

# We are IntechOpen, the world's leading publisher of Open Access books Built by scientists, for scientists

6,900

Open access books available

186,000

International authors and editors

200M

Downloads

Our authors are among the

154

Countries delivered to

TOP 1%

most cited scientists

12.2%

Contributors from top 500 universities



WEB OF SCIENCE™

Selection of our books indexed in the Book Citation Index  
in Web of Science™ Core Collection (BKCI)

Interested in publishing with us?  
Contact [book.department@intechopen.com](mailto:book.department@intechopen.com)

Numbers displayed above are based on latest data collected.  
For more information visit [www.intechopen.com](http://www.intechopen.com)



# Sensuality, AR/VR, and the Virtual Sublime

Lynne Heller

## Abstract

This article investigates the body, embodiment, augmented, virtual reality (AR/VR) and the virtual sublime. Through AR/VR one negotiates virtual worlds, often with a feeling of endless possibility and sublimity. This experience can lead to the danger of being swallowed up by the sublime. However, instead of being confronted by nature and the immensity of the skies, the virtual sublime references technology, infinitely zooming into microscopic and atomic structures, yet still shaking our sense of our world. The concepts of virtuality, digital materiality, the analogue/digital divide, an AR/VR spectrum, essentialism, sensorial sensuality and avatar instantiation will be explored, concluding with an analysis of the senses and the natural extension of sensorial engagement—affect. This article proposes that the heightened sensations of an AR/VR encounter lend themselves to the sublime. However, the deficit of AR/VR sensuality due to truncated sensorial input leads to feelings of disaffection and disconnection. The residual effect translates into a longing for a heightened engagement and becomes a yearning for the sensual input of physicality. Yearning therefore becomes a defining attribute of the virtual sublime. These ideas are considered in light of the philosopher Henri Bergson's concepts of the absolute and the relative.

**Keywords:** sensorial sensuality, AR/VR, virtual sublime, immersion, embodiment

## 1. Introduction

This text explores the body in augmented and virtual reality (AR/VR) and the implications of essentialism for the virtual sublime. The concepts of virtuality, digital materiality, the analogue/digital divide, an AR/VR spectrum, essentialism, sensorial sensuality, and avatar instantiation will be explored and conjoined, concluding with an analysis of the desire for experiences of the senses and the natural extension of sensorial engagement—effect. I propose that the heightened emotion and physical sensations of an AR/VR encounter lend themselves to an alignment with the sublime. However, the deficit of AR/VR sensuality due to truncated sensorial input leads to feelings of disaffection and disconnection. The residual effect of this less than optimal embodiment translates into a longing for a heightened engagement and becomes a yearning. Yearning then becomes a defining attribute of the virtual sublime. These ideas are considered in the light of the philosopher Henri Bergson's concepts of the absolute and the relative.

I have spent considerable time, both motivated and frustrated, in virtual worlds. Most of the time I have been a creator in AR/VR spaces, which perhaps leads to more excessive reactions to the medium as I seek to impose my artistic will through an inherently collaborative process. I only have the affordances and range for

self-expression that the application's coders and designers think to offer, accidentally program or intentionally impede. Contemplating this often one-way street of *collaboration* during both the highs and lows of making led me to think deeply about my experiences in AR/VR. Why was it such an exciting and propulsive activity, along with being a source of deep disappointment? I will approach this writing primarily as a maker but draw on other artists, designers, writers, and theorists to help me understand why I am continually drawn back to thinking about and working with AR/VR.

Composing this introduction in the time of an international pandemic is particularly instructive. It is impossible to ignore the terror and disruption a virus has created the world over. Sadly, little of the fear most of us are feeling could be typified as sublime. The sublime, along with its dose of danger, has a positive connotation of transcendence and awe [1]. However, how to look after ourselves physically and psychologically has suddenly come to the fore in most people's everyday existence. We can never escape our bodies as much as Eurocentric philosophical thought and academic traditions have sought to divide the intellect from our material existence. So one comes to terms with the body, a truce of sorts, particularly as one is made aware of an imminent danger to it. However, it is difficult to shake the mindset that there is a way to *outthink* our physicality and soar to great heights if only we didn't have to deal with flesh, blood, and bones. This is the promise of virtual existence and its Achilles heel. Virtual interaction has, seemingly overnight, become a mainstay for people with access to internet speed and applications such as FaceTime, Zoom, WhatsApp, and Microsoft Teams. With this acceleration into the virtual futurity, questions of sensuality, effect, and emotional engagement are timelier than ever [2, 3].

## 2. Virtuality

*Virtual* is a word tossed around on a daily basis now, a punchline for the gallows humour we engage in as we congregate around our internet water coolers. It has become a catchall word for communication and interpersonal relationships at a distance. As we are so reliant on digital technology for communication at a distance, common parlance often conflates the digital and the virtual. In this text, the digital is critical to enacting the virtual. However, they are different. To be blunt, the digital is the conversion of information into binary numbers—the virtual is our imagination.

Virtuality is a philosophically knotty discussion. The concept is considered extensively in the writings of thinkers such as Henri Bergson [4], Gilles Deleuze [5], Elizabeth Grosz [6], Pierre Lévy [7], and Brian Massumi [8], to name a few. It could even be said to be fundamental to the discussion of idealism versus realism or materialism, around which so much philosophical discussion is centred. However, three specific notions define the idea of virtuality in current digital culture, making them particularly pertinent to this text. One; the capability of “functioning or being used as, but not constituting, the physical object or entity represented. For example, virtual memory is memory that a microprocessor can use, but it doesn't correspond to actual chips in RAM.” Two; existence “in the form of, or by making use of, digital media. For example, groups of people who do not live near each other but who share a common interest or concern and keep in contact by means of the web can be said to be a virtual community.” Three; something that relates to or is existing in virtual reality [9].<sup>1</sup>

---

<sup>1</sup> Another definition of virtual, and my personal favourite, comes by way of the *New Oxford American Dictionary*, though very poetic is unintelligible to me. They define the word as an adjective and suggest that it is “Optics relating to the points at which rays would meet if produced backward” [10]. This is somewhat mysterious but a completely delightful sentence begs the question—What exactly would rays meeting, produced backwards, look like?.

