

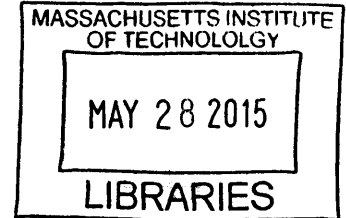
Staged Empathy:
Empathy and Visual Perception in Virtual Reality Systems

by

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Abstract

This thesis proposes *staged empathy* as a new analytical framework to examine how virtual reality work provokes empathic feeling. Virtual reality has seen renewed interest in recent years, and has been hailed by journalists and practitioners as an “empathy machine”. This characterization is informal and assumes that feelings of presence and a first-person perspective alone will drive empathic feeling. A critical method for analyzing how virtual reality work engages with the concept of empathy (specifically defined as “inner imitation for the purpose of gaining knowledge of another”) does not exist. This thesis reviews the intellectual history of empathy (prior to the diversification of the term in social psychology to refer to a host of social behaviors) to derive a theoretical foundation to staged empathy

A staged empathy framework foregrounds process and reflexivity, innate aspects of empathizing, and introduces an externalized and performed model for empathizing that is facilitated by virtual reality. To construct this framework, a variety of contemporary virtual reality works are studied which suggest the emergence of specific techniques that are referred to in this thesis as “intentional looking” and “direct address”. Applying theories of *affordances* and *revealed phantasms* from environmental philosophy and cultural computing to these techniques, staged empathy provides a framework for the analysis of virtual reality work that is sensitive to the new potentials of the medium as well as the limitations of empathy.

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Chapter 1

Introduction

Remember that “acceleration” does not just mean speeding up while going forward; it refers to any change in the motion of the user.

— Oculus Rift *Best Practices Guide*, 2015

Milking it for All it is Worth: “the Empathy Machine”

In March of 2015, filmmaker Chris Milk took the stage at a TED talk titled “How Virtual Reality Can Create the Ultimate Empathy Machine”.¹ Milk progressed through a series of examples that described how various mediums have produced empathy. The list proceeded in order from traditional linear film, to interactive multi-channel web video, to frameless and visually immersive virtual reality. This progression in visual immersion, according to Milk, corresponds with an increase in the ability of the medium to provoke empathy. Milk concludes his examples by describing *Clouds over Sidra*, a 360-degree film about a Syrian refugee camp in Jordan.

So, when you’re inside of the headset. You’re not seeing it like this. You’re looking around through this world. You’ll notice you see full 360-degrees, in all directions. And when you’re sitting there in [Sidra’s] room, watching her, you’re not watching it through a television screen, you’re not watching it through a window, you’re sitting there with her. When you look down, you’re sitting on the

¹ A “TED” (technology, entertainment, design) talk is a short, compelling (and simplifying) presentation about timely topics, famous for encapsulating complex research into entertaining and understandable presentations. For criticism on the TED talk format, see Benjamin Bratton: “If we really want transformation, we have to slog through the hard stuff (history, economics, philosophy, art, ambiguities, contradictions). Bracketing it off to the side to focus just on technology, or just on innovation, actually *prevents* transformation.” <http://www.bratton.info/projects/talks/we-need-to-talk-about-ted/>

same ground that she's sitting on. And because of that, you feel her humanity in a deeper way. You empathize with her in a deeper way.²

Of course, a viewer is not on the same ground as Sidra. A viewer is most likely in a technology demonstration area at a media festival or perhaps at his own home, connected to a power supply and to a computer via cables coming from an Oculus Rift headset. Most importantly, the viewer is sharing only *some* aspect of Sidra's experience: a visual recording in 360-degree video of her temporary home in the refugee camp. Her inner experiences, her sense of displacement, her physical endangerment, are not conveyed via the "empathy machine".

Despite limitations, the medium of virtual reality does offer unique perceptual experiences. However, there is an urgent need for critical reflection on what empathy means in current rhetoric, why it is considered a vector for social change, and how virtual reality is expected to facilitate this. This exploration of empathy and virtual reality is performed through scholarly engagement with recent work, including pieces created using virtual environments and work made with immersive (360-degree field of vision or similar) video. I situate this exploration against research done on visual media and empathy in media history and history of science.

² *How Virtual Reality Can Create the Ultimate Empathy Machine*, accessed April 23, 2015, http://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine.

It is important to establish the role of the term “empathy” in this thesis. *Empathy* has been defined by Karsten Stueber in *Rethinking Empathy as a form of inner or mental imitation for the purpose of gaining knowledge of other minds*.³ I propose the term *staged empathy* to refer to a new analytical framework that examines how virtual reality work engages empathy as a visible externalization of inner imitation. Specifically, staged empathy considers *looking* as a meaningful site of interaction supported by the technical attributes of virtual reality.

Empathy in this sense is distinct from the use of the term in social psychology. In social psychology, empathy “seems to refer to a bundle of sometimes quite different capacities and attitudes of one person toward the states of mind and the situations of another.”⁴ For example, Stueber describes “affective empathy,” “empathetic joining,” and “multidimensional measures” of empathy. In social psychology, empathy serves as a heading under which a variety of inquiries into the social behavior of human beings are grouped. This thesis specifically speaks to the philosophical understanding of the term empathy, which is an area that is not well explored in literature on virtual reality and empathy. The simulation of events and environments facilitated by virtual reality produces an intuitive connection in practitioners and writers between this technology and empathy. Despite the informal deployment of the term, “inner imitation” is the

³ Stueber, Karsten R. *Rediscovering Empathy: Agency, Folk Psychology, and the Human Sciences*. (Cambridge, Mass.: MIT Press, 2006.) 28.

⁴ Stueber, *Rediscovering Empathy*. 27.

practice implied by colloquial sayings like “to be in another person’s shoes” often associated with virtual reality. Rather than arguing for the superiority of the philosophical definition over the social psychology approach, this thesis seeks to understand how the intuitive linking of empathy and virtual reality by practitioners can be more closely examined from the “inner imitation” perspective. As grounds for generating valid knowledge about another person, empathy has serious constraints. However, the historical definition of empathy (which is closely linked to the philosophical definition) also contains nuance that is particularly relevant to virtual reality experiences, specifically the process of empathizing with nonhuman objects or representations and the reflexivity of this process for the empathizing subject. Staged empathy is distinct from the social psychology pattern of use for the term: rather, it refers to the externalization of *inner imitation* in a virtual reality system.

By turning to the origins of the term, I aim to reveal implicit assumptions in its use. Chapter 2 contains a literature review of both empathy and the technical attributes of virtual reality systems, and provides a theoretical grounding that supports my argument for staged empathy. As historian Ian Hacking notes, “Historical epistemology may even claim that present ideas have memories; that is, a concept requires an account of its previous trajectory and uses.”⁵ In this spirit, I examine empathy as one way

⁵ I. Hacking, *Historical Ontology*, Historical Ontology (Cambridge: Harvard University Press, 2002), 8.

among many to emotionally relate to another person. Hacking uses the term *dynamic nominalism* to refer to the idea that the names for types of persons come into being simultaneously with the possibility of *being* a certain type of person.⁶ I apply this notion not to descriptions of types of people, but to descriptions of types of relationships (specifically empathy) in my review of literature on empathy in Chapter 2. In this section, I bring together work showing that empathy is predicated on the modern individual subject, that it evolved as a process of aesthetic engagement, and that it is subject to recurrent limitations. These factors support my argument for *staged empathy*, which works within the constraints of the concept of empathy while using the capabilities of virtual reality to modify the process of empathizing.

In the second section of Chapter 2, on virtual reality, J. J. Gibson's theory of *affordance* and D. Fox Harrell's notion of *phantasmal media* support my argument for the use of virtual reality systems to create spaces where empathy can be staged performatively, rather than achieved through objective representation. I discuss the technical attributes of current head-mounted virtual reality, and how these lead to particular affordances of virtual reality environments: (1) head-tracking, (2) stereoscopy, (3) 360-degree image space, and (4) an opaque headset. *Affordance* is a term drawn from ecological psychologist James Gibson. Affordances are what an environment "offers

⁶ Ibid, 113.

the animal, what it provides or furnishes, either for good or ill.”⁷ Affordances are neither completely objective qualities nor completely subjective perceptions, but are perceived in light of what they make possible to the subject.

Chapter 3 discusses the notion of staged empathy in depth, as well as proposes two categories of design techniques for the analysis of virtual reality work: (1) intentional looking and (2) direct address. These techniques are useful in tracing how staged empathy is employed in virtual reality work, and they are drawn from the technical attributes discussed in Chapter 2. This chapter translates the concepts discussed in the literature review into tools for analysis, using a wide body of virtual reality work to surface common patterns.

In Chapter 4, I apply these techniques to a case study of *Assent*, a virtual reality artwork created by Oscar Raby where the primary form of interaction is “looking”.⁸ An analysis of *Assent* demonstrates how the techniques of intentional looking and direct address are used to stage empathy. Raby has described a belief that virtual reality is a medium in which empathy is *practiced*, rather than *produced*. A staged empathy analysis describes how this belief is reinforced within *Assent*. This case study supports a staged empathy approach by showing that it is the process of engagement that characterizes empathic feeling.

⁷ James J. Gibson, *The Ecological Approach to Visual Perception*. (Boston: Houghton Mifflin, 1979), 127.

⁸ Oscar Raby, *Assent*, 2014. Virtual Reality installation.

Chapter 5 is a conclusion of the core arguments in this thesis, as well as a suggestion for future research. The body of work developed for current virtual reality systems is rapidly expanding, as companies, studios, and individuals continue to experiment, and doubtless additional narrative techniques and game mechanics will continue to emerge. Additionally, the widespread use of the term empathy in connection with virtual reality work seems driven by unprecedented feelings of “presence”; however, as viewers become acclimated to the use of a virtual reality headset, it seems unlikely that presence alone will be able to generate the same kind of emotional intensity described in the popular press.⁹ However, regardless of the popular success of the current generation of headsets, what I have attempted to do in this thesis is demonstrate how a particular grouping of long-available technologies can invigorate *looking* as a central and meaningful form of interaction with a media experience.

⁹ Josh `Constine, “Virtual Reality, The Empathy Machine,” *TechCrunch*, accessed April 26, 2015, <http://social.techcrunch.com/2015/02/01/what-it-feels-like/>.

Chapter 2

Empathy and Vision: A Theoretical Framework

2.1 Empathy

Empathy is so frequently used to describe a type of interpersonal feeling that it is difficult to imagine a world without it. However, the world before empathy was not unfeeling, nor were people unable to imagine how another person felt. *Empathy*, as a term meaning “inner imitation for the purpose of gaining knowledge of another” simply did not exist as a specific concept. In order to understand how *staged empathy* is a notion that builds on empathy, as well as to understand the limitations and pitfalls of empathy, this chapter discusses the intellectual history of empathy. This history describes three elements of empathy that are relevant to staged empathy: (1) empathy is a *process* of inner simulation (as opposed to an emotional state, such as happiness, sadness or anger) (2) empathy is associated with *subjective* vision within an *objectively described* subject and (3) empathy is a reflexive practice, as much able to change the subject engaging in empathy as it is able to provide knowledge about the object of empathy. Hacking’s description of *dynamic nominalism*, where a name for a subject co-produces subjects belonging to that social category is here applied to an *emotional activity*. Hacking argues that categories come into being alongside the subjects they reference and as these categories become solidified concepts through a process of

measurement and normalization, the categories delimit the scope of kinds of behaviors that are available to the subjects they describe.¹⁰ For example, someone who is considered to be a “type A” person, will understand herself simultaneously as a member of a “type A” category, and this self-impression impacts her actions as well as how she interprets her own actions.

My aim in referencing Hacking’s work is to suggest that empathy, as a description, shapes possible emotion in certain ways, just as the unnamed emotions which come “from nature” influence what can possibly be called empathy. For example, the family of behaviors and reactions we call “empathy” influences what the category of empathy refers to (its definition), as well as influences how we interpret and understand the behaviors and emotions that come under that heading. This practice is more than semantics. In current interdisciplinary research, empathy has become the dominant concept through which any manifestation of social feeling — any experience of interpersonal, collective emotion — is inscribed.¹¹ However, empathy has persistent limitations that affect the scope and style of creative work that is intended to elicit empathy, such as its reliance on an objectively described subject. Furthermore, aspects of empathy which are well-suited to creative work in virtual reality have been

¹⁰ Dynamic nominalism is different from nominalism proper: In Hacking’s terms, “A kind of person came into being at the same time as the kind itself was being invented.” *Historical Ontology*, 106.

¹¹ Swanson, Gillian. “‘The Tender Instinct is the Hope of the World’: Human Feeling and Social Change Before Empathy.” *New Formations*, no. 79 (November 2013): 126.

overlooked and misinterpreted: such as the importance of process and reflexivity.

Gibson's *affordances* provide a theoretical framework for relating the technological attributes of virtual reality to a subject's empathizing process, and Harrell's *phantasm* provides a model for how imagination can be intentionally designed for in computational systems. Together, these models demonstrate methods for tying together visual perception, virtual reality, and the performance of empathy, and lay the foundation for *staged empathy* as an analytical framework for empathy in virtual reality.

2.1.1 Empathy as Process of Inner Imitation

This section describes how empathy has been historically understood as a *process*, rather than as an immediate reproduction of another person's emotional state. This detail is obscured in most discussion of virtual reality as an "empathy machine", where virtual reality is thought to "improve" or "enhance" the *accuracy* of empathy.^{12 13} However, empathy has historically described a visually instigated but fully embodied process that takes place over period of time, during which a subject is engaged in a focused relationship with the object of his attention. When empathy was first brought into the English language in 1909, it was as a translation from the German of Robert

¹² "Virtual Reality Isn't Just a Gaming Gimmick, It Could Improve Empathy Levels and Even Reduce Racial Bias," *The Independent*, accessed May 5, 2015, <http://www.independent.co.uk/voices/comment/virtual-reality-isnt-just-a-gaming-gimmick-it-could-improve-empathy-levels-and-even-reduce-racial-bias-9043832.html>.

¹³ "Can Virtual Reality Make You a Better Person?," *BBC Future*, accessed May 6, 2015, <http://www.bbc.com/future/story/20141001-the-goggles-that-make-you-nicer>.

Vischer's concept, *Einfühlung*. Empathy described a "feeling-into" of an object, and was a way for a person to "project" herself (unconsciously) outwards.¹⁴ For example, historian of science Susan Lanzoni describes how Vernon Lee and collaborator Clementina Anstruther-Thomson, working at the end of the 19th century, proposed a sensation-based theory of aesthetics founded on *einfühlung*. They conducted experiments where Anstruther-Thomson "reported her eye movements, breathing patterns, feelings of pressure, tension and balance in a prolonged contemplation of [a] chair and its parts."¹⁵ In these experiments, bodily sensation mimicked aspects of the physical form of the chair, but not simply in response to observation. Rather, "The perceiving body and the shape of the object were coordinated to such a degree that Lee and Anstruther-Thomson did not find that bodily adjustments were a reaction to the form of the object, but more strikingly constituted the perception of form."¹⁶ *Empathy* describes this particular process of perception, where the empathizing subject and the object of perception engage in a shared physical resonance.

In this mode of aesthetic appreciation and consideration of art objects, certain forms and shapes were deemed to create pleasing or unpleasant sensations within the human body. Art historian Juliet Koss shows that as a means of aesthetic appreciation,

¹⁴ Koss, Juliet. "On the Limits of Empathy." *The Art Bulletin*, 2006. 144.

¹⁵ Lanzoni, Susan. "Practicing Psychology in the Art Gallery: Vernon Lee's Aesthetics of Empathy." *Journal of the History of the Behavioral Sciences* 45, no. 4 (2009). 40

¹⁶ Lanzoni, Susan. "Practicing Psychology in the Art Gallery", 342.

empathy was understood as a process of “reciprocal experience of exchange and transformation”, where the viewer experienced inner change and the object of their attention became animated and lively as a result of the subject’s focus.¹⁷ This early understanding of empathy fell out of use in the twentieth century, when Wilhelm Worringer juxtaposed empathy (which he linked to naturalism and a feminine “sentimentality”) to abstraction (which “requires the viewer’s effort to become representational”).¹⁸ ¹⁹ Naturalism drew on realistic images (as opposed to idealized images or abstract images) and was considered to depict everyday subjects so apparent that empathizing required no intellectual effort on the part of the viewer. Within artistic practices, this polarization of empathy and abstraction led to a rejection of empathy and an association of empathetic feeling with “low art”, found in places like early cinema, which was a medium of entertainment for the wider public.

With the advent of classical cinema (as opposed to cinematic experiments like the stereoscope) and the movie-going spectator, Koss describes how empathy was critiqued as a passive form of emotional absorption. The emotional narratives of popular films did not elicit the “estrangement” of self that the intellectual community influenced by Worringer believed would provoke critical thought: cinema was particularly suspect

¹⁷ Koss, Juliet. “On the Limits of Empathy.” *The Art Bulletin*, 2006. 139.

¹⁸ Ibid 151.

