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Virtuality+: The physical body in virtual reality and the path toward augmented virtuality[1]

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Abstract. While many scholars have decried the erasure of the body in virtual reality (VR), this paper focuses on the body – and the physical reality for which it stands – as a critical component of any experience of virtual reality. Specifically, studying VR from the perspective of the physical body allows for a more nuanced appreciation of the unique reality of this «virtual» reality. Moreover, this paper argues that the body should not be seen as a distraction from the immersive potential of VR, but rather as a potential tool for augmenting what virtual reality can currently offer.

Keywords: Virtual Reality, body, virtuality, reality, phenomenology.

INTRODUCTION

I would like to begin with an anecdote. On various occasions, either in conversations with colleagues or during conference presentations, I heard someone decry the fact that when they looked down at their body when immersed in a virtual reality (VR) environment, they were surprised, even disoriented, by the absence of a body; either theirs or even that of an avatar. I have since found several forceful assertions to that effect in scholarship on VR from the 1990s to this day (see Balsamo [1995]; Murray, Sixsmith [1999]; Popat [2016]; Dalmasso [2019]; Zimanyi, Ben Ayoun [2019]). I am of a differing opinion. Namely, that we do really have a body in VR, albeit one whose nature and qualities merit more thoughtful consideration. In the following essay, I want to argue that the body – and the physical reality which it embodies – is not so much «missing in action», as the title of Sita Popat's insightful article puts it, but perhaps simply misunderstood. By extension, my analysis of the body will lead me to make broader claims regarding the potential of con-

[1] This paper's title is in reference to David J. Chalmers' *Reality+*, a major interlocutor of this project.

sciously integrating physical reality in one's experience of virtual reality.

In what follows, I take the body as a central object of study, but also as a tool for approaching physical and virtual «realities» in VR. That is to say that while this essay is inspired by David J. Chalmers' recent work on the (techno)philosophy of virtual worlds and the issue of «reality» therein (Chalmers [2022]), I also make use of a phenomenological toolkit to analyze how different realities *appear to* and *function for* an embodied user. To begin, I borrow from Chalmers' discussion of what I will call the «reality status» of virtual entities, namely the issue of if and how these special entities may be considered real. This will allow me to argue for a similar rejection of the outmoded distinction between «virtual» reality and what some might call «real» reality. I depart from Chalmers, however, in my focus on a phenomenological approach to the experience of virtual environments from the perspective of my own corporeal body[2].

Central to this approach is the belief that being attentive to one's perception of virtual worlds, objects and bodies can reveal the complex intermingling of the physical and virtual entailed by VR, or by any experience on the reality-virtuality continuum (Milgram et al. [1995]). In fact, to dispel the idea that our bodies are absent in VR, I will put forth an alternative to the typical opposition between virtuality and reality by suggesting that bodies are best understood as occupying a liminal position and as contributing to a form of «augmented virtuality», a term I borrow and adapt from Paul Milgram et al. (Ibid.). This will entail refocusing the presence of the body as an important vector toward immersion in virtual worlds, rather than as a distraction from the virtual, as it so often has been considered.

HOW REAL IS VIRTUAL REALITY?[3]

One of Chalmers' most resonant claims about virtual objects is that they are, in fact, real. The author makes this point throughout his book, but one example stands out in the context of this paper. This concerns the now famous reality-virtuality continuum introduced by Milgram et al. (Ibid.). The continuum describes all manner of mixed realities – what we would call today extended reality (XR). These are bookended by reality and virtuality, where «reality» names the physical environment a user inhabits, and «virtuality» is exemplified by «a VR environment […] in which the participant-observer is totally immersed in a completely synthetic world» (Ibid.: 283). The authors are careful to point out that reality and virtuality should in no way be thought of as antithetical to one another, being that they are simply «opposite ends of a *continuum*» (Ibid.). Nevertheless, Chalmers (Chalmers [2022]: 236) criticizes this naming convention, «because it bakes in the premise that virtuality is opposed to reality. […] A better name would be the *physicality-virtuality continuum*». If Chalmers rejects the opposition between virtuality and reality, how does he define the notion of the virtual in relation to the real? More importantly, how does physicality play into virtual reality as it exists on this new spectrum?