Virtual reality, on the other hand, is an ambiguous term “referring loosely to a broad spectrum of new media technologies which enable the user to interact with computer-mediated representations or simulations, and by implication also to any experience generated or mediated by such means” [11]. For example, video conferencing or video games could be considered virtual reality. It can also refer to “cutting-edge sensory immersive technologies which use head-mounted displays and an elaborate array of body sensors in order to enhance, elaborate, and expand our sensory interaction with new media objects” [11]. The term is oxymoronic—what is the virtual has generally not been equated with the *real*. From a “metaphysical perspective, virtual reality might complicate various issues pertaining to the age-old distinction between appearance and reality, since a new media object in a virtual reality environment may be a representation of something real, that is, a copy, and a genuine unique object at the same time” [11]. Following on virtual environments are “simulated computational” models designed to interact with people. “They can have objects representing real or abstract entities that have a simulated physical representation” through digital materiality, tools, and technology, principally using AR/VR devices and apps [12].

### 3. Digital materiality

The digital is implicit in the virtual which is popularly experienced through AR/VR technology. Less obviously, the virtual is imperative to the digital in that one needs to imagine what is possible through digital materiality. Along with digital tools, processes and networks comes a materiality that starts with electricity, more particularly the state of the electricity, registering as on or off, and then converted to corresponding zeros and ones. The zeros and ones are, in turn, built into low-level languages that allow for sophisticated programs which can then control the ensuing digitized output. The electricity and recorded states are ephemeral but they are still material, even if that materiality eludes our human, immediate, senses. It is hoped we do not experience a jolt of electricity directly, but rather, see the results of it and therefore know it exists. Digitized output is how this materiality is commonly experienced. The light waves transmitted through screens hitting our eyes and sounds through speakers hitting our eardrums are elusive but material. The digital has these concrete manifestations even if it is made of and from substances such as light, sound, waves, and wattage, substances not often described as material. But they are. Electrons and sound waves are physical phenomena.

The relationship between the digital and virtual is not just substance versus concept. The virtual we experience is a unique product of the digital means enacting it. All materiality and process suggest more than just what meets the eye/ear/nose. When we look at or experience an object, we see and intuit the combined histories of the substances and processes that went into its creation. That is also true when experiencing virtually. Brian Massumi in *Parables for the Virtual* insists that:

*The digital is a numerically based form of codification (zeros and ones). As such, it is a close cousin to quantification. Digitization is a numeric way of arraying alternative states so that they can be sequenced into a set of alternative outlines. Step after ploddingly programmed step. Machinic habit...The medium of the digital is possibility, not virtuality, [original emphasis] and not even potential. It doesn't bother approximating potential, as does probability. Digital coding per se is possibilistic to the limit....Nothing is more destructive for the thinking or imaging of the virtual than equating it with the digital [8].*

To some extent, Massumi is correct in thinking that the digital and virtual can not be equated; however, they are productive for each other. Massumi's thinking conflates a constraint of means, the 'possibilistic' nature of the digital with what people can do within and with constraints. This is similar to arguing that anything made with paper and pen is limited because of how paper and pens are manufactured. In art making, the issue is not only the materials at hand, though contra Massumi, constraints of materiality often contain the gift of serendipitous intent or meaning; but rather possibility inherent through the intention of the artist, manipulation of audience reception, wish fulfillment, and force of inner vision conveyed, no matter whether the artist is using analogue or digital technology. As well, the assumption that possibility is only 'plodding' is near-sighted. Exploring/exploiting even the simplest of digitally calculated possibilities could take a lifetime, making this abstract notion of possibility infinite. That computers can do the plodding for us and give us an infinite array of possibility, seems like a creative positive rather than the negative Massumi seems to attribute to it. This is surprising given his obvious admiration for artistic methodology elsewhere in his writing [8]. Henri Bergson refutes the idea that quantification is limited by proposing that "...though mathematical processes are applicable only to quantities, it must not be forgotten that quantity is always quality in a nascent state..." [13].

Massumi's point is taken, though. The tools one employs do have an organic relationship to outcomes. It is just not quite as straightforward as assuming the way tools are made or the materials one uses therefore determine outputs; sometimes results undermine the tools/materials or are used in surprising ways, and it is in the defying of our expectations that the most intriguing work is done. Nonetheless, capturing physical materiality and converting it into digital materiality and then back to the physical manifestations of the digital is now embedded in our artistic methodologies.

There is, however, a great irony to this digital material. It is infinitely malleable, indestructible, and very easily stored. On the other hand, it is incredibly fragile and error-prone. Much digital material is lost in obsolete storage devices, cloud computing, and virtual worlds that have disappeared. And as anyone who has ever had a computer file become corrupted knows a great deal of hard work can disappear in a nanosecond. As well, the ideal of endless storage floating magically in the cloud—in reality server farms located on vast tracts of uninhabited land—has become a critical issue as e-waste and environmental degradation impact our world [14], not to mention increased cybersecurity risk.

#### **4. Analogue versus digital**

*Were all the photographs of a town, taken from all possible points of view, go on indefinitely completing one another, they would never be equivalent to the solid town in which we walk about. Were all the translations of a poem into all possible languages to add together their various shades of meaning and, correcting each other by a kind of mutual retouching, to give a more and more faithful image of the poem they translate, they would yet never succeed in rendering the inner meaning of the original [13].*

The organic relationship between materials/processes and resulting artifact, how our materials and methodologies define what we create, comes into particular focus when considering the difference between that which is analogue in nature and contrarily, the digital. The analogue is an uninterrupted continuum which can never

be parsed, whereas the digital is always made up of discrete units even if they are so densely packed or measured as to seem continuous. Analogue we cannot measure in units because there are not discrete moments, but to translate anything into a digital form, we need to measure it in units, zeros and ones, electricity on or off, nothing in between. The units can be pixels, numbers, vectors, or other notations, but nonetheless, they are always bits, quite literally. Zoom into the highest resolution photographic image and you eventually see the individual printed dots translated from the screen pixels that make up what appears to be a smooth continuum.

Contrasting the analogue to the digital has both philosophical implications as well as an impact on artistic methodology. Here again I turn to Henri Bergson to explore the fundamental difference he delineated. A complete discussion of his ideas would be impractical in this text but central to his thinking was what he called the absolute and the relative. Though the analogue and digital are not aligned exactly to Bergson's absolute and relative, his thinking does give us a way to conceptualize these two opposites if compared to his terms. His absolute, "the object and not its representation, the original and not its translation, is perfect, by being perfectly what it is" [13] and one can only know it through intuition. Whereas his relative is "...a translation, a development into symbols, a representation taken from successive points of view" [13] and is analysis not intuition. His absolute connotes the analogue, indivisible, and whole, and his relative the idea of individual digital units, somewhat similar to his "photographs of a town, taken from all possible points of view."

