LET'S MAKE A CONNECTION: UNDERSTANDING HOW PHYSICALLY

INTERACTIVE TECHNOLOGY IS TAKING THE VIRTUAL TO THE PHYSICAL

by

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A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Arts in Communication

Boise State University

August 2012

BOISE STATE UNIVERSITY GRADUATE COLLEGE

## DEFENSE COMMITTEE AND FINAL READING APPROVALS

of the thesis submitted by

Lacey Vander Boegh

Thesis Title:  Let's Make a Connection: Understanding How Physically Interactive Technology Is Taking the Virtual to the Physical

Date of Final Oral Examination:  07 June 2012

The following individuals read and discussed the thesis submitted by student Lacey Vander Boegh, and they evaluated her presentation and response to questions during the final oral examination.  They found that the student passed the final oral examination.

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DEDICATION

This is in dedication to my family and friends who have helped me through this graduate process. I could not have done it without you. I am so lucky to have each one of you in my life in order to succeed in a graduate program. Thank you.

## ACKNOWLEDGEMENTS

Acknowledgements go to my committee. Thank you to Dr. McClellan, Dr. Reeder, and Dr. Moore.

AUTOBIOGRAPHICAL SKETCH OF AUTHOR

Lacey Vander Boegh recognizes the importance of education and scholarship within the field of communication. She earned her Bachelor of Arts in Communication in 2010, and is currently interning to obtain her certificate in Dispute Resolution while finishing this master's thesis. Throughout her academic career, she has earned many honors such as Miss Idaho International 2010, where she travels the United States promoting her platform of resistance to peer pressure. Her motivational speech helped inspire and encourage adolescents to hold strong to their identity. She was also Boise State's Emerging Student Leader 2007, and a Teacher's Assistant in 2008 and 2011. With the success of appropriate and professional communication, she served as an ambassador for Idaho at the Japanese Ambassador's residence, as well as the Ukraine, Thailand, and Swedish Embassies during the Cherry Blossom Festival in 2009. Her love for instilling valuable communication tools enabled her to co-found and lead Major Precision, LLC, where high school and college students are trained in leadership and communication skills. Vander Boegh's desire for effective communication, passion for teaching, guidance to others, and support in people's abilities make her a motivating and inspirational speaker, writer, and student.

ABSTRACT

This study offers initial research on Physically Interactive Technology (PIT). Findings of this research reveal how people made sense of PIT, how the ways people understand PIT reveal presence due to physical interaction, and how PIT challenges the definition of online interaction. Current and past literature on social presence theory and social cues theory provide a rationale for how "present" a person can be during online interaction via Computer-Mediated Communication (CMC). Current research states CMC is used in many contexts because of the beneficial ways it allows individuals to feel face to face. However, within this literature, scholars tend to treat CMC as the *transmission* of messages in a virtual space. PIT, however, extends the ways we think about CMC because it focuses on physical *interaction* and participation within reality. To explore the ways participants react to and understand the novel ability to physically interact via CMC, I engaged in twenty-one semi-structured qualitative interviews and participant observation of individuals' use of PIT. By analyzing the data using principles of grounded theory, I found three key findings. First, participants made sense of PIT as "cool" by means of its ability to control objects within a real environmental, resulting in personal connections. Second, there were generational differences in technical use and understanding of PIT. Lastly, women and men made sense of PIT differently in terms of possible applications. Overall, participants seemed to reflect a heightened sense of social presence because PIT provided an ability to recognize context cues, and physically engage in another environment, allowing an interaction more similar to face to face.

These findings imply that PIT is breaching a new boundary of online interaction and changing CMC into active interaction instead of a transmission of messages.

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CHAPTER ONE

**Making Sense of Technology**

Have you ever sat in front of a computer typing remarks to another person, trying to elicit some sort of emotional response?  Then when a reply appeared in the chat box you laughed, smiled, and wrote back?  Or, have you ever video-messaged another person?  During that interaction, did you tilt your head to the side, lean in towards the screen, and speak as if the two of you were in the same room?  These types of scenarios happen on a daily basis.  But what happens when a person "reaches" through the computer and physically interacts with another environment using robotic devices?  I argue, when a person is able to "reach" through their computer and physically interact with another environment using robotics they have a heightened sense of presence, and become a participant in interaction.  Here I will argue that the definition of online interaction needs to change to actually include *interaction* instead of a transmission of messages.

The past few decades have been marked by an increase in social interaction online.  For instance, people are increasingly using instant messaging, texting, and video-chatting as ways to stay in touch, engage in business, attend classes, and maintain relationships.  These interactions have been limited in terms of presence, which is the degree of awareness or representation with another during communication via a mediated device, trying to achieve an interaction close to face to face (Short, Williams, & Christie,

1976).  This is due to partial interaction elements, such as audio and visual aspects.

These are the typical elements when communicating online.  As a result, people have few

options to obtain face to face interaction because the online interaction elements are

limited.  Even so, people still engage online and find ways to communicate their presence

and non-verbals.  For many, presence and non-verbals online are normal when seeing

acronyms such as "LOL" and "OMG" or emoticons such as ":-)" and ":-(".  In fact, with

advances in computer-mediated communication (CMC) technology, research has

recognized an increase in users' perceived presence.  However, it is argued that face-to-

face interaction offers the highest degree of presence due to the ability to pick up on

social cues (Short et al. 1976).

Recently, a new form of technology, Physically Interactive Technology (PIT), has

incorporated another element into online interaction, this aspect is physicality.  PIT is a

recent technological development, allowing individuals to physically control objects via

the Internet in real time.  With this technology people can log on to the Internet and move

robots.  For example, a person can move a robotic cat toy via the Internet.  The cat toy is

attached to a control box operating the command signals coming from the online user.

Specifically, animal welfare organizations have implemented PIT, enabling people to

control the movement of a camera and cat toys by pressing buttons on computer

keyboards.  As of now, PIT is limited to the context of interaction with animals at

humane societies.  Even so, this type of technology has the potential to change the way

people perceive their presence online, as well as challenge the way people define online

interaction.  Currently, online interaction allows transmission of messages in a virtual

space.  But PIT offers interaction within reality in real time and the ability to physically

interact with another.  Thus, I claim PIT has transformed technology into active participation.  In order to better understand this, my study explores the ways people make sense of PIT.  I define "making sense" as the way people understand and attribute meanings to something (Collins, 1987; Dervin, 1992), in this case how people use and understand PIT and how those meanings relate to social presence and cues theories.

In order to support my claim, I will, in the next chapter, provide a framework for this study by reviewing literature on social presence theory and social context cues theory.  I will also provide a review of the literature explaining how and why people use CMC technologies.  In Chapter Three, I will review the development of PIT, describe its current use in animal shelters, offer my research questions for this study, and explain how my research might add to current scholarly conversations about technology and CMC.  In Chapter Four, I will review the qualitative methods used for this study and explain how I engaged in interviews and observations with participants to interpret the emergent meanings of PIT.  In Chapter Five, I will present my findings.  I will then conclude this study in Chapter Six by discussing some potential implications of this study, reviewing some of the possible limitations of my approach, and suggesting opportunities for further research in the area of  PIT.

CHAPTER TWO

**CMC and Presence**

Previous studies of CMC have provided insight into how people interact online. Social presence (Short et al. 1976) and social context cues (Sproull & Kiesler, 1986) theories explain qualities of CMC that individuals are drawn to. Combined, these theories state people are more present when the technology has advanced forms of interaction, such as audio and visual aspects, because they are able to recognize context cues. In this section I will explain how information technology (IT) turned into CMC, the many contexts CMC is used in, and how all of these interactions are a transmission of messages in a virtual space. After reviewing this literature, I will explain social presence and social context cues theories. In essence, literature consistently treats CMC as a passing of communication. Social presence and context cues theory help explain the reasons people use CMC, because it helps individuals to perceive presence with another person. However, presence is limited because CMC does not offer actual interaction. Thus, CMC is not an *interaction* online.

<u>An Introduction of IT and CMC</u>

Before CMC, interaction online was first known as Information Technology (IT). IT is a form of technology known as the potential for improving everyday performance (Curley, 1984; Edleman, 1981; Sharda, Barr, & McDonnell, 1988) by using microchips and the Internet. Currently, we use IT when we communicate via a computer, known as

computer-mediated communication (CMC). IT has transformed during the last fifty years (Rust & Oliver, 1994; Hill & Morgan, 2011) before being commonly used for CMC. Hill and Stephens (2005) suggest that media multi-tasking has increased dramatically, people use media technologies continually, and it has become a part of everyday life. Ransford (2005) demonstrates this evidence by recording that the typical American home consists of over twenty-six media devices and that the average U.S. consumer spends more time interacting with these media devices than any other activity. Media, in this context of IT, includes televisions, radios, computers, the Internet, cell phones, social media, video-chatting and conferencing, texting, and many others. Researchers suggests that IT makes it easier for people to gather information for decision making and collaboration (Katz & Rice, 2002; Ramirez & Burgoon, 2004), as well as improving the way in which humans communicate since it is quicker, reaches a large population, and allows diverse conversation (Garicano, 2000; Palakeel, 2011).

