interact with the digital world as if it were an extension of our own physical space. Consequently, the avatar’s role is not just as a “digital double” but as a transformative element that reshapes our perception and engagement within virtual environments. The reconfiguration of our body’s ecology through the avatar leads to a unique experiential reality, where the digital and physical intersect, creating a seamless integration of presence. This integration challenges traditional notions of embodiment and agency, suggesting that our digital interactions should be as real and significant as those in the physical world. As we delve deeper into virtual environments, understanding this relationship between the individual and the avatar becomes crucial in exploring

the evolving nature of digital experiences and the future of human–computer interaction.

If it is true that the question of dwelling implies rethinking our notion of the body (as a possession/belonging), it also requires further reflection on the dimension of space. If the avatar “dwells” in a virtual environment, and if the individual, through the avatar, can dwell in this space, what is its relationship to this space? In other words, what does it mean for the individual to act in that space, which, effectively, he/she does not inhabit through his/her body, but is only immersed in through a virtual body? The answer to these questions is not simple, since in that environment he/she acts, and by means of the appropriate instruments, his/her virtual representation/body carries out the tasks he/she orders it to do. What the avatar does has an impact on the virtual environment and modifies it (Diodato 2012, 2). Another ambivalence of the avatar is, then, a simultaneous “being-here” (in the physical world) and “being-there” (in cyberspace) and acting at the same time in two different places: “We are faced with a here and a there to which, moreover, correspond a different time horizon” (Trilles Calvo 2009, 432). The duplicity of the simultaneous being-there and being-here can be reinterpreted, according to Luciano Floridi, as an ambivalence between “*location* vs *presence*” (Floridi 2014, 71) in our “being located”: my presence (where I want to be or can be) does not necessarily coincide with my location (where I physically am), and that is where the splitting occurs (Wertheim 2000). For this very reason, the concept of “infosphere” has been introduced (Floridi 1999), that is to say, a new reality that is increasingly synchronized, delocalized, and correlated (Floridi 2014, 48). This doubling implies, as in mirroring (Valera 2022), two spaces, two bodies, two perceptions, and therefore two times, but a single ego (*self*): this is precisely what the process of virtualization of the self consists of.

All these considerations imply some meaningful relationship (regarding the construction of personal identity) of the self with the place to which it belongs. Let us explain further this point. If it is true that the metaverse is not simply a copy of the real world, insofar as it is made of virtual environments with their specificity (including virtual objects with their own consistency), also the interactions that occur in the metaverse are generative of different relations. Since these relations (or interactions) are constitutive of the virtual objects themselves, we could say that these objects change according to the events that occur in the metaverse, and that depend on interactions that are internal or external to the environment itself (virtual world and real world). Such a relation of retro-alimentation is meaningful, because it suggests new elements of the ontology of the virtual body (or object). First, virtual bodies have a twofold “position” in space, as Diodato (2012, 13) points out: “The virtual body is not a part of the internal world: the object-event of which

it is constituted is neither my dream nor my imagination, but an environment navigable by me and by others, a product of technology, and I remain aware of its difference with respect to what is usually called ‘reality’ (which, as we have seen, cannot be perfectly simulated). In short, I would say that the virtual body is neither internal nor external, but is, if you will, an outsidein, considering that this synthesis is not a mere sum, but is something else, that is, a testimony of the ontological novelty of the virtual body.” Second, virtual objects are also characterized by a twofold “position” in time, as Diodato (2012, 11–12) describes: “A virtual body occupies, assuming that these words have an intuitive sense, a certain portion of time–space, but not exclusively, as the virtual body happens within the time–space of a non-virtual body. Its temporal forms, moreover, are multiplied: what is its time? It certainly happens in the moment of interaction, but among its conditions of possibility, in its being a real body, there is the fact of having been previously written or recorded in a material support, in a memory. Thus, a virtual body is and is not itself in time and place, as its self-eventuation, its becoming-event depends upon the interaction with a user.”

The second kind of relation (between “physical” and “virtual” subjects) reveals a further interesting element: there is no bidirectional relation between “virtual body” and “physical body.” This means that some changes in the physical body can take place without generating changes in the virtual body, and vice versa (they can also generate changes, but this is not necessary). Because of this, the two orders of life (the “physical or real” and the virtual) can remain separate.