This conceptual understanding does not stop people from trying to construct the analog from the digital. Most digital endeavours seek to imitate the analogue in some way. AR/VR epitomizes this ambition. The photographer Edward Burtynsky, along with his colleagues Jennifer Baichwall and Nicholas de Pencier, recently completed a VR film, *Anthropocene: Ivory Burn* (2018), shot in the Nairobi National Park, where they endeavoured to capture the fantastical experience of the burning of more than "a hundred tons of confiscated elephant tusks and rhino horns." The torching took place in order "to send a deeply symbolic and visceral message to poachers and illegal trade syndicates" [15]. The filmmakers shot 2,500 still images in order to attempt to recreate a very small part of the event in three-dimensional AR. Tremendous effort and computing power went into stitching these images together and creating a surround environment. The critic Kate Taylor in commenting on the AR compared to the film of the same event points out though that the AR version still is lacking. "In truth, the cinematic version proves more immersive than the still-cumbersome miracles of AR..." [16]. How many more images would the Ivory Burn team need to capture to create more convincing semblance of the analogue? According to Bergson, it could never be anything but "an imperfect translation" [13].

So, what if the digital can never be the analogue and is always an imperfect translation? Are we not getting close enough to fool ourselves into thinking we have recreated the analogue? Here Bergson connects "[t]he real, the experienced, and the concrete" to "variability itself" and further claims that the element or in the case of digital materiality the zero or one, "is invariable" [13]. The implications for artistic methodology lie in the invariability of the element as the building block for creating AR/VR. He goes on to ask "[h]ow could you ever manufacture reality by manipulating symbols"? [13].

Bergson does not necessarily judge the relative although it is hard not to interpret his critique as a fundamental lack within the relative, which he also refers to as a process of analysis. He asserts that analysis "is much more useful in life than the intuition of a thing itself would be" [13]. He is clear that the relative and analysis are

as essential to shaping our understanding of the world as the absolute and intuition. However, he equally laments those that “have had no sense of the moving continuity of reality” [13].<sup>2</sup> This might be more of a critique of other theorists, who he labels the “masters of modern philosophy”, than the idea that it is easier to understand and valorize our ability to analyze over our embodied intuition.

There is an irony in the discussion of augmented versus virtual reality. By using the digital to evoke the virtual through AR/VR, a spectrum is created that is very much analogue in character; in that it is continuous and indivisible, akin to Bergson’s absolute. At one end of the spectrum there is AR, a layering of the digital/virtual on the material world, whereas VR, at the other end, is, in theory at least, a total immersion in virtuality through a headset. However, there are degrees of material imposition throughout the AR/VR spectrum. A completely immersive experience is still only an ideal that anchors one end of the AR/VR spectrum.

So are the two terms AR and VR of any use? They are popularly in play so at some level make a difference to users; however, most people only have the foggiest notion of the distinction between the terms and this may melt away as AR/VR become more embedded in our lives. Dennys Kuhnert and Roger Küng, trainers in the organization XR Bootcamp, theorize that “...anything you learn to do in VR can be applied to AR” and they “also believe strongly that AR and VR will merge together and define the future of computing” [17]. Just the fact that the AR/VR acronym is often written with a slash [18] implies that continuity between the two and the basically indivisible or analogue nature of this spectrum of digital virtuality.

## **5. The body in the digital virtual**

Even in the most immersive of circumstances we need some form of acknowledgement of the physical world around us for the very basic need to keep our bodies intact. For example, there is a safety feature built into a popular VR headset, the HTC Vive, that traces reality as a ghostly wireframe palimpsest so that the headset user is somewhat safe from bumping into walls and falling down stairs. When I first experienced this feature, I was much more intrigued with the wireframe of reality than the VR experience with which I was supposed to have been engaging. A competitor to HTC Vive, Oculus, has developed what it calls a Guardian System for its headset, a telling nomenclature. This functionality allows creators themselves to decide how best to visually hint at the physical world, for example, an overlay of a wireframe box that signals users when they are about to step outside of a zone. Another solution for safety, albeit low tech, is when an attendant is hired to physically and audibly guide VR users to prevent them from hurting themselves. A notable example of this was a VR installation at the Art Gallery of Ontario that allowed viewers to travel through a minuscule, medieval carved prayer bead<sup>3</sup> [19]. The magic of VR was somewhat diminished by the long lineup before donning the headset for a very brief time; and secondly by the constant reminder that someone was by your side limiting your

<sup>2</sup> In a beautifully written paragraph, Bergson complains “...metaphysicians have dug a deep tunnel beneath reality, that the scientists have thrown an elegant bridge over it, but that the moving stream of things passes between these two artificial constructions without touching them” [13].

<sup>3</sup> Ironically enough, technology helped us to feel surrounded by the amazing structure of the prayer beads but as yet conservators are not able to decipher how medieval craftspeople created these miniature complexities. With all our advanced knowledge of design and engineering, the prayer beads remain a miracle.

movement so you did not wander out of the prescribed area and do yourself or others harm. AR/VR systems often are in need of a babysitter to accommodate public interaction for both participant safety and equipment security.

As per this discussion of safety, it quickly becomes perilous to deny the body in AR/VR experiences at the basic level of straight-up survival, but philosophically, it is tricky as well. This is our instrument for knowing and being in the world and the only way we have to divine something like Bergsonian intuition. Academic Andrew M. Cox takes up the question of the neglect of the body in Western culture. In his overview of historical and theoretical influences that feed this disregard, he comes to the conclusion that a focus on the purely digital collapses in the face of “value and meaning in the everyday material and embodied world” [20]. Even though “the rise of the digital seems to reinforce disembodiment” [20]. There is apparently no way around the fact that we are creatures that can only illicit our knowledge of the world through our physicality. The digital, virtual or otherwise, is deeply entwined in our understanding of the world through our bodies. Utopic notions of liberating ourselves from our bodies [21, 22] now register as more and more dystopic rather than desirous.

Disconnect from the body or disembodiment is a contemporary conversation. As undeniable as our bodies have always been, discourse about them is now widely infected by technological concepts. We use the language of the digital in order to understand our own innate bodily processes. For example, people now quite often refer to their brains as hard drives. To quote artist Stephanie Cloutier: “In this present moment we are learning about our bodies again, using our body as memory storage” [23]. À la digital storage, we now believe we are accumulating experiences in our muscles, cells, and nerves that then inform how we think/process *data*. Depending on one’s structuralist’s beliefs—this vocabulary itself could be changing our minds, thus bodies, supporting the ambitions of the cheerleaders of a post-humanist future.

