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Video game aesthetics and the sense of presence in virtual reality

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Abstract: Virtual reality (VR) offers a new medium for video games. But how does VR as a medium affect the aesthetics and design of VR video games? In this chapter my aim is to answer this question. I begin by introducing video games as an art form, then highlight two types of pitfalls that a game's design can fall prey to. A game can be too permissive, or too restrictive, when structuring the player's agential role given its aesthetic aims. I argue that VR makes falling into either extreme easier because of the sense of presence VR elicits. After defining the sense of presence, I present a conceptual framework for designing virtual items, then apply this to the sense of presence. I argue that the resultant framework allows us to see how VR exacerbates the two pitfalls, and can help mitigate the difficulties of VR game design.

Virtual reality (VR) is a new medium for video games. But when a video game designed for traditional displays (e.g. TVs or monitors) is transferred as is to VR, its aesthetic effect is markedly different. How can this difference be understood theoretically, and in a way that informs the aesthetics and design of VR games? In this chapter my aim is to answer this question by offering a conceptual framework for thinking about the interaction between VR and video games. My hope is that this framework can offer guidance to VR game developers, while advancing a theoretical account of VR as a medium.

I describe the impact of VR on video games in the following six sections. In section 1 I briefly present video games as an art form. In section 2, I highlight two pitfalls of game design that emerge from this picture, and maintain that VR makes it easier to fall into either pitfall. The remaining sections support this argument. Section 3 to 5 focus on VR. Section 3 describes a central contribution of VR, the sense of presence. Section 4 presents a framework for thinking about the design of virtual items (which includes virtual worlds, environments, objects, properties, events, and actions), and section 5 applies this framework to further clarifying VR's sense of presence. Finally, section 6 explains how this framework allows us to see the way VR exacerbates the two potential pitfalls, while also helping us avoid them.

1 Video games as an art

The study of video games, and games, has come a long way, and it would be difficult to do the

literature justice as part of a broader discussion (see Nguyen 2017 for an overview). Approaches range from those that model them on texts (e.g. Aarseth 1997), fictions (e.g. Tavinor 2009), sports, and the interactive arts (e.g. Lopes 2009). In addition, there are theories, learned practices, and technical strategies that describe game design, and how games are made engaging. So, rather than summarize observations, in this section I limit my discussion to the emphasis games place on player agency, and two broad approaches to shaping this in-game agency.

Though theories of videogames, and games more generally, disagree on many features, one point of agreement is that games make room for the player's contributions in the game's unfolding. This is so even in so-called 'zero-player games' like Conway's Game of Life, since the player still sets the game's initial state. Nguyen (2020a) offers a helpful account of this central contribution. He argues that games are an art form whose medium is agency. Games create artificial systems with clear values, and locate the player's agency in a sculpted role within this system. Nguyen (2020b) summarizes:

> Games work in the medium of agency. Game designers don't just tell stories or create environments. They tell us what our abilities will be in the game. They set our motivations, by setting the scoring system and specifying the win-conditions. Game designers sculpt temporary agencies for us to occupy. And when we play games, we adopt these designed agencies, submerging ourselves in them, and taking on their specified ends for a while. […] Games constitute a library of agencies — and by exploring them, we can learn new ways to inhabit our own agency. […] Games turn out to be our technology for communicating forms of agency. (P.1)

This picture tells us something about game design. In designing a game, a central task is sculpting an agential role for the player to occupy. Success in game design is therefore partly a matter of creating an interesting role, and having the game's elements cohesively serve the intended sculpted agency.

But what elements are used to sculpt the player's agency? For our purposes, it is worth distinguishing two broad components. The first is a game's *rule set*, which specifies the game's possible states and transitions, including the states the player's agency can take, and in-game success and failure conditions. For instance, in chess there is the chessboard's layout, movable pieces, and their moves, which specify states and state transitions. These circumscribe the

players' agency, by determining that e.g. there are two players, who act alternatingly, and can make such and such valid moves. These rules also build in a value system that defines success, failure, and legitimate moves (for more, see Nguyen (forthcoming). For instance, removal of one's pieces from the board is a loss, but a piece facing the other way means nothing.