According to Spiro (2006) it is through the use of electronic media that people have modified their modes of thinking and learning. As a result, IT has made it possible for new forms of electronic media to serve as an extension of human beings (McLuhan, 1964). For example, a mother can call her son on a cell phone to find out where he is, which leads to the cell phone as an extension to the mother's ear. IT can also be used for opportunities where people are limited by the human capacities. Using the cell phone example above, the mother used to be limited by the loudness of her voice, but now she can use technology to extend past her own abilities. Thus, technology expands the way she thinks about herself, technology, and communication.

IT possibilities are nonlinear and multidimensional which result in a more complex and rapidly changing world in which people live and learn. Regarding what IT could advance towards, DeKerckhove (1995) suggests technology has the ability to transform the way people interact and experience reality. For example, before the Internet, people called on telephones, hand wrote and mailed letters, and geographically traveled to communicate with another. However, with the advent of the Internet people have transformed their understanding of interaction to include IT capabilities. Consequently, IT is advancing toward actual interaction as if two people were face to face.

These types of interactions are often referred to as CMC. Like mentioned above, CMC is communication mediated through a computer or IT where people are able to interact and continue ongoing associations with people anywhere in the world through synchronous or asynchronous abilities (McKenna, Green, & Gleason, 2002; Parks & Floyd, 1996; Walther, 1992). CMC first emerged as a way to connect computers to one another in efforts to stop redundant information sending and to make computers more secure, but an unintentional byproduct materialized (Walther, 1996). With connected computer systems people found they could send information and data to one another easily (Walther, 1996). From that point on, people realized they could communicate regardless of geographical locations (Hiltz & Turoff, 1978; Rapaport, 1991; Rheingold, 1993). People then began to meet virtually instead of face to face, and engage in electronic correspondence (Turoff, 1991). Within the past decade CMC has become increasingly commonplace (Walther, et al., 2010), and people are finding CMC beneficial in terms of interacting with others online.

Applications of CMC

As CMC advances, people continually interact online. Researchers interested in CMC have studied different applications to better understand why people use the technology, how they use it, and the benefits and consequences (Steuer, 1992; Fiore, Kim, & Lee, 2005; Murugesan, 2007; Lederman, 1990; Ward, Bertrand, & Brown, 1991; Green-Hamann, Cambell Eichhorn, & Sherblom, 2011; Ledbetter, 2010; Rabby, 2007; Ramirez & Broneck, 2009). There are three common contexts in which researchers have studied CMC: business, education, and interpersonal relationships.

Business

Companies and customers are drawn to CMC for many reasons. Companies recognize that they can communicate to customers on many levels, such as interactive blog pages, emails, and chat boxes (Varadarajan et al. 2010). These businesses say that when they are able to engage with people through CMC, people want to invest more time and increase participation in the company (Varadarajan, et al., 2010; Bucy, 2003). Also, customers use CMC to interact with different businesses by communicating with other customers, finding information, and adding to the content of conversation of the business (Fiore et al., 2005). They offer their opinion on such topics as whether they like the company, and their thoughts of products through online blogs, chat rooms, comment posts, and surveys (Murugesan, 2007). Customers and companies find CMC to be a way to engage one another. The way in which they do this is mainly through text-based CMC.

Education

Students and teachers alike engage in CMC technology.  The term E-learning has been coined as the way to teach or learn via the Internet (Yanguas, 2010).  E-learning includes visual and audio aspects.  With the adoption of this type of CMC, people find E-learning beneficial because of the ways educational relationships can be created and maintained online.  Research indicates that there are few restrictions on time or place, and that information can be delivered to a large number of students (Santally & Raverdy, 2006).  As a result, instructors and students are given the ability to be flexible (Nichols, 2003).  For instance, E-learning has been particularly successful for students learning a new language (Yanguas, 2010).  The oral component to studying language is key when trying to acclimate to a different form of speech.  Consequently, when people want to learn a new language they would ordinarily attend an educational classroom (Yanguas, 2010).  However, with the advancement of video and audio, people have the ability to learn a new language from long distances away (Yanguas, 2010).  Overall, people tend to have more flexibility in regards to time and space with CMC, and this seems to be a unique and useful quality for many students and educators.

Interpersonal Relationships

The ways people interact via CMC have changed through the years, in terms of interpersonal relationships.  Research conducted in the 1980s suggests that people found CMC impersonal, and it did not offer a replacement for face-to-face interaction (Kiesler, Siegel, & McGuire, 1984).  Researchers explained the key reason for this was because CMC did not allow people to pick up on non-verbal cues, or understand the physical environment of the other person (Siegel, Dubrovsky, Kiesler, & McGuire, 1986; Sproull & Kiesler, 1986).  Research indicates that with the absence of these conversational

aspects, CMC could hinder relationship development online (Sproull & Kiesler, 1986).

These 1980 studies indicate that CMC has the potential to harm relationships due to the

impersonal nature of not being face-to-face.

However, more recent research states a change in this opinion. These new

findings show people using CMC as a way to maintain relationships, stay connected to

long distance friends and family, and develop intimacy. The difference between past

studies and more recent research is likely the result of advancements in CMC technology.

Studies show people in interpersonal relationships are able to converse via many different

mediums, such as email, Skype, Facebook, and texting, and thus allowing intimacy to

develop (Ledbetter, 2010; Rabby, 2007; Ramirez & Broneck, 2009; Houser, Landis, &

Umberson, 1998). Research states that CMC allows openness, assurance, social

networking and task sharing (Houser et al. 1998). For example, Sheeks and Birchmeier

(2007) indicate that CMC allows shy people to express themselves to a greater extent

online. However, these finding are continually argued by other studies that state CMC

does not replace face to face intimacy and connection (Walther, 1996).

Throughout this entire body of literature, the important factor to recognize is

CMC is used as a medium to transmit messages in a virtual space. Companies and

customers transfer information about products and the business on blogs, surveys, and

chat rooms. Instructors and students send and receive educational information in virtual

classrooms. Interpersonal relationships transmit relational and personal messages in

virtual spaces, such as email, texts, and video-messaging. Businesses, education, and

interpersonal relationships use these forms of CMC in order to have a "presence" with

another. Over time, the ways people interact online and the tools available via

technology have evolved.  Social presence theory and social context cues theory provide
ways to understand the benefits and consequences of advancements in CMC.

Social Presence Theory and Social Context Cues Theory within Interactive CMC

        Social presence theory has evolved over the past forty years.  Social presence
theory was originally created to explain the effect of telecommunications media (i.e., the
telephone) on communication (Short et al., 1976).  Short et al. (1976) developed social
presence theory to include the degree of being with another when using a medium.  The
evolution of the theory makes sense considering the advancements in CMC and current
emerging technologies.  Theories such as cuelessness theory (Rutter, 1984, 1987), media
richness theory (Daft & Lengel, 1984, 1986; Daft, et al., 1987) and social information
processing theory (Walther, 1996; Walther & Parks, 2002) tried to explain the effect of
CMC technologies on communication.  However, each one of these theories seemed
deficient in certain areas.  As a result, researchers reconstructed social presence theory to
encompass all of these theories, focusing on the main explanation of why people engage
in CMC interaction.  Research suggests social presence theory defines presence as the
"feeling of contact obtained" through CMC (Williams, 1978, p. 127), or as being
perceived as "present," "there," or "real" where an emotional connection can be made
between communicators (Wise, Chang, Duffy, & Del Valle, 2004).  Thus, "presence"
implies that it is the ability to contact another with the perception of being "here,"
allowing emotional connection.

        Social presence theory (Short et al., 1976) states that presence is best attained
within face-to-face communication in which people have the ability to pick up on the
nuances of another person, such as seeing facial cues, tone of voice, and other non-verbal

behavior. As a result, presence is a sliding scale where face to face interaction is the highest degree of presence a person can achieve, and CMC interactions fall on the scale depending on the "richness" of the media. The "richness" is established through the amount of non-verbals a person sends and receives. When CMC technologies get closer to face-to-face interaction, the person using the technology is perceived as more present.