If we form our world through our physicality, does this make our embodied existence paramount and is this unavoidable consideration of the body a version of essentialism? An illuminating perspective on essentialism comes through feminism. Scholars of feminism have long grappled with issues of the body and how it makes us who and what we are, therefore structuring our experiences. Eventually most deliberations about feminism come back to the question of materialism, a euphemism for this thing we carry around with us called the body. Shivers of terror run-up backs when the still dreaded term, essentialism, is evoked in feminist circles. Intellectual pendulums swing, however, and the most recent iteration of the recognition of the embodiment of women is called material feminism—when ported over to ecological studies—ecofeminism. In their anthology, *Material Feminisms*, scholars Stacy Alaimo and Susan Hekman gather the writing of certain feminist theorists most invested in rethinking ‘the materiality of human corporeality’ [24]. Arguably, this academic turn to materialism is misnamed. The writers and associated thinkers in the anthology are not debating a strictly essentialist view of feminism, but rather, for the most part, they are looking at the fluidity and continuity between nature/culture, essentialism/constructionism, body/language. But they make a point of noting our detachment from materiality, nature and our bodies. In this sample, Jane Bennett critiques our ‘escape from materiality’:

*The philosophical project of naming where subjectivity begins and ends is too often bound up with fantasies of a human uniqueness in the eyes of God, of escape from materiality, or of mastery of nature; and even where it is not, it remains an aporetic or quixotic endeavor [25].*

Likewise we can think of the body and its relationship to the virtual similarly. Imagining the AR/VR without the body is an impossibility. But the body does respond to and adapt to the technology as well. Principally, AR/VR designers have been more than a bit oblivious to the body though the experience is rarely able to escape its reputation as a nausea and headache-inducing trial. The resurgence of the medium took place when the technology of screen refresh and eye tracking had advanced enough so that the majority of people can now withstand this experience for a little while without vomiting [26]. Still, the caveat remains—do not try this on too little sleep.

Another indicative design flaw in virtual reality headsets denies differences between bodies [27]. There is some consideration for the space between the centre of one's pupils or interpupillary distance (IPD) but not much accommodation beyond that. The head strap has a limited ability to adjust and the weight of the set is also prohibitive for people without a typically assumed adult's spinal and neck strength. These are just a few of the obvious disincentives to using the equipment by anyone who differs from the highly idealized male body.

## 6. Sensorial sensuality

*The experience of the senses are for real. This direct and unfeigned response was from artist, I'thandi Munro, describing a predominantly VR experience she engaged in but one with hybrid aspects. Munro continued "...I was walking on a piece of real wood and the touch of that wood was significant. I knew I wasn't really in VR because of the touch of the real" [28].*

The implications of essentialism/embodiment for the digital virtual is not just a feminist pursuit, rather it is widely considered. Cox mentions four areas of study that concentrate on the body—phenomenology, practice theory, embodied cognition, and sensory studies [21]. It is through sensory studies that I will consider the organic relationship between the body and AR/VR. Sensory studies contends that our senses are acculturated and extolls “sensual scholarship....research, theory, and methodology that are *about the senses, through the senses, and for the senses* [original emphasis] [29]. A key concept of sensory studies, the sensuous self, the “embodied self is both the material basis and reflexive outcome of perceived sensations and sense-making practices” [29], clarifies how we exist in the world, thus in virtual space. The reference to both a “material basis and reflexive outcome” signals the reciprocal relationship between self and environment. Our sense of self helps to create a VR world in particular where much is required of our sense making or somatic work from very little sensorial input. In return, the self is enlivened by the VR interaction.

Intersensoriality plays a critical part in this notion of cultural sensorial specificity and “refers to the interrelation and/or transmutation of the senses”. David Howes delineates four dyads of intersensoriality, each describing a continuum. “a) cooperation/opposition, b) hierarchy/equality, c) fusion/separation, and d) simultaneity/sequentiality” [30]. Put concisely and to quote designer Annika Dixon-Reusz: “We are focusing on one sense at a time, but every sense brings us closer to a full body experience” [31]. Circling back to Bergson and connecting the senses to self, he suggests that one is: “...on the one hand a *multiplicity* [original emphasis] of successive states of consciousness, and on the other a *unity* [original emphasis] which binds them together” [13]. We don't just see when we look or hear when we listen. Unfortunately, our innate intersensoriality holds a dilemma for digital AR/VR.

AR/VR creators and consumers are entranced with capturing what we can sense and converting it into digital materiality. Nonetheless, we can only covert that

which we can measure. The number of senses we have are somewhat contested—purportedly even up to 53 [32], however, there are five which are recognized traditionally: vision (sight), audition (hearing), gustation (taste), olfaction (smell), tactician (touch), and four more that are now widely recognized: thermoception (heat, cold), nociception (pain), equilibrioception (balance, gravity), proprioception (body awareness). We have more or less luck with digitizing what we can sense, ephemeral and otherwise, depending whether technologists have figured out how to measure those sensations. Here is a list from easiest to hardest to measure and why:

- vision (sight) can be measured in wavelengths—colour and luminosity—giving us specific numbers that then translate into imagery;
- audition (hearing) is measured in sound waves—frequency and amplitude resulting in sound files—we record this in both midi, the instructions for making sound and actual files themselves;
- thermoception (heat, cold) can be measured precisely in degrees—Kelvin, Celsius or Fahrenheit—so it can be controlled by digital means, though the actual transmission of these sensations is not very satisfactory through a computer interface; and
- tactician (touch) is measured in pressure and force.

These following senses are delivered to us through a complex combination of molecules, making them more difficult to measure than the list above:

- gustation (taste) is difficult to measure as everyone has a different configuration of taste buds but we speak of five tastes—salt, sweet, sour, bitter, and umami; and
- olfaction<sup>4</sup> (smell) is the measuring of smell is almost impossible because of the complexity of how it is delivered through a combination of millions of molecules hitting the nose and how the human receptors for smell absorb and interact with those molecules.

The last three senses on this list are dependent on our brain/nerve reception thus making them extremely difficult to measure:

- equilibrioception (balance, gravity);
- proprioception (body awareness); and
- nociception (pain).