Besides the rule set, games use a *game world* - a meaningful, sensorial, and conceptual presentation - to sculpt player agency. Sensorially, a game may present its world isometrically, with a given art style, and soundtrack. These determine the type of world implicitly, by showing it in a particular way. In *Final Fantasy 7*, even before one hears a word about Midgar, the city's looks and sounds already paint a meaningful picture. But games can also include an explicit conceptual presentation. Names, dialogue, and narrative all offer linguistic meanings that tell us what the world is like.

These two facets help sculpt the player's agential role, and co-determine one another. The game world determines the rule set by interpreting the rules within the game. Chess's rules outline possible moves, a value system, and player roles. But this says little about the game's meaning. For instance, does removing a piece amount to killing, defeat, or passing away? What determines this are chess's characters and scenario, that it depicts a battle of kings with diverse soldiers. Adding this meaning gives significance to the playing out of the rules. Conversely, the rule set determines possible meanings. Having described chess as a battle of kings, the playing out of rules adds truths about these kings. For instance, that kings can be trapped, or left alone. These meaning come from the rules. Even if chess's inventor(s) only stipulated warring kings without committing to their being trapped, the rules alone would commit them to this meaning. The rule set and game world therefore co-determine one another, and can do so well or badly (as in cases of ludonarrative disonnance (Hocking 2007)).

It's worth noting that not all games emphasize these layers equally when structuring player agency. Chess largely focuses on its rule set. Even if talk of kings and war is replaced in a Super Mario themed chessboard, this would still be a chess game with chess's sculpted agency. By contrast, some games lean more heavily on their game world. In *Final Fantasy 7*, replacing the world's look and characters while retaining the rule set would no longer allow players to engage in *Final Fantasy 7*'s sculpted agency; it is essential that one is Cloud Strife. By contrast,

updating the rules, as *Final Fantasy 7 Remake* does, retains *Final Fantasy 7*'s agential world (albeit more or less successfully). The key idea is that games allows for a *plurality* of agential forms because they set out to do different things, and these use the facets differently.

2 Two pitfalls of game design

In the preceding section I highlighted that games are an agential art form, and that game designers sculpt player agency through two broad means, by manipulating the rule set, and the game world. In this section, I use this picture to highlight two types of missteps a game's design can fall into.

Game offer specific agential forms, and in playing them players undergo a particular *agential experience,* an experience of their agency as sculpted by the game. Designers can seek all sorts of agential forms and experiences. A game may seek to evoke a sense of adventure, maximize player agency, help players see what is wrong with a given political system, or live the trials and tribulations of luck. But whatever the aim, ideally, both rule set and game world serve this aim, and help convey the intended agential experience. Sculpted agencies can be better or worse served by rule sets and game worlds.

In highlighting this, two potential mistakes in a game's design become clear. On the one hand, given the game's aim, a game's rules or world may be *over-restrictive* with player agency. On the other hand, its rules or world may be *over-permissive,* failing to sufficiently circumscribe the agential role. I consider each problem more closely.

Imagine a game aiming for an action-filled experience. The game can over-restrict the player's agency through its rule set if e.g. despite an elaborate visual sword play, the sword play is activated only by occasional and monotonous button presses that fail to convey the action (think about the criticism that a game contains 'nothing but quicktime events'). The game world can also over-restrict players. Complex button presses for the swordplay may be accompanied by muted sword attack animations, which limit the action-based agential experience.

Conversely, a game's design may be too permissive, diluting rather than preventing the agential experience. In an action game, if the player has to spend long periods performing mundane activities with slow movements between excellent action sequences, this can dilute the

experience by giving too much not too little. Though the rules successfully present intense action, the game drowns the experience out by including other rule-based opportunities (think about another common criticism, that a game has 'too many fillers', or is 'badly paced'). The same can happen with the game world. Though the overall story or characters may be exciting, adding long calm sequences of unexciting dialogue can dilute the intended experience.

The central argument of this chapter is that VR's sense of presence makes this balancing act, of not being too restrictive or permissive, more difficult. Explaining this will occupy the remaining sections.

3 The sense of presence in VR

Before turning to VR games, the next three sections focus on VR more generally, in particular the sense of presence, and how it is designed. Though the sense of presence has been widely discussed, the concept remains somewhat nebulous (e.g. see Held & Durlach (1992), Lombard & Ditton (1997), Draper, Kaber, & Usher (1998), and Witmer & Singer (1998) who all offer distinct definitions), along with its relations to immersion and VR hardware. So, in this section my aim is to begin with a conceptual clarification.

Consider the following three scenarios:

Case 1: Being in a restaurant.