¹⁹ Wilhelm Worringer, *Abstraction and Empathy: A Contribution to the Psychology of Style* (Martino Fine Books, 2014).

because of its use of the third dimension. 3D space was associated with naturalism, in contrast to the flat canvas of abstraction. Dramaturgist Berthold Brecht rejected the mode of “shallow, passive, weak-willed spectatorship” that had become associated with empathy. For Brecht, “[empathy] had little to do with the active experience of embodied spatial perception that the theorists of *Einfühlung* had debated in the last quarter of the nineteenth century.”²⁰ Indeed, such readings of empathy as a passive mode of engagement unable to provoke critical thought lose sight of the *process* of embodied contemplation that was initially bound up in the concept of empathy. By limiting the goal of a viewer’s effort to making an image representational, and through abstraction situating this in the *mind*, rather than the body, 20th century critics of *einfühlung* both changed the definition of empathy and obscured the embodied engagement and labor of the viewer with the object of his empathy.

2.1.2 Subjective Vision in the Objective Subject

I emphasize the *process* of empathizing as a valuable aspect of empathy (rather than empathic accuracy) because of the limitations of inner simulation. In *Rethinking Empathy*, Karsten Steuber defines empathy as “inner imitation for the purpose of gaining knowledge of another”. Steuber explains that from a philosophical perspective (as opposed to an aesthetic perspective, which I addressed in the previous section, or a

²⁰ Koss, Juliet. “On the Limits of Empathy.” *The Art Bulletin*, 2006. 152.

social psychology perspective), empathy was found to be a poor method for gaining knowledge of other minds because it relied on the ability of a subject to accurately simulate the mind of another person.

However, prior to the introduction of empathy as a concept at the end of the nineteenth century, a shift had taken place in how vision was understood. Historian Jonathan Crary writes that in the beginning of the nineteenth century, a new subject emerged. This person is “a physiological subject who will be described in increasing detail by the empirical sciences in the nineteenth century, and an observer posited by various ‘romanticisms’ and early modernisms as the active, autonomous producer of his or her own content.”²¹ In other terms, inner experience was understood to be filtered through embodiment, was validated as knowledge, and was increasingly standardized by scientific description. This standardizing practice, I argue, also validated inner simulation as an accurate epistemic technique for gaining knowledge of the inner state of another. It also emerged in contrast to earlier approaches to vision, which were informed by the study of “light and optical transmission”, and held that vision was “a privileged form of knowing”, where vision accurately represented reality.²² Koss describes how Vischer bridged objective optics, describing the passage of light and

²¹ Crary, Jonathan. “Techniques of the Observer.” October, Vol 45, 1988. 5.

²² Jonathan Crary, *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. (Cambridge, Mass.: MIT Press, 1990), 5.

geometry of perspective with subjective vision, which was formed by bodily human perception:

[Vischer] understood human vision to be simultaneously optical and bodily and described it, crucially, as binocular. [...] As objects that mediate visual experience, moreover, binoculars themselves create an image by means of bodily perception; held in the viewer's hands, they present a doubled image that becomes unified only within the viewer's body.²³

To use Crary's genealogy of observers, the "objective" observing subject had no sense of the human body as mediating element. The "subjective" observer, which emerged contemporaneously with the concept of empathy, understood the human body as a mediating element, but also understood this process to occur identically across all bodies.

As the subjective observer was coming into description, however, the transmissibility of subjective experience came into question. As Koss notes, "In the early twentieth century, psychologists and aesthetic theorists began losing interest in [empathy], owing partly to laboratory research that discovered perceptual differences among those tested."²⁴ In other words, if empathy is founded on the assumption that one's own inner imitation, driven by her own experiences, can provide accurate knowledge of another's experience, then it assumes that there is no difference in

²³ Koss, Juliet. "On the Limits of Empathy." *The Art Bulletin*, 2006. 141.

²⁴ *Ibid*,144.

experience (or that experience makes no difference). Stueber notes that empathy is egocentric.

Even if we use empathy in this manner to project our own feelings onto the other person, with what right can we expect that such a method will provide us with genuine knowledge of the other person's mental states? We are primarily acquainted with our own mental states from a first-person perspective and according to which we define our mental concepts privately in reference to those inner experiences...incapable of answering the question of how we can be justified in using our knowledge of our own mind to gain knowledge of other minds.²⁵

Thus, empathy is only a limited solution to Descartes' problem of "other minds", or the challenge of knowing another when our only point of reference is oneself. For empathy to accurately describe the experience of another, it would need to be possible to objectively describe or reconstruct this experience in some fashion.

Recent work in empathy and neuroscience describes empathy as a neurological phenomenon through the use of magnetic resonance imaging. This technique produces an image of changes in the blood flow in the brain, and is the means by which the so-called "mirror neurons" were discovered. These neurons appear to "fire" when an individual observes an action, as well as when she performs or experience that action herself, and have driven excitement about quantifying empathic feeling.²⁶ As a method for scientific description of the human body, it bears a resemblance to the physiological description of the essential "subject" that drove subjective vision. As historian of science

²⁵ Stueber, *Rediscovering Empathy*.18

²⁶ G di Pellegrino et al., "Understanding Motor Events: A Neurophysiological Study.," *Experimental Brain Research* 91, no. 1 (1992): 176-80.

Victoria Pitts-Taylor notes, this approach frames “intersubjectivity as a problem to be solved within the boundary of the individual brain”.²⁷ By casting neurological and neurochemical processes as the foundational building blocks of how individuals perceive relationships with others, this approach leaves no room for co produced, constructed representations at the level of basic response that are shaped by environment and interaction. This in turn leads to the second issue Pitts-Taylor has with this construction– that it relies on a perception of neural networks as stable– “once conceptual systems are learned, they become fixed in the brain.”²⁸ Finally, Pitts-Taylor suggests that the dominant interpretation of embodied simulation theory (the theory which suggests empathy is an automatic process occurring at the neurological level) assumes an “essential” brain, devaluing cognitive diversity and on occasion pathologizing it.

Empathy is linked to sight as well as to scientific descriptions of subjectivity. As “virtual optics” is added to the host of other types of vision (physiological optics, classical optics), the definition of empathy seems poised to shift to address this addition. Rather than figuring vision as synthesized fully within the subjective human body, or within the brain, virtual optics as Schroter defines it requires the cooperation of human

²⁷ Victoria Pitts-Taylor, “I Feel Your Pain: Embodied Knowledges and Situated Neurons.” *Hypatia* 28, no. 4 (November 2013): 864.

²⁸ *Ibid.*

vision and a computational system to respond to human sight and generate from instructions the appropriate image.

2.1.3 Reflexivity

The process of empathy, though it has another as its object (be this “other” a person or a work of art) is also capable of provoking change within the empathizing subject, especially when implicit feelings or assumptions of the subject are externalized and made apparent through the empathizing process. Gillian Swanson writes of empathy that “the imagining of the inner life of others may actually be based on the projection of the individual’s own feelings into the object, rather than an authentic understanding that derived from an engagement with the particularity of the object.”²⁹ In this interpretation, empathy is an almost Freudian notion, where it serves as a projection of the subject’s unconscious onto another. This interpretation also describes the source of the empathy’s limitations as an egocentric mode of gaining knowledge. However, it does position empathy as a successful behavior for externalizing one’s own assumptions and beliefs. A contrasting description of empathy describes the physical process differently:

This sensation occurred with particular intensity along the body's surfaces, he argued, usefully providing an explanation for the mystical shivers and goose bumps of aesthetic transport. Along with the destabilization of identity and psychic projection, such bodily sensations on the spectator's skin produced a

²⁹ Swanson, Gillian. “The Tender Instinct is the Hope of the World”, 126.

powerful self-awareness. *Einführung*, in other words, articulated a loss of self that simultaneously reinforced a powerful, physical sense of selfhood.”³⁰

Rather than a projection of subconscious feeling, this interpretation of empathy focuses on its ability to cause a subject to *lose* touch with his mental, subterranean ego, and to instead feel a physical sense of self tied to the surfaces of the body. From this perspective, the reflexive quality of empathy is not about a mental subconscious, but about a temporary estrangement from the bounded mental self that allows a viewer to reflect on their embodied self as an instrument of perception.

Empathy is a frame for describing intersubjective sensation that is founded on parity between subjects. However, insofar as subjects *feel* differently, the epistemic value of empathy (its ability to give an empathizer accurate knowledge about the object of empathy) is questionable. Nevertheless, the visual immersion and perspective sharing promised by virtual reality seem to many practitioners to be promising methods by which to produce an “accurate” imitation. However, this phenomenon is not precisely empathy: the objective simulation is no longer an “inner imitation”, but an externalized one which removes two important aspects of “inner” empathy: process and reflexivity. Nor is “accurate” simulation an implementation of staged empathy, although it can be critiqued by this framework. Furthermore, no matter how accurate a visual simulation is, important aspects of perception are lost, a fact which is not lost on the creators of

³⁰ Koss, Juliet. “On the Limits of Empathy.” *The Art Bulletin* 88, no. 1 (March 1, 2006): 140.

virtual reality experiences. In describing a virtual reality piece made using 360-degree video of the *Millions March* in NYC, Milk writes that one of the advantages of the virtual reality format is visual proximity but physical safety. “If you were there you would keep a natural distance of 10 to 15 feet like everyone else... I’m letting you connect in that space in a way that’s very safe.”³¹ In this example, aside from a more visually immersive, first-person perspective, a virtual reality does not necessarily provide more empathic accuracy than traditional video would. In fact, it diminishes the influence of process on empathy, and doesn't take advantage of the unique affordances of virtual reality to provoke a reflexive change in the empathizing subject. In the next section, I discuss two theoretical approaches to analyzing a visual environment that are well-suited to the aspects of process and reflexivity, which are missing from most discussion of empathy and virtual reality: Gibson’s *affordance* theory, and Harrell’s *phantasm*.

2.2 Affordances and Phantasms in Virtual Reality

This section describes two theoretical approaches that speak to both the design of visual experiences as well as the aspects of empathy and perception that are commonly overlooked: process and reflexivity.

³¹ Constine, Josh. “Virtual Reality, The Empathy Machine.” *TechCrunch*. Accessed April 26, 2015. <http://social.techcrunch.com/2015/02/01/what-it-feels-like/>.

For Gibson, an *affordance* is a characteristic of an environment that exists *relative* to a particular subject. Affordance is an evocative term to apply to the domain of empathy because both notions address how a subject can understand and be changed by the object of her attention.

An important fact about the affordances of the environment is that they are in a sense objective, real, and physical, unlike values and meanings, which are often supposed to be subjective, phenomenal, and mental. But, actually, an affordance is neither an objective property nor a subjective property; or it is both if you like. An affordance cuts across the dichotomy of subjective-objective and helps us to understand its inadequacy. It is equally a fact of the environment and a fact of behavior. It is both physical and psychical, yet neither. An affordance points both ways, to the environment and to the observer.³²

For the virtual reality environment, the notion of affordance is somewhat difficult to pin down, as the events and spaces depicted are virtual, and not purely real or purely mental. Furthermore, because the “observer” of each experience will have her own particular characteristics of perception, it is also not possible to explicitly anticipate these. However, I propose to situate affordances within virtual reality in the following way:

- Technical Attributes: these are discrete but interrelated components of the virtual reality system. In this thesis, I examine head tracking, 360-degree panoramic image space, stereoscopy, and an opaque headset.

³² Gibson, *The Ecological Approach to Visual Perception*, 129.

- Affordances: The particular interactions that are possible when a user engages with an environment composed using the aforementioned technical attributes.
- Techniques: Descriptions of techniques that directly engage the user in a particular manner that allows the user to express their own patterns of perception, while still accessing the affordances made possible by the technical attributes.

It may seem as though this list would be complete *without* affordances. To clarify why this is not the case, I will demonstrate with one example: The head-tracking, combined with a 360-degree image space, afford *looking without a body*.³³ Used differently, they can also afford *looking with a different body* or *looking with a model of one's own body*. Depending on the user, how the experience has been designed, and what peripherals have been added beyond head-tracking and 360-degree image space, there are a number of affordances that can be made possible. A technique that I propose as part of the framework for *staged empathy* is “intentional looking”. This technique refers to design choices that are made which are sensitive to the different characteristics of *looking* in a particular virtual environment, made possible by technical attributes, but also reliant on the performance of these attributes by the user. I will describe staged empathy and

³³ As I will discuss in more detail in Chapter 3, *looking* made possible by head tracking in virtual reality is distinct from looking by manipulating a camera in a screen-based interface because aspects like peripheral vision, stereoscopy, and a panoramic image-space situate looking in relationship to a physical body, as well as draw on the same strategies for visual perception used in everyday interaction.

design techniques more fully in Chapter 3. The remainder of this chapter gives an introduction to Harrell's "phantasm" and describes the individual capabilities of contemporary virtual reality systems.

Harrell's *phantasm* is a blend of a concept and a sensory or mental image (which can be dynamic such as in the case of animation). For example, Harrell demonstrates that given a person's location and her cultural background, she may associate a certain image depicting a woman in a dress to mean *woman*, without needing a "conscious reasoning process" to understand this. This person would be accessing a worldview that contains beliefs about how women dress. Phantasms, thus, go unnoticed often in everyday interaction. When confronted by other, contrasting phantasms, (such as a sign with a woman wearing a South Asian sari) a phantasm can become *revealed*. Harrell explains, "A *revealed phantasm* is one that an individual consciously understands to be based in a subjective worldview."³⁴ Phantasms can also be thought of as the missing elements when one person attempts to accurately empathize with another, as they develop out of a particular worldview and lived experience. Rather than experiencing another person's phantasm as her own, however, an empathizing subject could have her own phantasms be revealed to her through the reflexive aspect of empathy. With empathy, I sought to explore Hacking's notion of dynamic nominalism in the context of

³⁴ Harrell, D. Fox. *Phantasmal Media: An Approach to Imagination, Computation, and Expression*. (Cambridge, Massachusetts: The MIT Press, 2013), 9-11.

an emotional activity. Phantasms are visual and sensory pathways by which these worldviews that define certain subjects and emotions are built. Harrell concludes: “Phantasms, which conflate ideas and images that need not be related, thus have a significant real-world impact as they become, to some extent, self-fulfilling prophecies. They are made real by the imagination.” Specifically for virtual reality systems, which provide a sensitivity to the manner in which a subject *looks* about the experience or environment, a phantasm can also apply to habits of perception and ways of looking, in addition to images. In other words, an idea and an image and a *way of perceiving* are simultaneously conflated, because in virtual reality work the production and perception of the image is born out of an ongoing interaction between the system and the user.

In this thesis, I explore how virtual reality systems, given a set of specific affordances that are primarily visual and sensory, can reveal assumptions— phantasms— about the inner experience of others through a performative process and reflexivity. This form of empathy, which has been externalized into a virtual reality system, and makes use of this system’s affordances to reveal phantasms, is called *staged empathy*.

2.3 Virtual Reality

Technological determinism, the belief that technologies determine the paths taken by society and culture, appears recurrently in popular media, and in the case of the *Oculus Rift* the technology has been ascribed bombastic qualities.³⁵ However, technologies are often used as shorthand to encompass a host of social, cultural, technological, scientific, and political conditions. The phrases “the internet” and “the computer” are good examples of this phenomenon because they are often cited as revolutionary drivers of social change, when in fact causality is much more complicated. Rather than assessing whether or not the head-mounted display and its affordances directly influence empathy, I am interested in how these capabilities are used in ways that differ from other media. In this section, I discuss the common affordances of most contemporary head-mounted display virtual reality devices, as well as provide some historical context for these, review the methodologies of analysis I will employ, and propose several categories of design techniques. The affordances (such as head-tracking, panoramic display, and stereoscopy) are not themselves novel, but their assemblage together, decreasing price, and the increasing availability of necessary peripherals is.³⁶ In the previous chapter, I discussed how empathy evolved as a term alongside scientific

³⁵ Smith, Merritt Roe, and Leo Marx, eds. *Does Technology Drive History? The Dilemma of Technological Determinism*. (Cambridge, Mass: The MIT Press,) 1994.

³⁶ Some examples include cameras, 3D modeling and game engine software, panoramic video stitching tools, and distribution marketplaces like Steam.

imaging techniques, and carries with it assumptions about social feeling. In this chapter, I take a formal approach to the medium of virtual reality, but in the next chapter I will bring these two inquiries together in an analysis of *Assent*.

Contemporary head-mounted display devices generally have a family of affordances: they incorporate stereoscopy, can display a 360-degree field-of-vision, accommodate head tracking, and completely cover a user's eyes.³⁷ "Affordance" is a term drawn from ecological psychologist James Gibson. Affordances are what an environment "offers the animal, what it provides or furnishes, either for good or ill."³⁸ They are characteristics of things within an environment that are neither completely objective qualities nor completely subjective perceptions, but are perceived in light of what they make possible to the subject. In this section, I will describe and give a notable example of how each of these elements has been deployed in other contexts. I use the term "affordance" rather than apparatus, although I am talking about mechanical traits, because I want to distinguish between "apparatus" film theory, and the ecological philosophy of Gibson. Film historian William Uricchio defines apparatus film theory as a school which "turned away from the reigning auteurist, new-critical, and sociological approaches to film analysis and offered, instead, a theoretical account of the film

³⁷ This last attribute, the opacity of the display device, separates current devices from other tools that rely on transparency and more heavily emphasize "augmented reality", like data-glasses, Google Glass, and retinal-projection technology.