Keep in mind that while some of this sensorial input can be measured, there is no way of knowing how a person perceives it. Computers can theoretically record 16 million colours. The human eye can only perceive 4 million.

---

<sup>4</sup> One of the most elusive of all the sense abilities to duplicate has been smell. There have been infamous experiments such as the Smell-O-Vision. An article in *Wired* from 2006 [33] illustrates how hard it is to deliver smell.

Imagery, what we see, is now the most widely developed method for capturing sensorial input. Ironically, as easy as it is to capture, it is extremely complex for a computer to categorize what it has been fed. It takes a human brain to decipher an image, understand it as a whole rather than just a group of pixels of varying gamma and RGB levels. Humans excel at making sense of imagery. However, with the use of artificial intelligence, what I refer to as *collective intelligence*, machines are now better at recognizing images due to the *training* they have received from people. There is a labour force in India, for the most part women, that is, training machines to understand what they see.

On the fringes of the Indian city of Kolkata, in the dusty, crowded neighbourhood of Metiabruz, 460 young women are working at the vanguard of artificial intelligence. The women, mostly from the local Muslim community, are helping to train computer vision algorithms used in autonomous vehicles and augmented reality systems, for the likes of Amazon, Microsoft, eBay and TripAdvisor... The challenge is that the algorithms that underpin the technology are as naive as newborns. They need to be fed millions of labelled examples to teach them to “see” [34]. There remains, beyond sight and hearing, so much of human sensing that cannot be digitized because it is too elusive to measure. This leads to a lack of sensuality and intersensoriality in our digital experience. I will expand on this idea but contend that this lack is felt intuitively and causes a craving for sensorial completeness, a yearning.

Turning back to the question of capturing the ‘real’ world—there is a truism amongst technologists—garbage in/garbage out. The more *real* and complete information we capture, the more we have to work with when we convert it to zeros and ones. More information equals more detail—Bergson’s qualitative quantities—in turn, equal more sensuality and richness. Immediately, this enriched sensorial field translates into a deeper aesthetic experience. It has, though, another resonance and that is of heightened affect. Antonio Strati, quoting Michel Henry, claims “there is no sensory activity that is neutral and impassive; sensory activity always involves passion, and every sensation is affective” [35]. AR/VR has its affective and emotional implications which are tied to the abundance or lack of sensorial sensuality.

Another truism is that we are really in our infancy when it comes to interacting with machines. For example, we draw with a brick. There are options for using pressure and touch in the digital manipulation of images, such as the Cintiq tablet and stylus. But they are not widely adopted. Emulating what our senses tell us of the outside world depends on the sensitivity of instruments and technology we use to record the sensual experience. There was a time when one could tell the difference between a print of a digital photograph versus an analogue one, but with the addition of megabits of information captured by even the most rudimentary of phone cameras, it is hard for the human eye to discern digital from analogue continuity. So how much more could one capture if there were more sensitive instruments for recording the world around us? And when do we run into the Bergsonian brick wall of the impossibility of the relative translating the absolute? If we cannot discern the relative, can we *fake* the absolute by gathering more and more detail?

## **7. Tools extensions**

In this sense, the elegant term avatar, derived from the Sanskrit avatàra, is most apposite in suggesting the idea of a kind of transubstantiation, the incarnation of life in a different form [36].

One intriguing device for interacting with the virtual/digital realm is both a tool and an extension of self—the avatar. *Avatar* is a Sanskrit word meaning *descent*. It originally connoted the bodily manifestation of a “Hindu god emerging from the

heavens... in order to intervene in human affairs.” Neal Stephenson in “his science fiction novel *Snow Crash* popularised the use of the word, as it is commonly understood today.” Ironically it implies the opposite of its original Sanskrit meaning in that it is a “digital representation in a virtual environment.” It can refer to an online name, a profile and/or graphical representation such as photo or animated character “used to represent people in Internet chat, video games, social virtual worlds, massively multiplayer online role-playing games, social networking sites, and other mediated contexts” [37].

Given that on top of being a tool, it is also an image, the avatar goes one better and is an affective, embodied self-portrait. The person/avatar relationship allows for exploring self/other elisions through our affective reactions, wherein we inflect the avatar with *the idea of a kind of transubstantiation*. To paraphrase the philosopher Timothy Morton, who claims “[d]rawing distinctions between life and non-life is strictly impossible, yet unavoidable” [38]—drawing distinctions between yourself and your avatar is equally *impossible, yet unavoidable* and entirely in keeping with human emotional needs. This confusion of self is coherent with a collaboratively imagined world where an avatar is virtually and digitally manifested. I’m proposing an instability, between a subject-creator and an object-avatar, highlighting the *blurriness* in the division of self and other.

Mark Stephens Meadows in his book *I, Avatar: The Culture and Consequences of Having a Second Life*, observes there are three different kinds of avatars; the first is the *dashboard* avatar typified by a static image that accompanies account information or blog entries on forums and sites. This avatar associates an image with a name to add a mnemonically visual aid to an online identity. Secondly, there is a first-person avatar in a console game which is the personification of the player, but is one and the same as the person it represents. Meadows goes on to specify another avatar, “a third level—the second-person camera avatar” where:

*The “camera” floats above the avatar’s shoulder, or behind the head. Like puppets or dolls, they live in architectural space. Like the first-person avatar of the console game, they can run, jump, walk, roll and carry things around, but they are different in that you can, as you drive the avatar, see them do it. These second-person avatars also include the functionality of the first-person avatars as well as the functionality of the profile, or dashboard, avatars [39].*

Meadows gives us an important clue for understanding why there is so much confusion between self and other when considering the second-person avatar. We see this *puppet* or *doll* activated ahead of us. As the *camera*, we walk behind our own selves, somewhat in the manner of an obedient geisha girl or, worse still, a stalker. So, is this semi-autonomous image marching ahead of us? Why are we able to observe ourselves from a god’s eye view? As this is only ever available to us in a virtual world while using a second-person avatar, we are confronted by a distorted sense of self and embodiment.

Meadows further theorizes that “avatars are about the advancement of personality within a kind of fiction that is both social and personal” [39]. The avatar must play a dual function of *speaking* back to its maker with some sense of self but also be a representative, an “entity utilized in social environments” [40], a tool for interpersonal interaction. This sense of *toolhood* is further emphasized as the avatar is also the interface to create, build, and design in user-created virtual worlds, thereby fostering even more decentering of this *thing* that is you, but not you; autobiographical character but also functional tool.

