THE ‘SLIPPERY’ PERCEPTIONS OF DIGITAL SPACE

by

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ABSTRACT

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In discussing the slippery relationship between the physical and digital world, we redefine our understanding of space. Within the physical world a complicated process must take place for anything to be of use to us. The trees need to grow, the granite needs to be mined and the meat must mature to be butchered. In the digital world a person with a computer can create and manipulate space and objects. They can create a world not physical but virtual, a world without the laws that govern the physical world. This will lead to the virtual world and the 'uncanny spaces' created by digital materiality. In these 'uncanny spaces' the virtual world is experienced through a social-actor avatar. This avatar represents our 'presence of self' in digital space. When looking at the relationship formed with the avatar we see it reaches a human likeness of materiality where we begin to reach into the 'uncanny valley.' This is where technology begins to mimic human characteristics and personality through CGI techniques in animation.

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INTRODUCTION

What is digital space? Does it have a significant purpose or reality we can actually touch or feel? When does digital materiality begin to alter our perceptions of space and how we relate to the physical world? In what way do these materialities convey our understanding of space when moving from the physical to the digital and how realism has created a slippery understanding between the two? When are we immolated through digital mediums and capable of being immersed into the 'uncanny spaces' of the virtual? A digital platform begins to have a 'sense of presence' through the mind-body relationship of the avatar. The physical sense of materiality through a digital medium filters our interactions as we relate and socialize within a virtual world. We perceive and alter our perceptions of 'human' likeness through digital social actors. Could this begin to redefine our understanding of the uncanny valley as we are constantly pushing for a more human experience in the virtual world?

SLIPPERY SLOPE BETWEEN DIGITAL AND PHYSICAL

Materiality

Materiality to me is an emotional understanding of materials in the physical world, not based on the physical reaction, but rather the passionate response we have to that material. This is based on Juhani Pallasmaa's book "The eyes of the skin."

> *Every touching experience is multi-sensory; qualities of matter, space and scale are measured equally by the eye, ear, nose, skin, tongue, skeleton and muscle… Ones sense of being in the world, essentially giving rise to a strengthened experience of self.* (Pallasmaa 1996)

Physical Materiality

The 'physical' is all matter and objects that pertain to the real world i.e. the material world.

Physical materials are signifiers in the physical environment which gives a representation of the world we interact and live within. We then classify these materials into a broad spectrum that allows us to communicate about that material without needing to see it. In asking the question, "Would you like a wood counter top or granite?" Our minds immediately know the identity of a material without physically seeing or touching it. In the same sense we pay little attention to the sheer magnitude of the physical material world around us. We do not classify materials in scientific terms; rarely will a person describe a material by saying, "Do you possess any potassium feldspar,

plagioclase feldspar, or quartz, with perhaps a little extra muscovite and hornblende-type amphiboles." Instead we say, "I need some red granite countertops, preferably with crystal marbling in the slab." Materials are matter and make up the world around us. We know our physical environment and our place in that environment due to the scale of those materials. Materials are in many ways simple and seem insignificant to the day to day life of individuals, but in fact they are extremely significant as there is not a single object, person or thing that is not a material.

Physical materiality is best described as a set of familiar objects that anyone in the world can understand. For example; a brick is a hard, rough material used for architectural structures and facades. We know what a brick is, how big it is, how heavy it is, and what it was before it was a brick. We see a building with brick and recognize the height and age of the building by observing the brick itself. The material may be faded or have become smooth from years of rain. There might even be a variety of moss and vines telling the story of the building. We see these signs and immediately recognize the state of the physical materiality there for gaining an understanding of the history through the brick. When a materiality is not telling the story of its purpose and its greater part of a whole, we immediately pick up on it as an emotional response of indifference and unsure of its true material property. Case in point Las Vegas, Nevada is one of the fastest growing cities in the United States. (Christie) The short history of Las Vegas makes it truly a material mirage. Sixty years ago its population was less than ten thousand[i]. (City of Las Vegas) Now it has sprawling, newly built suburbs showing miles of what is perceived as stucco and brick perfectly placed in the desert environment. In truth there is not much real brick to be found, there is only a false materiality. The brick is not brick; it is in most cases ceramic veneer. The wear and tear of the ages will not show, no moss will collect and the colour will stay true. It is essentially a perfect brick facade for life. In my travels I have seen these readymade suburban environments stretching out across the horizon. It is a very uneasy material that surrounds the city; it is off by the most minuscule factor but is so different that the mind can't understand why it is so different. The materiality is dishonest and tricks what we observe as a familiar material to be an imposter of materiality and time.