Researchers have recognized that people can have a perceived sense of presence with another through a mediated form of technology (Short et al., 1976; Wise et at., 2004). This theory suggests that presence of a person differs depending on the CMC technology. For example, video, which is considered "rich" media, gives a higher degree of presence; whereas audio during a phone call gives a lower degree of presence. Combining the two (audio and visual), the interaction is closer to face to face which results in a higher degree of presence, such as video-chatting. If the CMC has a higher degree of social presence the communication and interaction is seen as sociable, warm, and personal (Short et al., 1976). Thus, the richer the media, the more presence a person will have (Ramirez & Zhang, 2007). Since CMC offers people a chance to be present with another, are we moving towards replacing face-to-face interaction with CMC? If so, do these types of interactions truly depict presence as if a person were face to face?

Geographically, people may be distant from others; however, social presence theory argues people have the ability to be present with someone long distances away (Short et al., 1976). New technologies allow people to be in contact over large distances with some level of presence, mimicking face to face interactions. Video-chatting is a good example of a "rich" media allowing a heightened sense of presence, because people are able to pick up on non-verbal communication and the environmental context. For

instance, when a person video-chats, an end user can see the room the other is in, if there are additional people, if the person is crying, furrowing their brow, focused on different things, or truly engaged in conversation.  As the theory goes, the more present someone is depends on the amount of cue systems available in CMC (Ramirez & Zhang, 2007). Thus, it makes sense that video-chatting enables a higher presence because of the added elements that are closer to face to face interaction.  However, people are still not in the other person's environment where they can physically engage in interaction.

Social presence theory consists of context cues another theory that further explains the importance of these cues is social context cues theory (Sproull & Kiesler, 1986).  This theory emphasizes the importance of non-verbal communication within social situations and offers further understanding as to why people engage in CMC. Context cues refers to non-verbals during interaction and understanding the context from which the communication is coming from (Sproull & Kiesler, 1986).  In social situations, non-verbal aspects are considered a large component of communication (Kramer, 1993). Non-verbals are typically related to the body, such as posture, eyes, mouth, arms, legs, and voice.  Thus, when a person is face to face they have the ability to pick up on these context cues.  For instance, in a face to face interaction the two individuals are able to witness the crossing of arms when the other is mad, the raised eye brow when the other is confused, and the pitch of the voice if the other is being sarcastic.  Also, within face to face interaction a person can physically interact, allowing for the highest form of presence.  Combining social context cues with social presence theory, a person is the most present when a person is face to face because they are able to recognize these non-verbal cues.

Typical CMC, such as instant chat, text, and phone calls, allows limited ability to pick up on non-verbal cues. For example, when a person instant chats, the visual representation of the conversation within text and emoticons does not portray the emotional aspects, resulting in impersonal effects (Walther, 2006). Past research using social context cues theory suggests that CMC prevents individuals from picking up on the other person's characteristics, such as charisma, affection, or dominance (Walter, 2006). This is problematic because communication is often taken out of context. Take for example, if a person does not hear the rise in the other's voice when making a sarcastic joke, the joke could be taken as serious. Text only CMC is where this happens most often, such as instant messaging and email. CMC technologies have advanced, allowing people to see and hear the other person, and as a result, the non-verbals are easier to distinguish (Ramirez & Zhang, 2007), enabling a heightened sense of presence.

Social presence theory and social context cues theory, together, explain qualities of CMC that allow people to mimic face to face interaction or at least try to mimic it. With the advancement of CMC, people have the ability to pick up on cues and have more of a presence with the other. This could possibly lead to the replacement of face to face interaction, because people could potentially have the same amount of presence and pick up cues by using CMC. However, this is a major leap considering these "interactions" are merely a transmission of messages in a virtual space. Once people are able to interact, by means of physicality, in a real space will the dynamic of interaction change? Thus, interaction allows participation instead of transmission of messages. Currently, research has not included new emergent forms of PIT. This added element of physicality

calls for research.  Does PIT offer a "richer" medium where people feel more present?  If

so, are people able to interact closer to, or even replace, face to face interaction?

CHAPTER THREE

**Physically Interactive Technology**

Traditional research on CMC technology has focused on visual (text and cameras), audio (cameras with sound ability), and interacting in a virtual space (email, instant messaging, video-messaging) as key forms of interaction. The ability to physically control objects in time and across space, however, has not been widely researched. Technology is now going beyond a virtual space and into an actual space. Instead of using a computer as a medium to transmit messages, people can now "reach" through the computer and physically interact using robotic devices. For example, PIT now allows individuals to move cat toys across the globe via the Internet. These individuals are interacting, by physically participating, within actual reality in real time. In short, technology is now breaching the boundary of a *transmission* and transforming into an actual *participant interaction*. As a result, PIT does not fit the definition of CMC. In past, CMC is defined as computer-mediated communication, which equates to transmission of messages in a virtual space. PIT allows active participation by physically controlling objects in another real environment. Thus, the emphasis here is on the *communication* concept of CMC and PIT, changing *communication* from *transmission* to *interaction*. In this chapter I will define PIT, offer some background development to a particular form of PIT, and review current applications for its use. I will relate PIT to

CMC and social presence and context cues in order to propose research questions for this study.

Physically Interactive Technology Defined

PIT is a technology that has the capacity to move tangible objects, regardless of distance and geographical location, in real time via the Internet. This is a relatively new concept, and the technology currently has few applications. There are some technologies that allow people to unlock their house, and turn on and off their lights (i.e., Xanboo and SmartHome). However, these systems do not control multiple devices with real-time video feedback often they control only timers. They are not scalable to multiple users. They cannot support multiple video streams; a user is limited to one browser selection and has a cumbersome software installation process for each device that still does not achieve real time control of robotics. I argue this is not PIT because it does not allow physical interaction or actual control of objects. With these types of technologies, people can use a motion sensor, timer, or program their house lights to their computer. People are not physically controlling the light switch. However, physical control must not to be confused with tactile touch. This refers to our sense of touch (Bascal, 2011), such as the texture of the object, the feedback we get through feeling, as well as temperature and density of the object. Physical control refers to manipulating objects in space. In terms of PIT, people are not able to tactilely touch an object, but they can physically control it. This technology is different from the others because it does allow real time physical interaction for multiple users with no installation. The company fostering this type of technology is AprioriControl. It is the only one of its kind, thus far. The following provides a developmental background of PIT.

<u>Background</u>

The development of PIT began as a way to make servicing large machines more affordable. Scott Harris, CEO of AprioriControl, stated the business started out as an idea to remotely control manufacturing equipment. Prior to starting AprioriControl, he worked in semiconductor and photovoltaic manufacturing (AprioriControl, 2012). During these years he realized how much money was spent on flying service technicians across the globe to fix problems with equipment. Harris thought if he could fix those problems from any geographical location he could save companies time, money, and make a difference on the carbon footprint of the world (Harris, personal communication, 11 February 2012), thus, the start of PIT.

In order to test this concept, Harris surveyed different populations of people using online technologies and found online gaming as a suitable testing platform. AprioirControl realized that online gamers would potentially provide a large global audience and likely give useful feedback. After six years of technical research and development, PIT became available through an initial beta-test referred to as "Shooting Joe." The concept of "Shooting Joe" was simple – have a person on a stage try to accomplish a task, for example, build a cup tower or juggling three balls. The online users' goal was to prevent the accomplishment of the task by propelling small rubber balls at the person. At the end of the 46th hour beta-test, Shooting Joe had 2,311 people from all over the world log into the website and shoot rubber balls. The large number of participants indicated a definite interest in PIT.

A thought-provoking example is the story of Richard, one online participant of Shooting Joe. During the beta-test, Richard watched as rubber balls shot across the

screen.  Alongside the video window was a chat box that allowed users to communicate to one another.  Richard's assumption of the technology was that it was pre-recorded, such as a YouTube video clip.  However, as Richard attempted to make sense of what he was seeing, a technician of AprioriControl chatted with him to help him understand that what he saw on the screen was real, occurring in real time, and that he had the ability to shoot the rubber balls if he wanted to.  Richard did not take the technician's word.  Richard replied back, "That's impossible" (Harris, personal communication, 11 February 2012).  After further discussion with the technician Richard said, "If this is real, have the target (the person on the stage) untuck his shirt," and so the target did.  Still unconvinced Richard retorted saying that action was pre-recorded.  The target then turned toward the camera and said plainly, "Richard, I am real.  What you are seeing is real.  You can shoot the paintball gun from your computer."  After that Richard replied with an O.M.G., commented how magnificent the technology was, and did not shut his browser for the next fourteen hours until the beta-test was over (Harris, personal communication, 11 February 2012).  Richard's reaction demonstrates the novel and unexpected qualities of PIT.