For Chalmers, virtual objects might not be *the* real entities to which a given word refers in common parlance, but they are real nonetheless. Put simply, virtual objects exist virtually just as physical entities exist physically; each are merely different instantiations of a given concept in their respective reality. Virtual pets, vehicles, and objects are all real, even though some are harder to consider as real as their physical counterparts.

[2] Because it is based on a phenomenological account of my own experience of virtual reality experiences, this discussion is limited to consumer-grade VR head-mounted displays. To avoid diluting my arguments by speculating on experiences I did not personally have, I will omit devices such as haptic suits and gloves or olfactory attachments. While these exist and while they might eventually further the claims I make in this essay, they currently remain out of reach for most and would therefore take away from the following discussion of contemporary VR.

[3] I borrow this title from Chalmers (2022): 192.

This raises a number of questions. How can we explain this appreciable difference in the reality status of certain virtual entities over others? What are Chalmers' criteria for considering these virtual objects as real? Finally, how do bodies – and a phenomenological perspective more broadly – affect our understanding of how real «virtual» reality truly is?

Out of the many ways Chalmers argues that virtual objects, worlds, and phenomena are real, three main criteria merit our attention[4]. To summarize, these relate to metaphysics, appearances, and functionality. The first way virtual objects can be said to be real is that they are in fact «realized» by bits in much the same way that physical objects are the product of an underlying structure of particles and atoms, themselves made up of fundamental quantum processes[5]. With this explanation comes great limitations, however. Being that virtual objects exist in a different manner than we do, this criterion is also impossible for us to judge. It might tell us that virtual objects are real in and of themselves, but not whether they are real *for us*.

This is where a phenomenological approach comes into play, asking us to consider how virtual phenomena appear to us, and how their appearance relates to that of their physical counterparts. The second of Chalmers' criteria is helpful in this regard, as it relates to the appearances of virtual objects. As Chalmers (Ibid.: 66-67) indicates, VR satisfies the «idealist» view according to which «appearance is reality […] If something appears real, and there's no appearance to the contrary, it is real». In one example the author gives, if a virtual apple appears red, then it really is (virtually) red (Ibid.: 210)[6]. At first glance, this would seem to align with the phenomenological doctrine according to which considerations of one's perception of the external world are given priority over supposedly *a priori* knowledge of reality (see Merleau-Ponty [1945]; Zahavi [2018]). However, a major caveat of this criterion is that it only functions – when at all – within the limited sensorial range accounted for by contemporary VR headsets, the nature of which Craig D. Murray and Judith Sixsmith describe as predominantly optical (Murray, Sixsmith [1999]: 316). At the time of writing, it would be more appropriate to say that dominant VR HMDs are *audio*-visual in nature. The fact remains, however that other senses (e.g., touch, smell, taste, etc.) are excluded from all but the most niche immersive technologies.

Indeed, since Chalmers likes to discuss virtual worlds in their (as yet unrealized) ultimate potential, he often glosses over the fact that «[c]urrent VR headsets achieve *audiovisual* immersion […]. They don't achieve *bodily* immersion, in which you experience your whole body as part of the world» (Chalmers [2022]: 189). While certain objects in virtual worlds might appear a certain way, they only do so for the eyes and ears. This means that if we leave behind the visual connotations of the word «appearance», it becomes clear that virtual phenomena do not appear to be real to the nose, mouth, skin, and other sense organs (e.g., in terms of temperature, equilibrium, pain, etc.). Indeed, as Sita Popat (Popat [2016]: 375) remarks, quoting Anne Cranny-Francis «"[o]ne cannot not

[4] There are five criteria in total: «Does it really exist? Does it have causal powers? Is it independent of our minds? Is it as it seems? Is it a genuine X? These five criteria – existence, causal powers, mind-independence, non-illusoriness, and genuineness – capture five different strands in our concept of being real. When we say that something is real, we sometimes mean one of these things and sometimes a mix of them» (Chalmers [2022]: 114).

[5] N. Katherine Hayles offers a similar explanation of this virtuality/reality opposition: «*Virtuality is the cultural perception that material objects are interpenetrated by information patterns*. The definition plays off the duality at the heart of the condition of virtuality – materiality on the one hand, information on the other. Normally virtuality is associated with computer simulations that put the body into a feedback loop with a computer-generated image» (Hayles [1999]: 13-14). Original emphasis.