Digital Materiality

The 'digital' pertains to all that is consumed and created from a computer aided process

Our perception of space and time are directly linked to our understanding of materiality in our physical environment. These perceptions are becoming altered and altogether perfected through digital media. Digital materiality is duplicating the physical properties and laws of the physical world into a digital format. This particular form of materiality creates a fabricated vision of the world bringing the physical through a digital medium. We see a perfected view of our surroundings but as

time passes what was perfect becomes out-dated. Digital materiality is only as good as the current technological advances. Technology is advancing increasingly faster than the physical world, creating an abundance of what could be called 'ancient' digital media. The new technological advances spin further into the future giving an even more realistic view of our physical world. Today we see the gleaming automobile commercial with a fake car racing around an artificial track but it looks so perfect

Figure 1

we don't know the difference. Technology becomes so realistic we lose the ability to distinguish one from the other. Yes, tomorrow's digital material will surpass todays but our senses will continue to be fooled. This creates a slippery slope between the physical reality and the digital reality.

Slippery Slope Defined

The digital and physical worlds are seamless within the movements of our day to day routine. Physical environments can be duplicated, destroyed and/or redesigned. This can be done without acknowledgement for its materiality in the physical context. The digital can simply overwrite and reinterpret our understanding of the limits to materiality. The point can be argued that the physical and digital have already joined into one through our 'emotional investment' to space but the fact still remains that the digital is becoming slippery to distinguish from the physical world and this is redefining the concept of 'physical environment'. The objects and materials of physical and digital spaces are almost indistinguishable. The spaces of the physical world are attached to our emotions. We as humans see the world through our senses and our individual identifiers of the physical materials that surround us. We attach physical space to every emotion, every experience. As technology brings the physical spaces into the digital format the emotions are inherently involved as are our experiences. Life experiences enhance our ability to see the difference between physical and digital and we feel empowered by this. We would like to think that we know what is real and what is digital. The context of the real allows our perception of physical spaces to coincide with the digital world. Do we really know where that line between digital and physical is drawn?

> *Places of this kind are outside of all places, even though it may be possible to indicate their location in reality. Because these places are absolutely different from all the sites that they reflect and speak about, I shall call them, by way of contrast to utopias, heterotopias.* (Foucault n.d.)

Figure 2

The seamless links begin to define a heterotopic system between the physical/digital. Michel Foucault's sixth trait of heterotopias in "Of Other Spaces," emphasis there function in relation to all the space that remains. This is conducted between two extreme poles, in this case between the physical and digital.

> *their role is to create a space of illusion that exposes every real space, all the sites inside of which human life is partitioned, as still more illusory. Or else, on the contrary, their role is to create a space that is other, another real space, as perfect, as meticulous, as well arranged as ours is messy, ill constructed, and jumbled.* (Foucault n.d.)

Foucault's heterotopic concept can be applied to the seamless digital/physical relationship 'not of illusion', but as the digital is just as real as the physical in the role of a heterotopia.

Our perceptions of digital and physical space are built on the experiences we have with the two worlds. Materiality of the physical is carried into the digital giving the perception of alternate realities. When a car commercial appears to happen in the Alps, water defies gravity, or a disaster destroys London in a film its realism is undistinguishable from that of the real world. Our physical understanding of what is real has become skewed with our perception of the digital. The digital is woven within our physical understanding of materiality and space. It has become slippery between the real and imposed telepresence. The digital coinciding with the physical is no longer running parallel but rather weaving between the physical and digital. Toni Dove, an artist who uses responsive interface technologies, defines the charged space of telepresence as "the space through which the body extends itself in to the movie or virtual space." (Dove 2004)

Adopting the Jacqueline Moiré concept; with the ontological assumption that the body has been recontextualized in the age of digital technology. (Morie 2007) The digital world is now an acceptable human sense of our experience within the physical world. The perception of digital spaces has now skewed to mimic and bend the laws of the physical world.

Figure 3

The coinciding interactions we receive from a digital source giving a physical response, begins to change our perceptions of space as purely physical. The reality is that the digital space is just as real to the human experience as the physical. This heterotopology between the digital and physical becomes seamless in our lives. We distinguish it in a very similar way but through snapshots of media, movies, billboards, virtual salesman and smart appliances. The digital is so engrained into our lives that not having that digital presence creates a physical response. The digital begins to redefine our understanding of the physical and allows for materiality to become flexible in its context through a digital medium.

Our perceptions of the digital/physical may become seamless, but the characteristics of the digital are built on the same understanding of the laws in the physical world. Materiality is a critical piece of substance when transferring the complexity of the physical world into a digital context. The familiarity and emotional attachment we have to its ability to convey space needs to be preserved. The human experience is defined by a lifetime of interactions with the physical world and that experience is vital to that understanding we carry over into the virtual world. It begins to define a heterotopic system between the physical/digital.

AVATAR AND THE VIRTUAL WORLD

What about when we begin to seek out the virtual as a form of human interaction; to be plugged into the virtual, directly interacting through a digital platform as a social actor in a virtual world, Were we can have a physical presence in digital space. How might virtual worlds change our idea of materiality and space? Does having a body in digital space transform our understanding of materiality in the physical context? If virtual worlds are capable of mirroring the materiality and realism of the physical world would it begin to alter our relationship to the physical?

Virtual World

A 'Virtual world' is a digitally constructed environment meant for peer-to-peer interaction, created after the introduction of computers, and computer aided design, for which a 'virtual world' could not exist, used through computer and video game platforms.