³⁸ Gibson, *The Ecological Approach to Visual Perception*.

spectator as ‘subject’”.³⁹ Although by addressing the specific technologies that compose the virtual reality experience I am entering into the sphere of the apparatus, I hope to continuously emphasize that in immersive virtual reality, the “subject” is not distinct from the apparatus or the virtual environment. Recall, according to Gibson, “An affordance... points two ways, to the environment and to the observer. [...] This is only to reemphasize that exteroception is accompanied by proprioception—that to perceive the world is to co-perceive oneself.”⁴⁰

Both of the broad techniques I will discuss, the intentional look and the direct gaze, rely on a connection between using embodied and apperceptive knowledge to inform perception of the environment. Likewise, as referenced in Chapter 1, a fundamental tenet of empathy is its reflexivity: its ability to modify the worldview of the individual engaging in empathy. In virtual reality work, I suggest that this process may be externalized and visible, through the manipulation of a virtual environment capable of revealing phantasms of perception.

2.3.1 Stereoscopy

Stereoscopy is the use of dual lenses, each displaying a slightly different angle of an image, to produce a sensation of depth and 3D space. Lenticular stereoscopy was invented in the 1850s. Similar explorations of what Jens Schröter terms “the transplane

³⁹ William Uricchio, *Technologies of Time*, forthcoming in J. Olsson, ed., *Visions of Modernity* (working title) (Berkeley: University of California Press).

⁴⁰ Gibson, *The Ecological Approach to Visual Perception*.

image” have emerged throughout history. Devices like the “View-Master” became available in the 1940s, and were predated by other, similar devices like the “vivascope” in the 1920s. These devices were made for the viewing of stereoscopic photographs. In 1966, Marcel Duchamp revealed a piece he had been working on in secret for twenty years. The piece is a sharp departure from the readymades like *Urinal*, and does not quite align with Duchamp’s optical experiments that Schröter discusses; it is a unique piece because it is not true stereoscopy. *Étant donnés* appears as a door in a wall, with two small holes that are eyes-width apart. A viewer approaches the wall, and places their head up against the door, one eye against each hole. Inside, a perspectively unstable cast of a woman’s body, a landscape, a backdrop, and a seemingly-animated waterfall spread out in 3D space. The work culminated a longstanding interest Duchamp had in vision and perception. Art historian Jean Claire, writing in the journal *October* in the 1970s, notes that stereoscopy, once a widespread media practice, faded from use, arguing that “because it has no material reality it does not permit symbolic exchange”.⁴¹ ⁴² By this statement, he is referring to the fact that the viewer’s two-eyed gaze creates the image in full, the “material reality” is not actually the experienced reality of the piece, and therefore it did not appeal to the dominant usage of

⁴¹ Clair, Jean. “Opticeries.” *October*, 1978.

⁴² It is also worth noting that “faded from use” does not mean disappeared, as Schröter points out, stereoscopic devices continued to exist in novelty and specialty applications during the 20th century.

photography at the time, which was to serve as an indexical record of the real.⁴³

Duchamp, however, was drawn to this form precisely for these reasons: it enabled a synthesis of the artwork that was somehow “closer to the brain”. Recall the earlier distinction between *naturalism* and *abstraction*. Despite the hyper-naturalistic quality of diorama work, *Étant donnés* obliterates the picture plane to create the synthesis in the mind of the viewer, an inversion of the approach taken by abstract artists:

In *Étant donnés* there is nothing that is fixed to the canvas, wood or wall. It is only the onlooker who can 'fix' the picture (or the painting). Therefore, the work has no sense or meaning without the onlooker. The picture (or the painting) only exists in the mind of the onlooker. Since there is no common or set image fixed anywhere, there cannot be any common interpretation.⁴⁴

Yet the suggestive content of *Étant donnés* cannot be ignored: the viewer presses their face against a closed door, peering through peepholes at the nude form of a woman.

Behind the viewer, the other persons in the gallery watch the spectator engage in this semi-public voyeurism. Behind the door, a meticulous construction of diorama, sculpture, and lighting extend back in space. However, even if the door were to be opened, entering this space would not give clarity to the image, only to its construction. Although the form of the woman is ambiguous and strange, her body slightly distorted, her face invisible, the viewer still occupies the only position from which the work gives a coherent illusion. I discuss this work within the stereoscopy section, even though it is

⁴³ Jean Claire refers to an opinion that indexicality and ownership are linked.

⁴⁴ “Tout-Fait: The Marcel Duchamp Studies Online Journal.” Accessed April 23, 2015. http://www.toutfait.com/issues/issue_3/Articles/Hoy/etantdon_en.html.

not actually stereoscopic, because it draws attention to the human visual perception system and *how* it functions without the use of a lens or a screen. Additionally, it raises questions about immersion and spectatorship because of the public placement of the work in a museum, where the spectator becomes a public voyeur because of the suggestive content.

Humans have many techniques for monocular depth perception, but stereopsis is only possible with binocular perception. In stereopsis, objects that are near have a more pronounced angle of difference. Were *Étant donnés* to have only one peephole, then optical techniques producing depth and realism in the diorama would have been similar to those possible in classical (non-abstract) painting. Abstraction implicates the body of a viewer, their perceptual systems, and the rectangular surface of the painting by refusing to engage in deceptive realism. By using lensless, binocular peepholes in an illusionist diorama, attention is drawn to natural, ongoing stereopsis and how it produces a spatial reality for the viewer.

2.3.2 360-degree Image Space

A 360-degree possible field-of-vision means that these systems are capable of representing complete three-dimensional space not only in 3D modeled environments,

but in photo and video as well.⁴⁵ Oliver Grau, author of *New Media Histories* and *Virtual Art* discusses the painted “battle panorama” (which is also a 360-degree image space), as an early important case study in the art history of virtual reality. In the panorama *Battle of Sudan*, photorealistic painting is combined with illusionistic techniques in space, such as a twelve-meter distance between the space a viewer could stand and the painting itself. These decisions were drawn from findings in physiology and perception made in the 19th century, particularly “the physiological observation that humans can perceive objects spatially only up to about this distance”.⁴⁶ Grau notes that although in one sense the observer has “a perfect, commanding view of the painted horizon”, the depiction of the king as a geographically elevated, “omnipresent” entity provides a contrast against which the observer is drawn into the “psychological fusion with close combat”.⁴⁷ The viewer is close to the soldiers, the king is just visible atop a higher vantage point in the horizon. Grau argues that the sense of immersion driven by the 360-degree horizontal field of view of the panorama should be considered in light of Foucault’s reading of the similarly spatially structured Panopticon: he argues that “the observer is the object of political control”. Grau also notes that “selective, focused perception” is important in aesthetic reflection, yet “it is impossible to select any art

⁴⁵ The actual field-of-vision for the Oculus Rift is about 110° which extends beyond peripheral vision.

⁴⁶ Grau, Oliver. *Virtual Art: From Illusion to Immersion*. (Cambridge, Mass: MIT Press, 2003), 106.

⁴⁷ *Ibid*, 108.

object in a total image, for everything is image”.⁴⁸ Importantly for contemporary head-mounted displays, this not only means that a viewer could turn a camera around through the virtual space, but that their vision itself lives in the space: a rectangular frame is no longer natural and peripheral vision becomes part of the mediated content.

I want to emphasize at least two aspects from Grau’s study. First, that Grau identifies one camp of discontents with the panoramic image, those who hold that immersion is counterproductive to aesthetic reflection. Ingrained in this perspective is the idea that the “total image” (without frame) resists aesthetic selectivity. Control oscillates between two readings of this phenomenon of framelessness: there is a freedom of gaze that permits the observer to direct their look however they want, with no separation between the subject-observer and the object-art. However, Grau also shows that one concern critics had at the time regarding panoramic paintings was that the “psychological fusion” and totality of the image-space prevents viewers from assuming “critical distance” (recall again the historic association between “naturalism” and “passivity”) and thus from being able to pick out particular aspects of the image to consider and give attention to in turn.

The second aspect of Grau’s discussion of *The Battle of Sudan* that is relevant to this study is his notion of the panorama-as-panopticon. The history of the immersive image space is intertwined with military action: in the popularity of battle-scene

⁴⁸ Ibid, 111.

panoramas in the period Grau studies, as well as in the military development and uptake of the head-mounted display. Although this does not occur materially in the panoramas of the 19th century, the sense of being watched from the outside, and the inversion of the panopticon structure, is mirrored by the combination of 360-degree field-of-vision when combined with computer-generated digital imagery and the head-mounted display. Simply put, although this does not have to happen, the direction of the observer's gaze is recorded and can be responded to by the system itself. This "head tracking" can occur both ambiently and as a form of intentional interactivity.

2.3.3 Head-Tracking and Virtual Optics

Head-tracking refers to the ability of the viewer's head to move around *in* the image space, a capability that also has a twin effect: the system displaying the image space detects and can respond to the positioning and movement of a viewer's head. Jens Schröter writes that "the [Head-Mounted Display] connects the stereoscopic image with the 360-degree panorama. This connection is historically new. It becomes possible only because the image changes with the movement of the viewing subject's head."⁴⁹

Importantly for Schröter, non-virtual representations were perceived via "physiological optics", rather than "virtual optics". Recall that "physiological optics" are tied to the "subjective observer". A virtual image is simply a "description of a space", which "is

⁴⁹ Schröter, Jens. *3D: History, Theory, and Aesthetics of the Transplane Image*. International Texts in Critical Media Aesthetics: V. 6. New York: Bloomsbury Academic, 2014. 384.

actualized performatively in the process of interaction.” This observation has a great deal of resonance with *Étant donnés* reliance on the *seeing* of the image in a way that is not necessary for traditional canvas painting; the image has to be synthesized from a kind of prototypical “virtual space”.

2.3.4 Opaque Headset

That the current generation of systems completely and opaquely covers a viewer’s eyes is, in some narratives, an unfortunate necessity. Mark Zuckerberg, CEO of Facebook, when discussing Facebook’s purchase of Oculus (the company behind the Oculus Rift headset) has stated hopes that eventually the system will transition to augmented reality, which would likely require a transparent headset.

[Games] are just some of the potential uses. By working with developers and partners across the industry, together we can build many more. One day, we believe this kind of immersive, augmented reality will become a part of daily life for billions of people.⁵⁰

In an earlier instantiation of head-mounted display virtual reality, Ivan Sutherland’s *Sword of Damocles*, the lenses were only semi-opaque: Schröter notes that Sutherland “did not even have the goal to create an *illusionist* space that would isolate the viewer.”⁵¹ Indeed, with telepresence as an eventual aim; as discussed in the introduction,

⁵⁰ “Facebook Closes Its \$2bn Oculus Rift Acquisition. What next? | Technology | The Guardian,” accessed April 26, 2015, <http://www.theguardian.com/technology/2014/jul/22/facebook-oculus-rift-acquisition-virtual-reality>.

⁵¹ Schröter, *3D*, 384.

“entertainment” that can function within the “hermetic seal” of the current generation of headset may be seen by industry producers as a temporary stepping-stone in market penetration. However, for the time being, most widely available virtual reality headsets are physically obtrusive and opaque, and must construct a complete image without relying on transparency. This provides visual conditions of immersion and separation from the physical world, a trait that could prove conducive to modes of looking that are contemplative or take advantage of disembodiment.

There is interplay and flexibility in these categories; for example, a screen-based game can still use head tracking, and an installation exhibit can likewise create a 360-degree field-of-vision. Alternatively, a head-mounted device can also incorporate even more technical capabilities, particularly those made possible by peripheral devices. These peripheral devices can be traditional, like a joystick, game controller, or mouse, or more unusual, like the gestural control facilitated by a Leap Motion or Myo armband (or, in the 1990s, the “data glove”). However, the aforementioned core family of characteristics come bundled together in one hardware platform, and are thus are immediate visual design challenges for media producers. Importantly, all three of these attributes are direct interventions into modes of *seeing*.

Rather than examining the phenomenon of presence or immersion directly, this thesis seeks to understand the formal and structural characteristics of *seeing* in the

context of recent head-mounted display virtual reality. To this end, the following chapter articulates how the previously discussed attributes that are specific to current virtual reality systems function in a sampling of current virtual reality work.

Chapter 3

Staged Empathy: A New Analytical Framework

Virtual Reality provides an opportunity for *staged empathy*, a process of empathizing with the experience of another where some aspects of the inner simulation of empathy are performed in virtual space. This process is enabled by two techniques innate to virtual reality: *intentional looking* and *direct address*.⁵²

I propose this analytical framework based on the limitations of inner simulation, as discussed in Chapter 2.⁵³ In this chapter, I situate the notion of staged empathy by explaining why a term is needed beyond “empathy”, why “staged empathy” conveys the necessary ideas, and how this framework connects theories of performed identity and phantasmal media to the affordances of virtual reality. Then, I will discuss the two techniques of engagement I propose for understanding staged empathy: intentional looking and direct address.

Empathy, as inner simulation, repeatedly encounters the problem that it is not possible to simulate, completely accurately, an experience that one has never had. However, within the staged empathy framework, the important part of empathizing is the *process* undergone by the empathizing subject, rather than the objective accuracy of

⁵² These affordances, as described in the last chapter, are perceptual phenomena in virtual reality which are made possible by the sensory environment of virtual reality technologies.

⁵³ Recall, because subjects are not identical, one subject’s perception of visual stimuli will be affected by variables that inner imitation in another subject cannot accurately reconstruct.

the simulated feeling. The relationship that develops between the subject and the object of their empathizing, the patterns of perception and the tenor of the interaction is performed externally in virtual reality, and the mechanisms by which it occur characterize how the experience can reflexively affect the empathizing subject. Virtual reality work that ties empathetic success to objective realism loses sight of the importance of imaginative simulation on the part of the viewer. For example, Nonny de la Peña's piece *Hunger in Los Angeles* takes on an "immersive journalism" approach, reconstructing the events of a man's diabetic attack as they occurred. By focusing on a supposedly objective reconstruction of a scene or environment, this piece and others like it disregard subjective experience that is not easily translated to virtual reality through an objective visual reconstruction, such as bodily risk, apperception (the use of past knowledge or experience to influence current perception), and an array of sensory and mental information that colors perception. Virtual reality work which seeks to approach objective visual realism in its documentation functions differently and has different aims than work which uses virtual reality affordances to aid in the imaginative simulation of empathy. Staged empathy seeks to find ways to affect and modify the process of inner simulation creatively.

The term staged empathy references the insufficiency of empathy as a means to gain complete access to the mind of another. As an internal performance of another

person's experience, empathy is always "staged". It is the performance in one's own mind of the real experience occurring in someone else's mind. However, performance and imitation is still a worthwhile endeavor, whereby we attempt to behave differently and to experiment with other ways of being. This term, staged empathy, also refers to Brenda Laurel's work on human-computer interaction and theater, in which she suggests that interaction is a collaborative performance between a person and a computer system.^{54 55} The notion that interaction and communication are a form of performance goes back to sociologist Erving Goffman's work in the 1950s. Individuals "perform" a representation of their identities in an attempt to communicate and interact in particular ways. These performances rely on shared expectations about what certain behaviors and symbols mean.

In this vein, Harrell's work on the "phantasm" shows how this performance between user and computer system both contains and can shake embedded assumptions and expectations that contribute to differences in perception. Harrell's phantasms "*are a combination of imagery (mental or sensory) and ideas*", a connection which is significant because "much of what humans experience as real is based upon the

⁵⁴ Laurel, Brenda. *Computers as Theatre*. (Reading, Mass.: Addison-Wesley Pub., 1991.), 35.

⁵⁵ Virtual reality work is capable of pointing to phantasms that function on the sensory level of Laurel's scale of interactivity, namely pattern and enactment. Laurel defines *enactment* as the sensory dimension of all that is represented, and *pattern* as the pleasurable perception of pattern in sensory phenomena.

imagination”.⁵⁶ The phantasm provides a way to understand what imaginative processes are at work in everyday perception. The analytical framework of staged empathy uses techniques that derive from the affordances of virtual reality to examine how empathy is performed in a work of this medium. Staged empathy is a framework for analysis, whereas empathy is often referred to as an affective goal.⁵⁷ As such, staged empathy is a more nuanced approach because it supports an understanding of *how* work creates conditions for empathy to be creatively performed, using techniques particular to virtual reality.

Staged empathy is a process of empathizing with the experience of another where some aspects of the inner simulation of empathy are performed within a virtual space. Rather than imagining the experience of another based entirely on a user’s own experiences, the user within the virtual environment has access to a site for experience that may be different from how her expectations might have shaped her inner simulation. Additionally, the virtual system is reactive and responds to the visual engagement of a user with the environment. In order for the system to generate the correct images for display, it is also recording the direction of the user’s gaze and responding to subtle changes. This connects the process of looking and perceiving in this

⁵⁶ D. Fox Harrell, *Phantasmal Media: An Approach to Imagination, Computation, and Expression*. (Cambridge, Mass.: The MIT Press, 2013), 4.

⁵⁷ As I described in the previous chapter in the section “Empathy as Process”, this is a characteristic of empathizing that is often overlooked. Staged empathy foregrounds the process of empathizing, and provides analytic tools with which to do so in virtual reality work.

environment with the user's process of inner simulation; for example, the way that a user chooses to look and to frame his attention provides information about his expectations. The virtual environment can adapt to this in creative ways, as I will describe in this chapter. In other words, staged empathy refers to a combination of the traditional inner simulation of empathy, and a computer-generated virtual environment that is designed with techniques of engagement. These techniques rely on the affordances of virtual reality to reveal and construct phantasms, concepts that combine images and ideas.⁵⁸

Figure 1 illustrates the relationship between technical attributes of virtual reality, the coproduction of "affordances" between the user and the system, and the techniques of engagement which emerge from these affordances. "Attributes" are the technical capacities of virtual reality headsets, as discussed in the previous chapter. Drawn from Gibson, "*affordances*" are a simultaneous relationship between a subject and the surrounding environment that gives forth certain possibilities, though these may not be immediate or directed towards a particular use.⁵⁹ "Techniques of engagement" are particular strategies for design that make use of the affordances that emerge between a user and the virtual reality system.