Case 2: Suffering an episode of depersonalization-derealization disorder in a restaurant.

Case 3: Dreaming of being in a restaurant.

Consider Case 1. Here, one is *present* in the restaurant. If the experience is typical, one will also *experience themselves as being present* there. One is factually present, and has a sense of being present, in the restaurant. Next, consider Case 2. Depersonalization-derealization disorder involves persistent or transient episodes of depersonalization, derealization, or both. Depersonalization is an experience of the unreality of (or detachment from) one's self, or aspects of one's self. Derealization is the experience of unreality of (or detachment from) one's surroundings, or aspects of the surroundings. A subject suffering an episode in a restaurant is also present in the restaurant. But they do not experience themselves as present there, either because they do not experience themselves as being there, or because they do not experience the

restaurant as being there. The disorder reveals that presence, and the sense of presence, can come apart: one can be present somewhere without having the sense of being present there. Case 3 shows something more. In dreams one is not merely present in bed without undergoing a sense of being present there. One is also not present somewhere - in the dream restaurant - while having the sense of being present there.

VR experience offers something like the case of dreams. The subject in VR both fails to register where they are perceptually (e.g. their living room) while also registering being somewhere they are not (the virtual world). It is this experience that is so distinctive of VR. Though VR is not a a teleportation device that really relocates us, it does result in an experience as of being relocated (but see Chalmers 2022 for a critical perspective).

This conception of the sense of presence allows us to briefly clarify the relation to other features of VR. Consider first the connections to immersion and VR hardware. Like the sense of presence, immersion has also been interpreted in distinct ways. Sometimes it is a feature of VR hardware (e.g. Slater 1999), where immersive hardwares are those that project digital stimuli onto the user's senses to a greater degree than non-immersive hardwares. This use draws on ordinary usage, since one can speak of things being immersed e.g. in water. But it is also misleading (more below). A more precise alternative is that VR hardware offers (some extent of) *sensory envelopment*. Sensorially enveloping hardwares envelop the user's senses with digital inputs, which take the place of inputs from the (non-virtual) surroundings.

I prefer sensory envelopment to immersion because in ordinary language immersion also mean something that is mentally or psychologically engaging. Activities, conversations, written works, movies, and games can all be immersive. For instance, a board game can be immersive because the gameplay is gripping, and a conversation could be because of its engaging ideas. But this use of immersion is distinct from sensory envelopment (cf. Slater 2003), since novels, board games, and conversations are not particularly enveloping. Indeed, on this sense, a VR experience may be less immersive than a book because its world is dull or boring. But this is not to deny a connection between immersion and the sense of presence. The sense of presence has been interpreted in terms of perceptual but also affective components, so psychological engagement is not irrelevant. Additionally, there is a straightforward path from sensory envelopment to

psychological immersion, since what perceptually surrounds us readily engages us psychologically. Still, the concepts are distinct, immersion focuses on psychological engagement, the sense of presence on the experience of being somewhere.

4 Virtually representing and reproducing properties

Even with a clearer view of the sense of presence, it is not easy to see how to operationalize the sense of presence in VR game design. So, in this section, I offer a framework for thinking about the design of virtual items before applying it to VR and VR games in the final sections.

To simplify the exposition, I begin with a puzzle about the design of *virtual counterparts* to non-virtual items (e.g. a virtual piano is the virtual counterpart of a piano), before expanding the account to cover all virtual items. Consider: sometimes a virtual x is an x, but sometimes it is not. For instance, the virtual calculator on your phone is a calculator. But virtual murder is not murder. What explains this fact?

In Ali (2023) I argued that to capture this fact different types of virtual counterparts should be distinguished. Considering different approaches to designing a given virtual counterpart reveals this. For instance, consider designing a virtual piano. One approach is to begin by *virtually reproducing* a piano's *essential properties* virtually. By focusing specifically on essential properties, the focus is on those properties that give an item its identity. For instance, it is an essential property of a piano that it has musical keys since without them it would not be a piano. But it is not essential that the keys be black and white, since a piano could have red and yellow keys while remaining a piano. By virtually reproducing *every* essential property of the piano, we build a *virtual reproduction* of a piano. Such a virtual piano will be a piano because it has the features of one. For instance it will have musical keys, that play particular notes in a particular order, etc.