> *Virtual worlds are persistent, computer-mediated environments in which a plurality of players can interact with the world and each other. From their humble beginnings, virtual worlds have evolved to become major hubs of entertainment, education, and community.* (BARTLE 2004)

An argument subsists that virtual worlds have always existed in literature, art, and religion. Maria Beatrice Bittarello, an independent researcher, considers that virtual worlds existed before the introduction of the internet. She outlines a history of literary and visual pre-internet virtual worlds, all of which represent an alternative, mythical, and often religious space. There is romance associated with the virtual world that links directly to our imagination. Characters come to life through literature, art and religion. (Bittarello 2008) The emotional response evoked through the written word guiding the reader to a virtual world is arguably as powerful as that from of purely digital virtual world. My definition of virtual world is strictly that of the digital, the design of those virtual worlds to mimic the physical properties and materiality of the real.

Avatar

The 'avatar' is our represented presence in virtual space. An individual's avatar is the virtual body or humanoid they can control through a digital medium. It is the direct filter to the interactions that happens in a virtual world. The virtual embodiment of people as avatars is a term used in many online worlds. According to Tom Boellstroff, a noted anthropologist, an avatar is a Sanskrit word originally referring to the incarnation of a Hindu God, particularly the God Vishnu. (Boellstorff 2008)

> *[w]hile 'avatar' […] historically referred to incarnation – a movement from virtual to actual – with respect to online worlds it connotes the opposite movement from actual to virtual, a decarnation or invirtualization.* (Boellstorff 2008)

Tom suggests that the avatars make the virtual world real to users. The avatar creates the link between the mind-body relationship and the virtual world.

The Immersive Experience of the Avatar and Virtual World

Virtual environments encompass all the physical traits of the real world and used as role-playing, peer-to-peer interaction through a digital medium. Our mirrored virtual counterpart, avatar, represents all physical interaction within digital space of the virtual world. These virtual environments are an immersive realm

of real experiences and uncanny spaces. The avatar becomes our tool of physically relating to the digital materiality of a virtual world; through a strong mind-body relationship. Having an avatar represents a physical presence in the virtual world and provides an uncanny opportunity of occupying both physical and digital space simultaneously. This direct physical relationship we have from the real to the 'in world' experience. The term was coined by Bruce Darner author of *"Avatars! Exploring and Building Virtual Worlds on the Internet."* The reference to 'in world' rather than 'fake or false' is due to the fact that it gives way to not discounting the virtual as unreal space. (Damer 1998)

Does this change our perceptions of materiality within a digital context? Capable of achieving a social richness through a virtual world allows for a sense of realism we feel between the physical and digital. As a social actor in a virtual world; you are a puppeteer controlling your digital self through a technological device in a virtual space. We feel our physical presence in an alternate reality in a virtual world. How this affects our understanding of the mind-body relationship when moving between these materiality's of the digital and physical, observing our digital actor as the filter in which we perceive the physicality of the virtual world. Jacqueline Moiré claims that there is a specialized and intrinsic set of qualities of 'being' in immersive virtual environments, and suggests that there has been a paradigm shift in what humans are now able to experience. She points to the research of visual and performance artists and their contribution to the exploration of virtual environments as key to our future understandings of us in the physical and digital domains. (Morie 2007, 123)

> *[…] sacred, encompassing space, where mind transcends body even as it references the body, the felt organism even in visual absence. This body, as felt phenomenon, is how we know the world, true as much within the virtual as in the real.* (Morie 2007, 133)

> *If the here-body exceeds its physical bounds, does the image-body have a sense of materiality that enables us to dream over it, and in turn, have a sense of the body of the avatar?* (Ihde 2002, 6)

The awareness we have with digital materiality redefines our accepted sense of the physical world, embodying the characteristics of the physical experience through an avatar. The understanding of materials and its purpose to physical space to be used to create a social richness we can feel as familiar when interacting with any real space. The virtual world is designed from these familiarities to create the immersive environments for us to accept and have an emotional investment to those spaces. The digital materiality of the virtual world is redefined as a medium, or filter we can move through and feel. This emotional investment to specific materiality in a virtual world is different from that of a digital presence in the physical world. Our experience with the physical and the digital through non computer based mediums need to have an uncanny resemblance to that of the real, and we begin to have a slippery definition of

were the physical ends and the digital begins. In a virtual environment it is unnecessary to mirror the physical materiality to convey a familiar tone through the graphics. The virtual world has many if not all qualities of the physical world but does not have the same need for slippery boundaries between graphically enhanced realism and materiality.