Overall, the beta-test of Shooting Joe was successful.  People found interest in it, and were drawn to physically interacting with others via the Internet.  During this beta-test the company received proof their technology worked.  AprioriControl figured out a way to move an object in real time via the Internet and allow users from anywhere in the world to do so.  One of the main values of PIT is that it happens in *real time,* meaning there is no perceivable delay or lag time from when an action is initiated by a user and when that action occurs on the other end.  A powerful revelation of the launch occurred

when the number of rubber balls fired from a person pressing a button on a computer was not limited by the technology, but by how fast the user could press the button (Harris, personal communication, 11 February 2012). Thus, the technology allows actual participation for individuals and is only limited by that individual.

The uniqueness of PIT is anyone with an Internet connection can control objects across time and space. There is nothing new or unique about robots being used in manufacturing. Manufacturing companies have been controlling mechanical devices within their facilities for decades by mediated forms, and these platforms are typically limited to users connected to an intranet, or a LAN (local area network). PIT differs because anyone with access to the Internet can participate. With this innovation technology has transformed from a transmission process of communication to a physical interaction.

Current Applications

While AprioriControl used Shooting Joe as a beta-test platform for proving the viability of their product, it has since been implemented in other ways. Specifically, the business has found an audience in animal welfare organizations. Humane societies are purchasing and implementing PIT in hopes it will provide a way for people to interact with animals, in particular, cats. Thus far, PIT seems to be helping the shelters. Studying the numbers of adoptions, sponsorships, and web traffic from their year prior to the year with PIT the numbers show a 295% increase in sponsorship, 52% sustained increase in web traffic, and 18% increase in adoptions (iPet Companion, 2012). The following offer some insight into how it has been implemented and the types of experiences people are having with this technology.

In 2010, a woman bound by a wheelchair due to paralysis of her legs and lower body found comfort in playing with a kitten in the Oregon Humane Society. Yet she was not geographically in Oregon or at the humane society. She was in the comfort of her own home hundreds of miles away. Yet she physically flipped a feather tail through the air, dangled a furry string, and swished a toy back and forth on the floor in real time by pressing buttons on her keyboard. She wrote an email to the creator of the technology expressing the emotional connection she experienced while interacting with the cats (Harris, personal communication, 11 February 2012).

Consider another example. In 2011, a man from Greece played with a grey and white kitten in the same animal shelter. After the given two minutes of interaction he telephoned the Oregon Humane Society and sponsored the adoption of the grey and white kitten he was moments ago playing with; in other words, the cost of the kitten's adoption for the new owners would completely be covered. The success of this technology for animal shelters is telling. As described in The New York Times (AprioriControl, 2011) "[AprioriControl] is now working on other ways that this technology can enhance animal-human technologies: A Seattle dog day care center has requested a Web-operated ball launcher. An aquarium in Idaho is developing a robotic submarine that can be controlled online and that can swim in an aquatic environment. Harris is also working on a device to feed lions at zoos remotely." Once again, these types of possible interactions demonstrate that PIT is advancing technology from a transmission process to actual participant.

But as described on AprioriControl's homepage (www.aprioricontrol.com, 2011) animals and pets are not the only use for this technology. Other potential outlets include

medicine, education, television, sports, and entertainment. Each one of these possibilities suggests that with PIT, people can participate physically online. Humane societies say it offers people an ability to connect with the cats on a personable level, and often people explain their experience as if they were "there." The interesting components for this study are how PIT offers interaction, and how people make sense of it.

Research Questions

Thus, I am interested in studying how people make sense of PIT, how the qualities of PIT might change the way people perceive their presence, and challenge the interaction process of CMC. For example, if the physically disabled woman had more of an emotional connection through PIT than by seeing a picture online, then it is important to know why that happened. I want to know if that experience allowed her to feel more present because she was able to physically interact instead of transmit messages. To do this, I need to know how she made sense of PIT. Ultimately, CMC technologies are continually evolving in allowing active ways to communicate. By using advanced forms of CMC, people feel more present because they are able to notice and respond to context cues. Until now, the most advanced forms of CMC transmit messages in a virtual space. PIT offers something different. It is changing the *communication* aspect of CMC into *interaction*. Thus, with the recent development of PIT, online interaction may take one step closer to face to face interaction, allowing for a richer presence.

To gain insight into this new form of CMC, I propose the following research questions:

RQ 1: How are people making sense of PIT?

RQ 2: How do the ways people understand PIT reveal presence due to physical interaction?

CHAPTER FOUR

**Methods**

To explore and understand the above questions, I performed a qualitative research study. It is through communication that we construct those meanings, and it is an ongoing process of meaning-making (Heidegger, 1977; Diefenbeck, 1984; Boudon, 1989). As mentioned earlier, meaning-making refers to how people understand or attribute meaning to something (Collins, 1987; Dervin, 1992). It is from this framework that I base my qualitative study of PIT. As a researcher, I can come to understand meanings of PIT through communication. In the following section I review my approach for research in the form of qualitative interviews and observation, explain my process of data collection, and describe my qualitative analysis techniques used to study the data and respond to my research questions above.

Qualitative Research

I engaged in qualitative research because I am interested in interpreting the meanings people make about PIT. Strauss and Corbin (1990) state that qualitative research is a non-statistic process that can include research about people's lives and behaviors as well as organizational structure, social movements, and relationships. Meanings are always in process. Denzin and Lincoln (2000) claim that "qualitative researchers study things in their natural settings, attempting to make sense of, or to interpret, phenomena in terms of the meanings people bring to them" (p. 3), and part of

qualitative research is to uncover "little known phenomena" (Strauss & Corbin, 1990), in this case people's use PIT and how they make sense of it. Meanings emerge through communication among people. Qualitative methods are a way to explore meaning-making. People in communication with one another make sense of the world. It is, thus, through communication that participants' understanding of PIT will come to exist.

Interviews and Observation

Qualitative researchers frequently engage in interviews and observations as a way to collect data on little-known phenomena. This type of method includes many advantages. One advantage is listening to what people say about PIT and how they use it. Using interviews as an integral part of my research study provides opportunity for participants to use their own words, express their feelings, thoughts, expectations, and hesitations of PIT. Incorporating observation as an element to this study allowed me to take note of people's behavior during their interaction with PIT. According to social context cues theory, much of interaction happens through non-verbal communication. Thus, by including observation, I took into account the non-verbal components of each participant. This helped me interpret their words and actions while they were reacting and making sense of PIT, because I noticeably recognized their actions, body gestures, interest, and engagement with the technology. By blending both types of qualitative practices, I am able to interpret participants' communication with me, as well as interaction with the technology. Other advantages include flexibility of the research, for example using follow up questions, limited time constraints, and communication between the interviewer and interviewee, as well as in-depth explorations and the ability to investigate the symbolic use of communication (Bryman, Bresnen, Beardsworth, & 1988;

Alvesson, 1996, Conger, 1998). Denzin and Lincoln (2000) state this type of inquiry is naturalistic and interpretive. In terms of this study it is naturalistic because I am examining the ways people use PIT and understand it. The "natural" setting includes all that it takes to use PIT, such as real people, a computer, the Internet, and real cats in humane societies. This study is interpretative because I, the researcher, am interpreting the meanings constructed of said technology.

Participants

Participants for this research were active users of CMC technology. Thus, chosen participants self-reported that they frequently used CMCs such as email, instant messaging, Facebook, Skype, or other CMC technologies to engage with others online in any context, such as work, school, or relationships. However, these participants were not required to have used PIT. I wanted to include people familiar with CMC but not necessarily PIT because I wanted to study the ways people make sense of this new form of online interaction. Twenty-one people participated in this study. All participants were above the age of eighteen, and I did not restrict any participants based on gender, ethnic background, or health status. My study is focused on how people, in general, make sense of PIT. Thus, I did not need to focus in a certain gender, ethnicity, or health group.

I recruited these participants through a chain referral process, commonly used within qualitative research, known as snowball sampling (Biernacki & Waldorf, 1981). With this process, participants are first found within the researcher's contact, and from there those participants refer the researcher to others (Mack, Woodsong, MacQueen, Guest, & Namey, 2005). As such, I initiated snowball sampling by inviting two individuals I knew to be active CMC users to participate in the study and then asked them

if they knew of any others who might also be interested in being part of this research. Based on their referrals and the referrals of the next participants, I was able to recruit participants.