If, on the one hand, it is true that they can remain separate, on the other, it is also true that there exists some relation between them, and that this relation can be useful to rethink our “encounter” with virtuality in particular and with the new technologies more generally. The topic of place identity (linked to social identity, as we are considering metaverses) appears. We cannot explore this point further: nevertheless, we are referring here to the reflections developed in the field of the Philosophy of place (e.g., Malpas 1999). The same Malpas (1999, 1) argues: “There are obvious ways, of course, in which the environment determines our activities and our thoughts [...] but there are other much less straightforward and perhaps more pervasive ways in which our relation to landscape and environment is indeed one of our own affectivity as much as of our ability of effect.” Johnson (1987, xxxviii) expresses this concept in a similar way: “As animals we have bodies connected to the natural world, such that our consciousness and rationality are tied to our bodily orientations and interactions in and with our environment. Our embodiment is essential to who we are, and to what meaning is, and to our ability to draw rational inferences and be creative.” Our identity is tied to our place, indeed. In

a way, we belong to a place, and to places, in general. The metaverse should be one of these places and, in this sense, our identity may be linked to it.

We have therefore in this section delved into the nature of the human presence in virtual environments (i.e., the avatar). To understand what kind of relationship we have with such an “instrument of virtual presence,” we should delve into the perceptual dynamics that emerge in such virtual environments in the next section.

4 Metaverse, brain, perception, and experiences

From the time we are born, and even before, knowledge of the world begins with our senses. Perception starts with receptor cells that transform different kinds of stimuli into neural electrical signals that are encoded as trains of action potentials. Receptor cells include photoreceptors (vision), chemoreceptors (smell, taste, and pain), thermal receptors, and mechanoreceptors (touch, hearing, balance, and proprioception). The information captured by these receptors then travels through various sensory pathways to the cerebral cortex. Contrary to our intuitive understanding, what is perceived is not an exact copy of the world around us but a construct. Our sensory system is not a device of exact measurements but a system of inferences that provide us with clues about reality. It is the brain that deciphers and gives meaning to these clues. When I look at a glass of water, the information about it reaches us through photoreceptors located in our retina that can respond to light stimuli and then travels via the visual pathway to get to the visual cortex. What is perceived in this latter goes far beyond what was presented to our retina. The brain uses the information it has previously extracted as a basis for informed guesses: perceptual inferences about the state of the world (Kandel et al. 2012). Thus, our brain, nourished by the various sensory systems of our body, builds the world and our experience of it and ourselves.

Our sensory experience takes place within a body that feels like our “own body,” that moves according to our intentions, obeying our will (Kilteni et al. 2012). Usually, that body tends to be our biological body, giving coherence to our self and the representation of our body. But what happens when this dissociates? What happens when the perceived body is not one’s own, or when our biological body perceives a virtual world? The development of technology and the emergence of virtual reality and the metaverse have forced us to ask these questions.

Unlike previous technologies, such as television or social networks, which can influence our thoughts and attitudes, the metaverse can transform our reality (Gaggioli et al. 2015; Riva et al. 2018). Throughout evolution, our brain has been

developing a sophisticated prediction system, learning to anticipate sensory stimuli before they are actually perceived (Newen 2018; Riva and Wiederhold 2022). Let us get back to the example of the glass of water and imagine that we want to pick it up; for this, our brain tries to predict the perceptions it expects to receive, thus guiding the action (movement of the hand toward the glass). Then, the brain⁷ will analyze the obtained result (verifying if the hand reached the glass) (Riva and Wiederhold 2022). If the prediction is correct, the action is completed. If, on the contrary, a problem emerges (e.g., the glass is too close), the brain will activate its attention and cognitive resources to correct the error. To do this, our brain constructs two different predictive models that interact: one of the physical world that influences our perceptions (the glass) and another of the body (the hand) that guides our actions (Riva and Wiederhold 2022). Our bodily experience emerges from the link between the two models. On one hand, thus, the body is the object of perception, and therefore, our mind captures it as one of the objects present in the world; on the other, the body is what allows us to act and, therefore, is the “tool” through which the mind represents our intentions in the world (Riva and Wiederhold 2022).