> *Virtual worlds 'can be uncanny spaces, in which new, anxiety-provoking yet rich understandings of the nature of being in a digital age can be confronted.' In such spaces, it is sometimes unclear whether an apparently animate object really is alive and, conversely, whether a lifeless object might perhaps be animate.* (Ferguson 2012)

The basic set of materials can define the physical qualities in the virtual world; these corky definitions are simplified to a graphical image of what we know certain materials to be, for example wood, grass, trees, tile, concrete, shiny or matte. The simplified environment gives no question to you rejecting what it is, a house looks like a house, a rock looks like a rock, but it doesn't look like a real rock, and it doesn't look like a real house. The ground planes that the interaction of a character walking over needs to only obtain a colour to represent materiality in a virtual space. A green plane below your feet and juxtaposing grey alongside it can define what is a walking path or grass. Its detail and flaws have been simplified, which makeup the 'real' materiality of the physical world. This simplified definition is completely accepted for what it is, a rock, a house, a path through a park. So when looking at digital spaces and how they can change the way we perceive space in the physical world, how is it that in a virtual world it does not need to have the same quality of material representation to be an acceptable stage for human interaction to coexist? A digital materiality of the virtual world can attain the same social richness in creating a sustainable virtual environment that hosts its occupants willing to visit and interact on a daily basis. When these socially rich environments allow for the operator and avatar to accept a separate ideal of reality in virtual space; our definition of space and its physical qualities are redefined on the basis of realism within a physical context. This re-defining of an acceptable materiality is now absorbed directly as our avatar is the mediator of our social interaction and a digital representation of our physical presence within these virtual environments.

Is it too real?

Recent video game studies show that the more increasingly realistic graphics become it embeds the user into a deeper familiarity in virtual worlds. When digital materiality begins to have identical characteristics of the physical our enjoyment and emotional response become stronger to that experience. The immersion of the avatar-body relationship begins to alter our perception of boundaries between real and 'in world' psyche.

> *Approaches to media effects and entertainment research on video games have often neglected the fact that video game playing is embedded in this aforementioned broader economic and technologic framework of interactive entertainment technology.* (Joeckel and Bowman, Graphics and gratification: Exploring the link between technology and enjoyment in video games 2012)

Figure 4

Yet, formal features of video games – such as game technology, graphics, control systems and other game features – have only recently become the focus of game research, and this research has almost exclusively emphasized the potentially negative effects of violent video gaming stemming from the portrayal of aggression and violence in popular games.

> *[M]eta-analysis of video games and aggression suggests that as game play graphics become increasingly realistic, stronger effects of violent video games on aggression may be found. While the majority of video game research has looked at the effect of increased video game graphics on aggression-related constructs, few approaches have focused on the effects that different technological advancements might have also on entertainment-related aspects.* (Joeckel and Bowman, Graphics and gratification: Exploring the link between technology and enjoyment in video games 2012)

'SENSE OF BEING' IN VIRTUAL WORLD

The understanding we have of the virtual world is built on our physical experience of the real world and the spaces we interact. This helps define the relationships we have between the two, and how we move from the virtual to the physical within the context of our physical bodies. These interactions that cause physical change and emotional attachment to the social actor-avatar relationship and environments we consider "in world" spaces. Below is an exert from Rebecca Ferguson's article entitled *"Death of an Avatar: Implications of Presence for Learners and Educators in Virtual Worlds."*

> *Educational researchers have researched the influence of presence in virtual worlds on learner satisfaction and communities of enquiry. Their definitions of presence tend to focus on learners*

and teachers 'having a sense of active participation' (McKerlich et al. 2011) and '"sense of being" in a particular environment' (Tugba Bulu 2012). Lombard and Ditton (1997) provide a wider definition of presence, which they express formally as 'the perceptual illusion of non-mediation' and informally as 'a mediated presence that seems very much like it is not mediated'. Their definition covers an extensive range of media and encompasses six interrelated conceptualizations of presence. They not only take the feelings experienced by individuals into account, but also look beyond these to include the mediating technology, the mediated environment and the characters within it. Those six conceptualizations of presence are thus,

1. *Social richness: The medium appears sociable, warm, sensitive, personal or immediate.*
2. *Realism: Perceptual realism represents living things and objects realistically, while social realism represents them as behaving realistically.*
3. *Transportation: The sense that an individual is transported to another place, which the place is brought to the individual, or that individuals are transported to a shared place.*
4. *Immersion: Perceptual immersion floods the senses with input from a virtual environment, while psychological immersion provides a feeling of involvement.*
5. *Social actor within a medium: Individuals respond socially to social cues presented by characters within a medium, even when this is not necessary and no response will be forthcoming.*
6. *Medium as social actor: Individuals respond socially to cues provided by a medium.* (Ferguson 2012)

Figure 5

Rebecca Ferguson looks into this virtual 'sense of presence' in the educator–student relationship were they can engage in difficult or impossible circumstances within a virtual environment. Allowing for a better sense of presence, this; "includes realistic representations, sophisticated social interaction and immersive experiences." (Ferguson 2012) Her article is developed from the research she conducted on a virtual ethnographic study carried out over a period of four years in *Second Life* and *Teen Second Life*. *Second Life* and *Teen Second Life* are virtual worlds that anyone can join online were you can make yourself virtually (avatar) then begin to build a world in most cases "an island" that you have in the vast virtual world. One can build up social standing and credit to use towards further

involvement within the community of *Second Life* and *Teen Second life*.[ii] Fergusons discussion is specific to the virtual experiences we have with death when experienced through our avatar. The mind-body relationship we have to the virtual world and the emotional link we carry over to its virtual spaces and social actors. Looking at death in virtual worlds and how that can translate into the physical. Is death in the virtual safe; or can it be temporary and permanent. She draws from her own experience with death as an operator (in *Second Life*) and a participant and how it begins to move from the digital to the physical and how physical death becomes the digital. (Ferguson 2012)