But reproducing essential properties is demanding, and it is a route infrequently used when designing virtual items, particularly in video games. More typically, a designer does not aim at a virtual reproduction of x, instead they aim to virtually represent x. One way to do this is by virtually reproducing x's *nonessential* properties. For instance, a designer might virtually reproduce only a piano's appearance, using the right colors and shapes to make it look exactly

like a piano. But even this approach can be too demanding. Designers can opt to virtually represent *without reproducing* any of x's properties. For instance, in a *GameBoy* game, a virtual piano is a few green pixels, and interactivity may involve hitting a single button to 'play the piano' by generating a sequence of roughly piano-like sounds. A virtual piano of this sort has properties that allow it to virtually represent a piano in the game, but not by *reproducing* a piano's properties. Similarly, in a modern game, designers merely virtually represent trees without including e.g. a root system, flowering stages, etc. So, just as a virtual reproduction of x can be built by virtually reproducing every essential property of x, a *virtual representation* of x can be built by *virtually representing all* of x's properties (and sometimes by reproducing nonessential properties).

Notice that both virtual reproductions and representations involve virtually reproducing or representing (respectively) *all* properties of a nonvirtual item. Alternatively, and sometimes out of necessity (see Brey 2014 for an argument), one virtually reproduces/represents *some but not all* properties of a nonvirtual item. This gives us two more types of virtual counterparts. Virtually reproducing *some but not all* of x's essential properties gives us a *virtual simulation* of x, rather than a virtual reproduction. Consider virtual climbing in *Horizon: Call of the Mountain*. Though this instance of virtual climbing virtually reproduces some essential properties of climbing, like having to lift one's arms upwards to reach ledges, it does not reproduce every property, since it does not virtually reproduce the effort required to lift one's weight. Similarly, virtually representing *some but not all* of X's properties gives us a *virtual simulacra* of x, rather than a virtual representation. Compare for instance a data frame that virtually represents every property of an object with a numerical value. This would be a virtual representation of that object. By contrast, if the data frame represents only weight and height properties, it is a virtual simulacra of the object.

Why distinguish virtual simulations and simulacra from their more complete counterparts? There are at least two reasons. First, notice that only virtual reproductions of x count as instances of x, since only they virtually reproduce *all* of x's essential properties. All other cases are not instances of x. Even a virtual simulation of e.g. climbing is not climbing, though it has some features of climbing. Second, virtual simulations and simulacra are worth distinguishing because

they raise a distinctive design issue. Since they only *partially* reproduce/represent properties virtually, they involve a *selectivity* that complete cases do not. This selection of properties is independently evaluable. Consider for instance virtual reproductions or representations of a woman, a player avatar, or a war. These virtual instances cannot be biased, since they reproduce/represent ever property of these items. By contrast, virtual simulations and simulacra select properties, so they can be biased (see Ali 2022 and 2023 for more). A virtual simulation/simulacra of a given woman may be faulted for being sexist if it only selects properties desirable to a male viewer. Avatars may be racist if they selectively reproduce/represent some avatar skin colors or facial features but not others. And a virtual simulation/simulacra of war may count as vicious if it selectively reproduces/represents properties that glorify war while excluding properties that highlight war's tragic nature. Because virtual simulations and simulacra introduce this additional design dimension, it is worth separating them from virtual reproductions and representations, which involve no such selection. The four varieties of virtual items are illustrated in the below table:

Four basic types of virtual counterparts	Virtually reproducing essential properties	Virtually representing properties (sometimes by reproducing nonessential properties)
Including all properties	Virtual Reproductions	Virtual Representations
Including some properties	Virtual Simulations	Virtual Simulacra

With this four-fold distinction in place, it's now easy to remove three artificial restrictions that extend the account beyond virtual counterparts. First, *virtual hybrids*, which both virtually represent *and* reproduce properties of x simultaneously, can now be countenanced. For instance, virtual drums may virtually reproduce drum sounds, but only virtually represent the hitting of drums with button presses. Second, *virtual fusions*, which virtually reproduce/represent properties of more than one non-virtual item simultaneously, can also be included. For instance, a smart phone's operating system virtually reproduces properties of alarm clocks, phones, and calendars simultaneously. And finally, *virtual singletons*, which virtually *innovate* properties rather than reproducing/representing nonvirtual item properties, can be added. An example is *Pikachu,* who has no nonvirtual equivalent.

