

## Virtual Interiorities

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Adam Nash, Kate Geck, Andy Miller

RMIT University  
Australia

### **Abstract**

*A practice of the virtual offers to interior design a dynamic conception of interiority that transcends simplistic representative notions of space, recognising the inseparable relationship of space and time, as well as an understanding of interiority as lived experience and its attendant amenability to active interpretation and therefore design. Ultimately, a practice of the virtual facilitates an understanding of interior as a dynamic and ongoing network of relations, and interior design as individuating participation in this network. In this article, we describe in detail an expanded notion of the virtual, and extrapolate how an understanding of this notion might help shape future interior design practice. We then offer some examples that might help translate these ideas into practice.*

*Keywords: virtual interior, virtual reality, interior design*

### **Defining 'Virtual'**

Concepts of the virtual offer dynamic possibilities for both the design of interior spaces and understandings of interiority. The virtual facilitates an ontological entanglement of these things, suggesting that they co-exist in an ongoing network of relations. With this opening statement, we blithely used the word 'virtual' as if we all know what it means. Indeed, over the last year or so of pandemic-induced life, the entire world has been using the term virtual as if we all know what it means. But do we? Perhaps virtual is a concept or practice that we have conflated our naming of with our understanding of. Here we attempt to define what virtual means by exploring three common ways of encountering the term. Through these encounters, we hope to reveal the generative power of the virtual as an active force that helps define and shape interiority.

A typical contemporary encounter with the virtual concerns virtual reality or virtual meeting. This usage is essentially synonymous with the term 'digital,' existing as an adjectival descriptor of a phenomenon that opposes the non-digital, physical world. So, when used in contexts like virtual meeting or virtual classroom, it is shorthand for 'a non-co-present shared experience realised digitally,' or in virtual reality, where it means 'a digital representation of three-dimensional space.' Ostensibly straightforward on initial encounter—a digital version of a physical thing or event—the meaning and implications of this usage of the term are almost immediately complicated, as we shall see, by the active or generative force of virtualisation itself, both in its creative power and in the retroactive power with which the virtual brings forth nascent tendencies in the actual event or thing it is virtualising (Munster, 2006; Nash, 2012).

We also encounter the virtual through French philosopher Gilles Deleuze (1977/2007). He senses the virtual as the set of tendencies and forces that accompanies the actual. Here, the virtual is the partner of the 'actual,' with the two making up the 'real.' The real is the result of the actual and the virtual, inextricably linked in a generative feed-forward loop of dynamic individuation. The virtual, in this conception, is different from ideas of potential or the possible; these both imply a static or given state rather than a dynamic, individuating tendency or force. The virtual, for Deleuze, is real; it is as real as the actual because it has effects in the real. Not only does it have effects in the real, but it is also affected by the real. The virtual affects the actual, and the actual affects the virtual, and they cannot exist without each other. In Deleuze's words,

Purely actual objects do not exist. Every actual surrounds itself with a cloud of virtual images. This cloud is composed of a series of more or less extensive coexisting circuits, along which the virtual images are distributed, and around which they run. (Deleuze, 1977/2007, p. 148)

This ongoing dynamic affect cycle constitutes the real which, in its individuating as a result of this affect cycle, in turn, affects that affect cycle, that dynamic relation between the virtual and the actual. The virtual is a set of forces that can affect the real, while the actual emerges once it differentiates itself from the virtual, thus becoming concrete. "In the process of actualization, the virtual annuls itself as such in order to re-emerge as an actual that thereby produces its own virtualities" (Grosz, 2001, p 129). In this way, the actual can be understood as "a particular response to a set of virtual forces rather than the realization of a possibility" (Munster, 2006, p. 90). We can understand the virtual as a force or a suite of intensities that are implicit within all material. Working with the virtual in this sense provides a reframing, a repositioning for doing design that allows us to attend more readily to the entangled nature of things and affects when we produce designs.

