

The constitution of virtual objects

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Introduction

- VR environments are made of *virtual objects*. *Virtual events* occur therein.
- What is the ontological status of these virtual entities?
- Two contenders:
 - *virtual realism* (Chalmers 2017, 2019, 2022)
 - *virtual fictionalism* (e.g. Wildman & McDonnell 2019)



Introduction

- We won't address the dispute between virtual realism and virtual fictionalism here.
- Our goal will rather be to flesh out a version of virtual realism on which virtual entities *ontologically depend* on digital entities.
- Specifically, we argue that virtual realists should see virtual entities as *constituted by digital entities and mental states*.

Plan

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Virtual realism

- The ontological core of virtual realism (Chalmers 2017, 311):
 - (1) Virtual objects really exist and are digital objects;
 - (2) Events in virtual worlds are largely digital events that really take place
- Two dimensions:
 - (A) Metaphysical claim: virtual objects/events are *real*
 - (B) Ontological claim: virtual objects/events are *digital* in nature (= **digitalism**)
- We'll focus on (B). For simplicity, we shall also restrict ourselves to the case of virtual *objects*

Digital objects

Digitalism states that virtual objects are *digital objects*

= minimally, *bits* (0s or 1s in computational systems)

= more broadly, “data structures” (organizations of data)

Digital objects can be seen as abstract types, but they are ultimately physically realized in the hardware as electrical impulses within integrated circuits



Digitalism: two readings

“To a first approximation, [virtual objects] can be regarded as data structures, which are grounded in computational processes which are themselves grounded in physical processes on one or more computers. To a second approximation, one may want to invoke more subtle relations between virtual objects and data structures, just as theorists often invoke more subtle relations between high-level nonvirtual objects (e.g. a statue) and underlying physical entities (e.g. a lump of clay)”

Chalmers (2017: 317)

Weak and strong virtual digitalism

- McDonnell & Wildman (2019) call these two options “Strong Virtual Digitalism” (SVD) and “Weak Virtual Digitalism” (WVD).

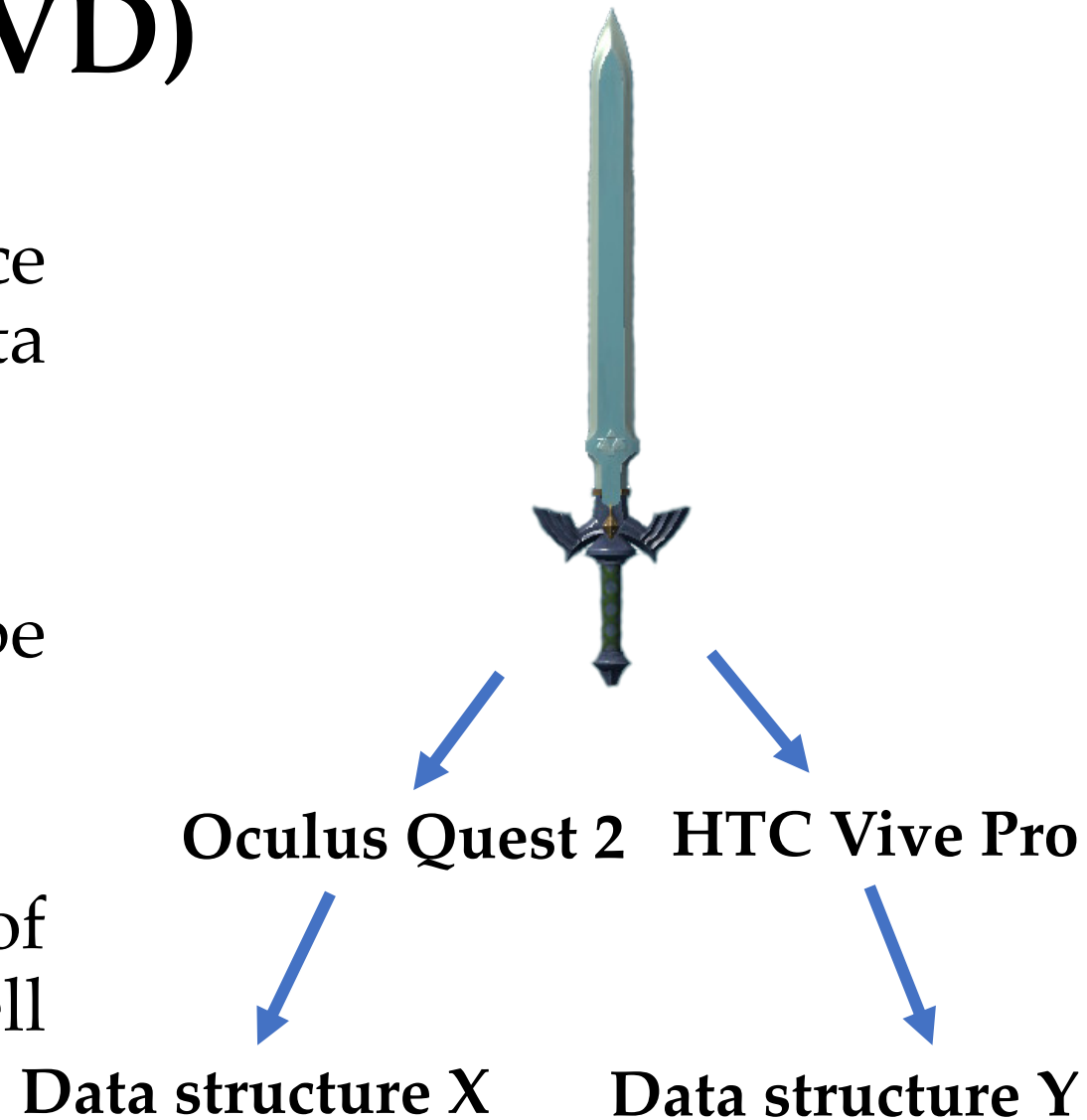
(SVD) Virtual objects are *identical* to digital objects