[6] «For now, I'll just say that an object is virtually red when it looks red to us, at least to normal human observers under normal conditions for VR, such as wearing a headset. This is parallel to a common view of physical colors. What does it mean to say an apple is red? Very roughly, an apple is red when it normally *looks red*, at least to normal observers under normal conditions for ordinary vision, such as daylight» (Chalmers [2022]: 210).

touch, so one is always connected to the world – to other people, species, objects, phenomena". But in a virtual environment the experience is the opposite: the user cannot touch the virtual objects, people, and phenomena, although she can touch her own body and the physical objects around it (which may not be visible in the virtual environment)». This limitation is damning for appearance as a criterion of reality in the context of VR. Indeed, a phenomenological approach to the body's place and potential within virtual environments will allow us to see in the latter half of this paper that these other senses challenge the impression that virtuality can be considered real.

The final of the three criteria I wish to evoke at this moment relates to the functionality of virtual objects as it compares to that of their physical homologues[7]. On several occasions throughout his book, Chalmers seeks to demonstrate that virtual objects have «causal powers», namely that they «can affect one another. A virtual bat can hit a virtual ball. An avatar can scoop up a virtual treasure, and so on» (Chalmers [2022]: 196). Functionality and causal powers are particularly useful tools when discussing virtual realism. While the word «cat» typically refers to physical cats rather than virtual cats, context clues allow us to understand that when I say I saw a cat in VR, I am referring to a (real) virtual cat. Part of Chalmers's project of bringing causal powers in conversation with the issue of language is to reject a kind of absolute internalism that would imply the meaning and function of things are independent of their context. Instead, he focuses on the function a given object serves within a virtual world, specifically as it relates to its being used by human agents. As Chalmers writes:

> In some cases, human minds may play a role in making an object what it is. What makes a table the object that it is? In part, that we use it as a table. A statue is what it is in part because we built it and regard it as a statue. Money is what it is because we treat it as money. These things are also true for virtual tables, virtual statues, and virtual money. Physical objects like statues are made of atoms, perhaps with a contribution by human minds. In the same way, digital objects like virtual statues are made of bits, perhaps with a contribution by human minds. (Ibid.: 195-196)

In other words, a (virtual) table deserves to be called just that if it serves for me the function of being a table (e.g., a surface upon which to set down a given object, or perhaps something I can climb onto if need be). Where I start to disagree with Chalmers, at least to a certain degree, is when he writes (Ibid.: 196): «Virtual objects can also affect *us*». To be sure, virtual object *can* and *do* affect us in powerful ways, but these are limited in both scope and efficacy. I return here to my earlier critique of the audiovisual limitation of contemporary VR. The causal powers of virtual objects are most salient when it comes to their visual or auditory capacities. A virtual river might *sound* like the real thing, but perhaps it won't make me wet – maybe not even virtually so – as I would expect water to do in physical reality. A virtual flower might *look* like the real thing, but it probably won't feel or smell like the real plant. In a curious reversal of Shakespeare's famous adage, a virtual rose might keep the name and visual appearance, but it would lack the power to smell as sweet, as well as the risk of pricking me with its thorns[8].

The logical continuation Chalmers' arguments is that, «while virtual reality isn't the *same* as ordinary physical reality (at least, not unless physical reality is itself a simulation), it's a genuine real-

[7] We find echoes of this criterion in the way the editors of this issue framed «virtualization», from the perspective of Grant Tavinor's recent *The Aesthetics of Virtual Reality* (2021): «a transformative process through which something maintains its function, while being instantiated in a non-customary way».

[8] Chalmers addresses this limitation when he writes that «objects have many grades of causal powers. […] These virtual objects affect only our perception; they have the causal powers to make you experience a virtual elephant or a virtual mountain. […] But if you think of reality as coming in degrees, you could reasonably think of these decorative objects as being less real than interactive objects» (Chalmers [2022]: 197).

ity all the same» (Ibid.: 202; original emphasis)[9]. However, what becomes clear in the counterexamples I have proposed here is that the reality status of virtual objects is not as easy to determine when we consider how the external world is perceived by users inhabiting bodies that are physical, rather than virtual. Adding the body to this discussion not only complicates the debate around whether virtual entities are real, but it also offers a path toward a potential resolution in the form of a hybrid «augmented virtuality».