The third, more longstanding and colloquial, usage of the term virtual is similar to the term 'almost.' This usage both contributes to and inhibits understanding of the first two usages. On closer inspection, this usage is related to an older definition of the term used by European religious philosophers of the Middle Ages. It meant having the effects of a thing while not being that thing, in other words having effects as if it were that thing. In fact, this meaning does influence Deleuze's (1968/1994) meaning, and it is also easy to see how this meaning also colours the meaning of our first definition of the term virtual. It is these colourings that will prove to be important in our understanding of the virtual as a generative force in the practice of interiority.

### **The Virtual as Generative Practice**

Here we are proposing a lived understanding of the virtual as a generative practice. All three usages of the term discussed so far remain in play, contributing to a holistic acceptance of the fundamental role of the virtual in the ongoing creative individuation of the world in which we live. We move from interior to the entire universe and back freely, not as a shock or a jump, rather as a realisation that they are two aspects of the same thing, each both

contained in and containing the other. Similarly, we practice in the digital and the physical simultaneously, recognising that they are not opposed to each other or even distinct from one another. Each informs and nourishes the other, producing an ongoing generative relation that constitutes reality. To help understand this perhaps more expansive concept of the virtual, we turn, as Deleuze did, to Spinoza's definition of affect, which is that everything (that is, literally, everything, whether physical or mental, present or past, organic or inorganic) modifies everything. This is a conception of change as the universe, or the universe as change, where the ability to change and be changed, to affect and be affected, is a quality possessed by everything. As Deleuze (1970/1988, p. 124) succinctly puts it, "if you define bodies and thoughts as capacities for affecting and being affected, many things change." Even earlier, this notion of an ongoing dynamic network of affect was described in the third century BCE by Plato (1921)—perhaps surprisingly given his dualistic notion of ideal forms—as a definition of power:

I suggest that everything which possesses any power of any kind, either to produce a change in anything of any nature or to be affected even in the least degree by the slightest cause, though it be only on one occasion, has real existence. For I set up as a definition which defines being, that it is nothing else than power. (p. 379)

This ontogenetical view of the universe is also diffracted eloquently by Karan Barad (2007) and Suzie Attiwill (2019). Barad's ideas on diffraction, drawn from the physical sciences, can be seen as valuable apparatus for registering, understanding and articulating the slipperiness of virtual space/time encounters with which interior designers grapple. Centred upon the disruptive elements and discernible patterns of interference that occur when wave-based formations such as water or soundwaves encounter obstacles, Barad (2007) writes that diffraction is an "apt metaphor for describing the methodological approach [for]... attending to and responding to the details and specificities of relations of difference and how they matter" (p. 71). By mapping these ideas of diffraction to interior design practice more closely, the practice of the virtual can be understood as an attunement to the registration of the interfering and reconfiguring forces that continuously produce 'space' (and the designer) through material arrangements. This idea of the virtual is a process that Suzie Attiwill (2019), referencing Elizabeth Grosz and drawing on Deleuze, suggests is inherent within interior design practices.

An important part of interior design practice is the selection and specification of materials including furniture and furnishings, lighting, colours and fabrics. These are brought in and arranged as a spatial, temporal and material composition, we could think of this as a network of relations and capacities; interior designing as the fabrication of a space 'in which sensations may emerge, from which a rhythm, a tone, colouring, weight, texture may be extracted.' (Attiwill, 2019, p. 173)

Attiwill is pointing towards interior design as a practice of attunement to the processes of becoming where space is continuously brought into being through relations and affects rather than pre-existing or determined.