> *Vignette 1: September 2007*
> *It's late on a warm summer's evening. I am sitting in a Japanese-style summerhouse with a group of friends and colleagues, mourning the unexpected death of a member of staff. 'She was like a mother to us', reads an artwork created by a group of teenagers earlier in the day. For a while, no one speaks or moves. I stare out to sea, where the moon is rising, casting an eerie glow over the trees nearby – but my thoughts are elsewhere. My neighbour, dressed in black, hands me a lighted candle; soon each of the group has one, and we begin talking softly of our memories and our feelings. The mood of the discussion becomes intense and dark; a couple of the teenagers and I opt out and head for the beach, where we sit long into the night beside a campfire discussing religion, reincarnation and personal beliefs.*
> *This event took place on Teen Second Life, where I had been working for six months on the Schome Park Programme, using virtual worlds in an attempt to explore and create new educational practices (Twining 2010). Those with me that evening were teenagers and adult educators from across the United Kingdom. Although some of us had met in the physical world, the majority of us had met as avatars and knew little or nothing about each other's lives offline.*

Figure 6

> *In many online environments, including the many virtual worlds used for gaming, death is a common feature. Comically or tragically, predictably or unexpectedly, our characters and those around us are destroyed. In most cases there is an opportunity to replay, reboot or respawn at the cost of power, position or points. Online death is rarely terminal.*

> *The intrusion of physical death into Second Life came as a surprise and a shock to us all. Within the Schome Park Programme, it prompted practical responses to the situation, reflection and discussion, events that united sections of the community, the loss of other members of the community, emotional exchanges and the creation of artwork and machinima. From the point of view of many teenagers, they were mourning the loss of a friend and teacher whom they met most evenings. Their family and friends, however, found it difficult to understand their need to grieve for someone they had never met in the physical world and whose real name they did not know. Two teenagers who wanted to attend the in-world memorial were unable to do so because their parents had punished them with restricted computer access – in both cases presumably considering the event as an element in an extended online game rather than a virtual funeral.* (Ferguson 2012)

Fergusons research and personal experience was an example I wanted to look at and compare to the materiality we have within digital spaces. In this particular case 'death' has transcended both the physical and digital to have an unexpected physical reaction. I don't find the reaction difficult to understand because the death was that of a 'real' person; she had substance to her existence although she was known through a digital medium. The feelings shared are truly genuine. With being immersed in a virtual world it carries over both the real materiality and social norms. We begin to transcend space all together, it's not an argument about what is real and what is "in world", and the distinction between the two becomes seamless in our lives.

We are the creators and operators of the virtual world and its function is designed for our use. A virtual funeral was a physical reaction in a digital medium, the ability to bring everyone together in one space without needing everyone to be physically obligated to meet in the real world, especially when the "in world" experience is a real emotion. Death is something we all face, and the virtual world has a different system of preservation which it does not follow like that of the real world. Fergusons experience with death and how it transcended physical and digital space with the occupants of Second Life gathering together to mourn in a digital context has an eerie perspective to the social heterotopology[iii] of the virtual.

DIGITAL WORLD INVADES HUMAN EXPERIENCE

When does it become too perfect, when do we recognize the uncanny valley of the digital?

Perhaps we don't notice it with our physical environment, non-organic materials such as brick, concrete, glass, metal, and processed wood can be digitally altered to limit our recognition between the artificial and real. Could we recognize the difference in the trees? No, the trees are now so imperfect digitally they are perfect; digital organisms that have an uncanny resemblance to the physical world. They too can be reinterpreted and adjusted through a computer aided process to breathe life into digital

organisms. The digital materiality and its realism to coexist with the physical outlined the counter argument for a completely virtual world; we accept the materiality of that digital world because it has the ability to convey the same characteristic details as the physical world.

The avatars in that virtual world are a non-realistic humanoid model, they have paper thin skin and no depth, as we move and interact in the virtual world we accept the appearance of a character we perceive as 'our presence' in virtual reality. The line of sight for experience in virtual worlds ascends in the order of; the Body, to sight, to the screen, to our avatar and the virtual world. When we experience the virtual world we don't see it through the eyes of our avatar, we are observers over our avatar and control the movements and actions through a digital filter. The humanoid we see can look similar or have little resemblance to us and we accept the human representation.

The distinguishing characteristics from the digital to the physical may appear seamless, because if our environment is capable of being altered between the digital/physical, than assumedly humans can be replicated with the same quality. Could this change our perceptions to the digital when we are the piece of environment being altered? If the environment we find as familiar is undistinguishable from the physical to the digital, than it can be assumed that we can be re-animated in a digital context and be undistinguishable from our physical counterpart. Or do the very human characteristics that define our subconscious not allow deception to happen when emulating us. Do the very human mannerisms discontinue our allowance for a digital authenticity of an identical person to be regarded as fake? If the digital has the ability to change and manipulate our perceptions of space through our understanding of matter only limited to the 'non-human'; and when the characteristics of the digital become authentically real, do we abandon our loyalties to the digital for sake of the human condition?