WHERE AM I?[10]

To set the stage for my analysis of the corporeal body in virtual reality, allow me to describe a unique encounter I had with virtual reality. I have selected *The Book of Distance (*Randall Okita, 2020) for this preliminary analysis as it presents a virtual world which exemplifies some of the previously described criteria for judging the reality status of virtual reality, as well as some of their most salient limitations. I saw *The Book of Distance* for the first time in June 2020, during a virtual edition of the Cannes film festival. Having cleared all the furniture in the living room of my modest apartment, I put on my Oculus (now Meta) Quest headset, along with a pair of handheld controllers. I was instantly transported to a space that was mostly black and empty, save for a pedestal on which lay a book which I needed to open in order to start the story. It is important to note at this point that I did not, in fact, have a body in this space, save for a pair of floating hands mapped to my controllers. Nevertheless, guided by shining particles I opened the book cover with my right hand and was greeted by a short introductory paragraph. Upon turning the page once more, I found real photos of the filmmaker and his grandfather playing horseshoes, as the text behind one photograph explained. When I grabbed the horseshoe that was lying on the opposing page, a patch of bare ground emerged from the darkness to my left with a stake conspicuously sticking out of it, allowing me to test my skill at throwing the weightless object. At this point, a stylized avatar of Randall Okita appeared, telling me about the way his grandfather taught him to play the game. From there, and for the duration of the thirty-minute experience, the filmmaker invited me on a journey through different tableaus retracing his grandfather's steps from Hiroshima in 1933 to western Canada, and eventually to a Japanese-Canadian incarceration camp during the Second World War.

Throughout the narrative, I was invited to manipulate different objects (letters, photographs, newspapers, personal belongings, etc.) and perform various actions (write a letter, take pictures, plant strawberries, etc.). While the director chose to render this virtual world in a stylized manner rather than in a photorealistic style, all the elements of the scenery did bear the appearance of the physical objects they represented (see figure 1). Even when more realistic objects appeared (notably the real family photos which showed up when I used the camera to capture key moments in the story), the fact remains that all objects that could be seen within the virtual environment appeared to be as they are: a camera, a field of strawberries, a house, a rocking chair, a black and white photograph, etc. Upon first inspection, then, the world of *The Book of Distance* does seem to satisfy the three criteria described in the previous section: the various virtual objects are «realized» by bits, which enable their presence and are crucial to their appearing before us as they are; they «appear» to be real and bear all the markers that allow us to identify different objects as what they really are; finally, they «function» in the way we would expect them to (i.e., the camera takes pictures, the mallet helps us drive stakes into the ground, etc.).

Upon closer inspection, however, it is not hard to see where Chalmers' criteria fall short. While

[9] The issue of whether we live in a simulation is central to Chalmers' project, but it is beyond the scope of the present essay. However, a more thoughtful critique of Chalmers' handling of that concept would be needed to highlight some of the shortcomings of his arguments on the matter.

[10] This subtitle is in reference to Daniel Dennett's essay of the same name (1978).

[**Figure 1.** Despite their stylized appearance, many of the objects are interactable in The Book of Distance (Randall Okita, 2020). Courtesy of the National Film Board of Canada].

the metaphysical criterion is beyond our capacity to evaluate, the other two criteria are easier to challenge through phenomenological analysis. To begin, objects in *The Book of Distance* may bear the visual and auditory appearance of their counterparts in physical reality, but they fail to translate any of their other sensory characteristics (e.g., the weightlessness of the horseshoe and other objects, the complete absence of odour in vastly different environments [from the sea to a farm in rural Alberta], the lack of distinct texture in different objects, etc.)[11]. This demonstrates the shortcoming of the second criterion (appearance), at least as far as current virtual reality technologies are concerned. Shifting to causal powers, there are only a few predetermined occasions when these are fully functional. In most other cases, I could not choose to pick up an object and use it in a way that was not intentionally programmed as such in the making of the film. In these moments where I might have wanted to use a given object as I pleased, it became clear that the virtual objects lacked many of the causal powers an equivalent physical object would normally possess.