### **Digital Interior**

The ongoing, bivalent, individuating relationship between the virtual and the actual that characterises the real occurs at an infinite number of nested and reticulating levels in time and space. From quantum to universal scales, nanoseconds to light-millennia, all levels of magnification of reality are relativised. At any given moment, at any given spot in space and time, the virtual and the actual are interfacing with each other to individuate that spot, that moment. Reality is a process. It is important to understand that this network of relations is not limited to what is commonly called 'life' but extends to all things, whether alive or not. This allows us to understand how, for example, that the digital can have concrete material effects and play a role in our conception of interiority. As Deleuze (1970/1988) puts it:

It should be clear that the plane of immanence, the plane of Nature that distributes affects, does not make any distinction at all between things that might be called natural and things that might be called artificial. Artifice is fully a part of Nature, since each thing, on the immanent plane of Nature, is defined by the arrangements of motions and affects into which it enters, whether these arrangements are artificial or natural. (p. 124)

Digital processes offer a microcosm of this process of reality, not as a simulation but as an actual example of the dynamic interaction of the virtual and the actual constituting the real as real-time change. The digital is by no means the first human-devised mechanism (it is not certain that humans did devise the digital but let us assume) of this kind—music, mathematics, language, images and money all represent sophisticated bounded systems that explicitly manipulate

the interaction of the virtual and the actual. Nevertheless, it means that we can consciously interact with the digital as an interactive component of reality, rather than as some kind of impoverished model or imperfect copy.

Certainly, when manipulating the digital—for example, when modelling an interior in a 3D modelling app—we witness and participate in endless amounts of virtual/actual interactions. An example might be computer code modulating into names for colour modulating into pixel addresses modulating into light waves modulating into an image which we perceive. On modern screens, this modulation process is happening at least 60 times every second at every single one of the 8,294,400 pixels on the screen. That is 497,664,000 virtual/actual modulations in one second just to show colour, without even considering the millions of interactions between ocular nerves, neurons, memory and history required to decode that colour and give it meaning to us as the designer operating the app. So, at any instant, the digital represents vast arrays of interactions between the virtual and the actual modulating our reality.

But at another level of abstraction, the entire digital process can also be seen as a level or site of virtual/actual interaction itself, with the digital as the virtual and the physical as the actual. This is analogous to music or language—each consist of complex nested layers of virtual/actual interaction. At the same time, music and language can each be seen as virtual phenomena in that they can be distinguished, at one level of abstraction, from their actualisation. This is why we are able to say that the digital-virtual, as in virtual meeting or virtual reality, is indeed virtual.

We think this is an example of what Karan Barad (2007) means when she talks about phenomena interacting with an apparatus, or what quantum scientists call measurement. At any given site, at any given scale, phenomena are modulating into display through other phenomena, which in turn affects both phenomena and so on. This is the same as Spinoza's affect. It is also similar to what French philosopher of technology Gilbert Simondon (1964/2020), highly influential on Deleuze's thought, calls resolution of disparate fields, such as happens when the 'feed' from each of our individual eyeballs is resolved by our brain into a stereoscopic view of the world. This resolution creates a new phenomenon that contains and is contained by the individual eyes as well as the environment in which this resolution is occurring (Simondon, 1964/2020).

## Digital Simulations and Models

How is it that the digital then can be used for simulations or models? In the same way that mathematics or diagrams on paper can. In fact, it is not a simulation or model or some other kind of copy, since a copy is an impossible proposition in the ontogenetic, processual view we are asserting. A simulation is a unique creative process from which we can draw analogies. Still, how is it possible to do this in the digital-virtual? In the widely accepted contemporary model of our physical world, time virtualises space, and space actualises time. By bounding this model of reality in a controlled process, the digital flips this configuration so that time actualises space and space virtualises time. It is the ontogenetic version of a mirror. That is why virtual reality experiences are familiar and weird at the same time—in other words, uncanny.

The International Federation of Interior Architects/Designers holds that “Interior designers and interior architects determine the relationship of people to spaces based on psychological and physical parameters, to improve the quality of life” (IFI Interiors Declaration, n.d.) As soon as we talk of relationships, as we have seen, we talk of change. As soon as we talk of space, we are also talking of time, and when we talk of time, we talk of change. The expanded conception of the virtual that we have briefly described here allows interior designers to operate as individuating nodes within a network of relations that is changing space and time. But how can we practice with this? Here we present some practical views of the virtual in interior design. There are many, many other aspects of practice that can identify and work with the intrinsic qualities of virtual interiority. Still, we present these few as an introduction for further exploration.