(WVD) Virtual objects and digital objects are distinct, but the former ontologically *depend* on the latter

- Which of these two views should be preferred by virtual realists?

Against (SVD)

- No identity and 1:1 correspondence between virtual objects and data structures.
- Indeed, a **same** virtual object can be associated to **different** data structures.
- This is what happens in cases of “*porting*” and “*cross-play*” (McDonnell & Wildman 2019).



Against (WVD)

- (WVD) can accommodate multiple realizability. However, this view too is objectionable.
- Ludlow (2019): a virtual gang in *VR Chatroom* could migrate to a non-virtual environment and keep existing there. Thus, it cannot *only* depend on underlying digital entities.
- At least some virtual objects must also depend on human intentions or some other mental factor.



Amending (WVD)

“One clear version of virtual digitalism might ... [say] that virtual objects are wholly constituted by, or grounded in data structures. In fact this is not my view (...) Virtual worlds involve not just data structures but also human users, and many virtual objects and virtual properties are grounded in part in the minds of the human users. (...) I suggest the following: virtual objects and properties are grounded in data structures and mental objects and properties.”

(Chalmers 2019: 455).

= an amended version of (WVD), where virtual objects are no longer seen as depending *uniquely* on digital objects, but also on the mental

The constitution view

We accept this revised version of (WVD) and simply specify the type of ontological dependence is involved here (viz. constitution):

(Constitution) Virtual objects are *constituted* by digital objects *and* mental states/properties

N.B.: Chalmers was the first to suggest something like this, but he did not specify how the notion of “constitution” should be understood. Neither did he develop that account in any detail.

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Goliath and Lump

An infamous puzzle: consider a statue (“Goliath”) and the lump of clay from which it is made (“Lump”).

At first glance, it seems plausible to say that Goliath = Lump. However, Goliath and Lump differ in *historical* and *modal* properties. Thus, they can't be identical.

Conclusion: we should accept the existence of numerically distinct but *spatially coincident* objects.