The limitations of Chalmers' criteria are made even more apparent when I attend to my immediate physical sensations, specifically as they concern senses other than vision and hearing. When extending my attention to phenomena that are not audiovisual, I cannot help but be drawn away from the virtual realm and back to physical reality. Paying attention to my tactile sensations, the physical dominates over the virtual as I shift to describing the feeling of the wrist strap, the controller's weight and texture in my hands, the weight of the headset on my brow and on the

[11] This is a recurring problem in virtual reality, as suggested by scholarship from the 1990s which likewise highlight the lack of sensory feedback in VR. In the context of touch, Craig D. Murray and Judith Sixsmith write: «Similarly, Hayles (1992) describes the act of closing the hand in VR to grasp an object. While the person sees the virtual object, often there is no kinesthetic feedback of touch. "Proprioceptive sense flows out of the body to meet the artifact, but since there is no material object, it returns a feedback loop that acts to de-materialize the body"» (Murray, Sixsmith [1999]: 333). See also Hayles (1993): 168.

ridge of my nose, the head strap tightly cinched around the base of my skull, and perhaps even the uncanny proximity of the Fresnel lenses to my glasses[12]. I could even expand my field of sensations and attend to the warmth of the headset, the build-up of fog on the lenses obscuring my vision of the virtual world, or the smell of the rubber membrane pressed around my eyes and nose. Broadening my attention still further outwards, I could also describe my awareness of my partner's presence and movement within our cramped living space and the scent of coffee brewing in the adjoining kitchen, two more elements which contradict what my eyes and ears told me was happening within the virtual world.

While I did feel a characteristic sense of presence within the virtual environment of *The Book of Distance,* a phenomenological description of my immediate sensations makes clear to me the inexorable presence of the corporeal body within a virtual reality which is predicated upon the exclusion of all things physical. What I aim to demonstrate in describing all these incursions of the physical world is not to say that I consider these virtual environments and virtual objects to be any less real than Chalmers would consider them to be. Simply, I wish to highlight the complex and hybrid character of any current experience of VR. While we see and hear real virtual objects, we are also always sensing phenomena that come from the physical world which, in many cases, are framed as roadblocks toward immersion within virtual realities. Conversely, we cannot see those very same things which we sense in the physical world. Case in point being the corporeal body, whose status as a physically real yet virtually non-existent entity merits further attention.

VIRTUALLY PRESENT, PHYSICALLY INVISIBLE[13]

The absence of one's physical body from virtual reality has been highlighted by many scholars since the technology's earliest iterations. In what follows, I offer a brief overview of some comments on the perceived absence of the body in VR, followed by a discussion of what this absence represents, and finally a possible solution to this conundrum. The recent revival of VR in the 2010s brought along a wave of scholarship on the body's absence in virtual environments. For example, Anna Caterina Dalmasso (Dalmasso [2019]: 109) writes of the person experiencing Alejandro González Iñárritu's *Carne y Arena* (2017) that: «She feels her own body, but she cannot see it». Sita Popat makes a similar argument, noting on several occasions how she could not see her body in VR, describing it as «missing in action»[14]. More recently, Eszter Zimanyi and Emma Ben Ayoun have echoed this concern for the «visual absence» of the body in VR, which the authors also describe in terms of a forcible erasure (Zimanyi, Ben Ayoun [2019]: 17).

While all three examples speak of the physical body as being invisible, missing, or erased within VR, the authors are ultimately describing a kind of phenomenological confusion that is at the heart of most experiences of virtual reality. Popat (Popat [2016]: 371) says it best when she describes her experience in VR as being «neither bodily nor metabodily anchored; instead, it was shifting and slipping, simultaneously both and neither. […] this was the experience of a single subject with blurring boundaries and definitions». Already in the 1990s, this phenomenological uncertainty was

[12] Interestingly, Chalmers does address the presence of the screen, dismissing it as phenomenologically invisible: «In the case of a VR headset, the case against seeing screens is even clearer because the screen isn't visible. Instead, you see right through the screen, all the way to virtual objects, such as avatars and buildings, in a three-dimensional space» (Chalmers [2022]: 208).

[13] This is the subtitle for Alejandro González Iñárritu's monumental VR exhibit *Carne y Arena* (2017).