The 'Uncanny Valley'

A hypothesis referenced from robotics and 3d computer animation which refers to human replicas that appear and act as human. This causes a response of revulsion from human observers. The comfort level humans feel toward a robot's/3D animation's human likeness, the "valley" refers to the dip in the graph between acceptance and revulsion. (Sofge 2010)

When the digital appears far too similar to ourselves we begin to revolt in disgust. We reject its authenticity, although it has a mirrored resemblance; we immediately pick up on it. So is there a double standard when comparing the uncanny valley to the physical environment? Objects and spaces have specific materiality's; why would we accept them as real and not reject it as false if fabricated digitally. Could the identity of materiality being so broad, limit our distinction between the digital and physical. Materials having non-human characteristics such as brick; is it limited to certain physical appearance and that we

deem brick as only having simple characteristics; red, building material, never alone and it does not fetch or speak back to us. Its character is its materiality we know a brick by its appearance and function and to see it alter its function is acceptable because we are in fact not bricks and could argue that we can't have the point of view as a brick thus have difficulty distinguishing between the physical and digital. Where we are human and the many human characteristics we have gives us unique individualities. If looking at only an object and its material we have difficulty distinguishing the digital from the physical. Materiality tells the story behind the material and when we don't see that story of stress, watermarks, scratches, reflection, and familiarity we can begin to distinguish from the artificial to the real. The same concept is applied to anything we know strictly on a material basis. Trees for example; we understand the character of trees and what they do. Although organic we can preserve how they look at all times and because that character is so distinguishing we have difficulty defining any specific tree as real or fake in digital space. Our movement and materiality can authenticate the human appearance when interacting amongst one another. If a digital human or robotics has an identical human character and fleshy materiality as an artificial person we can't accept its characteristics as genuine, we have no empathy towards it. This elicits our ideal of a human other and its normal expectations. The nonhuman characteristics will be noticeable, giving the human viewer a sense of strangeness. If a robot falls inside the uncanny valley it is

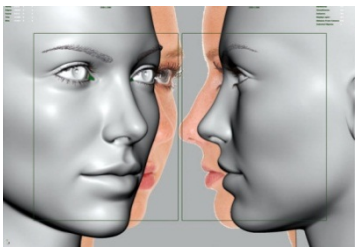

Figure 7

> *no longer being judged by the standards of a robot doing a passable job at pretending to be human, but is instead being judged by the standards of a human doing a terrible job at acting like a normal person.* (Kiderra 2011)

The characteristics of it are scrutinized on the basis that we are human, thus having the life experience of human qualities that can be distinguished amongst one another. The same happens with human actors, digital thespians on a massive scale and from a distance we can no longer distinguish detail, we see a mass of people but we lose our human signature that is so easily recognized up close.

The Uncanny Examples

Recent technology used in hologram projections from AV Concepts and CGI studio Digital Domain brought 2 Pac Shakur back to life on stage at the Coachella Music Festival in California. He was a completely synthetic creation; the hologram technology was used to interact with the crowd. It was a perfect 2 Pac, the illusion was so well received that there is talk of the holographic 2Pac going on tour.[iv] 2 Pac has a certain human quality to his

appearance but in watching the recorded video[v] he does have an uncanny resemblance to what 2 Pac looks like, but the extra human qualities he was given to appear 'as more human' gave signals for false materiality. The hologram human lookalike acts human, moves human but is so perfect that its strangeness materiality of the flesh could be called into question. But it looked just like a human!

The popular 2002 film S1mone[vi] features the main character as an artificial actress that is animated for her films, created by a movie producer who can no longer work with overpaid actors. The fanatic fan response to the digital thespian puts the producer in the position to have to animate her in all aspects of life to keep up the appearance of her non-human existence. The film has the strong concept for what the future can bring with digital people and how they can have an influence to our perceptions of the digital and physical. The film highlights technology at a point of duplicating all human characteristics and social norms. A digital thespian that is adored and loved, but has no real physical body, she occupies the world of film, but she is the ideal people begin to strive to reach.[vii]

Angela Tinwell, a researcher of the uncanny valley phenomenon, is researching the perception of facial expression, speech and the uncanny valley in realistic, human-like characters intended for video games and film. Looking at antipathetic characters in survival horror games and how they may be exaggerated to manipulate the uncanny. Building on the body of work already undertaken in android science, this research intends to build a conceptual framework of the uncanny valley using 3D characters generated in a real-time gaming engine analysing how cross-modal factors of facial expression and speech may exaggerate the uncanny. Tinwell has also introduced the notion of an unscalable uncanny wall that suggests that a viewer's discernment for detecting imperfections in realism will keep pace with new technologies in simulating realism. (Tinwell 2011)