Provisionally, I am positioning the avatar as simply an image rather than an *incarnation of life in a different form*. Suggesting the avatar as a fictional character

sidesteps the issue of whether it is alive or not, and instead engages with images and our relationship to them by referencing the ‘pictorial’ and ‘effective’ turns in theory. The *other-avatar* is a picture/image/icon we have fashioned and *own*: even so, the avatar mechanistically *acts out* on a regular basis, leading us to imagine that it has agency and personality beyond our intentions. The feelings and emotions one has for one’s avatar, along with the personal investment, the time and money one puts into creating it, elevate this image to much more than just an arrangement of pixels on a screen.

That an avatar or image-as-avatar is real in the sense of *truth to reality* is taken up in detail in the article “The real problem: avatars, metaphysics and online social interaction”. In that text, the author, David J. Gunkel “considers three theories of the real, extending from Platonism to the recent innovations of Slavoj Žižek” [41]. In essence what he is wrestling with is whether our ‘real selves’ are fiction or not, implying our avatars are built on quicksand. Fair point, but perhaps we need not discuss people or the avatar in this light. *Truth* or *the real* have very little to do with how we *feel* about people or things. So putting aside whether we want to call an avatar real or alive, their existence still reveals our desires, yearnings, fears, and insecurities, not to mention our *impishness* which often plays havoc with our sense of truth. Instead of reviewing the non, posthuman or cyborgian nature of the avatar, I propose a *reading* of the avatar as an animated, performed image and our desire to inject it with subjectivity, while at the same time thinking of it as an object. The avatar entity need not be proven *real* or *alive* for us to feel it is.

Of particular note in the preceding discussion is the subjective instability triggered by the avatar. Similarly the idea of the sublime, which I turn to next, destabilizes boundaries of self. One is overwhelmed and enveloped by the sublime, thus the convergence of subject and object, ironically at the same instance, one stands apart and fundamentally alone. A quote from artist Eugénie Shrinkle supports the idea of a *confusion of self* when discussing in particular the technological sublime: “...a feature of the technological sublime in the digital age is the absence of a consistent and uniform boundary between the self and the machine” [42]. That sounds like an avatar.

## 8. The virtual sublime

The notion of the sublime has ebbed and flowed since it was first written about by the 1st century CE writer, Longinus,<sup>5</sup> whose text is the first reference we have to the sublime in Western philosophy. Baldine Saint Girons, quoting Longinus, identifies some of the fundamental characteristics: “...for, as if instinctively, our soul is uplifted by the true sublime; it takes a proud flight, and is filled with joy and vaunting, as though it had itself produced what it has heard<sup>6</sup>” and goes on to suggest that this “rapture or ecstasy by storm” is, nonetheless, a “violence” which “is indeed accepted, but it is violence all the same” (Longinus as quoted in [43]). Longinus also claims that “...the experience of the sublime is fundamental in that it brings about a relativization of knowledge” [43]. If a phenomenon is huge, terrible, infinite, and overwhelming, then one experiences the sublime and *knows again*.

Notwithstanding its ancient pedigree, it appears the sublime is still very much alive and kicking; it persists both in popular imagination and academic literature,

<sup>5</sup> It is generally acknowledged that the name Longinus is a placeholder for an anonymous writer. Some references use Pseudo-Longinus or “Longinus” to indicate the uncertainty of authorship.

<sup>6</sup> Saint Girons explains that Longinus’s text was actually a discussion of rhetoric and thus references are to the aural rather than the more common visual manifestations of sublimity.

though its nuances have morphed according to different epochs and socio-political contexts. It also has the effect of anthropomorphizing and personalizing phenomena, whether it be natural or manufactured, to the point where what people see/hear/smell/feel/taste resonates deeply inside themselves, making it difficult to extract self from other/nature/technology. This is the crux of understanding the morphing character of the sublime and why it is so pertinent to this chapter—Sensuality, AR/VR, and the Virtual Sublime.

The classic sublime was formed in the heyday of the Romantic era. Since then, in the modern era and particularly in postmodernism, myriad adjectives have been conjoined to it—the classic natural sublime: technological; virtual; feminist; ecological; quantum; to name a few. It is a flexible term, but the notion of terrible awe and overwhelming effect predominate. Of the virtual sublime in particular, Vincent Mosco sums up its mystery and complicated status thus: “... cyberspace has become the latest icon of the technological and electronic sublime, praised for its epochal and transcendent characteristics and demonized for the depth the evil it can conjure” [44]. The virtual shares some characteristics with a classic natural sublime. When faced with the natural, one feels anonymous, alone, forsaken. In the vast tract of the virtual sublime, particularly user-created virtual worlds, there is an equally problematic loss of identity as one navigates a space where one can be anything one wants, but amongst a muddled multitude that only serves to make a person lonelier. As N. Kathrine Hayles puts it, “opening the human to the unthought and unrecognized otherness of a universe much bigger than human conception can hold” [45]. Together with our intrepid avatars, participants are negotiating virtual worlds with a feeling of endless possibility at the same time experiencing the sense of losing self.

One can never really get to the end of a virtual world. It unfolds in front of you and is only contained by the computing power you have or the time you want to invest in the journey. There is no there to get to. This was well illustrated for me by an early encounter I had in the user-created virtual world of *Second Life*. I was approached by another avatar who was attempting to travel to the far reaches of this world. He asked if I wanted to join in the sojourn. Off we went, but then, very quickly on, got trapped dancing endlessly in a disco that we did not understand how to escape other than by turning off our computers and ending the quest. This is indeed a type of infinity, but not particularly sublime.

Along with the psychological implications of the virtual sublime, there is the physical embodiment associated with VR. Immersion is the means of delivering a virtual experience, enveloping the viewer through one’s visual and aural senses. One wears a headset to experience true immersion and with these devices come the inevitable physical symptoms. On the positive side, one can fly and float above the world, climb mountains, and dive into the depths of an ocean, all without any auxiliary help in the form of oxygen, external transportation, and protective devices. However, the accompanying sensations of nausea, heart-stopping drops, gut-wrenching twists, sickening feelings can imitate or initiate feelings of mental terror [46]. These are common sensations when negotiating VR through headset technology. Often these experiences fall well short of anything close to the sublime. Nonetheless, if one’s stomach drops out when peering over the edge of a platform that is the only obvious structural support in an unbounded sky, then one feels fright and vertigo, which is never far from sublimity.