Constitution is not identity

- A vast number of metaphysicians accept the argument: Lump and Goliath are nonidentical, but spatially coincide.
- This is often called “*the constitution view*”, also frequently expressed under the slogan “*constitution is not identity*”.
- Constitution differs from identity in that it is:
 - asymmetric
 - irreflexive
 - meant to capture a kind of ontological *dependence* (the statue depends on the lump for its existence and properties, but not vice versa)

Baker's account of constitution

- According Lynne Rudder Baker, constitution is:
 - an ubiquitous phenomenon
 - *not* mereological: when x constitutes y, x is not a part of y.
(constitution is not *composition*)
 - a relation which is halfway between identity and separateness; or a form of "*unity without identity*"
- The fundamental idea:

“when a thing of one **primary kind** is in certain **circumstances**, a thing of another primary kind – a new thing, with **new causal powers** – comes to exist” (Baker 2007: 32).

Primary kinds

“For any x , we can ask: What most fundamentally is x ? The answer will be what I call x ’s ‘primary kind.’ Everything that exists is of exactly one primary kind – e.g., a horse or a passport or a cabbage. An object’s primary kind goes hand in hand with its persistence conditions” (Baker 2007: 33- 34).

A thing’s primary kind

- 1) specifies what that thing is most fundamentally
- 2) determines its persistence conditions (if x has K for primary kind, then x could not fail to be of kind K and continue to exist)

Favorable circumstances

- Constitution also require “favorable circumstances” = conditions that “trigger” constitution, and without which the constituted object does not come into being.
- In the case of Lump and Goliath, such circumstances include the physical properties of the clay, the intention of the sculptor, and also perhaps the social and cultural conventions which make artworks possible.
- By contrast, the circumstances favorable to the constitution of H₂O molecules by an oxygen atom and two hydrogen atoms are purely physical.

Causal powers

- If a piece of metal is painted red, with white marks spelling S-T-O-P; if it is placed in a suitable location, in an environment that has certain laws and regulations, a new thing, namely a stop sign, comes into existence.
- The piece of metal has certain causal powers, that the traffic sign inherits. Yet, the traffic sign has *novel causal powers*: e.g. pushing automobilists to slow down and stop where it is placed.
- According to Baker, there is thus distinctive and irreducible causality



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Constitution and the virtual

- We wish to apply Baker's theory to virtual objects. This gives us:

when a digital object of a certain primary kind is in certain favorable circumstances, a thing of another primary kind – a virtual object with new causal powers, comes to exist.

- Several questions:
 - what are the primary kinds of digital and virtual objects?
 - what are the relevant favorable circumstances?
 - how do digital and virtual objects differ in causal powers?

The primary kinds of virtual objects

- What are the primary kinds of virtual objects?
- Answer: they can have a myriad of primary kinds, which can be determined by analogy with non-virtual kinds
- Just like some things are cats or cathedrals, some virtual objects have *virtual cat* and *virtual cathedral* for primary kind properties

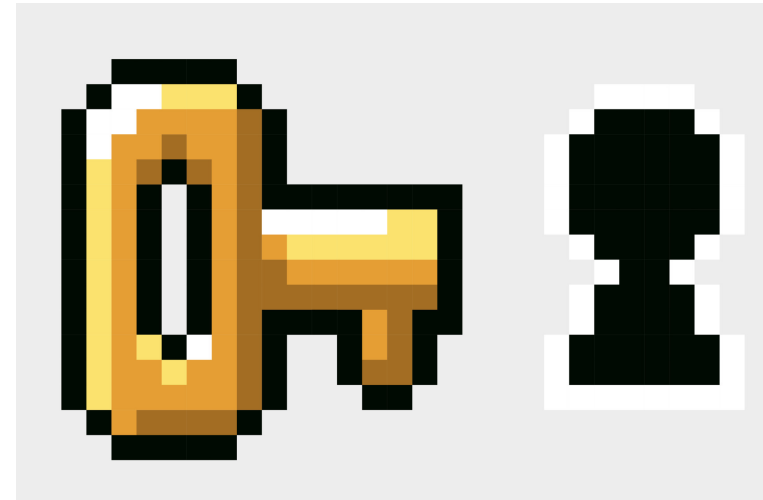


The primary kinds of virtual objects (ii)

- Question 1: what licenses introducing *sui generis* virtual kinds?
- Answer: a virtual cat, to the difference of non-virtual cats, depends for its existence on a digital software and hardware basis; and may lack many properties that are essential to non-virtual cats.
- Cats and virtual cats, that is, have different identity and persistence conditions.