5 Designing the sense of presence

The preceding framework helps extend our understanding of the sense of presence. Broadly, one way of thinking about VR is that it allows us to virtually reproduce properties that could only be virtually represented with traditional displays. In particular, VR allows for the virtual reproduction of properties related to egocentric spatiality, sensory embodiment, and embodied action, which are all constitutive of the sense of presence.

Consider first egocentric spatiality. Egocentric spatiality is spatiality that centers around a subject. In a Cartesian coordinate system, space is represented as extending across different axes. But nothing in this space counts as e.g. above or above, since there is no privileged reference point to determine the referents of these designations. But in egocentric space, the coordinate system has a privileged position from which the space unfolds, so to speak. This is the position of the subject or ego, and it makes every point in the space either above or below, to the left or right of, and in front of or behind.

Traditional displays can virtually represent properties of egocentric spatiality. In a traditional video game, for instance, the avatar or first-person camera represents egocentric space by making the world relative to the player-controlled avatar. But this only virtually represents egoecentric space because the player does not really have to e.g. turn around to see what's virtually behind them (virtually behind is not behind). By contrast, notice that in VR properties of egocentric spatiality are virtually reproduced. Something virtually behind really does require that one turn around (virtually behind is behind), and something virtually above does require looking up (virtually above is above). The player may have to really jump, or stand on their tiptoes, to see past a tall gate. That VR virtually reproduces features of egoecentric space is at least part of why it elicits a sense of presence.

Next, consider *sensory* embodiment, which is helpfully juxtaposed with embodiment. At this moment, you are *embodied* in some way, in a body that has e.g. a specific height, gender, etc. To alter one's embodiment, one has to be re-embodied, since one is already in a body. In discussing personal identity, Locke (1694) imagines a mind transplant case, where the prince wakes up in a cobbler's body. This is re-embodiment, since the prince is now factually in a

cobbler's body. A less fantastical case is plastic surgery. In undergoing plastic surgery, one's body is factually changed to lesser or greater extents, depending on the surgery. But VR, unlike mind transplant machines and plastic surgeries, does not re-embody the user. One's body remains as is, before, during, and after the VR experience (though one may acquire skills or abilities in a VR experience). Though the user's body never morphs into something else, the subject in VR does have *a sensory experience* of being in a different body. This is the core idea of *sensory* embodiment. VR offers sensory inputs of a virtual body located in a virtual egocentrically spatial world. VR devices offer this by stimulating the senses in ways that elicit a sensory experience of a virtual body that conforms to the user's body. As the user looks at their body, they see the virtual counterpart body. If they are wearing a haptic vest, they might also feel that virtual body by feeling their body. This stands in contrast to traditional media. In traditional video games, the player also senses their virtual body by seeing the on-screen avatar, hearing their footsteps, or feeling things with the help of controller vibrations. But this sensory feedback only virtually represents one's sensorially embodied condition. To see the virtual body players look ahead not down, their footstep sounds comes from the screen not their feet, and only their hands feel bodily vibrations. VR devices can, at least in principle (more on this below), do more than this. They virtually reproduce the sensory experience of being embodied some way in egocentric space.

Finally, VR also enables the virtual reproduction of *embodied action* properties. Traditional video games constitutively involve embodied actions, since the player's hand movements manipulate the controller, and these manipulations impact the virtual world. By pressing a button, the player can represent their avatar's jump, or unsheathing a sword. But these embodied actions are only virtually represented because the player need not actually jump, or perform an unsheathing action. By contrast, in VR, motion controllers (which are shared with at least some traditional video game devices) allows virtual reproductions of various acts. Virtually unsheathing a blade may require the player to actually perform an unsheathing action, and virtual jumping can require jumping. So VR allows us to virtually reproduce rather than represent properties of embodied action.

Before moving on it is worth noting three points. First, notice that unlike egocentric spatiality, which largely depends on the VR device's head-mounted display, sensory embodiment

and embodied action significantly depend on other parts of the VR device, like the controllers, audio output, haptic vest, etc. Second, notice that unlike egocentric spatiality, which is virtually reproduced by current VR devices to a large extent, properties of sensory embodiment and embodied action are only virtually reproduced to a limited extent by current VR devices. This is because current devices primarily track and stimulate the user's hands and head, leaving out most of the user's body. Finally, notice that virtual reproductions are not always desirable. VR horror games are typically much scarier than their traditional display counterparts because they virtually reproduce egocentric spatiality. A full virtual reproduction of sensory embodiment would likely make VR 'too real', since one does not e.g. really want to feel the virtual punch fully. And full virtual reproductions of embodied actions would make VR tasks as tedious, dangerous, or demanding as the non-virtual action, which in many contexts limits or diminishes their utility (see Bailenson 2018 for a discussion).