Currently technology allows us to give identical material characteristics to a digital space. That same technology is being used to change human characteristics that may hold the key to separating from the uncanny valley. There have been many alterations between the physical and digital human interaction within digital environments as characters. The recent film *The Avengers* was released in May, a super special effects film that had many CG shots and actors to include in the film. Two of the main characters are in fact digital characters, The Hulk and Ironman[viii]. The actor Mark Ruffalo[ix] was playing the Hulk two years before the movie's release because ILM[x] needed to take photographs and casts of his feet, hands, chest, individual fingers, legs, toes, head, face, and his teeth. They used a high speed Phantom camera from the vision research on the light stage at USC's institute for creative technologies to record geometry, skin textures and lighting on Ruffalo's face and through his hair as the lights revolved around his head. From this data, they created his digital double. This information was given to a visualization team that breathed life into the huge Hulk,

Figure 8

taking skin and pore textures from the actor's skin and exact bone structure to give the impression of an exact digital representation of the actor if he were in fact the Hulk himself. His uncanny resemblances to Ruffalo's physical person are very convincing, all movement and human characteristics hardly allow for an uncanny valley perspective to form. The hulk does not speak and has little to say when he does, so the final 30 minutes of the Avengers film is not in fact inhabited by any true physical characters. The human materiality that is represented onto the Hulk is a stifling example of re-animating a person and its seamless interaction with the physical world. This virtual character we become involved with looks, feels, and reads as real. Materiality of the film is seamless (3D World 2012).

The materiality that defines the physical environment we live and experience allows us to manipulate those characteristics in a digital context; altering those properties so that we can't distinguish between the digital and physical. The slippery relationship between the two allow for the operator to cheat or temporarily alter a perception we have in the physical environment, but the real deception happens when the digital world uses the physical to change our understanding of digital qualities, allowing us to then redefine what those relationships are and how the two are seamless.

AVATAR & VIRTUAL REALITY SYSTEMS EXPERIMENT

I have been a part of research that has been happening at the University of Utah[xi] between Psychologists, Sociologists and Engineers. My purpose in the experiments was to design and make the digital environment used in the AVATAR[xii] system of the experiment. My work was facilitated under Associate Professor Sarah Creem-Regehr, Ph.D. of Cognition and Neural Science at The University of Utah. These studies are looking at the perceptions of physical space in digital environments. The experiments conducted consisted of putting someone in a physical room with basic objects around them so that they could answer simple questions about the size and difference between objects and the scaling queues we use to judge an objects size.

This is the question Associate Professor Sarah Creem-Regehr is trying to answer. Do our perceptions of space become altered within a digital context? Although a digital space can be identical to that of the physical our perceptions of scale, and proportions became altered. Simple spatial queues are missed and our perception of space is transformed.

All questions are for example purposes within my thesis because the research has yet to be published. All questions are similar but not exact to the experiment, all answers are of my own when writing my thesis as examples, and it is not an actual test subject.

For example: They would sit in a chair at a table with three different sized cubes on the opposite side of the table, each cube has three colours (strictly for familiarity in the digital environment). The cubes ranged in size from 10cm to 30cm.

Each box has a specific purpose to the experiment. The room is 4x 6 meters and has no details to scale other than the objects on the table and the table itself (Absolutely no electrical outlets or lights within sight). Then the person conducting the experiment sits behind the individual to ask them questions about the physical space he or she is sitting.

Q: What is the colour of the room?
Q: What is the table's material?

These simple questions built up to more complicated questions of the space.

Q: Which box is larger?
Q: Can you pick that box up with one hand?
Q: Can you pick up the middle box with one hand?
Q: Can you pick up the smallest box with one hand?

The experiment conductor would have them close their eyes while the boxes were stacked from largest to smallest, and when ask to estimate the height of all three boxes together. My personal experience with the experiment was that individuals had an understanding of scale in the real room.

We naturally understand objects in space around us based on scale and proportions of an object in the environment, we know whether or not an object can be picked up or how tall it is. Do objects in the room give away the scale, or do we just know how we are relative to an object in physical space? After the "physical" space experiment the same person would be brought in a blacked out room (no light) that a simulator is used to duplicate the physical room in digital space.

The simulation is an AVATAR from the perspective of the first person (your eyes are the eyes of the AVATAR in digital space). Compared with our early discussion of avatars in games, this AVATAR is used to create a first person experience vs. the observation of a virtual actor in games. The AVATAR goes over a person's head and puts the observer in the digitally fabricated room that is identical to the physical room. The room is marked with lasers to pinpoint the location of the subject as they move.

Figure 9

The room is digitally replicated to match the identical atmosphere of the physical room, all the walls, shadows, light, table, and materials. Wearing the AVATAR device allows them to see the room exactly as it is in physical space. The experiment begins the same way as in the physical experiment, sitting at a table they can touch and see in digital space almost a kilometre

from the real physical space. The only difference is they are allowed to walk around the digital room to move and interact in this digital space. The subjects are then asked to answer the same questions about an objects size and proportions.