The primary kinds of virtual objects (iii)

- Question 2: what determines that a virtual object is of such or such virtual primary kind?
- Answer: generally, this is a matter of the virtual object's function, affordances, or causal role within the VR environment. E.g. *virtual keys* can normally unlock virtual doors.
- In other cases, the object may be recognized as a virtual F simply in virtue of its superficial appearance and resemblance to non-virtual Fs.



The primary kind of digital objects

- Now, what is the primary kind of *digital* objects?

For Baker, a non-virtual table \leftarrow aggregate (platter + legs) \leftarrow aggregate of molecules \leftarrow aggregate of atoms ... (Where \leftarrow is the constitution relation)

We suggest that: virtual table \leftarrow aggregate (virtual platter + virtual legs) \leftarrow high level data structures (source code) \leftarrow lower level data structures (assembly code) \leftarrow lowest level data structures (machine code/arrays of bits) \leftarrow aggregates of bits

- If that's so, the primary kind of the digital objects that ultimately constitute virtual objects is *aggregate of bits*.

The constitution of the virtual, fleshed out

To see a virtual table as constituted by a digital object means:

- 1) that constituter and constituted differ in primary kinds. The former has *aggregate of bits* for primary kind, while the latter's primary kind is *virtual table*.
- 2) that the aggregate of bits is in virtual-table-favorable circumstances. As we'll see, these include physical/computational conditions but also intentional ones.
- 3) that when the virtual table comes into being, a novel entity appears, with causal powers different from those of the underlying digital object.

Note: no coincidence

- For Baker, constituter and constituted always *spatially coincide*
- This does *not* go for virtual and digital objects. In the VR game *Vader Immortal*, the virtual lightsaber does not spatially coincide with the aggregate of bits that constitutes the saber.
- This isn't a problem, however: coincidence isn't a necessary requirement of constitution, but only a contingent feature.
 - See Hindrinks (2013): NGOs are plausibly constituted, but they do not spatially coincide with their constituting members!

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Virtual objects as artifacts

- The non-virtual world is full of artifacts, i.e. objects which are intentionally produced by human beings in order to serve a given purpose. However, it is also populated by a myriad of non-artifactual (natural) beings.
- Things are different with virtual worlds. Virtual worlds are themselves artifacts, and they are comprised *only* of artifacts.
- The artifactual nature of virtual objects has a crucial consequence on their nature: it makes them partly dependent on the mind. This conclusion owes to a specific feature of artifactual primary kinds.

Baker on artifacts

“What distinguishes artifactual primary kinds from other primary kinds is that artifactual primary kinds entail proper functions, where a proper function is a purpose or use intended by a producer (...) The nature of an artifact lies in its proper function – what it was designed to do, the purpose for which it was produced. An artifact’s proper function is an intended function. Since artifacts have intended functions essentially, they are [intention-dependent] objects: they could not exist in a world without beings with propositional attitudes.”

Baker (2007: 51-52)

Artifacts and mental dependence

- Artifacts depend on human intentionality for their existence. In a world free of beliefs and intentions, there would be no cars, churches, credit cards or tables, but only particles or matter arranged in certain ways.
- Propositional attitudes are necessarily involved in the “favorable circumstances” that bring artifacts into existence
- Given that **all virtual objects are artifacts**, they too are intention-dependent objects. Propositional attitudes must feature in the “favorable circumstances” which bring them into existence.

Example

- A virtual screwdriver is constituted by an aggregate of bits. But what makes the aggregate of bits constitute a virtual screwdriver is also a collection of propositional attitudes, which determine its intended proper function.
- The virtual screwdriver must have been intended to be usable to (un)screw things in the virtual world. This functional role is no less constitutive than the underlying digital object.
- In a world without propositional attitudes, there could be no virtual screwdriver, even if the very same underlying digital entities happened to exist.