## Virtual Interiority in Design Practice

Much virtual reality (VR) design is presently focused on visualisation and gaming. Yet, there is significant potential to think about VR space in non-mimetic, ephemeral ways that investigate the relationship between digital and physical space. Interior design knowledge of atmosphere, material and the body can be applied to virtual environments to design powerful experiential spaces that move beyond the skeuomorphic. Each of the approaches we outline here explores the relationship between body and atmosphere in a different way. These approaches are premised on the idea that the physical and the digital, as described above, comprise a singular material that is inherently experiential. They are not oppositional matters containing that which the other does not, rather both participate in creating the real. In these approaches, the digital materials ‘intra-act’ with the physical material of the body to produce an experience or atmosphere.

### **Atmospheric Material is Physical and Digital**

The nebulous nature of atmosphere makes it hard to define or construct empirically. Atmospheres are composed as we encounter the many things around us; their immersive nature is inherently affective. They mass and overlap with one another; they have porous edge conditions and fold into other atmospheres endlessly. We know anecdotally through our bodies that the spaces we move through leave traces on us and within us. They make us feel a certain way. Rather than trying to define specific configurations of material and program, Shanti Sumartojo and Sarah Pink offer the suggestion to instead “think atmospherically” through dimensions of the spatial, the temporal and the mobile (Sumartojo & Pink, 2018, p. 19). These three aspects can provide a foundation on which to consider how the atmosphere might be felt and how it might form.

Importantly, these three aspects are fundamental to VR and so provide entry points to think about it atmospherically. It helps us understand that virtual spaces are composed of digital materials, but these have a real atmospheric affect. Their digital surfaces interface with our physical sensing apparatus as we move through computational temporalities. This makes us feel a certain way. From this perspective, we could see that atmospheres are made of physical and digital materials—those of our actual bodies (physical) and those of the virtual space (digital). Often, the physical and the digital are thought of as binary. The physical world is real while the digital is not real. Questions of authenticity aside, this is compounded by the various metaphors of digital space, which tend towards the barely material—the cloud, the web; while the virtual itself describes the almost, the not-really or the projected. Despite this, digital space still relies on the physical processes of energy, which is material at an atomic level, as and physical infrastructures of networks and hardware. However, this is possibly too abstract for everyday thinking about the presence of the digital, as it is hard to imagine how this entangles with the body.

One way to think about the physical and the digital could be by beginning with Elizabeth Grosz’s (2001) idea of the ‘in-between.’ The in-between speaks to becoming; it is the space within which things are undone to become anew. It is “formed by juxtapositions and experiments, by realignments or new arrangements, and it threatens to open itself up as new, to facilitate transformations in the identities that constitute it” (Grosz, 2001, p. 94). The in-between helps to steer us away from reductive binarization. A binary forces us to define only one concept, from which we extract ‘otherness.’ This runs the risk of reductionism; how can we wholly conceive of something which by its

nature is defined only as ‘not-that’? If we think instead of material as an in-between construct that is capable of creating experience, the physical and the digital can exist within a typology as independent constructs with affective capacity.

We use our sensing body to experience virtual space, to be affected by its atmospheric qualities. This produces another point: an atmosphere exists in relation to a body. They are dealt with by sensing bodies. Another way to think about this is to see that the intra-action of the physical material (human body) with the digital material (virtual space) is what produces the atmosphere, which is therefore inseparable from the experience. This connects with Karen Barad’s (2007) ideas of intra-action and agential realism. Agential realism sees that phenomena in fact only form when a material is measured by an apparatus (Barad, 2007). Here, an apparatus can be understood as a specific ordering of material that facilitates and records an aspect of the exchange. From this vantage point, an objective reading becomes impossible. Instead, the measured material intra-acts or dynamically exchanges with the sensing material of the apparatus, producing a phenomenon. In the case of a virtual reality experience, the digital materials of the space intra-act with our eyes or ears and construct the phenomena of our experience. Here, the intra-acting materials of the human body and the digital space produce agential cuts of reality. In this way, the phenomena that produce realities emerge as our sensing apparatus intra-act with these digital materials.