⁵⁸ Ibid.

⁵⁹ This term is sometimes used in human-centered design to refer to immediately perceived uses for an object or a space, such as the presence of a handle on a cup implying that it should be lifted by this. This is not my aim here, particularly because I am interested in how the potential dynamism of virtual reality work might trouble or counter traditional expectations about objects or environments.

Relationship between Virtual Reality Attributes, Affordances, and Techniques

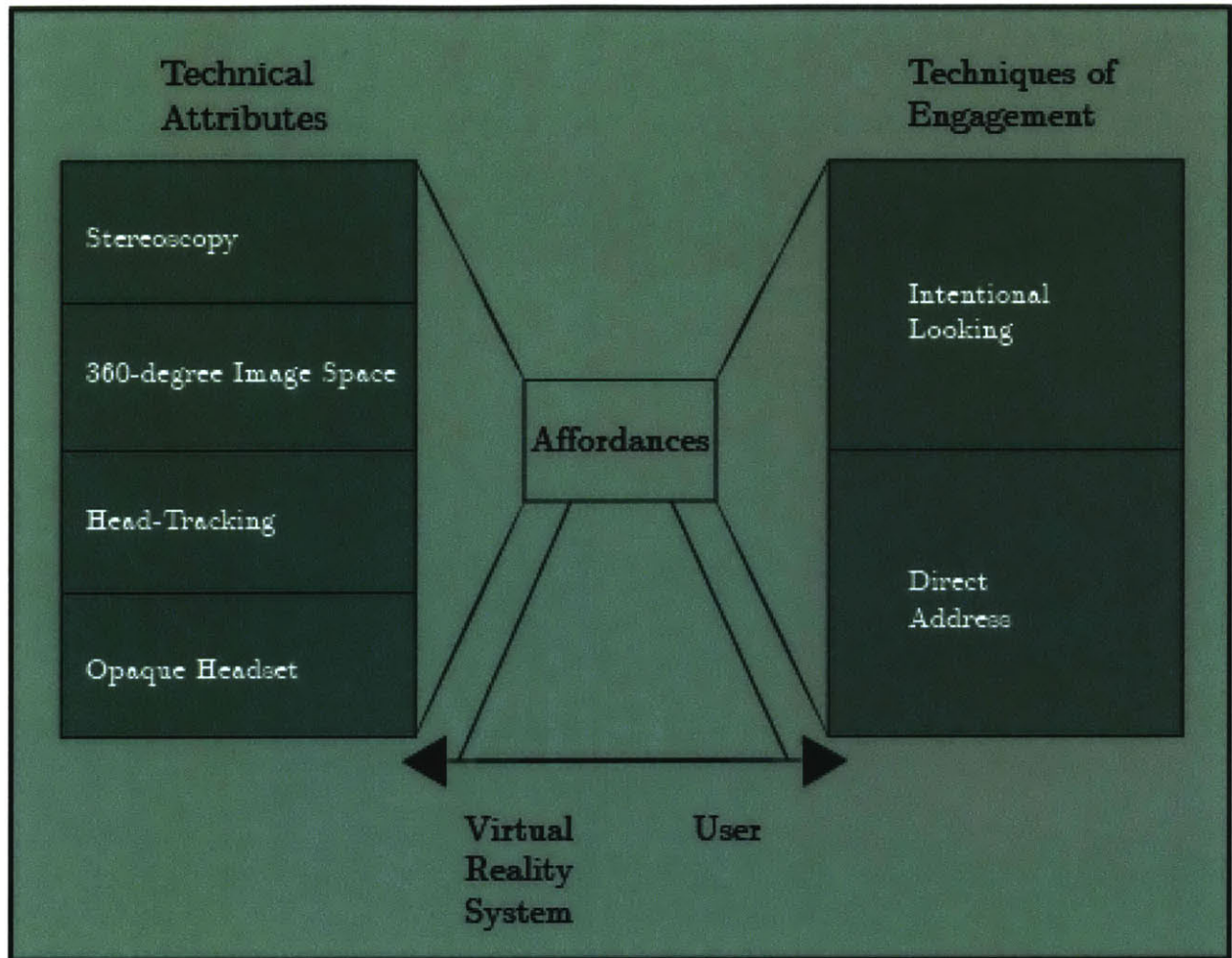


Figure 1

This section discusses a diverse body of current virtual reality work to reveal how the techniques of intentional looking and direct address appear in various examples. Both of these techniques suggest ways that the affordances of virtual reality work are different from normal perception, and as such can produce phantasms that creatively modify perceptual activities like apperception, proprioception, (a sense of how one's body is oriented and moving through space) and exteroception (a sense of the environment outside one's body). Intentional looking describes how virtual reality

supports a wider range of ways of looking, ranging from glancing to gazing to staring, a mode of interaction that distinguishes the visual composition of virtual reality work from other media. Direct address references the ability of both characters and the environment to *see* and react to the viewer's gaze. To show how these techniques are employed in current virtual reality work, as well as to illustrate how they emerge from the particular affordances of virtual reality, I will draw on a number of examples. For ease of reference, Table 1 below describes a list of different works that I will refer to when describing these techniques. The Oculus Rift and other virtual reality devices are still not in wide release, and many of these works are in-progress, sketches, trailers, proof-of-concepts, or very short games. Some examples are created with 360 degree video, and others are virtually modeled environments. These examples are intended to provide a sense of how these techniques of engagement emerge given the affordances of virtual reality. In the next chapter, a case study of *Assent*, I will describe how these techniques make staged empathy possible.

Title	Description	Notable Elements
<i>Assent</i> , 2014	A virtual reconstruction of a memory passed on from father to son.	The user can use her gaze to trigger events. Characters speak to the user directly.
<i>Black Mass</i> (trailer), 2014	A trailer for a film in the horror genre shot in 360-degree video.	Displays several ways to cut between scenes.
<i>Chair in a Room</i> , 2014	A game where the user explores a dark room with a flashlight in order to solve a mystery.	The flashlight is controlled by the user's gaze. The virtual environment changes when the user looks elsewhere.
<i>The Enemy</i> (demo), 2014-15	An installation where a user explores a virtual room and listens to two virtual characters respond to interview questions.	The characters physically respond to the viewer's movement and attention. If a user approaches and stands in the same space as a character, the aspect ratio shifts and the user sees the room from the perspective of the character.
<i>Hunger in Los Angeles</i> , 2012	An immersive journalism piece that embeds the user in a virtual reconstruction of an incident where a diabetic man in line at a food bank in Los Angeles suddenly collapses.	The user can move around the space but cannot change the outcome of the events.

<i>In Mind</i> , 2015	An arcade-style game where the user is in the cockpit of a vehicle attached to rails, moving through a landscape composed of computer-generated models of “neurons”. A voice directs the user to use their gaze to “shoot” the “bad” neurons.	The user is able to fire on neurons by holding them within her gaze. The user can look around as she wishes, but a “cockpit” encloses the user as she travels through the brain.
<i>Machine to Be Another</i> , 2014	A performance that uses a virtual reality headset and a body-mounted camera to allow a performer to “swap” bodies with a participant.	The performer must mirror the body movements of the user to maintain the illusion.
<i>Osmose</i> , 1995	An installation where the user experiences a succession of abstracted virtual environments.	Although the user is free to explore, the environment itself is dynamic and changes smoothly around the user.
<i>Phantom (Kingdom of all the animals and all the beasts is my name)</i> , 2014-15	An artwork made using laser scans and virtual reconstruction of a rainforest.	The user enters the environment within a model of a tree trunk. The environment is modeled with point-cloud data, making objects semitransparent.
<i>Pixel Rift</i> , 2015	A game where the player loads and fires spitballs at various characters in a virtual classroom.	Characters react to the user and the player must avoid the attention of the teacher. The user loads and fires the spitball gun through looking.
<i>Zero Point</i> , 2014	A promotional 360-degree film for and about the Oculus Rift device.	Cuts are slow fades between different scenes.

Figure 2. A chart describing virtual reality work referenced in this thesis.

3.1 Intentional Looking

Looking, often considered a passive form of interaction, takes on new importance in work made specifically for head-mounted virtual reality that combines stereoscopy, 360-degree image space, head-tracking, and an opaque headset. I have selected the term because “intentionality” implies both context and desire, and references a phenomenological tradition where we perceive space not objectively, but through the lens of what affordances emerge in a resonance between our bodies and the environment.⁶⁰ “Looking” delimits the scope of my study: I am arguing that in virtual reality, looking is a significant interaction and activity. Virtual reality promotes a variety of modes for visual engagement beyond “watching”. The way in which a user visually perceives the environment will construct the sensory dimension of the entire representation.⁶¹ The ways in which the user is glancing, gazing, or staring and the objects of these modalities replace the traditional tools in framed media for composing scenes. Furthermore, this degree of nuance in looking mirrors daily social engagement with others, a characteristic that is important in understanding how intentional looking contributes to staged empathy. In this section, I will describe how intentional looking is used in different work to construct a user's visual experience of the representation, in a

⁶⁰ Gibson, *The Ecological Approach to Visual Perception*.

⁶¹ This is a reference to Brenda Laurel's “enactment”, the base sensory layer from which all other components of narrative performance are built.

way which is distinct from the framing and cutting of traditional framed media. I will address framing and camera movement, two areas where intentional looking provides a useful for conducting analysis.

3.1.1 Framing

In virtual reality, looking replaces framing, and the design of an experience should attend to both the mode of looking and the object of looking. Framing sets the limits of a composition, separating the work from the external environment. Traditionally, this has occurred in a rectangular shape, as is familiar from traditions in painting, photography, film, and other screen-based media. Framing in virtual reality is split between the author's ability to stage the environment and the user's ability to actively look around it. The image space in virtual reality is not constrained by a rectangular frame, but can extend up to a complete 360 degrees. Additionally, stereoscopy provides a sense of tactile depth, changing the perception of objects that are near versus objects that are far. Thus, a viewer's "frame" is determined by her attention within the surrounding image space, rather than by the limits of a screen. Furthermore, within such a space, a viewer will look using different modalities.

Some aspects of cutting in film are replaced by a pattern of glancing and refocused attention on the part of the user. Edward Casey provides a sampling of how different modes of looking convey different intentionality, reproduced below in Table 2.

The main distinction Casey draws between gazing and glancing is duration. Gazing is a familiar mode of aesthetic engagement, but more unusual is the notion that a gaze can be imbued with particular affective weight: for example, a glare. Glancing, and the modes of looking that it encompasses, suggests a spacious environment and an interpersonal component: one glimpses something or someone, peeking or peeping are done in a clandestine manner.

Kinds	Gazing	Glancing
Modes	Contemplating; Scrutinizing; Scanning; Staring; Glaring	Looking around; Glimpsing; Peeking/Peeping
Modalities	Scanning over, through; Staring at; Glaring at	Peeking at, out; Peeping into, through; Glimpsing of

Figure 3: figure drawn from Edward Casey’s *The World at a Glance*. These are examples of how modes of looking can carry different intentionality, broken down also by length of attention: long, as with gazing, or short, as with glancing.

In the remainder of this section, I will present several examples of how intentional looking works to “frame” a user’s experience of a work in a way that makes use of the affordances of virtual reality. The staging of a scene, sound, movement, and lighting which draw attention, a sense of the periphery and the unseen space in a scene, the variety of intention behind different modes of looking, and the traces that looking leaves on a scene all emerge as contributing effects.

In the trailer for *Black Mass*, lighting, staging, and horror film genre context prepare the user to glance about in a certain way. The lighting, which periodically darkens to complete blackness before returning, encourages the viewer to glance about quickly, trying to see who or what has changed or moved about in the scene while it was dark. This mode of looking is rapid, and seeks to identify threats or danger. Unlike rapid cutting in a high-tension scene in a film of the same genre, which convey the sense of panic a character feels, the user glances around quickly, scanning the environment for threats. The shifting attention of the user on different spaces and objects replaces the sequential images of a cut. As characters move towards the user, a motion which is emphasized by stereoscopic depth, the sense of physical proximity and actual space around the user's body imply that when the lights turn off, the character continues to move. Thus, when the lights flicker back on, the user looks searchingly for what has changed. This sense of movement and "searching" look activates the visual space behind the user. This is a phenomenon that does not exist in a first-person focalization in film, and would not be available through glancing in a screen-based virtual environment (where some type of control or interface, rather than head motion, would be responsible for shifting the camera). This glancing action is facilitated by head-tracking and the panoramic image, which allows a user to lean towards and away from parts of the image space, and to glance at things behind the user or in the periphery of the user's vision.

In the game *In Mind* (Figure 4), a user is in a vehicle attached to a rail like an amusement park ride that travels through a simulation of a brain. She is tasked with shooting neurons that have turned red as the vehicle she is in caroms through the brain.

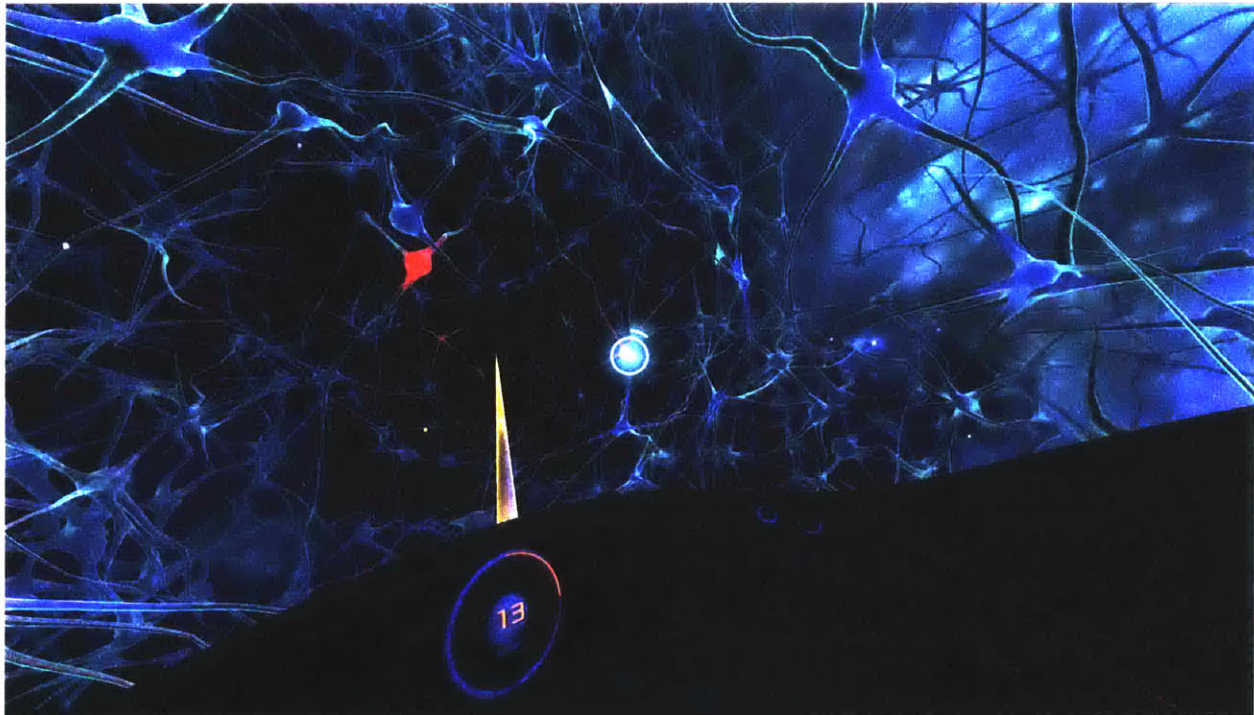


Figure 4: Screen capture from *In Mind* showing the cockpit area, the surrounding neuron models, and a target neuron. The yellow stripe is the rail guiding the vehicle the player is seated in.

The direction in which the user looks is instrumental for success in the game. By staring at a “red neuron”, a user is able to “fire” at it. Because the direction of the gaze is so important, peripheral and rear vision would interfere with the user’s success. Thus, *In Mind* places the player in a cockpit-type environment, which simplifies the challenges of the 360-degree set; the area behind the user, though visible, is always the same.

However, an unusual consequence arises because the user must gaze at a neuron model long enough for the vehicle to fire: the user’s eyes can actually move, as long as her

head remains still. For *In Mind*, this characteristic functions very instrumentally, as the user can peek about with her eyes for the next neuron to take aim at, while keeping her head still and directed towards the neuron currently under attack. Staring is the initial mode of looking, and as a user learns that she can peek and peer about while holding her head still, this faster and smaller motion becomes predominant.

In *Chair in a Room*, a user sits in a room decorated with various objects. When the light illuminating the room goes dark, the only door to the room is shut and the user can hear the sound of someone breathing. The user has a flashlight, but the light only charges when it is turned off. Because the light's movement is tied to head positioning, the user's look itself is "illuminating", as shown in Figure 5. This produces two effects: first, the area outside the range of the light is not simply off frame, but is also site of visual darkness and ominous potentiality (a sense that is increased by the suspicion that the breathing sound is coming from another presence in the room with the user).