The Interview/Observation Process

Once participants were found, I engaged in both qualitative interviews and observation simultaneously. Each interview/observation session lasted approximately forty-five minutes. Before the interview began, participants were given an Informed Consent form in which I reviewed the purpose and background of the study, procedures of the research, along with risks, benefits, extent of confidentiality, and reassurance that the process was voluntary. After providing an opportunity for participants to ask any questions regarding the consent form or the actual research, they signed it, and I initiated the interview.

I started the interview by asking the participant to define *technology*. This simple request opened the door to converse about different forms of technology, what kind of technology they use, why they use it, if it is important to them, and why. Their answers provided a foundation for me to interpret their understanding of interactive CMC. It was within this question that people answered by saying technology is a tool, and specifically, a computer is a medium or tool to interact or communicate with others. After this, I asked each participant to use PIT. The PIT used for this research included physically interacting with cats in humane societies around the United States. To start this process, I opened an Internet browser on my MAC laptop, searched for AprioriControl's homepage, and clicked on PIT, labeled iPet Companion. I then turned the computer to the participants to operate and maneuver. From there they were able to ask me questions,

talk to me, and do whatever they wished while figuring out how to use PIT (for instance, move the camera and manipulate the cat toys). I took detailed notes while observing them. Specifically, I took note of their non-verbal communication including facial expressions, the pitch of their voice, and their body posture. I also noticed if they talked to me or to the computer. From there I asked them about their experience, what they thought was different or the same in terms of other technology, what they liked or did not like, other possible uses for it, and potential benefits or consequences. These basic questions enabled me to ask many follow up questions. When a participant said, "It was like I was there," I followed up by asking, "Tell me how you were there?" The combination of interviews and observation of participants using PIT provided the data for this study.

<u>Data</u>

The data collected for this study consisted of interview transcripts and field notes taken during and after each interview. First, I audio recorded and transcribed each interview. Audio recording the interviews allowed me to give full attention to the participant during the interview and to take field notes during observations of PIT use. Transcriptions of the audio recordings provided an opportunity to study the language used during the interview. The field notes allowed me to assess my understanding of how the participants were behaving, what I was feeling, and interpreting from the conversation, and overarching thoughts of the interaction. In an attempt to support confidentiality, I allowed each participant the opportunity to choose a pseudonym. As such, pseudonyms are used in any transcription, field note, or written work of the research. This data became the basis for my analysis.

<u>Analysis</u>

I used grounded theory to interpret the interview transcripts and field notes. This qualitative analysis technique provided a way to study the little known phenomenon (Glaser & Strauss, 1967; Bowers, 1988) of how people use PIT. Specifically, grounded theory provides a way to interpret the data collected during the research (Strauss & Corbin, 1994), and gain insight into the meanings emerging through communication recorded in the transcripts and my field notes. The following is the process of grounded theory I used during analysis.

The first step in the process of engaging in grounded theory was to code the data. This is the initial process of establishing categories to simplify the data. To do this, I found key phrases from the participants' own words (Eaves, 2001). For example, one key phrase included, "This is reality. I can interact with something real." I wrote this key phrase along with many others on index cards. From here, I made a list of the codes and developed code phrases that encompassed the participants' main ideas (Eaves, 2001). I organized this by writing the codes above the participants' words on this index card. Next, I grouped similar code phrases in order to devise clusters by pinning the cards together. Similar words that created a cluster included "real," "control," "physical." From these clusters I determined concepts brought forth from the study, and finally I created categories to fully incorporate the main thoughts generated from the research (Strauss & Corbin, 1990). In efforts to show the categories in my organization, I placed a larger index card on top of the cluster to symbolize the category.

These categories helped provide insight to the driving questions of this study: How do people make sense of PIT? And how do the ways people understand PIT reveal

presence due to physical interaction?  In the following section I review the findings from

this interpretative process.

CHAPTER FIVE

**Emerging Meanings of Physically Interactive CMC**

Three themes emerged from data analysis regarding how people made sense of

PIT. These emergent themes respond to the first research question: How are people

making sense of new PIT? Further analysis of these themes in relation to social presence

theory and context cues theory respond to the second research question asking: How do

the ways people understand PIT reveal presence due to physical interaction? The main

theme emerging from this study is that participants found the technology to be "cool" in

terms of being able to choose to physically control objects in another environment,

articulating a greater sense of reality from the interactions, and expressing emotional and

personal connections with the cats. Another theme was a generational gap in

understanding PIT. Findings suggest that younger participants were more comfortable

and less surprised by the new technology, while older participants demonstrated a larger

learning curve and were more shocked at the advancement in technology. The final

theme included gender differences in ways of understanding PIT. Women and men

identified differently with the technology. The ways participants made sense of the

interactive technology are explained in more detail below.

Cool to Control - Feels Real and Personable

The consistent way in which people reacted to the first use of PIT was "cool."

For example, after participants had an opportunity to use PIT, I asked them, "What was

that experience like for you?"  All participants quickly responded "Cool!"  Many

individuals straightened their backs and pushed their chests forward as if taking

ownership for what they just experienced.  The word "cool" contains many different

meanings.  For participants of this study, "cool" has three subsets of meanings.

Participants enjoyed the novel ability to control and have the choice to control an object

in another environment via the Internet.  Participants also explained that the ability to

control an object resulted in the experience being more "real."  Additionally, quite a few

participants articulated the technology was "cool" because it allowed personal connection

with the cat.

Cool Because of Choice to Control

For many, PIT was "cool" because it was associated with the ability to physically

control objects.  For instance, Lars said, "When you can push a button and have

something move on the opposite end, it's amazing."  Before interacting with the cat

online he sat uninterested in his chair. However, after using the technology his eyebrows

perked, and he said, "When I first looked at it I thought it wouldn't be any different [than

other technologies], but when I used it, it was so much fun to be able to have an actual

interaction by controlling the toys."  While in the midst of moving the mouse on the

computer, Lars laughed at the sight of a circular wall toy in New York's shelter, and

became more intrigued with controlling the movement of the motorized sticks that he

began searching for the other toys on the floor while talking to himself and memorizing

which key went to each toy.  Observing Lars' body gestures and behavior as he moved

the cat toys seemed to indicate a sense of enthusiasm for the unique experience of PIT.

For Lars, the ability to move pink and black feathers via the Internet is what made PIT "cool."

The ability to decide and choose if a toy would move is another aspect of PIT as "cool" in the sense of control. Many participants suggested that the ability to choose *if* they wanted to move the toy made PIT "cool." For example, Kibi excitingly said, "Oh, this is cool" as she pecked at the mouse to move the camera in the room. She moved toy number one and waited to see movement, but nothing happened. She glared at the screen determined to find what toy she made move. She pressed the mouse to pan the camera to the left and pressed toy one again, then, just as soon as she pressed the button, toy one jangled up and down in the air. She shuffled her seat forward and giggled to herself. After the interaction she told me, "You get what you want with this [technology]. You can control it." To Kibi, and other individuals, the movement of the cat toys was an action created by them because they chose to move the toy. By using PIT, these individuals had the ability to participate in interaction. Their choices of physical movement allowed them to actively engage in the interaction. Additionally, McGee, an older man says it's "like a sense of power." When people are able to control objects and see an immediate reaction, they have the power to get what they want. They are the ones choosing to press the button to move the toy, and they are the ones deciding which angle to zoom in on. The cat toys and the camera are the objects they have the choice to control, but by having that choice, the participants seemed empowered by their ability to control objects according to their choice.

<u>Cool Because It Was Real</u>

Additionally, participants described the technology as "cool" in terms of it being real. "Real" was expressed in terms of moving a real toy for real cats in real time. Thus, these individuals interacted in the humane societies as participants and not observers. Their "real" experience came from actual engagement with a real, physical environment located many miles away.

The use of PIT was expressed as being "cool" because participants had an ability to interact with the "real" world. For example, Molly vocalized this by saying, "It's not fantasy, it's a reality. I can play with something live, and I can react to something that is reacting to me." Her explanation showed enthusiasm for being able to physically interact with real beings. Similarly, Allen expressed excitement for the "reality" of PIT by comparing this technology to virtual video games his sons play. While searching for a way to communicate his comparison, he sat up in his chair and claimed, "With this, there are real consequences." Video games, he claims, provide a way to kill, shoot, or alter reality without any consequence, and with PIT the other end is live and can be affected by the actions. He continued by saying, "I wouldn't want to hurt a kitten or a person." This shows how PIT is an extension of a person. This form of technology is now a participant in interaction. He emphatically explained that with this technology, "It's reality!" The technology is "cool" because it is real--it is not pre-recorded or imagined. The cat is *real* the toy is *real;* the choices to move the toy are *real*; and it is all happening in *real* time.