From Grosz and Barad, we could see that the physical and the digital comprise the same stuff—material, matter. Realities are always real; realities erupt through the intra-action of physical and digital materials converging at different points and in differing proportions. This idea is helpful in conceiving virtual interiors, to know that our choices of digital and physical materials are atmospheric.

### **In-Between Encounters**

Jess Johnson’s and Simon Ward’s *Terminus* installation is a sophisticated interplay of physical and digital materialities working together to craft a unified, mixed reality experience. The space is wrapped in physical textures and artefacts that are diffracted through five VR experiences or digital realms (Johnson and Ward, 2019). Each realm takes the viewer on an immersive 360° journey through digital space. This is seemingly a clever ploy that moves the work beyond a 360° experience—the lack of agency weaves in with the vaguely dystopian thematics of the digital and physical environments; the idea that you are on a journey to and through a future that you cannot control. This work makes excellent use of threshold—the

physical space is immersive and total; every aspect ties into the narrative of the work and entwines with the digital experience. The physical space, in fact, prepares you to enter the digital space and receives you as you emerge. There is a smooth, unified transition between the two stylistically and thematically. Viewing the physical and the digital as material reinforces the potential for physical spaces to prepare us for the experience of virtual spaces. In *Terminus*, gallery attendants assist audiences with the VR experience. Most VR experiences require a handover of some sort—someone to check the headset and briefly explain how it works. This idea of physical ritual or preparation for virtual experiences is laden with potential for spatial design. How might we craft the spaces within which we wait for our virtual experience? This is particularly pertinent in galleries where people spend a long time waiting in lines for a headset to become free. How too can we craft the rituals of exchange as we prepare audiences for their viewing experience? Considering the materiality and program of the prefacing physical space is one way to extend and innovate virtual experiences.

### **From Skeuomorphism to Somaesthetics**

Presently, much VR is highly skeuomorphic—focused on relatively realistic transpositions of the physical to the digital to aid human understanding in the new virtual environment. For example, when you put on the Oculus Quest headset, you enter a *waiting room*: a relaxing space styled as a living room, from which you can access your games, videos and experiences. Interaction design has a strong history of using skeuomorphism to transition humans into new interaction paradigms. For example, early graphic user interfaces employ window and trash can metaphors to orient people in the desktop space in a simplified yet realistic way (the trash can icon looks like a trash can, and is where you pop your unwanted files). Early iPhones also made use of this paradigm—with photorealistic bookshelves for your e-books and a realistic lens for your camera app. This makes a lot of sense and is based on excellent and thorough empirical research into human learning. However, as we become more familiar with new environments, we can open out our design strategies to explore new things that are not necessarily based on mimesis. Importantly, the highly immersive capacity of virtual reality allows us to consider the body much more deeply than has been the case with screen-based interactions.

Starting with the material experience of the body provides a novel way to approach the design of the virtual interior. Char Davies' 1995 VR work *Osmose* takes the participant ('immersant') on a journey through a slightly abstracted, virtual space. Using breath and

balance, the viewer floats up and down and moves through space. By deeply tuning to their physical body, immersants are able to journey anywhere within these worlds and hover in the ambiguous transition areas in between (Davies, 1995). This is a really interesting example of how leveraging the corporeal experience of time and space could be an exciting step towards very new virtual experiences. Brenda Laurel and Rachel Strickland's 1993 work *Placeholder* takes a similar approach, where the audience takes on the form of an animal spirit, experiencing a new 'umwelt' or sensory gamut through this form. The critters function as 'smart costumes,' each one changing not just the appearance of the user, but fundamentally shifting the range of sensory expressions and experiences available to them. As Brenda Laurel (1993) writes: "Experiences are said to take place. One comes to know a place with all one's senses and by virtue of the actions that one performs there, from an embodied and situated point of view." This work ties back to Barad's (2007) agential realism: the sensory range of the avatar you adopt determines your experience of the space through material intra-action.