The metaverse, through virtual and augmented reality, works similarly, trying to predict the sensory consequences of bodily movements, constructing the same scene (visible in the headset or glasses) and the same sensations (generated by sensors) that users experience in the real world (Riva et al. 2018; Riva and Wiederhold 2022). The sensation of presence is generated by the metaverse’s ability to predict how the mind simulates reality and then produce digital content consistent with these predictions (Riva and Wiederhold 2022). The more accurate the prediction, the more present the subject will feel in the virtual environment they are experiencing, even though they know the environment is not real (Riva et al. 2019; Riva and Wiederhold 2022). This ability of VR to alter the body experience gives it great therapeutic potential for conditions, such as anxiety, eating disorders, addictions, or psychosis (Riva et al. 2019).

The metaverse seeks, thus, to merge the virtual world with the physical world in such a way that it is perceived as one. The same happens with the virtual body generated by avatars and the biological body. To achieve this, it relies

⁷ We will inevitably refer to the brain as the subject of those actions so that the reader can generally understand our argument. However, it is worth emphasizing that it is always the whole person the real subject of those actions, not a part of it (in this case, his/her brain). Just as the eye does not see (it is the person who sees *through* his/her eye), the brain, *strictu sensu*, does not analyze (it is the person who analyzes *through* his/her brain). In fact, if we claimed that the brain is the real subject of the action (and not the person), we would be incurring the so-called “mereological fallacy” (Bennett and Hacker 2003; Smit and Hacker 2014).

on the prediction system explained earlier. This is a system that is easy to manipulate, as evidenced by the classic experiment of the “rubber hand illusion.” In this experiment, the participant sits comfortably and places both hands on a table. The left hand is hidden from the participant’s view by a vertical board placed on the table. A left rubber hand is placed on the table aligned and close to the real hand. Using two identical brushes, both the left rubber hand and the real hand are synchronously stimulated. After a few seconds of stimulation, the participant is likely to experience a deep illusion, feeling the rubber hand as their own (Botvinick and Cohen 1998; Kilteni et al. 2012). Additionally, when asked to indicate where the real hand is, with their eyes closed, the participant will point to the rubber hand (Botvinick and Cohen 1998; Costantini and Haggard 2007; Kilteni et al. 2012; Tsakiris and Haggard 2005). Another example along the same lines is what happens with phantom limb syndrome where patients have the vivid impression that the amputated limb still exists, feeling the presence of pain in the empty space where their limb used to be (Ramachandran and Hirstein 1998). In both cases, the experience of our body is not direct, but the result of a simulation created by our mind through the multisensory integration of different bodily signals. And this simulation occasionally fails (Riva and Wiederhold 2022).

In summary, entering the metaverse involves sensory, cognitive, social, and emotional experiences similar to those produced by the external world. Furthermore, even interoceptive experiences are beginning to be imitated by new technologies (Riva et al. 2017), bringing the virtual world closer to the real one. As we continue to explore and integrate these virtual environments, we may discover new dimensions of our identities and expand the possibilities of human experience.

5 Like a new Proteus? Re-representing our “self,” toward new ontologies

The embodiment in the metaverse may liberate us from the constraints of time and place, creating other virtual, times, and places. Kozinets and Kedzior (2009) call this process “re-worlding,” which means taking us out of the constraints of our physical space and providing us with new abilities. In Belk’s (2013, 486) words, “the ability to remodel the virtual environment extends the identity project far beyond the body [...] Therefore, places in virtual worlds can also be considered vivid markers of virtual identity.” Indeed, our presence through avatars in the virtual world, precisely because of the possibility of immersion in them, helps to generate new identities. Since our identity is also the result of interacting with environments, it is safe to assume that one such environment in which we can actually inhabit is