[14] A few examples are: «And yet, glancing toward where my senses were screaming that my body should be, I saw nothing. My body was, I will argue, "missing in action"» (Popat [2016]: 361); «My body was highlighted by its visual absence […] The visual absence of my body, missing as object, focused all of my attention on my action as subject» (Ibid.: 365); «my missing, yet acting body» (Ibid.: 366).

being described by scholars of the nascent technology. In *How we Became Posthuman*, for example, N. Katherine Hayles remarks that: «Questions about presence and absence do not yield much leverage in this situation, for the avatar both is and is not present, just as the user both is and is not inside the screen» (Hayles [1999]: 27). Meanwhile, Murray and Sixsmith describe a similar duality when they ask, «how is it that while we are physically sitting in a room at a computer terminal we can also be phenomenally embodied in virtual representations?» (Murray, Sixsmith [1999]: 315). One of the answers the authors propose for this ability to feel embodied in VR over one's immediate physical environment is that it hinges upon a «dampening of awareness in reality and a heightened acceptance of the surrounding virtuality» (Ibid.: 324). In other words, a user's ability to direct their intentionality toward their virtual surroundings rather than their physical reality depends on what Anne Balsamo calls a «willful repression of the material body» (Balsamo [1995]: 123). With that said, the impossibility of fully repressing the physical aspects of our embodied experiences may explain the phenomenological confusion I alluded to earlier.

The rationale behind this erasure of the physical realm – and the corporeal body along with it – derives from the impression that the physical distracts and detracts from the virtual. This is not to deny Chalmers' arguments as to the reality of virtual entities. Simply, the nature of their reality must be recognized as different from that of the physical reality upon which is predicated our very mode of being in the world. Once again, while virtual objects might be real in and of themselves, they are not necessarily real *for us*. The reverse is also true: my body might be physically real, but that doesn't mean it can be real in a virtual context. As virtual and physical phenomena do not always mix, it becomes clear why a privileged strategy when designing for VR has been to shut the user off from physical reality (including their body) in favour of a more undivided attention toward virtual stimuli. With all signs pointing to this erasure as a crucial component of a flawless immersion into virtual worlds, it is important to remember that the physical cannot, in fact, be eliminated. Recall that «[o]ne cannot not touch» (Anne Cranny-Francis, quoted in Popat [2016]: 375). Contemporary immersive interfaces are not «transparent» enough to allow for an immediate experience of virtual reality. Even if I attempt to fully immerse myself in a virtual world, the physical will always be either sharing my attention (the weight of the headset pressing on my nose and face, etc.) or just barely out of reach, constantly threatening to break into my field of sensation and jeopardizing my appreciation of a virtual reality. Dalmasso's description of this phenomenon is worth quoting in full:

> In fact, it should be noted that what is supposed to be – according to the rhetoric of total immersion – an hermetically sealed and seamless reality, on the contrary, is pierced by a number of discontinuities in perception […] As a matter of fact, in virtual environments the experiencer faces the continuous emergence of a fundamental discrepancy between the virtual visible world and the physical presence of her own living body. (Dalmasso [2019]: 105)

One solution I would like to propose to this perceived discrepancy between the virtual and the physical comes in the form of a change in perspective. Indeed, rather than seeing incursions of the physical realm into the virtual as discrepancies, could we imagine a case where the physical and virtual synergize? In other words, I want to suggest that the physical might serve to *augment* what virtual reality can do. Moreover, this solution would also put an end to critiques of the body's absence in VR by insisting on the crucial role the body can play toward the creation of this augmented virtuality.

TOWARD AUGMENTED VIRTUALITY

Rather than speaking of an erasure of the body in VR, Chalmers reminds us that: «A human being in a virtual environment typically has *both* a physical body (sitting at home interacting with

a computer) and a virtual body (in an adventure in a virtual world). At different times, someone's sense of having either a physical body or a virtual body may dominate» (Chalmers [2022]: 221). More importantly, the author is careful to insist on the fact that in the context of contemporary virtual reality, «awareness of one's virtual body is *mediated* by awareness of one's physical body, tying the two senses together. For example, you may know where your virtual arms are by knowing where your physical arms are» (Ibid.; original emphasis). Chalmers puts into words here the main counter-argument I have always brought up in response to those decrying the lack, erasure, or invisibility of the body in VR; I do not necessarily need to *see* my body because I very well *feel* my body.