These two examples actively leverage the entwined mind-body plane in the design of the experience by experimenting with corporeal expression to navigate digital space. This could be described as a somaesthetic appreciation of bodily movement in the space, where attention to the sensation and practices of the virtual body is used to guide the experience. Somaesthetics is a suite of methodologies for understanding and articulating the affective qualities of body movement. Kristina Hook (2018) has developed the practice of soma design, "arguing for designs that recognise the soma as the unity of mind and body, intellect and experience" (p. 158). Her book provides tools and methods for ideating, experiencing and evaluating design from the perspective of somatic engagement (Hook, 2018). Applying soma design to the production of virtual space provides another interesting opportunity to create new interior experiences. In this way, paying close attention to the material experience of the body allows new ways of navigating and experiencing virtual space to become possible.

### **Experience Moves Across Threshold**

Research shows that the experiences we have in virtual reality can transfer and affect us in the physical world, and this could be another way to approach the design of virtual interiors. A large amount of research has focused on how VR can be used to promote empathy through the use of 'perspective-taking' experiences. These experiences use a virtual avatar to provide the user with an alternate perspective; the user occupies a foreign body within a contextualised

virtual space. This contributes to what has been described as the illusion of body ownership, where people become connected to their virtual avatar and begin to perceive space-time through that body (Krekhov et al., 2019). This sense of embodiment is comprised of a sense of self-location, a sense of agency and a sense of body ownership (Bertrand et al., 2018). The illusion of body ownership has been demonstrated in the physical world through the rubber glove illusion, where people have their own, hidden hand stroked with an unseen paintbrush while simultaneously watching a rubber hand near them also get stroked with a paintbrush (Botvinick & Cohen, 1998). The study finds that people seemed to “feel the touch not of the hidden brush but that of the viewed brush, as if the rubber hand had sensed the touch” (Botvinick & Cohen, 1998, p. 756). This has been used to effect in various VR scenarios to treat phantom limb pain, where patients are able to interact in the virtual world through therapeutic engagement with a fully limbed avatar to alleviate phantom pain sensations (Botvinick & Cohen, 2019).

In several studies, the Stanford Virtual Human Interaction Laboratory has built on the illusion of body ownership to show that VR is implicated with an increase in empathy and an increase in prosocial behaviour. One paper compares ‘imagine-self’ perspective-taking tasks, where the first-person narrative is used to place audiences in the position of homelessness (Herrera et al., 2018). The aim was to compare traditional narrative-based perspective-taking against immersive VR based perspective-taking. The narrative group read a first-person account of becoming homeless, with the instruction to imagine it as happening to themselves. The VR group experienced the same narrative sequence but in an immersive 360° space in the body of the homeless subject. The study found that the VR group had more positive, longer-lasting attitudes toward the homeless than the narrative-based group. The second study of the paper compared three groups using mediated perspective-taking: one narrative-based, one low immersion via desktop (screen-based) and one high immersion via VR. The narrative and VR groups were as in the first study, and the screen-based group had access to video and imagery to enhance the story. A control group did not take on any imagine-self perspective task and instead received literature on homelessness. The study found that the three perspective-taking groups rated higher on empathy than the control group, but that those who became homeless in VR signed a petition supporting the homeless at a significantly higher rate than participants who performed a traditional perspective-taking task (Herrera et al., 2018). They also found that these perspective-taking activities enabled longer-term empathy than just reading literature (Herrera et al.,

2018). These studies indicate that through the bodily experience itself, VR can have an emotional effect on people that transfers into the physical world.