For most, physically interacting online was novel and exciting. As Julie explained, "I always knew the world existed outside of where I live, but now I can see,

*and* interact with it." McGee boldly explained that PIT is "cool" because it allows the world to become a "global community." And, as Nicoline "shelter hopped" from one human society to another, she explained that it provides "instantaneous travel." PIT, once again, allows participation. No longer does a person need to be in New York to play with kittens in the Bidawee shelter; active participation is now available via PIT.

While this technology offers the ability to interact as participants, many people expressed potential consequences. For example, McGee said, "I don't want to see anyone abuse this" by means of hurting others. David stated, "It has nothing to do with the technology, but the people using it." Once in the hands of humans it could be used to play with kittens, physically hit someone, or fight a war. Mit suggests, "The whole idea of fighting with robots is upon us." Since PIT allows participation in the real world instantaneously, these participants saw potential harm and ramifications because it is reality and not a virtual space. As a result, active participation via PIT has possibilities to have benefits and consequences.

Cool Because of Personal Connections

Much of the discussions about PIT as "cool" revolved around personal connection. For instance, Molly said, "With this I feel like I am creating a bond, even if it is with a kitten." Most all of the participants echoed the same sentiment. In each session participants "Oohed" and "Aahed" at the cats. Zoe tilted her head to the side, pursed her lips, and cooed at the screen, afterwards saying, "I was able to address them personally." She saw an immediate response from the cats as she flicked cat wands up and down, during which her face loosened and eyes widened. Her body posture and vocal sounds demonstrated her emotional response. And it was through her ability to

control the cat toys and camera in real time that she was able to elicit emotion to the real cat at a humane society miles away.  Once again showing that PIT allows participation instead of transmission.

Nicoline and Allen both expressed an emotional connection. During Nicoline's session she was completely compelled by the ability to entice the cats.  She began to coax them by using her voice.  As the cats lazily sat on their perches she exclaimed, "Hey, come on! Oh my gosh. Dude, come on!"  A black cat jumped off his carpeted bed and stretched by arching his back and pointing his tail straight in the air.  The sight of the cat's movement sparked even more of an interest in Nicoline.  Her voice grew louder as she moved the cat toy in attempts to lure the cat into playing: "Kitty, kitty.  Oh my goodness, dude, come on!  How can you not love this?  Come on!"  Allen had a comparable vocal response to Nicoline.  He sat straight in his chair as he leaned in to the computer searching for cats.  At the first sight of a cat he zoomed the camera in and said, "Hey, buddy."  As he pulled the zoom back he hunted for the toy closest to the cat. Finding the right toy, he started to coax the cat into play by speaking at the screen saying, "Come on, buddy.  Oh, come on, buddy" in a higher pitched voice than usual.

Both Nicoline and Allen's body language of leaning into the computer and straightening in the chair illustrates their piqued interest in the interaction.  The way in which both spoke to the screen indicates that they thought the cats could hear them.  All of the participants spoke or made sounds at the computer during their kitty "play date" online.  Interpreting these vocal intonations and body comportment, I found that through real time interaction people acted as if they were with the cat because it seemed much like reality.  Allen said he spoke to the cats on the screen because "I talk to my pets at

home. I guess that's just what I do. It was like I was there." He thought the cats could hear him just like his pets at home. Thus, when speaking to these cats he expressed a sense of bonding and creating a personal connection between himself and the cat. PIT offered him a way to "be" with the cat, changing interaction online into participation.

Overall, participants articulated an overwhelming understanding of PIT as "cool." "Cool" because a person can choose to control objects in real time, in real environments, and with real cats, promoting emotional connections. This theme suggests people made sense of PIT as a unique experience in which they had the ability to choose control of objects within real environment miles away, resulting in an emotional response.

Generational Gap of Understanding and Interacting

Although all participants made sense of PIT as "cool" there was a generational gap in the ways people made sense of it. The *younger generation* defined as the ten participants between the perceived ages of 18 and 40, had little trouble navigating their way when using PIT and seemed less surprised by the capability of physically interacting online. What I have termed the *older generation* consists of the eleven participants perceived to be above the age of 40. These participants asked for more assistance when using PIT and expressed more amazement with the abilities of the technology. Interpreting this generational gap, I found the difference between the two age groups lies within the ability to use the technology and the ways in which they understood PIT.

The younger generation took the computer and navigated their way through the interaction without any directions needed from me. These participants figured out how to press and hold the mouse pad to make the toys and camera move, and they directed themselves to other shelters to play with different cats. Simply put, they ignored me.

Molly, for instance, took control of the computer by immediately pressing buttons to figure out what key went to what toy, and how fast the camera would move. She zoned in on the interaction by leaning forward, squinting her eyes, and laughing to herself when she figured out the connection between a toy and a computer key. She kept me out of eye sight while she physically interacted with the cats.

However, the older generation acted differently. These participants continually asked me questions, talked to themselves, and self-doubted their ability to use PIT. For example, Kate said, "I don't think I'm doing this right. How do I press the button?" Stella asked, "How do I move that toy?" As she furrowed her brow and pointed at the screen, and Julie mumbled to herself, "I'm probably not doing this right." The second guessing and questioning extended well into each one of these participants' interactions. From these types of interactions, I found the two generations constructed meanings of PIT differently. The younger generation saw PIT as "Just another technology," demonstrated by their ability to navigate PIT, and the older generation saw it as surreal, as shown in their constant questioning of how to use PIT.

Similarly, there were generational differences in how the two age groups made sense of PIT. The younger generation understood it as one more advancement to technology, and the older generation attributed a surreal understanding to it. PIT did not phase the younger generation as something that was challenging or even hard to comprehend. I asked Zander how he played with the cats. He shrugged his shoulders and said, "I just pressed a button on a computer" as if to assume immediate acceptance of this novel capability. Antonio and Jamie, both in the younger generation, expressed their thoughts as saying everything should be in real time, and it is not surprising that another

technology has been introduced to society.  And as for Landon, he said, "I didn't make the connection that it was across the continent.  It was just cool to control something." He automatically accepted the technical advancement without giving it much thought. The younger generation simply attributed a nonchalant understanding of the advancement in technology.

Whereas, Stella, part of the older generation took a little more time making sense of PIT by quizzically asking, "How is this possible?  How am I moving a toy in another state?"  Her prior knowledge of technology did not allow her to think physical participation via the Internet was possible.  Kate summed this difference up by saying there is a learning process to just about everything, and people can choose to jump on the learning curve or not.  The older generation seemed to have a steeper learning curve due to their continual questions and expressions of self-doubt in terms of working the technology but also their sense making of PIT.  These participants expressed a surreal feeling when understanding PIT.  For instance, Mit continued to widen his eyes saying "This is surreal."  Zoe used the word "mind-boggling" when she talked about the technology.  McGee leaned back in his chair, rolled his shoulders forward, and starred at the screen after his use with PIT.  He said, "That was wild. I moved *something* from a computer. That's wild!"  His body gestures of bewilderment and communication of amazement once again support the claim that the generations constructed meanings of PIT differently.  The younger generation attributed meanings of immediate acceptance and were less surprised by the advancements made in technology.  The older generation, however, understood PIT differently.  They were shocked, and assigned surreal meanings to PIT.

Men and Women Constructing Meanings Differently

Gender differences also emerged as participants made sense of PIT. There were differences in the ways the technology was understood. Mostly, this happened when I asked participants, "What other possible applications could PIT be used for?" Women consistently spoke of relationship uses, while men overwhelmingly suggested various military, business, science, and entertainment uses. The various ways women and men made sense of PIT suggest meaning-making about technology is gendered.

Women typically said they could see PIT being used for training physicians in the medical industry, families in the military, teaching, day care centers, and nursing homes. Zoe offered a simple possibility by saying, "Anytime a person is separated from a loved one I can see this being very beneficial." Kate expressed the ability "To interact with your children when they are at day care would provide moms and dads more of a connection." She continued to say, "To have it happen in real time would be the next best thing as to being there." Julie considered counseling as a great opportunity for this type of technology because the counselor could be able to see non-verbals on their patients, and have instant interaction with them no matter where they were in the world. And Stella articulated it could be a great gift to fathers in the military if they could not be at the birth of their child. She said, "This may give them the possibility to be a part of that process by cutting the cord or something." Overall, women's statements about possible outlets for PIT reveal their emphasis on connecting with other. Thus, the way women tended to think about the possible uses of PIT is in terms of relationships.