This concentration on the physical sensations of the virtual sublime do not address the contradiction of the virtual, that is, theoretically at least, a denial of the body. Referencing back to Gibson’s *Neuromancer*, one can see the overarching conception of the virtual sublime as a “consensual hallucination.” This is all happening in the head which is the promise and mirage of virtuality—we can avoid the

inconvenience of bodily functions, such as eating, sleeping, defecating, pregnancy, by figuring out how to exist only in the virtual. What irony that the physicality of a headset existence is perfectly suited to a faux sublime feeling but often the intentions of both theorists and technologists are to rid us of these *unnecessary* sensual reactions. The technology will get better and quit reminding us of our weighted, earth-bound bodies and then one will really be able to experience the true sublime.

## 9. Yearning

Sublimity troubles our sense of self when one asks what is knowable in the face of enormity, infinity or even the endlessly microscopic. The sublime shakes our normative sense of subjectivity but also reminds us of our boundaries. It is always just beyond our grasp but alarmingly close. Although being infinite, overwhelming, terrible, and beautiful—we still seek out the pleasure and pain associated with the sublime; but instead of nature and uncontrollable expansion outward to the frontier of space, we are turning to digital technology which is deeply disrupting our subjectivity. Though AR/VR virtual worlds are negotiated, often with a feeling of endless possibility, they are at the same time horrendous Möbius strips of existence. Along with the possibility inherent in this affect, there is an added ingredient in the virtual sublime and that is of yearning.

Susan Stewart in her book, *On Longing*, expands on the meaning of yearning desire: ...the direction of force in the desiring narrative, is always a future-past, a deferment of experience in the direction of origin and thus eschaton, the point where narrative begins/ends, both engendering and transcending the relation between materiality and meaning [47, 48].

Here Stewart is making the connections that work so persuasively to argue for a yearning in the digital virtual sublime. Materiality meets meaning and there is a lack. Usually implicit in the sublime is sensory overload. The missing pieces of materiality or truncated intersensoriality in the virtual sublime trigger yearning. As I proposed in the introduction, an AR/VR encounter has an affinity with the sublime but with a deficit of sensorial sensuality leading to less than optimum embodiment and then longing. Perhaps we are grasping at the sublime in order to make up for a lack of sensual input in our digital experience. We need to conjure up some magic again in a digital universe, and sublimity points the way to creative possibility and inspiration. Does the sublime stand in for the thing we crave? Part of the sublime's power is its hallmark, awe. In awe, one is left speechless. In order to be speechless, all our other senses need to be subsumed and overcome.

Most importantly, what does AR/VR mean for our future and why would we go to the trouble of subjecting ourselves to the physical discomfort that often accompanies it? Acceleration into the virtual futurity through strange times such as the worldwide pandemic fulminate questions of sensuality affect and emotional engagement. Can we make AR/VR embodied, fully sensorial, an absolute? Can it give us a full experience of a range of affects, sublimity included? Let's try.

## Acknowledgements

The following text benefitted from research I conducted for my doctoral thesis, *Avatar Daughters: Envisioning a Spectrum between the Material/Virtual through Feminist Theory* [1]. I also developed ideas for this chapter while teaching *Interactive Media*, at Ryerson University, Canada. Research for a proposed article for the Canadian Review of American Studies furthered my understanding of virtual sublimity.

I would like to extend a thank you to the support of research assistants, Stephanie Cloutier, Annika Dixon-Reusz, Shiemara Hogarth, and I'thandi Munro, who are fellow team members for the project *Thinking through Craft and the Digital Turn*. They generously offered ideas, anecdotes, feedback, and contributed to the literature review that supported this writing. Specific quotes from them are attributed throughout the article. In addition, Annika Dixon-Reusz looked over the text with an eagle eye and suggested corrections and additional thoughts. This effort was above and beyond, so I would like to express my special gratitude to her. *Thinking through craft and the digital turn* is funded in part by the Social Sciences and Humanities Research Council, Government of Canada.

## Author details

Lynne Heller  
OCAD University, Canada

\*Address all correspondence to: [lheller@faculty.ocadu.ca](mailto:lheller@faculty.ocadu.ca)

## IntechOpen

---

© 2020 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/3.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. 

## References

- [1] Clewis RR. Towards a theory of the sublime and aesthetic awe. In: *The Sublime Reader*. London/New York: Sydney Bloomsbury Academic; 2019
- [2] Sklar J. 'Zoom Fatigue' is Taxing the Brain. Here's Why that Happens. National Geographic; 2020. Available from: <https://www.nationalgeographic.com/science/2020/04/coronavirus-zoom-fatigue-is-taxing-the-brain-here-is-why-that-happens/> [Accessed: 27 April 2020]
- [3] Murphy K. Why Zoom Is Terrible. *The New York Times*; 2020. Available from: <https://www.nytimes.com/2020/04/29/sunday-review/zoom-video-conference.html> [Accessed: April 29, 2020; 30 April 2020]
- [4] Bergson H. *Matter and Memory*. London: Allen & Unwin; 1929
- [5] Deleuze G. *Bergsonism*. New York: Zone Books; 1988
- [6] Grosz EA. *Architecture from the Outside: Essays on Virtual and Real Space*. Cambridge, Massachusetts/London: The MIT Press; 2001
- [7] Lévy P. *Becoming Virtual: Reality in the Digital Age*. New York: Plenum Trade; 1998
- [8] Massumi B. *Parables for the Virtual: Movement, Affect, Sensation*. Durham, NC: Duke University Press; 2002
- [9] Virtual. *High Definition: A-Z Guide to Personal Technology*. 2007. Available from: <http://search.credoreference.com/content/entry/hmhighdef/virtual/0> [Accessed: 2 June 2014]
- [10] Stevenson A, Lindberg CA. *Virtual—Oxford Reference*. New Oxford American Dictionary; 2011. Available from: <http://0-www.oxfordreference.com.library.meredith.edu/view/10.1093/acref/9780195392883.001.0001/acref-9780195392883> [Accessed: 28 April 2020]
- [11] Guter E. *Virtual Reality. Aesthetics A-Z*. 2010. Available from: [http://search.credoreference.com/content/entry/eupaes/virtual\\_reality/0](http://search.credoreference.com/content/entry/eupaes/virtual_reality/0) [Accessed: 28 April 2020]
- [12] Neves J. *Virtual Environments*. *Encyclopedia of Geographic Information Science*; 2008. 504-506
- [13] Bergson H. *An Introduction to Metaphysics*. Authorized Edition, Revised by the Author, with Additional Material. G. P. Putnam's Sons: New York and London; 1912
- [14] LeBel S. *Wasting the future: The technological sublime, communications technologies, and E-waste*. *Communication*. 2012;1:20
- [15] Baichwal J, Burtynsky E. *Anthropocene: Ivory Burn*. Documentary. 2018. Available from: <https://boxoffice.hotdocs.ca/websales/pages/info.aspx?evtinfo=89840~fff311b7-cdad-4e14-9ae4-a9905e1b9cb0&> [Accessed: 14 May 2020]
- [16] Taylor K. *Anthropocene Art Show and Documentary Will Shock You with a View of Human Impact on the Planet*. *The Globe and Mail*; 2018. Available from: <https://www.theglobeandmail.com/arts/film/reviews/article-four-year-collaboration-project-looks-to-evangelize-the-term/> [Accessed: 14 May 2020]
- [17] Kuhnert D, Küng R. *Immersive Interaction Design Principles Master Class*. 2020. Available from: <https://xrbootcamp.thinkific.com/courses/take/immersive-interaction-design-principles-master-class/>