6 The distinctive challenges of VR games

Using the preceding framework, we can see how VR exacerbates game design's two pitfalls, of failing to bring about the intended agential experience either by being too restrictive or too permissive with the player's agential role (for a discussion of VR aesthetics more broadly, see Grau 2003 and Tavinor 2021).

Consider the choices game developers face when sculpting the player's agential role in a game. One way of interpreting these choices is through the framework offered in section 4. Game developers are faced with the task of deciding what properties to virtually represent, reproduce, or innovate to generate their intended agential experience. For instance, designers may wonder whether virtually representing or reproducing a choice better serves the game's aim. In many first person shooters, the choice to kill is only represented virtually, since the player does not actually choose whether or not to virtually kill if they want to proceed. By contrast, in the *Metal Gear Solid* games, this choice is virtually reproduced. Players really decide whether or not to virtually kill, since they can proceed through non-lethal means. This choice creates a marked aesthetic difference on the game, and the sculpted agential role of the player.

But now notice that although traditional video games allow for some virtual reproduction,

in particular virtual reproductions of control and choice within the game (since video games are interactive), in general they offer limited opportunities for virtually reproducing properties. For instance, in traditional video games virtually turning around and ducking are always virtually represented, since the player does not turn around or duck. Though these restrictions make traditional video games limiting, they also free video game designers from certain choices. Designers need not wonder whether to virtually reproduce or represent turning around or ducking because they can only virtually represent these. This also shapes player expectations, since players do not expect features the medium does not afford them.

But as the preceding discussion highlights, VR can virtually reproduce and not just represent properties of egocentric spatiality, sensory embodiment, and embodied action. As a result, VR game designers, unlike traditional video game designers, need to consider how they handle egocentric spatiality. Should turning around be virtually reproduced or represented? Does the player turn around, or is an analog stick movement sufficient? Similarly, VR designers must wonder about virtually reproducing or representing sensory embodiment properties, and about how these impact the experience. For instance, reproducing sensory embodiment properties will mean that other avatars getting close will virtually reproduce experiences of entering one's personal space. And when players choose avatar skin colors, this forces them into a virtual reproduction rather than representation of being sensorially embodied in some way. The same choices face embodied action: should the player virtually duck and jump by ducking and jumping, or is virtually representing these acts with button presses sufficient? The partiality of virtual simulations and simulacra further complicates these decisions, and designers responsibilities. The player will not merely have to deal with virtually represented bias, but also virtually reproduced bias.

These additional design choices, and the accompanying player expectations, makes it easier for VR designers to err on the side of over- or under-restricting the player's agency. It is easy to err on the side of over-restriction because if designers simply follow the rules of traditional video game design, they will virtually represent features which might otherwise be virtually reproduced. This can easily over-restrict the player's experience. Consider for instance the negative response to *Firewall Ultra*'s decision to force players to reload with a button press

rather than embodied reloading actions. Players expected more agential opportunities given VR's affordances, so the omission was salient. Conversely, it is also easy to be too permissive with the player's agency. Since many properties can now be virtually reproduced, it is tempting for designers to virtually reproduce all properties they can. But doing this can easily dilute the player experience. If every item in VR can be picked up, placed in another, etc. this can detract from the intended e.g. fast-paced gameplay by offering too much of a distraction (the player may get too distracted by the world's physics). Moreover, over- and under-restriction can happen at the level of rule sets and game worlds. The rules need to take into account the possibility of virtual reproduction, and the game world must e.g. the game world must be proportioned correctly for a virtually reproduced egocentric space, have enough but not too much variety, etc.

In VR, the gap between too little and too much is made larger by the added possibilities of virtual reproduction, so VR design can more easily err in either direction (by being too restrictive or permissive) when compared to traditional video games. At the same time, this bigger gap amounts to a greater design freedom. Game designers can now sculpt the player's agency to a greater extent with extended rule sets and game worlds that can afford new gameplay experiences. The joy in a game like *Beat Saber,* for instance, at least partly derives from the virtual reproduction of embodied action; that one can dance through the game. Similarly, in *Synapse,* the joy partly comes from using movements and gestures to experience the action, and seeing the black and white world from an egocentric spatial point of view. Used well, VR can produce games with new highly sculpted and interesting agencies.