Men offered other alternatives. Men thought of performing surgery, hands-on research, military training, business, sports, and adult entertainment as possibilities. For

example, Allen suggested that the military could train personnel using PIT. Mit went to the actual combat of the military when he said, "The whole idea of fight with robots is upon us." Lars' eyes grew as he expounded on research, he said, "I'm picturing a science lab. People behind a big plexy glass because they can't touch what they have behind [it]." Zander, Mit, McGee and Landon all thought it would be neat to interact with a professional sports player by throwing a pass or a pitch to a celebrity athlete. But the most significant difference between women and men is adult entertainment. Not one woman announced the possibility of using PIT in that particular arena, although, many men did. In fact, Chip laughed when I asked him the other possible uses for the technology. He chuckled and immediately said, "Porn." The first thing out of Flappy's mouth was, "Porn. Whenever [someone] mentions the Internet, that's the first thing that comes to mind." Men's statements regarding possible uses for PIT highlight the control component of PIT in terms of military, science, and entertainment.

There was one thing both women and men agreed upon: the medical industry. However, it was in very different ways, once again, reflecting gendered sense making of PIT. Women thought training physicians via PIT would be the next best thing than actually being there, and men mainly focused on literally performing surgery via the Internet. Through this interpretation, women stressed significance on relationship connection through training, whereas men still focused their meanings of medicine through the control factor. Either way, both genders constructed possibilities for PIT as a great opportunity for the medical industry.

The contrast between genders suggests that women and men constructed possible future applications of PIT differently. It seems as though women and men emphasized

importance differently in terms of personal connection and control. In specific relation to this study, I assessed the themes of "cool" from above and found differences in the ways women and men responded to PIT; Women constructed meanings in alliance to emotional connection within relationships; whereas, men found PIT as a way to control and move objects in many different contexts. This suggests women focused great importance on the ability to emotionally connect by using PIT, and men found meaning of PIT as a way to control objects as the most significant aspect.

Overall, women and men constructed meanings of this new emergent technology differently in terms of discussing the range of alternative possible uses. While both women and men expressed enthusiasm and excitement for this novel way to interact, women primarily expressed meanings of this technology in terms of a way to connect with people emotionally or personally, while men expressed the value in interacting with others through the choice to control objects via the Internet. These findings reveal a gendered understanding of this technology in which women express an interest in this technology for relationship development or maintenance, and men articulate an interest in the ways PIT could lead to military, business, science, and entertainment opportunities.

Thus, in response to RQ1, I found three main themes. Participants made sense of it as a "cool" technology because it allows control in a real environment with real objects and animals, resulting in an emotional connection. There was also a generational gap between how two different age groups used and understood PIT. The younger generation had little difficulty navigating the technology and immediately accepted PIT as "one more advancement in technology." The older generation had a little more technical difficulty, and they found PIT as a surreal development. Lastly, women and men

constructed meanings of possible future applications for PIT differently. Women focused on the emotional connection aspect of PIT in terms of relationships, and men stressed control as the essential element.

<u>Heightened Presence and Social Cues with Physically Interactive Technology</u>

The above findings reveal how participants made sense of PIT. Collectively, those findings help respond to RQ2: How do the ways people understand PIT reveal presence due to physical interaction? Overall, the findings of this study reveal a heightened level in presence because they could actually *interact*. Participants were able to pick up on more social context cues, leading to a greater sense of presence in the environment with which they were interacting. Participants were able to recognize and respond to the cat's actions, and presence requires being able to pick up on non-verbal characteristics and environmental settings. Thus, participants were able to interact as if they were in the room, and as a result, PIT offered individuals a second best interaction compared to face to face. I claim that with PIT people feel a heightened sense of presence not only because they can pick up on context cues, but because they are participants in the interaction. In the following sections I will review the findings above in terms of social presence and social cues theory and consider how heightened presence and ability to recognize cues relate to the ways participants found the technology to be "cool" as well as how they made sense of it differently based on age and gender. Overall, my main claim is that presence for participants was the result of being able to interact. PIT is a "richer" media allowing a "richer" presence. PIT has changed the definition of CMC by breaking the boundary of a transmission process of messages into active participation by means of physical interaction.

Coolness, Presence, and Cues

As a reminder, "presence" implies that it is the ability to contact another with the perception of being "there" allowing emotional connection (Williams, 1978; Wise et al., 2004), and face to face interaction allows the highest level of presence because a person can pick up on social context cues (Short et al., 1976; Sproull & Kiesler, 1986). Participants of this study experienced a heightened presence because they had the ability to control objects and recognize cues within another "real" environment. For example, by being able to move the camera, see real time reactions of a cat, and decide to move (or not move) a cat toy, participants could pick up on context cues of the cat and the environment. One participant, Stella, was afraid of waking the cats during nap time so she spoke quietly and did not move any of the toys in that particular shelter. She was able to pick up on their tiredness and responded personally to their behavior. Being physically present with the cat, in terms of physically manipulating objects and cameras, participants were able to interact as if they were actually with the cat and were able to feed off of the environment. Most individuals were excited and moved their bodies as if they were in the room with the cat. When the cat jumped, the participant perked up in their chair. Participants were reading the playfulness of the cat and responded with their own body movements. This concept expresses the actual participation of the individual when using PIT.

Emotions are typically shown, experienced, and interpreted through non-verbal performances (Kramer, 1993) and are not easily depicted through CMC (Siegel et al., 1986; Sproull & Kiesler, 1986) however, with PIT, people were able to pick up on social context cues, in relation to the shelter and cats' demeanor, all within real time. As a

result, the participants expressed a personal connection with the cats. They formed a bond with the cat by physically interacting, or, as I suggest, by participating via PIT. I claim this through the participants' heightened vocal annotations and body gestures. These findings suggest that the added element of physicality enriches the experience because it allows for an active interaction due to choice, control, and emotional connection. Thus, PIT is a richer medium than other forms of CMC. PIT is not only rich; but it transcends into a new realm. It enables a user to physically interact in a real environment as if that person were "there."

### Generation, Presence, and Cues

Generational differences showed differences in sense making, but in relation to presence and cues they were close in comparison. The younger generation seemed to make effortless transition from focusing attention on conversation to playing with the cats. For instance, Jason took the computer and leaned into it, turned his body completely away from me, did not speak to me during the interaction, but did speak to the screen. Then when he was done playing, he pulled away from the screen while turning back to me as if removing his presence from one environment back to another. Even though the older generation made sense of PIT differently, their presence changed from being in conversation to playing with the cats, as well. For example, Julie, continually asked, "What button moves a toy? I don't think I'm doing this right. Oh, look at what I did! How do I do that again? Come on kitty, kitty, kitty. Oh, look how cute you are!" This demonstrates that the participants' presence was not with me; instead it was with the cats. I was simply a guiding tool for them. The older generation's "surreal" thoughts of PIT indicates why their presence altered between communicating with me and with the

cats. The older generation's disbelief in the development in technology did not make their experience less present than the younger generation because, in fact, both generations would talk to the cats, figure out what kind of mood they were in, and move their bodies as if they were in the room playing with the cat. Instead technical use of PIT simply took the older generation longer to make sense of PIT and fully be present with the cats.

### Gender, Presence, and Cues

Women's emphasis of PIT was placed on emotion and personal connection through relationships. It is possible to interpret that women want to be present with loved ones, even if they are not actually "there." With future application of PIT, women could develop relationships in various ways. This is because individuals' presence would be heightened by their ability to physically interact with others. As found in this study, emotional connections take place when using PIT, thus, relationships could develop because people can be present and emotionally connect with others. Their interaction would not be a transfer of words or text, but a participation of physical engagement, as a result this interaction leads to more context cues, and a heightened sense of presence. Men found value in PIT as a way to physically be present with another. The emphasis for men was placed on control. For instance, Flappy suggested surgery performance as a possible outlet for PIT. When men thought of possible applications of PIT, they thought they could be more present because they were able to control physical movements in another environment. As a result, regardless of gender differences in application, both women and men imagined possibilities for the technology in areas that typically require face to face interactions. Both genders thought with the mimicking of face to face,

people could have a heightened sense of presence and benefit from those types of interactions.

PIT Is Closer to Face to Face than Other CMC

When assessing the findings of this study, I have found that PIT offers participation for users, resulting in heightened presence and cues. Thus, CMC has changed from a transmission of messages to an active interaction, which allows an interaction closer to face to face. PIT is a novel advancement and as a result people find it a "cool" and close to face to face. However, the novel aspect does not limit the participants' understanding of PIT. Individuals of this study did find PIT as a second best form of interaction compared to face to face. They even suggested PIT offers a possible replacement for face to face when time and distance are factors. For example, Flappy said, "This is better than others (CMC). The trick is how close can you get, and this seems like it's the closest."