There are countless tasks for which I do not need to have visual feedback of my body in order to succeed (e.g., touch-typing, walking, conversing with someone, etc.). In these contexts, I need only feel, see, or hear the progress of my action (e.g., the words appearing on screen, my destination moving closer to me, the reactions of my interlocutor). In some cases, my body might furnish me with other kinds of feedback which can inform my actions, but I do not need to see my body to understand these sensations and act accordingly. As far as these kinds of actions are concerned, visual knowledge of the body is not a necessary condition. In fact, Murray and Sixsmith remark that «in real life, for much of the time, the body recedes from awareness» (Murray, Sixsmith [1999]: 327). On the contrary, the authors note that: «Only with various forms of corporeal breakdown do we pay attention to the body, and at these times the body appears to be "other"» (Ibid.: 323). If the body's absence from our attention in physical reality is the norm rather than the exception, it follows that the perceived (visual) absence of the body from a virtual environment should not take away from one's enjoyment of virtual reality. However, understanding this requires that we move away from either extremity of the reality-virtuality continuum and into the murky waters of «augmented virtuality».

Already in 1995, Milgram et al. defined «augmented virtuality» in terms of a «completely graphic display environments, either completely immersive, partially immersive, or otherwise, to which some amount of (video or texture mapped) "reality" has been added» (Milgram et al. [1995]: 285)[15]. While Milgram et al. describe their project as «limited strictly to visual displays» (Ibid.: 282), I would like to borrow their concept to imagine more ways in which «some amount of reality» could be added to an otherwise fully immersive audiovisual experience. Since we cannot do away with the body, I want to argue that VR designers have much to gain from taking the body and its physical context into account as a tool for *augmenting* virtual reality[16]. In the remainder of this essay, I go over several projects which suggests ways in which physical reality can serve to augment virtual reality, rather than needing to be willfully repressed for the latter's benefit. More importantly, instead of relying on complex technical solutions (e.g., haptic suits, olfactive headsets, etc.), the following examples make use of the always already present physical body.

There is much that the (invisible) physical body can bring to the table in virtual environments. In my earlier review of Chalmers' criteria for the reality status of virtual entities, I argued that while some virtual object may appear real to the eye, they seldom appear so to the other senses. Similarly, while Chalmers suggests that «the virtual body is the locus of my perception», he overlooks the fact that current technologies merely allow for it to be the locus of my audiovisual perception; it is not the locus of tactile, olfactory, or kinaesthetic sensations. This is where the physical body can come into play. One solution toward the creation of augmented virtuality experiences

[15] Augmented virtuality is to virtual environments as augmented *reality* is to the physical world: a step back from one of the continuum's extremities, leading to complex and productive interactions of both regimes.

[16] Dalmasso hints at such a process when she highlights this passage from the presskit for *Carne y Arena:* «With *Carne y Arena*, Iñárritu turns the exchange between vision and experience into a process of osmosis in which the duality between the organic body and the artificial body is dissolved» (Dalmasso [2019]: 103).

comes from Murray and Sixsmith, who remark that narrative justifications can easily repurpose incursions of the physical realm into tools for buttressing immersion into virtual worlds (see Murray, Sixsmith [1999]: 325)[17]. In Assaf Machnes' *Borderline* (2018), for example, viewers are put in the position of an agent at the Israel-Egypt border, looking through binoculars at the surrounding desert. Here, the head-mounted display (HMD) becomes integrated into the story as a proxy for the binoculars, making its weight and position justified within the diegesis. The same can be said for *Virtual Virtual Reality* (Tender Claws, 2017), where players take on the role of humans who travel between virtual worlds by putting on different head-mounted displays. Rather than repurposing the HMD as a prop in the story, *VVR* uses the very way we enter VR as a game mechanic. In both examples, this lessens the feeling that the real (physical) HMD is a distraction within the virtual reality experience.

There are yet other ways in which the immutable presence of the physical body may be repurposed by VR creators. During Venice Immersive 2022, festival attendees were given a single grape to carefully touch, smell, and savour as part of the conclusion to *Okawari* (Landia Egal and Amaury La Burthe, 2022), an experience which deals with overconsumption. In *The Anticipation of Rain* (Naima Karim, 2022), visitors were handed two sticks which exuded odours designed evoke the scent of rain at key points in the narrative, thereby also tapping into the user's own memories. Perhaps the most recognizable use of the physical body as a tool for fostering immersion in virtual worlds is *Carne y Arena*, which asks visitors to walk barefoot in sand as a way of helping them feel grounded in its desert setting. Mathieu Pradat's ongoing project *Rencontres* echoes this last experience by having its users walk barefoot in water. Finally, in the context of a film festival which hosted its collection of VR films next to a large fountain, I was pleasantly surprised that the smell and sound of the rushing water supported my immersion into a body of water in *Ashes to Ashes* (Steye Hallema and Jamille van Wijngaarden, 2016).