precisely the virtual world, generating, thus, new identities. This identity construction is always a co-construction: our identity should not only be found in behavior or the reactions of others but in the capacity to maintain a continuous narrative (Giddens 1991, 54). This aspect is particularly relevant, since in virtual worlds, we continuously narrate stories through our presence and immersion: we are writing a new story through a new body that will influence the development of our “self.” We recall here the idea of the “narrative subject” developed by Carr (1986, 126): “Narration in our sense is constitutive not only of action and experience but also of the self which acts and experiences. [...] I am the subject of a life story which is constantly being told and retold in the process of being lived.”⁸ In this sense, virtual environments may enhance and deepen our “self.” Nevertheless, virtual environments may also allow us to alter our self-representation drastically. Studies have shown that people infer expected behaviors and attitudes by observing the appearance of their avatars, a phenomenon known as the Proteus effect (Yee et al. 2009). This effect, named after the shape-shifting Greek god Proteus, illustrates how our digital avatars can influence our behaviors and self-perception, as Belk points out: “This phenomenon has been labeled the Proteus effect after the ancient Greek god who could take on whatever form he wished. The mind is an embodied mind, but it is also now a reembodied mind extended into our avatar” (Belk 2013, 483).

This phenomenon demonstrates the plasticity of our identities and how virtual environments can serve as laboratories for experimenting with new facets of self. For instance, users with taller avatars are more aggressive in negotiations than those with shorter avatars, and more attractive avatars foster friendlier interactions, reduce interpersonal distance, and increase the frequency of self-disclosure (Yee et al. 2009). Another study revealed that avatars dressed more formally emphasize education, books, and numerical content in their writings, whereas avatars in more casual attire focus more on social behavior and entertainment. The Proteus effect is influenced by the virtual world’s context and the individual’s degree of shyness, reflecting that virtual bodies can change how we interact with others in both virtual and real environments (Yee et al. 2009).

Furthermore, as the metaverse continues to evolve, it will become increasingly important to understand the implications of our digital selves on our real-world identities. The blurring of boundaries between physical and virtual realities presents both challenges and opportunities for personal and societal growth. By embracing the potential of VR to reshape our perceptions, behaviors, and interactions, we can

⁸ A similar concept of the narrative subject as the subject unifying different experiences may be found in MacIntyre (2007, 217).

harness this technology to create more inclusive, empathetic, and adaptive communities. The ongoing exploration of the metaverse will undoubtedly reveal new insights into the nature of identity, presence, and human connection in an increasingly digital world.

It seems like the virtual world may have two main impacts on our identities: it may generate a sort of “Identity tourism” (Nakamura 2002), or digital nomadism; or it may produce extended selves (Belk 1988; 2013): “The self is seen as embodied (i.e., not merely thoughts) and that material things (i.e., objects in the noun categories) most clearly make up the extended self” (Belk 2013, 478). The virtual world expands the concept of the extended self, thus, by allowing individuals to accumulate and interact with digital possessions. For example, social media profiles, gaming avatars, and online collections can become integral parts of one’s identity, reflecting and shaping who they are.

Nevertheless, the process of extending selves is not something immediate. As the same Belk (2013, 477) argues, it implies five main steps: dematerialization, reembodiment, sharing, co-construction of self, and distributed memory. In this paper, we will mainly focus on the first two steps, which have more powerful ontological implications than the following three.

First of all, it is worth focusing on dematerialization.⁹ This is the first step (or condition of possibility) for reembodiment: in other words, it is only possible to reappropriate one’s body after distancing oneself from it. In this sense, the dematerialization of our ego is what makes the embodiment of a virtual body possible. The dematerialization of our data—as a consequence of the dematerialization of currency, personal relationships, etc.—has thus led to a dematerialization of the self, that is, a reconstruction of our identity from the information we release.

In a sense, concerning virtual environments and avatars, dematerialization is the result of the “datafication of the self” (Koopman 2019). Once body inputs are translated into data, it is possible to thus reconstruct the self from that same data. In this sense, the password for accessing data is thus transformed into the gateway to the self itself (Belk 2013, 484): all information concerning the self is included there. The password thus becomes the gatekeeper of human intimacy, once the self is dematerialized.

Indeed, since “things are disappearing right before our eyes” (Belk 2013, 478), we have to wonder what our relationship to these immaterial possessions is. The dematerialization of the self is a profound shift in how individuals

perceive and attach significance to their possessions in the digital age. Traditional material possessions, such as books, photos, and music, have long been integral to one’s extended self, serving as physical embodiments of personal identity and memories (Belk 2013, 478). However, with the advent of digital technology, these tangible items are increasingly replaced by their digital counterparts.