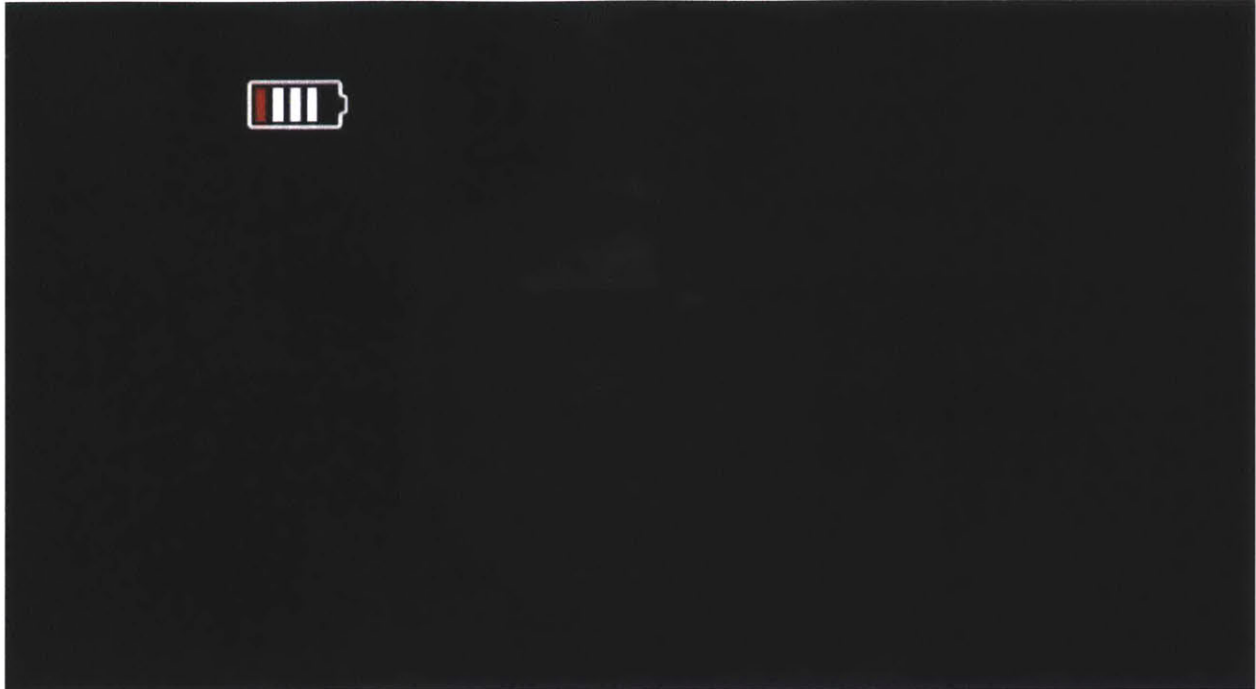


Figure 5: Screen capture from *Chair in a Room*, after the overhead light has been turned off.

The dark area spreads out to encompass the visual field of the user, and only the small point where the user focuses his attention is lit, which indicates the second effect: the point of attention is always obvious. While this detail does not have a great impact on the narrative interpretation of *Chair in a Room*, which is a brief demo, it is a generalizable phenomenon. It is possible, in a virtual reality environment, to remind a user at any moment of his own attention, and how he has been distributing it.

Machine to be Another is a unique case among the rest of these examples: it is generated using real-time video, with a performer and a participant.⁶² The performer wears a camera attached to a small motor that is synced to the head-position of the

⁶² In some cases, the performance is conducted using two people who are not performers. The *Be Another Lab* behind the piece refers to this as the “Gender Swap” when two participants of different gender participate.

participant, using information gathered from the Oculus Rift headset. A performance is pictured in Figure 6. Through a combination of this camera setup and a performer who mirrors the actions of the participant, the arrangement gives the effect that the participant “is” the performer. For the mirroring effect to successfully give the illusion of being in another person’s body, both participant and performer must move slowly. Each time the participant takes an action, the creators of the performance emphasize that the performer must consent to mirror the action.⁶³ The type of looking facilitated by this performance is heavily influenced by how visual perception interacts with apperception — which influences expectation — and proprioception, which influences the participants sense of their own body. Participants lean down to look carefully at their hands, and begin to move their appendages slowly, checking to ensure that the motion they are engaging in is actually taking place in the body part (belonging to the performer) that they see.⁶⁴

⁶³ The *Be Another Lab* emphasizes that this agreement to mirror the participant indicates the performer’s consent to engage in particular motions and contact with the participant. Thus, they argue that it is not the case that a participant is “controlling” the performer, rather that the performer is allowing the participant to explore their perspective. It is worth considering the dynamic of control in this type of work, especially when being able to stand in “someone else’s shoes” gives the user control over the actual or representational body of someone else.

⁶⁴ These observations have been drawn from performances at the Massachusetts Institute of Technology in 2014 and at the Tribeca Film Institute Interactive Conference in 2015, and personal experience this author had in using the system on both occasions.



Figure 6: An image from a performance of *Machine to be Another*, courtesy Be Another Lab. For the mirroring process to succeed, both performer and participant must move slowly.

Discrepancies — such as visible differences in skin, clothing, and surroundings, visual latency, and disconnects between felt texture and seen texture — occasionally rise to the surface and interfere with the illusion.

In the *Machine to be Another* performance, empathy is not an automatic effect. Rather, the limitations of visual techniques for forging empathy become apparent.⁶⁵ However, the relationship that develops between the participant and the performer as they move and explore leads to a sense of intimacy.

⁶⁵ In the *Machine to be Another* performance, a soundtrack relays a personal story from performer's history. This seems intended to provide "inner access" to the mind of the performer, but the technological novelty of the system tends to distract from this narrative. However, upon a second engagement with the system, I found that attending to the story is easier. Still, it does not accurately simulate the inner mental state of the performer. Instead, it provides access to an anecdote from that person's life. In the performance, my attention oscillated between listening to the anecdote and focusing on my movement.

Staged empathy provides an analytical framework to talk about this phenomenon, where the process of attempting inner simulation is affected by outside stimuli. The intimacy produced through this experience does not necessarily produce more accurate inner simulation, but it engages the participant in a process of intentional framing. When a user is invited to focus on his hands, they occupy an interstitial space between being the hands of the performer and being the user's own hands. The "success" of the illusion, or the access that a first-person point of view on the performer's body provides, does not directly improve the accuracy of inner simulation. However, it provides the conditions for a performed reflection on the part of the participant on what it is like to be the other person, and the small stutters in realism disrupt this process enough to remind the participant that the subject of his empathy is present and consenting to this exploration.

3.1.2 Camera Movement: Tracking and Cutting

This section refers specifically to the author's control over tracking and scene changing. As discussed in the previous section, in virtual reality the user's gaze itself can be a source of cuts in attention, which makes the user's attention and framing replace traditional cutting in film. However, both tracking and scene changing also affect and are affected by intentional looking.

Many current virtual reality experiences are composed of long, static takes with gradual transitions. For example, in the opening scene of *Black Mass*, the user first sees only bright dots of light in a black space that then become lamps and orient the viewer for when the rest of the image appears. This smooths the transition between darkness and the scene, giving the viewer visual cues for where bright light sources will be before they are able to make anything out. The next scene, and the next “cut” on the filmmaker’s part, occurs over twenty seconds later. David Bordwell notes that in contemporary Hollywood films the average shot length is in the range of five seconds.⁶⁶ The length of each scene in virtual reality work allows the user to gain her perceptual bearings. It is useful to compare this to traditional film because meaning is built up in different ways. In a linear, screen-based film, a viewer makes sense of what he sees over time. Images accrue sequentially, building meaning and context in order. In these virtual reality works, a user uses her own patterns of looking, her own intuition or expectation, to make sense of what she sees. This is informed by her expectations drawn from media and film, but she is responsible for the framing of her perception within the image space. Though each user participates in the same system, the experience of the space is not only nonlinear and individual, but is constructed through a combination of embodied habits (apperception) and the use of environmental cues. Cuts only occur in

⁶⁶ “The Way Measurement Tells It,” accessed May 4, 2015, <http://www.cinematics.lv/bordwell.php>.

three ways in the *Black Mass* trailer: the blur-in of the initial shot, a fade to black justified by flickering lights in a closed room— when the lights go off, the observer is thrown into complete darkness— and a fade to black justified by a sack that is placed over the observer’s head. *Zero Point*, which is an extended promotional video for the Oculus Rift system, does not use such contrivances, sticking rather to a slightly quicker fade-out to black and fade-in to the new scene. In both examples, the “cut” is not so much a manipulation of the camera angle as it is a theatrical shift in scene.

In *Assent*, progress in the narrative is associated with camera movement and sound. When it is time to move to the next stage of the narrative, the camera tracking is usually started when the user maintains a steady gaze on a particular object or area. In the staging area, a reproduction of artist Oscar Raby’s studio, the user can stare at a canvas hanging on the wall and spur the camera to track towards it. Thus, framing (staring at the painting) results in a tracking effect. In *Assent*, this tracking changes the orientation of the user’s virtual body; there is a disconnection between where the camera is able to go and where a body could possibly go. Although the viewer still feels aware of her body (engages in proprioception), the normal understanding of how much space she occupies and how she can stand in relation to objects is violated. I include this aspect under the umbrella of intentional looking because it is a type of looking enabled by a virtual environment that would not be possible outside of it. A 360-degree,

panoramic image space with a perspective that is not attainable in everyday space affords a new type of *examining* look, as the texture of the painting becomes magnified and palpable.⁶⁷ Although the viewer is still free to look around as they like, the amount of visual space occupied by nearby objects constrains the image space.

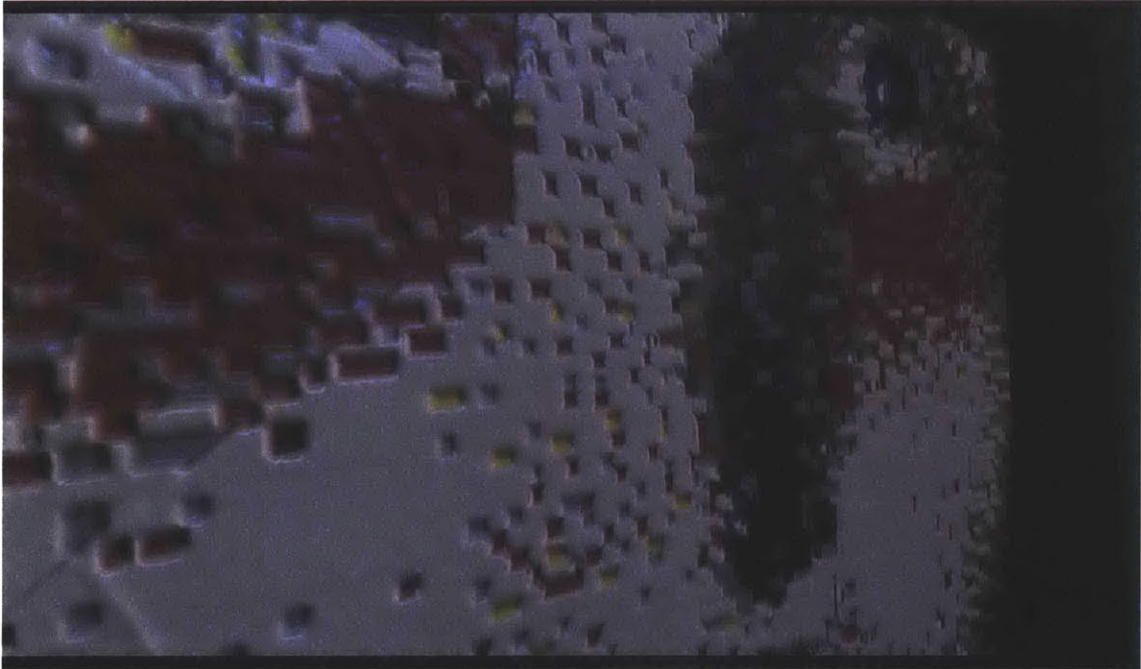


Figure 7: A still from *Assent*, depicting the point-of-view of the user after being drawn in close to the surface of a virtual painting.

Assent combines user-initiated camera movement with involuntary scene changes. *In Mind* moves the user along a rail, like a ride on a rollercoaster. *Black Mass* and *Zero Point* also do not give users control over scene changes or freedom to move around physically in a space aside from head movement. However, control over camera

⁶⁷ One technique for the analysis of virtual reality environments is to ask where the screen is located: although lenses in the headset provide a literal screen, they are held close to the eye and are difficult to perceive when the headset is functioning correctly. However, objects within a virtual environment have some capacities in common with traditional screens: they provide dynamic surfaces, subject to change, which the viewer can position herself towards in a variety of ways.

movement can be passed to the user. Both *The Enemy* and *Phantom* allow the user to move around a physical area by extending the length of the cord that connects the virtual reality apparatus to the computer. In both of these examples, motion-capture cameras aid in translating the actual movement of the user's body to the virtual environment. This ambulatory exploration was also present in *Osmose*, a piece made by Char Davies in 1995, although *Osmose* is unique because the scene moves *around* the user, using multiple image layers. Discussing her work, Davies explains the motivation for her visual choices:

When the immersant moves within the space, multiplicities of semi-transparent, three-dimensional forms as well as abstract foreground "flecks" combine to create perceptual ambiguity and slippages between figure and ground, near and far, inside and out. Compared to the all too familiar literal representational style commonly associated with three-dimensional computer graphics, this more evocative aesthetic intensifies the perceptual and cognitive process.⁶⁸

As Davies notes, the aim of her work is to spur contemplative reflection rather than active exploration.⁶⁹ *The Enemy* takes an opposite approach to spatial exploration, rendering the characters and environment realistically. The explorative element extends the attention of framing to include physical approach and retreat.

⁶⁸ Char Davies (1998). "Changing Space: Virtual Reality as an Arena of Embodied Being" accessed May 4, 2015, http://www.immersence.com/publications/char/1998-CD-Virtual_Dimension.html.

⁶⁹ Ibid.

3.2 Direct Address

Direct address describes the two-way process of a user both seeing and being seen, by individual characters within an experience and by the virtual environment itself. Direct address is a more specific way to discuss some of the phenomena encompassed under the term “immersion” or “presence”. In this section, direct address is broken into two categories: characters addressing users, and the environment responding to users. This functionality is in contrast to other mediums. The spectator of film cannot be *seen* by the film itself, only implied or anticipated; even in the case of a direct address in film, the entire audience is addressed and the comments are knowingly one-to-many. In interactive film and games, a player is able to affect the course of the narrative through her actions. However, this is a fundamentally different type of viewer than one who is *watched* in return, as she watches media. Both the virtually generated environment, which monitors head-tracking information to produce the correct image, and the first-person perspective the user experiences work together to place the viewer at the center of the inverted panopticon discussed in Chapter 2. Because the media is digital and can be computationally generated, rather than pre-rendered, the material depicted can change based on simply the direction or pattern of a viewer’s gaze. In this section, I discuss how this “returned gaze” of the system can occur on both the human

level — a character reacting to my presence — and an environmental level, where the space itself changes in response to the viewer's attention.

3.2.1 Characters Seeing Users

When characters address the user in virtual reality experience, the affordances of the system described by intentional looking, surrounding virtual space, and eye contact access a series of social norms and make the viewer aware of the direction of their own gaze and their behavior within the space.

In *The Enemy*, the reactive gaze of the virtual characters activates a sense of social norms and self-awareness in the user. Two characters occupy the virtual room with the user. On one side, Abu Khaled, and on the other, Gilad. Both characters are virtual constructions of real people, living in the midst of the ongoing Israel-Palestine conflict. When the user approaches a character, the character follows the user's presence with his eyes. Moving side to side causes the character to track the user's position back and forth. The user's head is at eye level with the characters. When the user approaches a character closely, the character recoils slightly. This body language mirrors the response that might be triggered in everyday interaction, if the user was to violate the sphere of socially acceptable personal space around another person's body. When the user moves to the opposite side of the room, to engage with the other character, the combination of peripheral vision and the knowledge that virtual space continues to exist

even out of sight combine to produce an uncomfortable sense of being watched. Moving to one side or the other feels like a choice, rather than impartial spectatorship.

In *Black Mass*, the viewer is addressed directly by characters and holds a central, though non-participatory role in the video. In *Assent*, the virtual character representing Oscar Raby addresses the viewer as “dad”. This first-person perspective is very common in digital games, but less so in film.⁷⁰ When specifically attending to *looking* (whether the looking is performed by a user or character), the technical attributes of the virtual reality display give rise to different affordances. The panoramic image space and the ability of the user to move his head and gaze around within it, makes it possible for a user to break the gaze of a character. A user can choose to engage actively, following instructions and attending to the character, or he can glance about and explore the space without responding to the character with his attention.

3.2.2 System Seeing Users

The direct address of characters to the user is familiar because a character is an easily recognizable entity. Yet in many virtual reality experiences, the character is only one aspect that is part of a larger system, which powers the entire image space: character and environment. If one thinks about the environment as stable, like a real environment, changes can be obvious, as when objects and characters who are present

⁷⁰ One notable exception to this pattern is Gaspar Noe’s film *Enter the Void* (2009), distributed by Wild Bunch.

move or change. However, the virtual image is *instruction* for an image. Merely looking does not only allow the viewer to see different parts of the image, it also instructs the system to construct different aspects of the image, in real-time.⁷¹ In this way, the system observes and records a viewer's gaze, and based on this summons particular images. This technically necessary interaction occurs even in "noninteractive" environments. Schröter writes about the notion of an "interactive transplane image", and *interactive* does not necessarily mean that a viewer selects options or takes action within the virtual world. Rather, interactive refers only to how the image itself is generated: in reaction to the viewer's gaze.