Virtual artifacts

- We claim that all virtual objects, insofar as they are artifacts, partly depend on the mental.
- This echoes Ludlow (2019), who claims that the identity of virtual objects relies (if partly) on intentions and “social consensus”.
- See also Chalmers (2019, 459):

“... part of what it is to be a table is to be treated as a table, or to be disposed to be treated as a table, or to be designed as a table, or something like that. Two physically identical pieces of wood might differ in whether they are tables because one satisfies this condition and the other does not. On this picture, both being a table and being a virtual table will be partly grounded in the mental”

How virtual objects depend on the mental

Drawing on Thomasson (2005), we may differentiate:

1. *Direct* and *rigid* mental dependence, where the dependent entity is wholly mental and depends on particular acts of consciousness (e.g. private imaginings).
2. *Mediated* and *generic* mental dependence, where the dependent entity does *not* uniquely depend on acts of consciousness, nor on *particular* acts of consciousness.

Virtual objects depend on the mental in the second sense:

- their dependence is mediated by mind-external entities (i.e., digital objects)
- they don't depend on *particular* acts of consciousness

Function and appearance

- We see virtual kinds as essentially tied to intended proper functions. However, can't there be *virtual doors* which can't be opened or be interacted with by any means?
- Reply: in such cases, the virtual object is not a *virtual door*, but rather a *virtual door image*, i.e. a virtual object whose proper function is essentially decorative (see also Juul 2021; Grabarczyk & Pokropski 2016).
- Conversely, some virtual objects have the intended proper function of an X but lack the typical appearance of an X. A sword might be programmed to launch rockets, effectively making it a *virtual rocket launcher*, which happens to have the visual appearance of a sword.

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A difference in persistence conditions

- Aggregates of bits, just like other types of aggregates, comply to **Mereological Essentialism (ME)**: they have their parts essentially
- By contrast, virtual objects can undergo (at least some) changes of parts without going out of existence: I may add a door to my virtual house or change my avatar's outfit without thereby destroying these virtual objects.
- Chalmers : "... a virtual statue is not exactly the same as a structure of bits. Bits may change and the statue may remain. The statue may be destroyed and the bits may remain" (2022 : 195)

A difference in persistence condition (ii)

- If virtual objects may survive (some) changes of parts, what determines if they persist through a given change?
- A decisive factor is their proper function: central to a virtual screwdriver's identity is its capacity to keep fulfilling a certain role within the virtual environment. Alterations inconsequential to this function will tend to be identity-preserving.
- The persistence of virtual objects requires neither the diachronic identity of their parts nor the sameness of underlying digital objects.

A difference in causal powers

- Say that I play a game of tennis table in VR. When my virtual racket hits the virtual ball, the latter is propelled.
- There are digital and ultimately physical causal processes underlying this virtual event. Yet, these physical processes within the hardware simply are not the same as the event taking place within the virtual world.
- There is no necessary isomorphism between the two causal levels. Virtual objects have their own causality, which is irreducible to that of the objects which constitute them.

A difference in causal powers (ii)

- According to Baker, constituted objects have a distinctive causality, irreducible to that of the entities that constitute them:

[With constitution], new things of new kinds, with new kinds of causal powers, come into being. An organism—but not the aggregate of cells that constitutes it—can eat its prey. A flag—but not the aggregate of pieces of cloth—may cause a veteran to cry. (Baker, 2004: 101)

- It is the object whose primary kind is *flag*, with all the properties involved by this kind, that causes the veteran's tears. Likewise, it is the object whose primary kind is *virtual racket* which causes the ball's propulsion; and not the aggregate of bits constituting the virtual racket.

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Conclusion

The constitution view of the virtual sketched here has several virtues:

- 1) *Prima facie* plausibility: just like the statue and the clay, an aggregate of bits and the associated virtual object differ in properties and persistence conditions. Constitution theory explains this as stemming from a difference of primary kinds.
- 2) The constitution view accounts for the (manifest) differences in causal powers between digital objects and virtual objects. Constitution brings about novel and irreducible causal powers.
- 3) The constitution view accommodates the multiple realizability of virtual objects.

Conclusion

4) Beisbart complains that “claims about grounding or the constitution of objects do not answer the question of what the objects are. To know what certain objects are we should at least be given the category they belong to as well as some of their essential features or at least the types of features they must essentially have” (2019: 320).

→ Our approach provides definite answers to these issues: it can specify what kinds of virtual objects exist, how they differ from digital objects, and which features are essential to them.

5) The constitution view explains why and how virtual objects partly depend on the mind (like other types of artefacts and social entities). This does not threaten their reality or make them mere subjective projections.