Another study explored the impact of occupying your future, elderly body on your desire to save for the future. People interacted through age-progressed photo-realistic renderings of themselves in virtual space and were subsequently asked to then allocate resources towards their future (Hershfield et al., 2011). The study found that exposure to visual representations of one's future self leads people to think more closely about whether they would spend in the present or wait for the future, lowering the discount of future rewards and producing higher contributions to saving accounts. They think that these effects are not due to thinking simply about the implications of ageing, but rather, they arise simply from direct exposure to renderings of the future self (Hershfield et al., 2011). Another study used perspective-taking VR to expose male perpetrators of domestic violence to the experience of their female victims. The study found that being embodied in a female victim who suffers verbal abuse and intimidation by a male character using VR resulted in an improvement of the ability of the offenders to recognise fear in female faces (Seinfeld et al., 2018). The study found that these offenders often incorrectly attributed happy emotional states to fearful facial expressions (Seinfeld et al., 2018). The perspective-taking VR task enabled them to reduce this response bias in the real world, indicating that changing the perspective of an aggressor by means of virtually embodying the victim impacts emotion recognition (Seinfeld et al., 2018). These findings are significant and indicate that experiences in the digital world can transfer to the physical world.

The BrainPark clinical research institute at Monash University makes use of this transfer concept to provide therapeutic intervention for people affected by addictive and compulsive behaviours. Here, they use virtual reality to treat patients with OCD, allowing patients to gain immersive exposure to challenging environments or objects. They state that the experience of these virtual environments may feel more real than using imagination, and this exposure allows for control, as people can decide when the next object will be present in the environment or leave instantly when the space becomes overwhelming (Allen, 2020). Interestingly, BrainPark's wider research traverses the physical and digital empirically, providing prescriptions for exercise and meditation in conjunction with virtual and traditional cognitive therapies.

From these examples, it is evident that in virtual space we are still intimately and affectively tied to the experiences of our digital bodies. This makes sense because the intrinsic connection between mind and body is exactly what makes VR so immersive in the first place. Our body responds to digital phenomena; the narratives of space and practices we engage in are evocative and effective. We feel things through our virtual avatars or personas. Understanding that there is an incredibly nuanced, affective relationship between the physical body, the digital body and an experience in virtual reality again provides many opportunities for the design of virtual space. How can virtual reality experiences encourage empathy? How might the activities or rituals of a virtual space affect the way that we feel in physical space? To what extent do these experiences overlap with and transfer to physical space?

### **Conclusion**

In this paper, we hope we have highlighted the value and the need for conceiving the virtual in more complex ways. We appreciate how the practice of virtual interiority presented here may seem difficult to grasp at first. It requires some unpacking, as it is an engagement with ideas of emergence and elusive ambiguity that is key for getting a sense of how all things (including ourselves) are always in states of 'becoming'—productive processes that extend beyond the boundaries of human perception and knowing. Accepting this, the practice of interior design can expand into sitting with the paradox of not knowing and recognize that not knowing is a specialist field of knowledge itself. Through this process, interior designers can help articulate design practice through entangled forces and affects, a network of relations in space and time. This is a practice that takes practice. It takes time and can be at odds with ideas of control and productive efficiencies. When the intra-active idea of the virtual is mapped more broadly to our ecological crises, practising the virtual can be understood as an ecological practice with broader intrinsic value. In this space, interior designers can lead the way for feeling/thinking/being with our relationship with the earth differently and play a critical role in reshaping future design practice.