The [Head-Mounted Display] (HMD) connects the stereoscopic image with the 360-degree panorama. This connection is historically new. It becomes possible only because the image changed with the movement of the viewing subject's head. It is not an accident that in [Ivan] Sutherland's text on HMDs the word 'virtual' appears. The three-dimensional space that surrounds the viewer is a virtual one... The panorama is real, it continues to exist also 'behind the back' of the viewing subject. In the virtual environment, however, only the screen at which the viewer is looking at the moment is being displayed... The virtual environment is primarily only a mathematical description of a space.⁷²

In this way, the virtual environment is *not* consistent in the way that one expects a physical world to be. Glancing around, ascertaining the location of various objects and moving based on those observations is the normal way humans move through space.

The environment of virtual reality does two things differently: first, it leads a viewer to

⁷¹ I am referring to Jens Schröter's work on the digital transplane image.

⁷² Jens Schroeter, *3D: History, Theory, and Aesthetics of the Transplane Image.*, International Texts in Critical Media Aesthetics: V. 6 (New York: Bloomsbury Academic, 2014., 2014), 384.

believe that it has the same properties of consistency as an actual environment. This happens through the availability of peripheral vision and the sense that a viewer is able to glance over her shoulder. Second, the virtual environment does not need to make good on these beliefs. For example, in *Chair in a Room*, one of the techniques deployed is that the environment changes when the viewer is not looking. *Chair in a Room* takes advantage of the ability of the system to track the user's gaze to shift objects in the environment when the user is looking elsewhere.

In *Phantom*, artist Daniel Steegmann Mangrané has reconstructed a portion of the Mata Atlântica rainforest in southern Brazil. The reconstruction is made of transparent point cloud data, which gives the objects in the environment a sense of transparency. A viewer is placed into this environment, “where objects — trees, grass, dirt — react as the viewer approaches or touches them”. Mangrané references “perspectivism”, a theory where there are “no fixed subjects, only dynamic relationships.”⁷³ While the reactions of the objects in this environment are imperceptible, the proximity of the user increases the space between points in each object's point cloud, an effect that is augmented by stereoscopic depth. The portrayal of material as point maps reduces the integrity of individual objects, suggesting that all objects present are interrelated and formed from a common material. Though this is a

⁷³ Museum label for Daniel Steegmann Mangrané, *Phantom*, New York, New Museum of Art, 18 April 2015.

visual effect, rather than an objective photographic representation of the rainforest, the modified environment supports the type of empathy Mangrané desires. A viewer may explore the space at will, focusing on objects, but as attention draws closer, the object dissolves into points in space. In this interaction with the rainforest representation, the viewer is left not with a sense of an ideal natural environment that has been virtually preserved, but of a ghostly space of points that resolve and dissolve into discrete shapes based on the viewer's location and attention. A fixed photoreal (complete with textures and solid objects) representation of Mata Atlântica, would have provided a object for reference if the viewer were to practice feeling empathy for the environment. However, the dynamic point cloud provides a space for performative interaction, where the attention of the viewer is countered by the dissolution of specific objects. This produces a more complex empathizing process, based not on the ability of the viewer to appreciate the beauty of a natural environment, but on the viewer's engagement and attention with "nature" in the responsive virtual environment.

I propose that this virtual image construction made apparent in *Phantom* is an example of how *perception*, in addition to images, can be part of a revealed phantasm using Harrell's definition. The *image* of a rainforest carries connotations for many people of pristine nature, an idealized concept of the site that is susceptible to abstract narratives such as "the rainforest is threatened by development". By causing the image

to dissolve into points when examined closely, *Phantom* invokes and undermines perceptual expectations held by the user of “spectatorship”.

The inverted panopticon described in Chapter 2, where a viewer is at the center of an observing environment, describes a type of surveillance. Indeed, as user behavior is tracked in online browsing, so too is the gaze tracked in a virtual reality environment. As it is tracked, recorded, and used to produce new visual material, the gaze becomes an important site of interaction between a user and the virtual reality system. The process of perception and how the system responds to perception are more clearly creative activities in virtual reality, while in everyday life the combination of imagination and perception are often taken for granted. An analysis of the work in a staged empathy framework asks how the technical attributes of the system and the content of the experience produce particular affordances. Then, a staged empathy analysis uses the manner in which these affordances are accessed through intentional looking and direct address to examine how the system and user perform or attempt to perform empathy. Not all of the works explored in this chapter are directed towards empathic feeling, implicitly or explicitly. However, they provide examples of how formal techniques for constructing a virtual reality work can convey particular effects in the user, and these relationships are foundational for conducting an analysis of staged empathy.

This chapter argues for staged empathy as an analytical framework for understanding how empathy is performed in virtual reality work in a way that is sensitive to the specific affordances of virtual reality as well as the limits of empathic accuracy. An *affordance* is not simply an attribute or a capability; rather it provides specific conditions that, in combination with the desires (and apperceptive knowledge) of the designer and the viewer, create possible interactions.

Chapter 4

Assent: A Case Study

The following section contains a first-person, narrative account of my experience in a piece for the Oculus Rift by artist Oscar Raby. The piece is described in this fashion to emphasize that it is constructed for an observer who will be wearing a virtual reality headset, as well as to emphasize the ways in which my experience is subjective: dependent on my own expectations and patterns of perception. The (plural) first-person narrative is how Maurice Benayoun's textual documentation for *World Skin* is presented, and the first-person narratives of participants in Char Davies' *Osmose* provided the basis for a description of its effects. I am focusing on how *visual interaction* operates in this work, applying interaction poetics and a phenomenological description of experience. The use of the first person, descriptive language, and metaphor is employed because I am seeking to communicate how my experience oscillated between conceptual, directed consideration and immediate physical or visual perception. After this description of the piece, I will apply the tools for formal analysis I laid out in Chapter 2 to my experience of this work. Then, I will examine how these formal techniques function as part of the artist's argument about virtual reality being a medium in which to *practice*, rather than *enact*, empathy.

4.1 Description of *Assent*

My gaze illuminates a small circular area, focusing my glance at particular points as I cast my eyes about the dark room. A man's shape fades into visibility under my gaze. He begins to speak, addressing me as "dad", a fact which does not immediately register. When it does, I look down to see who I am "supposed" to be. There is nothing below my head, and I have the uncanny sensation that I am looking through my own chest. I return my gaze to the man in front of me, I recognize him as the artist, Oscar Raby. However, his visage and body are made strange and distorted, like photographs that have been hammered together and mapped over a virtual body like paper mache. His body is imperfectly rendered, its features slightly fused together as though it has been drawn from memory. My gaze is drawn to the sharp points where polygons in Raby's face overlap and intersect, juddering out from his form, and where the virtual material breaks into streaks and holes at the back of his head and beneath his chin.⁷⁴ He tells me to "look around", and that if I stare at things long enough, "something happens." When I look at a painting hanging on the wall of the shed, the light that marks my gaze begins to flicker a brighter blue. As I continue to look, I float forwards, almost into the surface of the painting. It becomes an abstract landscape.

⁷⁴ A "polygon" here refers to the basic unit of 3D modeling, where complex shapes are formed from a concatenation of simpler polygons. A simple, blocky model will have few polygons, a complex and realistic model will have thousands. There are other forms of modeling which do not rely on polygons, but the polygon model is generally a computationally efficient solution.

He asks me to stare at him, and I am now able to move in the same way towards Raby; I am brought uncomfortably close to his face. His features are recognizable but strange: his skin fuses with the texture of his shirt. He tells me that he has made something for me, a “rendering of that day in seventy-three”, when I saw an execution of prisoners. Behind him, portions of what had been an abstract painting hanging on the wall of this virtual room begin to fold out as strips of color into space. Over his shoulder, a computer screen is glowing on a desk. I am offered a choice, to *accept* or to *quit*. Rather than pressing with a cursor, I have to steadily watch the portion of the screen with the option I want. I hold my gaze on *accept*, and wait. My gaze and my perspective is drawn into the screen, just as I had been earlier to both the painting and Raby’s face, and the entire image-space fades to black.

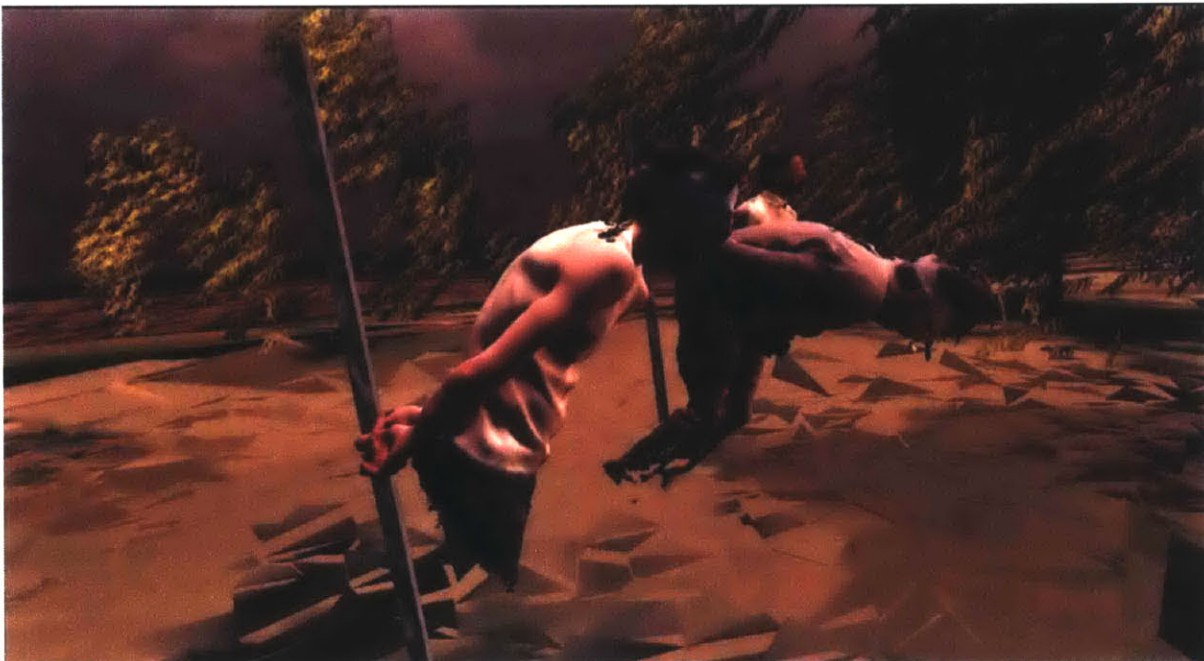


Figure 8: Screenshot from *Assent*

I am transported to a grey, desaturated desert. Raby is still nearby, his form still and his arm upraised, fingers dissolving into shards. I follow his reach up with my eyes, and gaze into the sun. It expands brilliantly to fill the entire image space with its glow, and when my eyes recover from the flare, the desert is saturated with color. Raby has turned his face down to watch me. He tells me that it is 1973, that he has modeled this space from photographs and descriptions. I look around, trying to survey the landscape, but his voice draws me back. He says that I have just been notified of a “court martial up the hill”, and that I did in fact go. He is interrupted by gunfire, which I hear from a direction to my right. I jerk my head towards the sound, but see only trees in the distance. He asks me not to go immediately, and this time to stay a bit longer before going to the hill. I am confused by what he means, “this time”, and unsure if there is a way that I can choose or not choose to go to the hill. He tells me to look “over there”, then disappears. In the distance, I look searchingly for him.

I see his form, and the small circle of light that illuminates the direction of my gaze begins to flash. Once more, I hold my glance on Raby’s shape, and I am drawn forward towards the grove of trees. Raby’s seated form blends with the flat triangles and quadrilaterals that are scattered across the face of the desert. He tells me about how the day depicted in this rendering unfolded from his perspective as a young boy, and the conversation is occasionally punctuated by more gunfire. Once more, Raby

disappears. I look for him again, and then I glimpse him, slightly obscured by trees, deeper into the oasis. I watch him. Again I am brought closer to him through the same mysterious acceleration that so far has been the only means of movement in this experience. Behind Raby, there is a wall obstructing my vision. He talks to me about painting, which reminds me that I am somehow supposed to be his father. He suggests that I get back into it— painting— and I begin to explore the area with my eyes while he speaks. More gunfire. The sky has slowly been darkening into an eggplant purple, a sign of either dusk or a gathering storm. He tells me to look at the sun through the leaves. I turn my gaze up into the sun, and hold it there.

When I turn my head down again, Raby has moved. He no longer faces me, but faces outward to a gathering of other bodies. I can see through his back, can see that the front of his hollow form is painted on empty space rather than a complete mesh. White noise begins to suffuse my hearing, Raby speaks urgently. He is cut off by gunfire again, this time before he can finish. Again I glance around. I strongly feel my inability to move and to seek him out. The bodies Raby faces are hidden behind the bough of a tree. I am moved towards them, this time without first holding them in my gaze. First, I see Raby, and then another Raby, both holding automatic weapons. Then I see figures crouched, kneeling, or sprawled on the ground. Their hands are bound, and blindfolds cover their eyes.



Figure 9: Screenshot from *Assent*

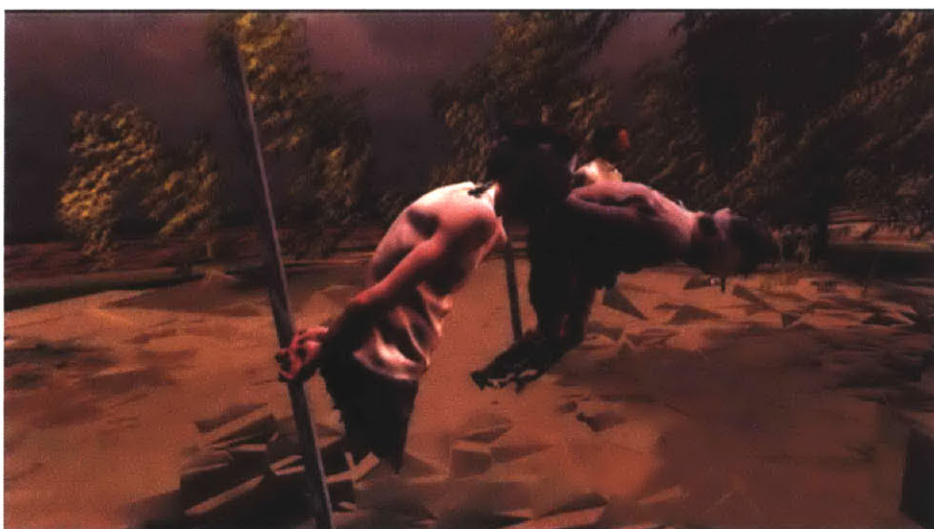


Figure 10: Screenshot from *Assent*

These figures are also Raby, posed in new positions and with different missing pieces and artifacts, but all in various states of prostration. The figures are monolithic, and it seems that I sink into the ground at their feet to look up at them before I rise upward. The piece ends, and fades to a black title screen.

4.2 Analysis of *Assent*

Assent is a rendering of a memory passed down from father to son of a mass execution in Chile in 1973. Oscar Raby's father was a witness to this event, a fact that has had ongoing ramifications in the family's life after the regime ended and the next government began to prosecute for crimes committed during the regime. The status of a "witness in uniform" is fraught: Raby's father was present to atrocities and yet unable to prevent them. The entire experience is composed of just two scenes: the first takes place in a reproduction of Raby's studio, the second in the desert landscape and grove of trees where the memory of the execution is rendered. My intention in including the subjective narrative of the experience above is to focus on the layer of interactivity posed simply by looking. Laurel, in *Computers as Theater*, argues that perception is not enough, that "sooner or later, something [plot] will have to *happen*." It is not my aim to disagree with her on this count; rather I believe that there is significant plot in Raby's rendering. However, it would be reductive to convey this in terms of actions, things that I am able to do to influence the environment or story, just as it would be reductive to convey it in terms of the actions taken by figures in the rendering (who are not animated). It would also not sufficiently describe the experience to reproduce the spoken narrative alongside still representations, although that is the limitation I am bound to here.

I am arguing that the specific combination of panoramic space, head-tracking, and stereoscopy produce a visual language that draws on our phenomenological knowledge of everyday experience, even as it does not reproduce it. In my analysis of *Assent*, I will examine how the intentional look and direct address are sites of both pattern and enactment. In the next section, I will discuss how this reading of *Assent* supports the artist's desire to make a rendering that allows for the *practice*, rather than *application*, of empathy.

The intentional look, as I defined it in the last chapter, encompasses techniques that influence how the observer visually perceives the media. This is a type of perceptual "editing" that corresponds to ideas from cinema about framing and cutting, but also borrows from an observer's natural apperception about bodies and space. Framing is conventionally understood in film as what is included, and how it is arranged in the rectangular field of the camera's vision, as well as how the camera moves and how this content changes over time. In screen-based digital games, the frame is still a limitation on vision, even as the player can often manipulate it. A crux of my argument is that looking, as in looking over one's shoulder, looking around an environment, casting one's gaze across near and far objects in a similar fashion to how one performs this activity in everyday life, is fundamentally different from the operation of a viewpoint camera through input. Access to peripheral vision, moreover, and the

ability to turn one's gaze behind oneself, implies an activation of this unseen space--making it not simply off-camera, but a site of potentiality. I will examine these characteristics through the techniques I have discussed previously in Chapter 2: namely, the intentional look and direct address, and how these ideas integrate with or expand Laurel's notions of pattern and enactment.