Russell Belk’s (2013, 478–479) insights into the phenomenon highlight a deeper inquiry into the nature of ownership and identity in an era where virtual possessions become commonplace. The convenience and accessibility of digital items offer a new dimension to how we interact with our possessions. For instance, e-books and digital music libraries can be carried effortlessly, providing an on-demand personal archive. Yet, this shift also introduces a paradox: the more ephemeral nature of digital possessions may undermine the depth of attachment traditionally afforded to physical items. Belk further explores whether consumers can derive the same sense of self and status from immaterial possessions. Digital devices, while being physical, act as gateways to vast digital ecosystems filled with non-material possessions. The curation of social media profiles, virtual goods in online games, and digital art collections all contribute to an individual’s digital identity. These virtual possessions can, indeed, enhance one’s sense of self and confer status within specific digital communities, reflecting a modern extension of personal identity.

However, the question remains whether these digital forms can evoke the same level of experiential value and emotional connection. Physical objects often carry a history of tactile interactions and personal narratives, which digital counterparts may lack. As such, while digital possessions offer convenience and new forms of engagement, they also challenge traditional notions of material attachment and the essence of self.

As we mentioned above, dematerialization—as a consequence of datafication—is the first step toward reembodiment. It refers to the process of transferring or recreating one’s identity and presence in a virtual, digital environment. This concept encompasses several aspects, such as: 1. creating and customizing a digital avatar that represents oneself in the metaverse. Users can imbue their avatars with their personal characteristics, traits, and even social identities. This can include customizing appearance, mannerisms, and other attributes to reflect their real-world self or an idealized version of themselves. This avatar can be a realistic representation or a fantastical version, depending on the user’s preference and the platform’s capabilities, as Belk argues: “The relative freedom of configuring our avatar bodies has led some to suggest that our avatars represent our ideal selves [...], possible selves [...], aspirational selves [...], or a canvas on which we can ‘try out’ various alternative selves” (Belk 2013, 482). Indeed, recalling a famous

⁹ We use the concept of dematerialization to refer to a state transformation of physical reality. Clearly, dematerialization does not mean the loss of essence or reality, but simply a transformation of the material substrate. For more on this topic, please see Somaini (2023).

New Yorker cartoon's sentence, "on the Internet, no one knows you're a dog" (Peter Steiner, cartoonist, July 5, 1993, in Belk 2013, 481), and that is the sense of reembodiment. 2. Reembodiment also involves how users interact with the virtual world and experience sensory feedback. Advanced technologies like haptic feedback, virtual reality (VR) headsets, and motion capture can enhance the feeling of presence and immersion, making the virtual body feel more like an extension of the user's real body (e.g., Hwang et al. 2024; Kurzweg et al. 2024; Villa et al. 2024). In the metaverse, this process allows for social interactions where users can communicate, collaborate, and build relationships through their avatars. This creates a sense of social presence, where the virtual interactions feel genuine and meaningful. In this sense, reembodiment can be described as a progressive process of auto-identification: "Together with designing our avatar, giving it a name, learning to operate it, and becoming comfortable with it, we gradually not only become reembodied but increasingly identify as our avatar" (Belk 2013, 481). In this regard, reembodiment cannot be considered as "the bracketing of presence" (Stanghellini and Sass 2021), since "a persona is a player, in a virtual world. That's in it. Any separate distinction of character is gone—the player is the character. You're not role-playing a being, you are that being; you're not assuming an identity, you are that identity; you're not projecting a self, you are that self" (Bartle 2004, 155). 3. From the previous points, we can conclude that reembodiment embraces the persistence of one's digital identity and assets across different virtual spaces and over time. This means that a user's avatar, achievements, and belongings in the metaverse remain consistent and carry over as they navigate different virtual environments, giving a sense of continuity to the user. The individual's progression may coincide, then, with the avatar's development. Indeed, when the person is online, the individual *is* the avatar: "At the persona level, the player no longer distinguishes between himself and the avatar" (Belk 2013, 482). 4. This last fact has some evident consequences on the "real" individual, outside the virtual environment (or metaverse): "Besides enacting the character we portray, the mask can grant us some anonymity and safety, even to violate taboos. But, since we are inside a mask or costume, we do not see ourselves and must rely on feedback from others. With an avatar, however, we are not only inside, anonymous, and recipients of feedback from others; we are also outside and constantly looking at ourselves as avatars. Although focused on the alter ego of the avatar, this is a much more effective mirror and reinforcement than simply relying on others' feedback" (Belk 2013, 482).