lessons/12709201-understanding-how-the-human-brain-perceives-reality [Accessed: 14 May 2020]

[18] Springgay S, Irwin RL, Kind SW. A/r/tography as living inquiry through art and text. *Qualitative Inquiry*. 2005;**11**:897-912

[19] Art Gallery of Ontario. Small Wonders: The VR Experience | AGO Art Gallery of Ontario. 2017. Available from: <http://www.ago.net/small-wonders-the-vr-experience> [Accessed: 8 May 2020]

[20] Cox AM. Embodied knowledge and sensory information: Theoretical roots and inspirations. *Library Trends*. 2018;**66**:223-238

[21] Kurzweil R. *The Singularity is Near: When Humans Transcend Biology*. London: Duckworth; 2016

[22] Graham E. 'Nietzsche gets a modem': Transhumanism and the technological sublime. *Literature and Theology*. 2002;**16**:65-80

[23] Cloutier S. *Conversation with Research Assistants for Thinking through Craft and the Digital Turn*. 2020

[24] Alaimo S, Hekman SJ. *Material Feminisms*. Bloomington: Indiana University Press; 2008. Available from: <http://search.ebscohost.com/login.aspx?direct=true&scope=site&db=nlebk&db=nlabk&AN=642393> [Accessed: 14 April 2015]

[25] Bennett J. *Vibrant Matter: A Political Ecology of Things*. Durham: Duke University Press; 2010

[26] Rubin P. The Inside Story of Oculus Rift and How Virtual Reality Became Reality|Gadget Lab. *WIRED* 2014; 78-95

[27] Stanney K, Fidopiastis C, Foster L. Virtual reality is sexist: But it does not have to be. *Frontiers in Robotics and AI*. 2020;**7**

[28] Munro I. *Conversation with Research Assistants for Thinking through Craft and the Digital Turn*

[29] Vannini P, Waskul D, Gottschalk S. *The Senses in Self, Society, and Culture: A Sociology of the Senses*. New York: Routledge; 2013

[30] Howes D. *The Expanding Field of Sensory Studies—Sensory Studies*. 2013. Available from: <https://www.sensorystudies.org/sensorial-investigations/the-expanding-field-of-sensory-studies/> [Accessed: 16 May 2020]

[31] Dixon-Reusz A. *Conversation with Research Assistants for Thinking through Craft and the Digital Turn*. 2020

[32] Trust S. *Sensory Trust*. 5, 9, 21, 53... How Many Senses? 2003. Available from: <https://www.sensorytrust.org.uk/information/articles/senses.html> [Accessed: 15 May 2020]

[33] Brownlee J. *A Brief History of Smell-O-Vision*. *WIRED*; 2006. Available from: <https://www.wired.com/2006/12/a-brief-history-2-2/> [Accessed: 14 May 2020]

[34] Murgia M. AI's New Workforce: The Data-Labeling Industry Spreads Globally. *Financial Times*; 2019. Available from: <https://www.ft.com/content/56dde36c-aa40-11e9-984c-fac8325aaa04> [Accessed: 7 August 2019]

[35] Strati A. Sensible knowledge and practice-based learning. *Management Learning*. 2007;**38**:61-77

[36] Tofts D. Avatars of the tortoise: Life, longevity and simulation. *Digital Creativity*. 2003;**14**:54-63

[37] Fox J. Avatar. *Encyclopedia of Gender in Media*. 2012. Available from: <http://knowledge.sagepub.com/view/genderinmedia/SAGE.xml> [Accessed: 31 May 2014]

[38] Morton T. Thinking Ecology: The Mesh 1. 2009. Available from: <https://www.youtube.com/watch?v=R-mWCPa9y3c&list=PL7A77EA0E1CE85B39> [Accessed: 7 July 2015]

[48] Heller L. Avatar Daughters: Envisioning a Spectrum between the Material/Virtual through Feminist Theory. Doctoral Dissertation: University College Dublin; 2016

[39] Meadows MS. I, Avatar: The Culture and Consequences of Having a Second Life. 1st ed. Berkeley, CA: New Riders Press; 2008

[40] Hill DW. Avatar ethics: Beyond images and signs. *Journal for Cultural Research*. 2013;17:1-16

[41] Gunkel DJ. The real problem: Avatars, metaphysics and online social interaction. *New Media & Society*. 2010;12:127-141

[42] Shrinkle E. Video games and the technological sublime. *Tate Papers*. 2010

[43] Saint Girons B. The Sublime from Longinus to Montesquieu. *Encyclopedia of Aesthetics*. 2 ed. 2014. Available from: <http://www.oxfordreference.com/view/10.1093/acref/9780199747108.001.0001/acref-9780199747108-e-695> [Accessed: 14 October 2019]

[44] Mosco V. The Digital Sublime: Myth, Power, and Cyberspace. Cambridge, Mass. London: MIT Press; 2005

[45] Hayles NK. How We Became Posthuman: Virtual Bodies in Cybernetics, Literature, and Informatics. 1st ed. Chicago, IL: University Of Chicago Press; 1999

[46] Anderson SC. Psychobiotic Revolution: Mood, Food, and the New Science of the Gut-Brain Connection. S.L.: National Geographic Society; 2019

[47] Stewart S. On Longing: Narratives of the Miniature, the Gigantic, the Souvenir, the Collection. Durham, N.C.: Duke University Press; 1993