My hope is that the proposed framework sheds theoretical light on the difference between VR games and traditional video games, while also giving VR designers a framework for approaching VR game design. By thinking explicitly about what one wishes to virtually reproduce and represent, VR designers can better sculpt the agential experiences they aim for. The sense of presence VR affords might make balancing more precarious, and add responsibilities, but it also affords designers and players even more opportunities for playing.

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Bibliography

Aarseth, Espen J. (1997). Cybertext : Perspectives on Ergodic Literature. Baltimore, Md.: Johns Hopkins University Press.

Ali, Rami (2022). The video gamer's dilemmas. Ethics and Information Technology 24 (2).

Ali, Rami (2023). The Values of the Virtual. Journal of Applied Philosophy https://doi.org/10.1111/japp.12625

Bailenson, J. (2018). Experience on demand: What virtual reality is, how it works, and what it can do. Norton.

Brey, Phillip (2014). The Physical and Social Reality of Virtual Worlds. In The Oxford Handbook of Virtuality, edited by M. Grimshaw, 42–54. Oxford: Oxford University Press.

Caillois, Roger. (1961). Man, Play and Games. Chicago: University of Illinois.

Chalmers, David J. (2022). Reality+: Virtual Worlds and the Problems of Philosophy. New York: W. W. Norton.

Draper, J. V., Kaber, D. B., & Usher, J. M. (1998). Telepresence. Human Factors, 40(3), 354–375. https://doi.org/10.1518/001872098779591386

First Contact Entertainment Inc. (2023). Firewall Ultra. Playstation 5.

Firesprite & Guerrilla Games (2023). Horizon: Call of the Mountain. Playstation 5.

Grau, Oliver (2003). Virtual Art: From Illusion to Immersion. MIT Press.

Held, R.M. and Durlach, N.I. (1992) Telepresence. Presence: Teleoperators & Virtual Environments, 1, 109-112. https://doi.org/10.1162/pres.1992.1.1.109

Hocking, Clint. (2007). Ludonarrative Dissonance in Bioshock. Click Nothing. https://clicknothing.typepad.com/click_nothing/2007/10/ludonarrative-d.html

Konami. (1998). Metal Gear Solid. PlayStation.

Locke, J. (1694) An Essay Concerning Human Understanding, (The Clarendon Edition of the Works of John Locke), Peter H. Nidditch (ed.), Oxford: Oxford University Press, 1975. doi:10.1093/actrade/9780198243861.book.1

Lombard, Matthew, & Ditton, Theresa. (1997). At the Heart of It All: The Concept of Presence. Journal of Computer-Mediated Communication, 3(2), 321. https://doi.org/10.1111/j.1083-6101.1997.tb00072.x

Lopes, Dominic (2009). A Philosophy of Computer Art. New York: Routledge.

nDreams (2023). Synapse. Playstation 5

Nguyen, C. Thi (2017). Philosophy of games. Philosophy Compass 12 (8):e12426.

Nguyen, C. Thi (2020a). Games: Agency as Art. New York: Oxford University Press.

Nguyen, C. Thi (2020b), Precis of Games: Agency as Art. https://philpapers.org/rec/NGUPOG

Nguyen, C. Thi (forthcoming). Value Capture. Journal of Ethics and Social Philosophy.

Oculus (2018). Beat Saber. PC.

Slater, M. (1999) Measuring Presence: A Response to the Witmer and Singer Questionnaire, Presence: Teleoperators and Virtual Environments, 8(5), pp. 560-566.

Slater, M. (2003). A note on presence terminology. Presence Connect 3(3).
Squaresoft. (1997). Final Fantasy VII. PlayStation.
Square Enix. (2020). Final Fantasy VII Remake. PlayStation 4.
Tavinor, Grant (2009). The art of videogames. Malden, MA: Wiley-Blackwell.
Tavinor, Grant (2021). The Aesthetics of Virtual Reality. New York: Routledge.
Witmer, B. G., & Singer, M. J. (1998). Measuring presence in virtual environments: A presence questionnaire. Presence: Teleoperators and Virtual Environments, 7(3), 225–240. https://doi.org/10.1162/105474698565686