In *Assent*, when Raby is interrupted by gunfire, I immediately jerk my head around to find the source of the noise. As dusk falls, I do not look around to see where it begins, but instead gather that it is happening slowly, as it becomes more difficult to see in the lowered light. When his voice increases in speed and urgency, I am listening but I am also looking around, searching for the cause of his anxiety. These behaviors are perhaps loose interpretations of Laurel's *pattern*, after all, the sound of gunfire is not exactly "pleasurable", which is one of the requirements. But still, there is a pattern between how I react to these sounds with my body in the media environment and how I react outside of it. The pattern emerges in how I look around: sharp, startled glance for the gunfire, strained gaze under the fall of dusk, glimpsing Raby and the bodies of the victims through the tree boughs. The idea that a viewer brings her own ideas and experiences to bear on an artwork is a common expectation. However, the phenomenon of being able to frame the immersive artwork in a way that corresponds to my embodied apperception is more unusual. Rather than addressing me in primarily in the language

of signs and representation, this rendering seems to speak also to the sensory layer of information. These patterns emerge and are produced by my participation in the enactment.

When Raby urges me to look at the sun, I focus on and define a particular frame of attention. The limit of my attention is not defined by the frame itself, but is a defined entity that is flexible of scale – I am not looking at a screen, rather I am looking at the virtual sun. I can look at entities whose limits are defined by my own inclination and focus – a copse of trees, a single figure within the trees, the sky – and this is achieved through attention, rather than framing. Casey describes a characteristic rhythm in how we glance about ourselves, “we glance at tiny things that catch our momentary attention, a fugitive fleck or a sudden speck, but we also glance at colossal things: whole regions of landscape, the World Trade Center, the Montana sky.”⁷⁵ Rather than glancing *at* or *away* from a screen, as we do when surrounded by computers or phones or wall-mounted TVs in a bar, in a 360 headset the screen is the objects and spaces themselves. What happens when we consider the virtual floor to be a screen, as much as or more so than the lenses that deceive our eyes within the bulky device? And, in a head-tracking system, it is a screen which “sees” back, the screen which moves and

⁷⁵ Edward S. Casey in E. A. Grosz (ed.), *Becomings: Explorations in Time, Memory, and Futures*. Ithaca, NY: Cornell University Press. 79–97 (1999).

changes dynamically in response to shifts in the direction of a viewer's gaze or the position of her head. Casey writes:

When Merleau-Ponty asks why we should not think that the trees see us as much as we see them, he is appealing to a virtual response on their part: 'I *feel myself* looked at by the things'. What matters most is not the metaphysical status of this response-- that is, whether trees really do look at me-- but our own expectation that our glance will be returned, if not actually, then virtually.⁷⁶

In this way, a glance produces a loop between a looking subject, and the object of the glance. Inspired by philosopher Henri Bergson, Casey juxtaposes the glance as a "kaleidoscope" to cinema's "snapshots of reality". Casey writes that the kaleidoscope of perception is the movement, the activation that allows the cinematographic picture to form. Bergson holds that perception is a kaleidoscope that is formed from action and attention-- neither objective, illusory, or subjective-- perception is to the "images" of reality as a "part is to a whole".⁷⁷ Another way to understand perception is as a "transcript or reflection of objective reality", it has some connection to the "reality" it occurs within but is necessarily incomplete and biased towards aspects of interest to the perceiving subject.⁷⁸ In traditional film, the "image" is an image of the world of the film. In *Assent*, although there is an image-space, there is no image: rather, the kaleidoscope of perception and the modified sense of embodiment that a viewer has parallels the

⁷⁶ Ibid 90

⁷⁷ Guerlac, Suzanne. *Thinking in Time: An Introduction to Henri Bergson*. (Ithaca, NY: Cornell University Press, 2006) 114.

⁷⁸ Ibid 114.

“glancing” and situated form of engagement with the world through perception described by Bergson and Casey.

In *Assent*, the glance is both what informs me about the layout and contents of the space, as well as shows me what can be possibly done with it. In Gibson’s words, I perceive the *affordances* of the environment at a glance. But the virtual reality environment does not have the same affordances as a natural environment. In *Assent*, my apperception about the relationship between my glance and the environment is troubled. The glance, in this virtual reality experience, can be like a physical action. Casey writes that “The glance is the primary way in which we are watchful for the incipient future”, but in *Assent* the glance is also an action, which is registered by the system and governs my movement through the environment. Unlike traditional cinema, where a spectator is subject to the ordering of information in time determined by the filmmaker, space has renewed importance for suggesting what is possible in the “incipient future”. Raby notes that in *Assent*, he controls only the camera tracking, not the framing. In this way, the *choice* of where and how to look gains additional weight; it is not a passive information-gathering activity facilitating more instrumental interaction.

When Raby disappears from one place, reappearing in another, my expectations about movement and the behavior of objects is changed. In the virtual environment,

rules about the motion of bodies are different. But it also may be a way to experience a world in a way that allows me to learn how other individuals perceive their niche, to borrow Gibson's ecological term for a creature's relationship to its place-world. But just representing the world in an "objective" fashion, without modifications that bridge the difference in apperception between the observer and the subject whose experience it is intended to depict. In Raby's piece, the "embodied conceptual metaphor" of this argument is the ghostlike appearing and disappearance: Raby himself knows this moment only through his father's retelling. For his father, it is presumably an admixture of vivid details and irretrievable ones, as traumatic memories often are. The virtual space I inhabit exhibits the symptoms of something remembered and partially forgotten, the patterns of movement echo this as well.

When I flow towards the surface of a painting, or Raby's countenance, or a distant part of the landscape, the speed and smoothness of movement reminds me that it is not my body which is moving, but some vessel that contains my point-of-view. The latency of vision in *Assent* is hardly noticeable, but other aspects are more insistent about the difference between my physical body and where I feel myself to be in the virtual environment of *Assent*. In the neurological research conducted on mirror neurons, there is a loop drawn between image, vision, and the neurons that correspondingly fire within the brain.

The direct address refers to the strange combination of embodied presence and feeling as though one is at the focus of someone or something else's attention. In *Pixel Rift*, despite the cartoonish characters, the illusion of being watched, of making eye contact, was startlingly strong. In *The Enemy*, the faces are modeled photorealistically and then animated. In *Assent*, the way that Raby has pieced together his avatar using 3D scanning, allowing imperfections and glitches to remain in the finished piece, allows for some distance in this regard. Photogrammetry is the process of stitching together photographic information with depth information to produce a shape that has both volume and photographic texture. Raby has used the Microsoft Kinect to this effect, which produces a low-resolution 3D scan with texture information. The process is imperfect, but has a different quality than the smooth artificiality of a completely computer-rendered likeness. Unlike the reactive visage of the combatants in *The Enemy*, Raby's face is not animated, and does not respond to my gaze or lack thereof. When he speaks, my instinct is to look at him, but when I see that his face is frozen it is almost as though I have permission to glance freely away. He also addresses me directly: as his father. But when I am turned to examine the environment, and still hear his voice, I feel strongly that he is speaking to my turned head. I cannot decide whether Raby is a disembodied narrator or that he is present and observing me, and my distraction and wandering gaze is socially uncomfortable.

Raby is not the only entity in this virtual environment that seems to be watching for my gaze. When Raby instructs me to look into the sun, I do so. This movement is distinct from “clicking” a selection; it requires a different degree of physical attention and also changes the moment of choice from a decision to a span of time. Raby describes how he sees the affordance of *looking* in a virtual reality environment as different from the more familiar use of a mouse to control an interface.⁷⁹

I think that that presence that virtual reality is providing us is the presence of yourself. Not just sitting... but actually being there, with minimal interaction. Just moving your head. [If] you move your head a little bit, you know that the camera is actually moving with you. Which is different than having the mouse sitting on the table. You need to be purposeful when moving the mouse because you have to break that inertia of the mouse sitting on the table. Whereas with the head, you just breathe and the camera is already moving. A tiny bit.⁸⁰

Given the topic of the memory that *Assent* represents, this destabilization of “choices” from precise moments into ongoing action, which eventually becomes a choice after it has lasted long enough, seems apt. A viewer cannot change the progression of the experience, they can only affect the timing and what they focus their attention on. In

⁷⁹ A comment from the Oculus Rift “Best Practices Guide”: “Some first-person games apply a mild up-and-down movement to the camera to simulate the effects of walking. This can be effective to portray humanoid movement on a computer or television screen, but it can be a problem for many people in immersive head-mounted virtual reality. Every bob up and down is another bit of acceleration applied to the user’s view, which—as we already said above—can lead to discomfort. Do not use any head-bob or changes in orientation or position of the camera that were not initiated by the real-world motion of the user’s head.”

⁸⁰ “Oculus Trauma: Inside Oscar Raby’s ‘Assent.’” *The Creators Project*. Accessed April 23, 2015. <http://thecreatorsproject.vice.com/blog/oculus-trauma-inside-oscar-rabys-assent>.

many ways, this movement through space and attenuation of the moment of decision or choice is a kind of metaphor for the role of “witness in uniform”.

In the final scene of *Assent*, the camera begins drifting along the bodies of the victims, positioned uncomfortably close to their virtual bodies and moving inexorably slowly, unlike the other moments of tracking where the camera movement is swift and accelerates. Also unlike other moments in the experience, this time the movement is not triggered by a sustained gaze. The body of the viewer has certain properties: perhaps it is a machine, able to do “work”. In *Assent*, the body becomes something different.

Perhaps it is a camera, or an eye, or a memory: Unlike in linguistic metaphors, *Assent* does not offer specific words. However, the fundamental nature of what the “body” can do (in this virtual space at least) is changed. All one can do is watch-- choose what to watch, yes-- and perhaps have more responsibility for it. This can be read as one version of embodied conceptual metaphor for the Raby’s father’s status as a “witness in uniform”. Not forced to watch, or a spectator as in a movie, but a ghostly participant, troubled by the choice of what to see and perceive in a situation where the images will remain indelibly etched into memory.

It is not enough to show or reconstruct the exact conditions from the memory of Raby’s father. An environment that a user could explore and effect would have also had

a different emotional import. Instead, the observer participates in the enactment of helplessness, choosing to look away or towards the victims.

It doesn't have to be photorealistic, it doesn't have to resemble an external reality. It has to resemble an internal reality, something you comprehend from the inside. So if you're exposed to a puzzle, something that's a question to your intellect, when you discover the answer to that puzzle, that's the real dimension of it. You are here, answering that question. The question from the documentary perspective is: what would you do if you were in a situation? What would you do if you were asked to go to an execution? Would you answer, I would go and see the execution or I would stay and stare at the sun.⁸¹

In Raby's description of the viewer's experience within *Assent*, it is important to note that the viewer is not actually "playing" as Raby's father, though they are addressed by Raby as "dad". Rather, they are expected to make choices based on their own desires, and how they would themselves choose to distribute their attention in this situation. Rather than to understand Raby's father's experience, *Assent* provides an opportunity for the spectator to meditate on and consider what their own actions might be in this situation. How does this relate to the definition of empathy I have adapted from Karsten Steuber, where empathy is "Inner imitation for the purpose of gaining knowledge of another"? In *Assent*, the viewer is empathizing not with Raby's father, but with a fictional, constructed version of themselves, while aided by the visual immersion of virtual reality. This is why, though empathy has been critiqued as a closed

⁸¹ "Interview with Oscar Raby | MIT – Docubase." Accessed April 23, 2015. <http://docubase.mit.edu/lab/interviews/oscar-raby-interview/>.

epistemological loop that is delimited by the boundaries of the individual subject, it can nevertheless produce new forms of social feeling.

Raby has directly discussed how his work functions in relation to the concept of empathy, suggesting that rather than allowing direct access to the “other”, and having empathy directly, an observer is *practicing* empathy. In short, there is some difference between actual access to the experience of another, and simulated access. Raby sees his work as positioned to provide “practice” for this type of emotion, a concern that I argue is in line with a conception of empathy as a process-based phenomenon, rather than a quantitative one.⁸² In a published interview about *Assent*, Raby explains his perspective.

...[M]y version of empathy has to do with finding something in yourself, not putting yourself in someone else’s shoes. For me, empathy is always an abstraction, kind of a retroprojection. What I’m feeling right now by donning this mask is something making me feel open to what someone is telling me. I’m still myself, you never breach the gap to the other. That thing is triggering something in myself...with virtual reality, we’re depriving ourselves from contact with other people just to find in ourselves the exercise of empathy...Before going to the actual event, you prepare your body for the event, in the real place. You train for a soccer game in a soccer field. I think virtual reality has somehow that capacity– training us for that empathetic contact. It is not putting myself in someone else’s story, it is just putting myself in the mood to be open, to be accepting, to be tolerant.⁸³

⁸² By making this distinction, I intend to suggest that the *way* in which one engages in empathetic feeling is significant, and that whether empathy is “increased” or “decreased” is not a sufficiently descriptive metric.

⁸³ <http://docubase.mit.edu/lab/interviews/oscar-raby-interview/>

This is a different narrative of empathy than found in Chris Milk's TED talk description of how viewers respond to *Clouds over Sidra*, where the emotional response of the audience is read as being spurred by an elision of reality and simulation. Rather than figuring empathy as an automatic response to visual presence, Raby has created work that is aware that "you never breach the gap to the other". Rather, you experience an "abstraction" of the other person's experience. Virtual reality work opens up the possibility of making this abstraction meaningful through the use of direct address and intentional looking to reveal phantasms. Virtual reality has been developed throughout its military history with a significant emphasis on simulation that actually impacts reality, where any abstraction is intended to promote control over an environment. Seymour Papert, who applied Jean Piaget's theories to computer science education, dreamed of computational "microworlds", where users would learn in closed environments where each action had a logical and predictable outcome. In *Assent* this occurs differently.

Chapter 5

Conclusions and Future Directions

Virtual reality is garnering renewed excitement in a variety of industries, like gaming, film, media art, and communications. The technology for head-mounted virtual reality has been available to researchers, the military, and other specialized and expensive applications. However, dropping costs, conspicuous corporate investments and a confluence of related hardware and software developments— as well as publicity— have created the conditions for more widespread interest in virtual reality. As I have shown, virtual reality is not simply a technology for display that will be grafted onto existing media practices. It presents formal challenges and opportunities for visual and experiential design. Not all of these characteristics are novel: as shown by Oliver Grau, William Uricchio, Jens Schröter, and an array of other writers, stereoscopy, the “transplane image”, the panorama, and even the head-mounted virtual reality display that combines these elements have emerged periodically and been present in some capacity throughout history. It is not my aim to argue for a linear narrative of progress for this technology, but rather to use the opportunity of renewed interest to explore and bring together relevant research in this area that is specifically focused on the sensory, perceptual affordances of virtual reality. Furthermore, these challenges are intertwined

with the social construction of the observer. This thesis is focused on the concept of *empathy* as a connective idea between aesthetics, visual technologies, and social feeling.

Staged Empathy is an analytical framework that is able to describe how virtual reality work uses formal techniques such as *direct address* and *intentional looking* to externally enact and modify the inner imitation of empathy. These techniques connect the theoretical frameworks of *affordances* and *revealed phantasms* that relate visual perception and cultural concepts to the specific technical attributes of virtual reality.

In this thesis, *empathy* is defined in light of its historical origins as it an aesthetic and philosophical concept that came into usage at the same time as the notion of subjective vision and an increasingly scientifically described subject. Virtual reality is a technology that primarily impacts visual perception. As such, the assignation of virtual reality headsets as “empathy machines” by practitioners and journalists is an interesting trend. Despite changing definitions of empathy over time, particularly the diversification of the term through social psychology research, the immediate connection drawn between virtual reality – a technology of simulation– and empathy invokes the earlier definition of empathy (of inner imitation for the purpose of knowledge). I suggest in this thesis that the empathy provoked by virtual reality is fruitfully understood as *process-based* and *reflexive*, two traits which are drawn from empathy’s earlier existence as an aesthetic and psychological concept. I also address the limitation of this form of

empathy. It relied on an “objectively described” subject, as a means of standardizing and verifying the epistemic value of subjective perception. Contemporary descriptions of subjectivity understand that visual perception is influenced by lived experience, cultural worldview, and other idiosyncratic elements. Virtual reality work that maps virtual experiences onto an objective-as-possible representation of reality, but also seeks to evoke empathic responses, is subject to the same limitations in epistemic accuracy.

Staged empathy, however, proposes analyzing how virtual reality works use the affordances of virtual reality to *reveal phantasms*. The *affordances* of an environment are realized in a way that blends the distinction between subject and object: an affordance only exists relative to each subject. In Gibson’s original description of this, relativity to a subject could refer specifically to things like a subject’s height, physical traits, knowledge, or any variety of attributes that would affect what the subject can possibly do in or with a particular environment. A virtual reality environment adapts this theoretical framework in several ways: the subject brings his own perceptual habits and abilities to bear on the environment, and the environment is able to sense and change dynamically based on these traits. The technical attributes of the virtual reality head-mounted display (stereoscopy, 360-degree image space, head-tracking, and an opaque headset) contribute to a hybrid embodiment of the subject where natural

patterns of perception are moved into a virtual space. In this thesis, I describe several potential ways for identifying how affordances are implemented in virtual reality design.