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## References

- Attiwill, S. (2019). A new image for interior and interiority. In G. Brooker, H. Harris, & K. Walker (Eds.), *Interior futures* (pp. 170–175). Crucible Press.
- Barad, K. (2007). *Meeting the universe halfway: Quantum physics and the entanglement of matter and meaning*. Duke University Press.
- Bertrand, P., Guegan, J., Robieux, L., McCall, C., & Zenasni, F. (2018). Learning empathy through virtual reality: Multiple strategies for training empathy-related abilities using body ownership illusions in embodied virtual reality. *Frontiers In Robotics and AI*, 5(26). <https://doi.org/10.3389/frobt.2018.00026>
- Botvinick, M., & Cohen, J. (1998). Rubber hands ‘feel’ touch that eyes see. *Nature*, 391(6669), 756–756. <https://doi.org/10.1038/35784>
- Davies, C. (1995). Osmose [Exhibition]. <http://www.immersence.com/osmose/>
- Deleuze, G. (1994). *Difference and repetition* (P. Patton, Trans.). Columbia University Press. (Original work published 1968)
- Deleuze, G. (1988). *Spinoza: Practical philosophy* (R. Hurley, Trans.). City Lights Books. (Original work published 1970)
- Deleuze, G. (2007). The actual and the virtual (E.R. Albert, Trans.). In G. Deleuze & C. Parnet, *Dialogues II* (H. Tomlinson & B. Habberjam, Trans.) (pp. 148–152). Columbia University Press. (Original work published 1977)
- Grosz, E. (2001). *Architecture from the outside: Essays on virtual and real space*. MIT Press.
- Herrera, F., Bailenson, J., Weisz, E., Ogle, E., & Zaki, J. (2018). Building long-term empathy: a large-scale comparison of traditional and virtual reality perspective-taking. *PLOS ONE*, 13(10): e0204494. <https://doi.org/10.1371/journal.pone.0204494>
- Hershfield, H., Goldstein, D., Sharpe, W., Fox, J., Yeykelis, L., Carstensen, L., & Bailenson, J. (2011). Increasing saving behavior through age-progressed renderings of the future self. *Journal of Marketing Research*, 48(SPL), S23–S37. <https://doi.org/10.1509/jmkr.48.SPL.S23>
- Hook, K. (2018). *Designing with the body: Somaesthetic interaction design*. MIT Press.
- International Federation of Interior Architects/Designers (n.d.). IFI Interiors Declaration. <https://ifworld.org/programs-events/interiors-declaration-adoptions/>

- Johnson, J., & Ward, S. (2019). *Terminus* [Exhibition]. Heide Museum, Melbourne Australia.
- Krekhov, A., Cmentowski, S., Emmerich, K., & Krüger, J. (2019). Beyond human: Animals as an escape from stereotype avatars in virtual reality games. *Proceedings of the Annual Symposium on Computer-Human Interaction in Play (CHI PLAY '19)*, 439–451. <https://doi.org/10.1145/3311350.3347172>
- Laurel, B., & Strickland, R. (1993). *Placeholder* [Exhibition]. [http://tauzero.com/Brenda\\_Laurel/Placeholder/CGQ\\_Placeholder.html](http://tauzero.com/Brenda_Laurel/Placeholder/CGQ_Placeholder.html)
- Lévy, P. (1998). *Becoming virtual* (R. Bononno, Trans.). Plenum Press. (Original work published 1998)
- Munster, A. (2006). *Materializing new media: Embodiment in information aesthetics*. Dartmouth College Press.
- Nash, A. (2012). Affect and the medium of digital data. *The Fibreculture Journal*, 21. <https://twentyone.fibreculturejournal.org/fcj-148-affect-and-the-medium-of-digital-data/>
- Plato. (1921). *Sophist* (H.N. Fowler, Trans.). William Heinemann. (Original work written 360BCE).
- Rutledge, T., Velez, D., Depp C., McQuaid, J.R., Wong, G., Jones, R.C.W., Atkinson, J.H., Giap, B., Quan, A., Giap, H. (2019). A virtual reality intervention for the treatment of phantom limb pain: Development and feasibility results. *Pain Medicine*, 20(10), 2051–2059. <https://doi.org/10.1093/pm/pnz121>
- Seinfeld, S., Arroyo-Palacios, J., Iruretagoyena, G., Hortensius, R., Zapata,, L. Borland, D., de Gelder, B., Slater, M., and Sanchez-Vives, M.V. (2018). Offenders become the victim In virtual reality: Impact of changing perspective in domestic violence. *Scientific Reports*, 8(2692). <https://doi.org/10.1038/s41598-018-19987-7>
- Simondon, G. (2020). *Individuation in light of notions of form and information* (T. Adkins, Trans.). University of Minnesota Press (Original work published 1964)
- Sumartojo, S., & Pink, S. (2018). *Atmospheres and the experiential world*. Routledge.