The digital space is identical to the real space but the general observation between subjects is that the space has somehow been manipulated. A 10cm cube in real space is easily understood and the subjects know they can pick it up without actually touching the object. Placing the same box in digital space across the room at the same size and they cannot tell how large it is or if it is able to be picked up. Their perception of space has become skewed and unsure. Something they could easily estimate in physical space is now altered in digital space to be unrecognizable in a fully submerged digital environment.

OPINION AND CONCLUSION

My focus of study at the Royal College of Art is architecture and main emphasis is emerging technologies that are used in developing digital spaces. Technology is evolving so rapidly software needs every four to six months to stay competitive in the field of visualization. The constant evolution of technology makes the field a fast pace career. We will never be able to stop learning or we will find ourselves outmatched by the competition. Personally, my obsession with 3D and digital spaces are only enhanced through the competitive edge that is caused by the now virtual networking that is constantly changing. The ability to work and network globally has created a diverse environment to live and share; for the first time your physical location doesn't limit your ability to be a global contributor. The digital world is redefining how we work, eat, date, socialize and look at space.

When looking at materiality and its role in our experience with space and how we relate to the physical world, the sheer scale that the word materiality entails is vast and defining the emotional qualities of materiality vs. the physical understanding of matter was crucial in conveying the attachment we have to the materiality of space. My understanding of materiality is still evolving as I process digital and physical materiality's from the day to day, my attachment I have with fly up posters and how they are constantly changing on the sides of buildings and phone booths with their explosion of bad graphics and bright colours. When I see layer upon layer of posters and when it rains hard enough they bleed colour through all the layers and it makes me feel like it has become a temporary digital graveyard were physical materiality begins to digest what the digital lacks in substance. From my research and reading I have found little about how temporary digital materiality actually is, just because it can be everywhere at once doesn't mean it will last. It has a way

of flooding our senses and being pushed out just as quickly with the next digital piece, a constant churning of digital work being produced is a part of the over flooding experience we have with the digital world; and because its bursting at the seams we have this slippery idea of the real and fake.

My exploration into virtual world and the digital materiality of them was planned from the start of my research because of my work with the University of Utah, but the avatar as another experience added additional depth and realism that materiality helps to convey in digital space. An individual's emotional attachment with a virtual world and especially the relationship created between the avatar and user. This is something I don't share, but find myself addicted to the social norms of an online interactive game, and how it transcends that of the real world. Especially the level individuals allow for themselves to go with taking the avatar relationships further than the human capability. I found a virtual birth in Second Life and assumed it to be figuratively like a new player signing up to play, but I was greeted with the sight of a full vaginal birth. I have never played a game with social incentive like Second Life or World of War Craft. In researching virtual worlds and the mind-body relationship, the most popular topic of debate is sex, and misleading gender identities that happen more often with men portraying women avatars to have more sex. The ability to have sex in a virtual world is something that is coveted for the user. Designers have tried to design sex out of gaming systems but the elaborate relationships users want from their experience is too great.

When working with The University of Utah I created the digital environment used for the experiments, the experience is what gave me the ability to define the links between the digital and physical environment. My needing to bring every detail from the physical room into a virtual model pushed my personal ingenuity to the limits and really immersed me into the similarities and differences between the two. I felt like a test subject myself by the end because I had difficulty keeping track of my spaces.

The uncanny valley is something I am fascinated with and have been recently introduced to the hypothesis. My avatar research with the virtual worlds allowed for me to collect enough research from opinions in journals about graphic similarities in human avatars and how users want them to have identical characteristics of the human body. The uncanny valley isn't discussed in the journals but it does give me context from which I could pull from when we assume that it would be repulsive to have those quality's as the graph suggests, but the examples provided are of recent technological strides to eliminating the uncanny from the virtual human counterpart thus possibly redefining what a future uncanny valley may entail.

LIST OF FIGURES

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[i] Las Vegas' population grew to 8,422 at the outbreak of World War II.
[ii] As a side note: *Second Life* and *Teen Second Life* have the option to buy digital clothes, homes, jewellery, trees, and hair styles for your avatar. The price for any of these items range from $10-$4000 of actual money, visa is preferable but they take MasterCard, and American express. (Ferguson 2012)
[iii] Heterotopology is a sort of simultaneously mythic and real contestation of the space in which we live (Foucault n.d.)
[iv] http://technabob.com - 2Pac Hologram May go on Tour
[v] http://vimeo.com/11269396 - 2Pac Hologram Snoop Dogg and Dr. Dre Perform Coachella Live
[vi] http://www.imdb.com/title/tt0258153/- Simulation One Film
[vii] Film Note: S1mone uses a real world actress, Rachel Roberts, and avoids the uncanny valley by not using digital thespians in the film.
[viii] Characters based from Marvel Comics
[ix] Mark Ruffalo is an Oscar nominated actor.
[x] Industrial Light and Magic- Industry leading CGI studio
[xi] University of Utah, Salt Lake City, Utah, USA
[xii] AVATAR- Advanced Video Attribute Terminal Assembler and Recreator