The figure of the avatar, in this sense, is very interesting, since it represents a middle way between the mirror image and the "perfect double": concerning the possibility of acting, it is not totally independent, like the perfect double, but

it is not integrally dependent either, like the mirror image. While the mirror image "does" everything I do (moves, smiles, etc.), the perfect double does not act in the same way as its double, and, on its part, the avatar does mainly what the user wants it to do. Herein lies the essential difference between the image and the self, between the individual and its representation, and thus between doing and acting (Valera 2022, 79). Furthermore, unlike the previous two, there is a feedback effect of the avatar on the "real" individual, since this latter is immersed in a virtual world through the avatar itself. Paraphrasing what we mentioned above, the individual through the avatar is not role-playing a being, he/she is that being; he/she is not assuming an identity, he/she is that identity, he/she is not projecting a self, and he/she is that self. In this regard, reembodiment in the metaverse is about creating a coherent, immersive, and interactive digital identity that allows users to exist and engage in virtual environments in meaningful and personalized ways.

6 Conclusion: is there "someone" out there?

In this paper, we have explored the emerging ways of inhabiting the metaverse (or virtual environments), that is, the new anthropologies and ontologies that arise from our interaction with (and immersion in) the digital. In this sense, starting from a conceptualization of the metaverse as a possible "environment" for the human being, we tried to understand the meaning of "having" a virtual body (the avatar), which is configured as an attempt mirror that tried to mimic ourselves. To clarify these last points, we have revisited the entire process from dematerialization through datafication to reembodiment. In this sense, for the individual to be able to inhabit these environments—in which he is immersed, thanks to technological devices and prostheses—it is necessary not to consider the self simply as an illusion, as something fictitious.¹⁰ Indeed, we argue that there really is "someone" in the metaverse: we are really present in these virtual environments. This is not fiction. Indeed, switching between the "real" individual and the avatar would attest to the persistence of the self, beyond the material world. This implies rethinking—as we did in this paper—the issue of corporeality in the current virtual world, the meaning of our perceptions and emotions mediated by "new bodies."

What should be clear, at the end of this paper, is that one cannot clearly assess the ethical dimensions linked to the metaverse without a reference ontology (or hermeneutic paradigm). In this paper, we try to outline some elements of

¹⁰ In this regard, we do not agree with Hood (2012, 134) when he argues that the "authorship of actions requires the illusion of a unified sense of self," recalling a Humean approach to human nature.

this ontology, leaving, of course, some questions inevitably open. From this ontology of “presence,” then, it will be possible to raise ethical and bioethical questions concerning our interaction in these new environments for the human being.

From this ontology of “presence,” it will be possible to raise ethical and legal questions about our interaction in these new environments for human beings. It is worth recognizing that the metaverse is not simply a replica of the real world or an augmented reality; rather, it is a distinct, rapidly evolving space with seemingly limitless potential, necessitating regulations to safeguard the well-being of its participants.

It is challenging to grasp the idea of immersing oneself in a virtual world while remaining physically present in one’s own space, simultaneously assuming multiple personas. It is equally difficult to comprehend the possibility of interacting with hundreds or thousands of other participants (avatars) within this virtual environment, a feat impossible in the physical world. Is self-regulation sufficient? What about ethical considerations?

These questions not only prompt reflection but also give rise to new modes of development and coexistence within the metaverse. These new forms of engagement bring about inherent risks, including identity theft, unauthorized use of personal information, and cyber-attacks, but also hold the potential for benefits such as enhanced collaboration and creativity.

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Declarations

Competing interests The authors declare no competing interests.

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