These examples show that the physical body is all but absent from virtual reality. More importantly, it need not be seen as a distraction: taste, touch, and smell can be borrowed from the physical body and added to the otherwise strictly audiovisual modern HMDs to augment the range of stimuli virtual experiences can use. That being said, it is just as easy for the body and its ability to perceive phenomena in physical reality to incur upon, and distract from, virtual reality. However serendipitous in the case of this last VR film, the same water fountain became a grating distraction when viewing the other pieces in the selection, including *Borderline*, whose desert setting was negatively impacted by the incursion of this physical element. While physical augmentations of the virtual are possible and potentially powerful, they remain to this day the exception, rather than the norm.

A much better appreciation of the body's ability to augment virtual reality experiences requires a shift to more complex forms of interaction, namely ones where flesh and blood actors are co-present with the user. Two examples come to mind in this respect: *The Machine to be Another (MTBA)* (BeAnother Lab, 2014) and *Eve, Dance is an Unplaceable Place* (Compagnie Voix & Omnipresenz, 2018). *Eve* has users watch a 360° video of dancers, which is precisely matched in the physical world by dancers reproducing the movements of the characters seen within the HMD. Every time a physical contact seen inside the headset is corroborated in the physical context, the body serves to augment the valence of the virtual world. *Machine to be Another* goes further still. In *MTBA*, two users are invited to put on head-mounted displays which allow them to see the world from the other's perspective. Each person is asked to follow the other's movements, instructions which usu-

[17] Murray and Sixsmith write: «If there is a purpose for having peripherals, such as the dataglove, within the narrative of the virtual environment itself, then it may be possible that the dataglove becomes transparent in the same way that Heidegger's hammer and Merleau-Ponty's cane do» (Murray, Sixsmith [1999]: 325).

ally lead to slow movements of the hands, touching one hand with the other, touching one's legs, and so on. All throughout the experience, users *see* a body which is not theirs, but they also *feel* the tactile sensations that exactly match what their eyes show them. Not only do these hands appear real (both to the eyes and to touch), but they also function as you would expect hands to do in physical reality. That is, of course, because they are real physical hands, even though they are not yours. At key points during the experience, a pair of docents comes into play, touching each user's hands at the exact same time to further accentuate the functional realism of these «virtual» hands. Although it is far from your typical virtual reality experience, *MTBA* remains to date one of the most convincing uses of the user's body to augment the capacities of HMDs.

CONCLUSION

Far from being missing in action, the body is ever present in the experience of virtual reality. And while some experiences do make the physical body invisible within virtual worlds, and others depend on the «willful repression of the material body» (Balsamo [1995]: 123), others still have made use of the body as a way of mitigating the limitations of current VR technologies, both in terms of the appearance and functionality of the virtual worlds they offer. This «augmented virtuality», as I have called it here following Milgram et al. (1995), is not meant to discredit the reality status of virtual entities or to argue that the physical is «more real» than the virtual. Rather, its goal is to highlight the productive ways in which the physical and virtual can benefit from each other's affordances. It is also to underline how rich the zone between both extremes of the reality-virtuality continuum can be.

Already, VR experiences designed as physical installations in so-called LBE spaces (Location-Based Entertainment) have experimented with ways of including physical objects, room layouts, sounds, smells, and other «physical» elements as augmentations to virtual experiences. *Carne y Arena* has users walking barefoot in sand, while *Okawari* introduces a real piece of fruit for users to enjoy. Contrary to the unpredictable context of at-home consumer VR experiences, the greater control over the experiential conditions afforded to LBE spaces makes them a more fitting candidate for investigating the potential of augmented virtuality. In particular, the possibility of using physical actors appears as a remarkably powerful strategy for expanding the currently limited capacities of virtual technologies. And since it is doubtful VR HMDs will ever reach market saturation, let alone more specialized olfactory headsets or haptic suits, it seems these alternative solutions based on the ever-present physical body are best suited at present.

Every experience of virtual reality is always to some degree an experience of physical reality. It remains at the discretion of VR designers and curators how the physical is dealt with, whether as a distraction from, or an augmentation to, the virtual.

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