Intentional looking refers to the way that virtual reality provides new challenges to visual composition. The 360-degree image space combined with head-tracking means that the viewer is typically responsible for framing their visual experience, and also that the visual experience includes peripheral vision and an “out of sight” area that is still potentially active, where events are still possibly occurring even out of view.

Stereoscopy produces an image space that gives the illusion of spatial depth, making abrupt cuts disorienting and emphasizing the “staging” of a scene spatially over a linear progression of frames. In virtual reality, a broad range of types of visual attention are possible, which is in contrast to the “watching” mode found commonly in film or even watching combined with instrumental objectives found in interactive media like games. By drawing on Edward Casey’s work on the phenomenology of the “glance”, I suggest that natural patterns of looking which include varied forms of attention – staring, glimpsing, peeking, scrutinizing, contemplating – embed patterns of perception with learned expectations. Looking thus has added valence in virtual reality, a phenomenon that can factor into the design of an experience. For example, the intentional look can also play into movement between scenes and interaction with the piece itself.

The movement of a viewer through a virtual reality environment can be controlled normally, through a keyboard and mouse or other peripheral interface, but it can also be controlled by the artist or by the user's gaze. An event that is triggered by a sustained gaze is different from a moment of decision signified by a click or a tap, and suggests that attention as much as interaction can influence an experience. Both of these components imbue the manner and object of the user's attention with added significance, hence the heading of *intentional looking*. This aspect is accompanied by attention that is directed back from the virtual reality system onto the user herself.

Direct address refers to this reflexive attention. It is equally facilitated by technological necessity (the virtual reality system must "know" the position of the viewer's head in order to produce the correct image) as well as the first-person placement of the viewer's perspective. It is found at the *character* level, where characters see, respond to, and address a user as well as at the *environmental* level. In *The Enemy* and *Assent*, virtual characters address the user and evoke a range of social norms and expectations. Attention becomes not only a factor of the user's interest, but also signifies social interest or disinterest, looking or moving away becomes akin to turning one's back on another. A host of technical attributes contribute to this; the head-tracking means that it is possible for a character to sense the direction of a viewer's gaze, the 360-degree image space means that it is always possible to turn away,

the complete visual occlusion of non-virtual space separates the user visually from their physical body while still maintaining proprioceptive expectations about physical presence. In *Chair in a Room*, the environment changes when the user's attention is elsewhere, one example of the virtual environment "seeing" the user and responding accordingly.

Staged empathy examines how these techniques are implemented to reveal phantasms. Revealed phantasms, as Harrell notes, can expose a worldview or cultural assumption as subjective. In this fashion, staged empathy uses two elements of empathizing (process and reflexivity) to address the major shortcoming of empathic feeling: that it relies on the accuracy of subjective experience. Revealed phantasms may not give more accurate information about the experience of the other, but they can show innate assumptions and misconceptions held by the empathizing subject.

Ultimately, this may be the limit of empathy, as well as virtual reality experiences that seek to reproduce exactly the inner experience of another. A technology founded on simulation and a subset of social feeling occupied with the inner self may not be able to provide the type of genuine access and knowledge facilitated by communication and ongoing interaction with another subject. However, it is an interesting space to explore one's own assumptions and expectations about the lived experience of another, and perhaps to use the sensitivity of virtual reality work to modes of looking to question the

traditional expectations about the border between self and environment or subject and object. Ecological philosopher Timothy Morton asks:

One may pose differently the question of the distinction between person and environment: what if people were more like environments? In other words, perhaps one might deconstruct personhood into ambience, atmosphere, surroundings, dwelling, environment.⁸⁴

While virtual reality does not change material reality, it may, as Oscar Raby notes, offer opportunities for practice or experimentation with certain kinds of emotion. It would be an interesting avenue of research to explore how *environments* might serve as metaphors for personhood.

I want to discuss the implications of head-tracking and environmental responsiveness more generally. It also offers the opportunity to create work that asks users to reflect on how they look and what they choose to look at, as well as creating environments which support and reward changes in attention patterns. Although current work does not exhaustively explore this area, there are many moments where virtual reality does provide a situation where the viewer's look and attention becomes activated. This phenomenon suggests that virtual reality work has a unique capability to reveal looking and perception as active, rather than passive, forms of interaction.

⁸⁴ Timothy Morton, "'Twinkle, Twinkle, Little Star' as an Ambient Poem; a Study of a Dialectical Image; with Some Remarks on Coleridge and Wordsworth," 2001.

I would also like to address the question of opacity and illusion space. As discussed earlier, current popular headsets like the Oculus Rift, Google Cardboard, and the Gear virtual reality are completely opaque, and thus create a completely illusory image space. Virtual reality in its current incarnation, where the headset blocks out the surrounding world and creates a hermetically sealed environment, may not be a long-lived model. Although it provides interesting circumstances for attention and absorption, it makes some things— like eye contact with another user— more difficult. Technologies that use retinal projection, such as the as-yet undemonstrated Magic Leap, lighter-weight data glasses that have some degree of transparency, and even Ivan Sutherland’s Sword of Damocles all fall into what is referred to as of the writing of this thesis as “augmented reality” or occasionally “mixed reality”.⁸⁵ Augmented reality (AR) is a virtual overlay on actual space, rather than the completely constructed model required by current virtual reality. However, while this added transparency has a host of implications for how computer-generated images might be integrated into everyday activities, whether or not “AR” will replace “virtual reality” is the wrong question to ask. As William Uricchio argues, virtual reality is “the latest technological effort to achieve a set of expectations well in place since the late 19th century, developments incrementally

⁸⁵ Rachel Metz, “Magic Leap and HoloLens Demos Show Augmented Reality Challenges,” *MIT Technology Review*, March 20, 2015, <http://www.technologyreview.com/news/535806/reality-check-comparing-hololens-and-magic-leap/>.

realized (or at least claimed) at various moments from that time until the present.”⁸⁶ It seems more pressing, especially within the vein of this thesis, to investigate what transparency or selective transparency could add to the narrative space, which will continue to occasionally demand full opacity.

Finally, it is also worth revisiting the notion that *empathy* is not an innate characteristic of humankind. It is a word, which we define to mean different things in different contexts, from the art gallery to the neuroscience lab. It is also selected for use from a wealth of other available words, like sympathy or altruism, because it has been imbued with a particular connotation and has been part of a particular history. My purpose in examining how *Assent* presents empathy is not to provide a definitive definition of empathy in virtual reality, or to argue that empathy is the only form of social feeling that is relevant to virtual reality. Rather, I discussed how empathy was employed in *Assent* because it provided an example of how the limits of empathy as a concept can be used to support some elements of the work. Empathy is an oft-heard term, drawn on casually to point towards any aspect of a work intended to speak to social feeling. In this thesis, I have aimed to provide reasonable evidence that *empathy* is not always what is intended in these works, and to caution against the careless use of the term. However, the affinity between virtual *simulation* and inner imitation is not misguided; as I show by deploying the staged empathy framework, valuable techniques

⁸⁶ Uricchio, *Technologies of Time*.

for self-examination exist that can shift embedded worldviews through calling attention to perception *itself* in addition to images and narrative.

Bibliography

- Bachelard, Gaston. *The Poetics of Space*. Translated by Maria Jolas. Reprint edition. Boston: Beacon Press, 1994.
- Blair, Rhonda. "Cognitive Neuroscience and Acting: Imagination, Conceptual Blending, and Empathy." *TDR/The Drama Review* 53, no. 4 (November 1, 2009): 93–103.
- Bogost, Ian. *Persuasive Games: The Expressive Power of Videogames*. Cambridge, Mass.: MIT Press, 2007.
- Bordwell, David. *Poetics of Cinema*. New York: Routledge, c2008., 2008.
- Burdett, Carolyn. "Is Empathy the End of Sentimentality?" *Journal of Victorian Culture (Routledge)* 16, no. 2 (August 2011): 259–74.
doi:10.1080/13555502.2011.589684.
- "Can Virtual Reality Make Us More Empathetic?" *Kill Screen*. Accessed May 5, 2015. <http://killscreendaily.com/articles/can-virtual-reality-make-us-more-empathetic/>.
- "Can Virtual Reality Make You a Better Person?" *BBC Future*. Accessed May 6, 2015. <http://www.bbc.com/future/story/20141001-the-goggles-that-make-you-nicer>.
- Casey, Edward S. *The World at a Glance*. Studies in Continental Thought. Bloomington: Indiana University Press, 2007.
- "Char Davies (1998). Changing Space: Virtual Reality as an Arena of Embodied Being." Accessed May 4, 2015.
http://www.immersence.com/publications/char/1998-CD-Virtual_Dimension.html.
- Clair, Jean. "Opticeries." *October*, Vol 5. (1978). 101-112.
- Constine, Josh. "Virtual Reality, The Empathy Machine." *TechCrunch*. Accessed April 26, 2015. <http://social.techcrunch.com/2015/02/01/what-it-feels-like/>.

- Crary, Jonathan. *Techniques of the Observer: On Vision and Modernity in the Nineteenth Century*. Cambridge, Mass.: MIT Press, 1990.
- Bordwell, David. "The Way Measurement Tells It" Accessed May 4, 2015. <http://www.cinemetrics.lv/bordwell.php>.
- Delahoussaye, James. "Virtual Games Try To Generate Real Empathy For Faraway Conflict." *NPR.org*. Accessed May 6, 2015. <http://www.npr.org/blogs/alltechconsidered/2015/01/25/379417927/virtual-games-try-to-generate-real-empathy-for-faraway-conflict>.
- "Digital Empathy: How 'Hunger in Los Angeles' Broke My Heart in a Virtual World | The Verge." Accessed April 23, 2015. <http://www.theverge.com/2013/6/14/4431308/digital-empathy-how-hunger-in-los-angeles-broke-my-heart-virtual-reality>.
- Di Pellegrino, G, L Fadiga, L Fogassi, V Gallese, and G Rizzolatti. "Understanding Motor Events: A Neurophysiological Study." *Experimental Brain Research* 91, no. 1 (1992): 176–80.
- "Farocki: A Frame for the No Longer Visible: Thomas Elsaesser in Conversation with Alexander Alberro | E-Flux." Accessed April 28, 2015, <http://www.e-flux.com/journal/farocki-a-frame-for-the-no-longer-visible-thomas-elsaesser-in-conversation-with-alexander-alberro/>.
- Gibson, James J. *The Ecological Approach To Visual Perception*. 1 edition. New York: Psychology Press, 1986.
- Grau, Oliver. *Virtual Art: From Illusion to Immersion*. Leonardo. Cambridge, Mass.: MIT Press, 2003.
- Guerlac, Suzanne. *Thinking in Time: An Introduction to Henri Bergson*. Ithaca, NY: Cornell University Press, 2006.
- Gumbrecht, Hans Ulrich. "On Presence: Presence Achieved in Language (With Special Attention Given to the Presence of the Past)." *History & Theory* 45, no. 3 (October 2006): 317–27.

- Gunning, Tom. "To Scan a Ghost: The Ontology of Mediated Vision." *Grey Room*, no. 26 (2007): 94–127.
- Hacking, I. *Historical Ontology*. Historical Ontology. Harvard University Press, 2002.
- Harrell, D. Fox. *Phantasmal Media: An Approach to Imagination, Computation, and Expression*. Cambridge, Massachusetts: The MIT Press, 2013.
- Hickok, Gregory. "Eight Problems for the Mirror Neuron Theory of Action Understanding in Monkeys and Humans." *Journal of Cognitive Neuroscience* 21, no. 7 (2009): 1229–43.
- Hills, Jason. "Limited Horizons: The Habitual Basis of the Imagination." *Transactions of the Charles S. Peirce Society*, no. 1 (2012): 71.
- How Virtual Reality Can Create the Ultimate Empathy Machine*. Accessed April 23, 2015.
http://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine.
- "Interview with Oscar Raby | MIT – Docubase." Accessed April 23, 2015.
<http://docubase.mit.edu/lab/interviews/oscar-raby-interview/>.
- Kelly, Samantha Murphy. "360-View Oculus Rift Film Gets Groundbreaking Interactive Trailer." *Mashable*, February 19, 2014.
<http://mashable.com/2014/02/19/oculus-rift-documentary/>.
- Koss, Juliet. "On the Limits of Empathy." *The Art Bulletin* 88, no. 1 (March 1, 2006): 139–57.
- Lakoff, George, and Mark Johnson. *Metaphors We Live By*. Chicago: University of Chicago Press, 1980. 1980.
- Lanzoni, Susan. "Practicing Psychology in the Art Gallery: Vernon Lee's Aesthetics of Empathy." *Journal of the History of the Behavioral Sciences* 45, no. 4 (2009): 330–54.

- Laurel, Brenda. *Computers as Theatre*. Reading, Massachusetts.: Addison-Wesley Pub., c1991., 1991.
- Maister, Lara, Mel Slater, Maria V. Sanchez-Vives, and Manos Tsakiris. "Opinion: Changing Bodies Changes Minds: Owning Another Body Affects Social Cognition." *Trends in Cognitive Sciences* 19 (January 1, 2015): 6–12.
- Metz, Rachel. "Magic Leap and HoloLens Demos Show Augmented Reality Challenges." *MIT Technology Review*, March 20, 2015.
<http://www.technologyreview.com/news/535806/reality-check-comparing-hololens-and-magic-leap/>.
- Merleau-Ponty, Maurice. *Phenomenology of Perception*. International Library of Philosophy and Scientific Method. New York, Humanities Press, 1962.
- Morton, Timothy. "' Twinkle, Twinkle, Little Star' as an Ambient Poem; a Study of a Dialectical Image; with Some Remarks on Coleridge and Wordsworth," 2001.
- Noë, Alva. *Varieties of Presence / Alva Noë*. Cambridge, Mass.: Harvard University Press, 2012., 2012.
- "Oculus Rift: Mark Zuckerberg Targets 50m-100m Headset Sales in 10 Years | The Guardian." Accessed April 24, 2015.
www.theguardian.com/technology/2014/oct/29/facebook-mark-zuckerberg-oculus-virtual-reality-sales.
- "Oculus Rift PC SDK, Samsung Gear VR Mobile SDK, Docs, Integrations | Oculus Developer Center." Accessed May 7, 2015.
<https://developer.oculus.com/documentation/>.
- "Oculus Story Studio." Accessed March 12, 2015.
<https://www.oculus.com/storystudio/>.
- "Oculus Trauma: Inside Oscar Raby's 'Assent.'" *The Creators Project*. Accessed April 23, 2015. <http://thecreatorsproject.vice.com/blog/oculus-trauma-inside-oscar-rabys-assent>.

- Pitts-Taylor, Victoria. "I Feel Your Pain: Embodied Knowledges and Situated Neurons." *Hypatia* 28, no. 4 (November 2013): 852–69.
- Schroeter, Jens, Brigitte Pichon, and Dorian Rudnytsky. *3D: History, Theory, and Aesthetics of the Transplane Image*. International Texts in Critical Media Aesthetics: V. 6. New York: Bloomsbury Academic, 2014., 2014.
- "SensoMotoric Instruments GmbH > Gaze and Eye Tracking Systems > Products > SMI and WorldViz." Accessed April 27, 2015.
<http://www.smivision.com/en/gaze-and-eye-tracking-systems/products/smi-and-worldviz.html>.
- Smith, Merritt Roe, and Leo Marx, eds. *Does Technology Drive History? The Dilemma of Technological Determinism*. Cambridge, Mass: The MIT Press, 1994.
- Stueber, Karsten R. *Rediscovering Empathy: Agency, Folk Psychology, and the Human Sciences*. Cambridge, Mass.: MIT Press, c2006., 2006.
- Swanson, Gillian. "'The Tender Instinct is the Hope of the World': Human Feeling and Social Change Before Empathy." *New Formations*, no. 79 (November 2013): 126–48.
- "The Oculus Rift Makes Elite: Dangerous Amazing—and Impossible to Describe | Ars Technica." Accessed April 23, 2015.
<http://arstechnica.com/gaming/2014/11/the-oculus-rift-makes-elite-dangerous-amazing-and-impossible-to-describe/>.
- "Tout-Fait: The Marcel Duchamp Studies Online Journal." Accessed April 23, 2015.
http://www.toutfait.com/issues/issue_3/Articles/Hoy/etantdon_en.html.
- Uricchio, William. "A 'proper Point of View': The Panorama and Some of Its Early Media Iterations." *Early Popular Visual Culture* 9, no. 3 (2011): 225–38.
- "Virtual Reality Isn't Just a Gaming Gimmick, It Could Improve Empathy Levels and Even Reduce Racial Bias." *The Independent*. Accessed May 5, 2015.
<http://www.independent.co.uk/voices/comment/virtual-reality-isnt-just-a->

gaming-gimmick-it-could-improve-empathy-levels-and-even-reduce-racial-bias-9043832.html

“Virtual Reality Made Me Believe I Was Someone Else.” *The Verge*. Accessed October 3, 2014. <http://www.theverge.com/2014/3/24/5526694/virtual-reality-made-me-believe-i-was-someone-else>.

“Zuckerberg: Why Facebook Bought Oculus - Business Insider.” Accessed April 24, 2015. <http://www.businessinsider.com/zuckerberg-why-facebook-bought-oculus-2014-3>.