The reason behind PIT providing a second best alternative to face to face is because it adds a new element other CMC technologies do not have. Consider Kibi's thoughts of PIT as a way to connect personally, and Kate's statement of "You receive an immediate response in real time," and Mit's explanation of instant travel and physical interaction. These participants' understanding of PIT demonstrates how technology has changed from a transmission of messages through a medium in virtual space to a physical participation in reality. Because of this, people perceive to have a heightened presence. As a result, PIT is not only adding to other CMC audio and visual aspects; it is challenging the way we understand CMC. The last "C," the communication aspect of computer-mediated communication, has transformed to actual interaction. As a result,

PIT is computer-mediated interaction.  All of this suggests PIT is more congruent with face to face interaction because people can actively interact.

As such, this study not only strengthens social presence theory and social context cues theory by showing how rich media influences a person's presence in another environment; it also challenges the way these two theories understand CMC.  PIT has changed the very essence of CMC.  As a result, transmission of messages is of the past, and participation is the experience people search for.  That is why PIT is the closest form of interaction to face to face.

CHAPTER SIX

**Potential Implications, Limitations, and Conclusion**

This research provides understanding of how people make sense of PIT, how

those meanings relate to social presence and social context cues theory, and how PIT

challenges the understanding of CMC.  In this chapter, I will explain potential

implications and limitations of this study.  I will also explore possibilities for future

research and offer some concluding thoughts regarding this thesis and its findings.

Potential Implications

This study has potential implications for those interested in social presence and

cues theory, as well as those interested in CMC.  The findings seem to indicate that the

ability to physically interact with others online increases levels of presence because it

allows for immediate reactions of context cues.  PIT also adds a new element when

evaluating the "richness" of media and forces us to reconsider what CMC is.  Instead of a

process transmission of messages, it is actual physical interaction.  These findings can

contribute to the ways CMC is defined in social presence and cues theory and how it is

used to develop and promote business relationships, educational experiences, and

interpersonal relationships.  In the following paragraphs I will explain the implications of

these two areas and how this research adds to current academic literature.

The findings of this study seem to indicate that the additional component of

physical interaction online adds to social presence and context cues theory.  Social

presence theory suggests that with richer media, people can have a richer presence with another (Short et al., 1976; Ramirez & Zhang, 2007). Richer media consists of elements that approximate face-to-face interaction. Participants of this study found that the physical components allowed for a heightened sense of presence within the environment they were interacting with, such as the animal shelters. This study states that PIT is a richer media than other forms of CMC, and it goes one step further arguing that PIT has changed CMC to actual interaction.

Social context cues theory has complexities. Non-verbal interactions (social cues) are important to interaction; however, online people are typically unable to pick up on many cues, resulting in an impersonal interaction (Sproull & Kiesler, 1986; Walther, 2006; Ramirez & Zhang, 2007). As stated previously, with this study I found that PIT allowed for heightened presence because participants were able to pick up on social context cues within the animal shelter in real time. This not only allowed participants to feel a heightened presence because they could recognize and respond to the context cues, but they also had an experience closer to face-to-face because PIT allowed interaction.

This research also adds to the complexities of the use of CMCs in businesses, education, and interpersonal relationships. Studies conducted on businesses who use CMC as a way to relate to customers suggest that this type of interaction leads to more involvement in the company from the customer (Varadarajan et al., 2010; Bucy, 2003). With PIT, customers could potentially physically interact with the businesses and their products, resulting in a sense of control and connection with the organization. The humane society is a great example. PIT has allowed "customers" to play with kittens; as a result, humane society's adoption rates, sponsorships, and web traffic have all

increased. In terms of education, the literature claimed that students engaged and became more involved in class when using CMC (Taylor, 2007). Thus, with PIT students may be able to physically act in a classroom without necessarily being there, which may result in even more engagement and participation. Take for example, the participants' thoughts of training medical students with this technology. Doctors from around the globe could participate in education with PIT, allowing students to receive an active role in their education from experienced and highly prestigious doctors. Lastly, interpersonal relationship research suggests that women use CMC as a way to maintain relationships (Ramirez & Broneck, 2009). The addition of PIT might allow for heightened ways to maintain relationships. For example, if a couple is separated from each other by distance, PIT could possibly allow the couple to make a cup coffee for the other in the morning. Or even if it is extreme circumstances, like one of my participants said in interview, a father in the military could be present at the time of their child's birth and even cut the umbilical cord.

Overall, this study addressed the meanings people create about PIT and how those meanings relate to social presence and social context cues theories. In doing so, the implications added to the literature of social presence theory, social context cues theory, and CMC. This study also supports the main claim of this paper, suggesting CMC is now defined differently in terms of interaction online.

Potential Limitations and Directions for Future Research

This study has several limitations that could lead to exciting potential for further research. There are four main limitations to this study. I see limitations including the interaction between human and animal, the fact this technology has recently developed,

generational questions, and gender inquiries. I will explain the limitations and how further research could address these issues.

Specifically, while the focus of my study was on how people made sense of PIT, it was limited to the context of interaction with animals at a humane society. This limitation is because, at the time of this study, physically interacting with cats was the only publicly available use of PIT. Thus, interacting with cats was the only available context to explore this technology. Studying the physical interactions among people was simply not available for study. As such, this study was limited to people making sense of the technology in terms of interactions with animals and applying social presence theory and context cues theory to those meanings. As PIT becomes more widely available and used in other contexts, further study of how people interact with other people physically is needed. Person to person interactions via PIT would allow researchers to explore meanings created among interactants, rather than meanings emergent between the interviewer and the participants, as well as how physical interactions and control might change interpersonal relationships online. Once different uses become available, we can interpret the sense making process of the other end user. This will help determine if this type of technology is one way or if both parties find value in this type of interaction.

PIT is a novel technology. As such, a limitation to this study may include its newness to the field of interactive technologies. This was a one-time study, not a longitudinal study. As a result, a limitation includes the brief glimpse into meaning-making of PIT during its introduction to society. A large component of my findings suggests PIT as "cool." Participants found it intriguing for many reasons. However, it would be interesting to see if in ten years people still thought of PIT as "cool." When the

microwave oven was invented many people were shocked and astonished at the technical advancement.  However, in 2012 it is a common household item taken for granted.  Thus, will PIT be the same way?  Once the new factor wears off will it be as exciting as when it first came to the marketplace, or will it be taken for granted?

However, it is possible the acceptance of new technologies may become taken for granted because of generational gaps of technical use and navigation.  For example, participants of my study were divided into two perceived age ranges.  There was a distinct difference between the two generations in terms of how they made sense of PIT.  Thus, when people are introduced to a new technology, are they astonished at its ability based off of their age and prior knowledge and experience?  This is another limitation to my study.  I required all participants to be over the age of eighteen.  However, it would be interesting to know how adolescent and elementary age individuals make meanings of PIT.  My study suggests that the generations (ages 18-40 and ages 40+) made sense of the technology differently.  As a limitation, I do not know how people under the age of eighteen would make sense of PIT.  Since emergent forms of interactive technologies advance quickly, it is important to know how society will adapt, especially if they are young in age when the technology becomes available.

Also, while my research questions did not inquire about gender differences in relation to PIT, an emergent finding did reveal differences in the ways women and men made sense of PIT. Thus, looking into how women and men understand and use PIT will add to current literature on interpersonal communication and gender studies.  For example, in past research, women were found to use CMC more than men in terms of relationship maintenance, and in terms of my study, I found women focused on the

emotional and relational aspects of PIT. As a result, it would be interesting to find out if women and men value technology differently and how that relates to their interaction to one another within relationships. Taking this limitation further, I suggest further research to include gender differences in terms of technology and CMC.

Concluding Thoughts

Overall, this study offers a foundation of research on PIT. Past research done on social presence and cues theories state that with "richer" media, people are able to pick up on more cues and have a "richer" presence. However, with all of these studies the CMC technologies allowed for a transmission of messages in a virtual space. This study explores how recent developments in technology challenges the definition of CMC, arguing that with PIT, people can actually interact within reality. Due to actual interaction, participants of this study found PIT as "cool" because they could choose to control objects within another environment in real time, enabling an emotional connection to occur. Because of this, participants were able to pick up on more context cues and have a heightened sense of presence with PIT. Thus, PIT offers an interaction closer to face-to-face. As a result, PIT has the potential to change the way we interact with others online.

Since there are limitations to my study, I encourage and support further interest in this field of scholarship. With more people conversing, the better we will understand emergent forms of technologies, how interaction online with technologies relates to social presence and cues, and how technology is changing from a transmission process to active participation.

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APPENDIX

**Qualitative Questions**

**Qualitative Questions**

**Potential Questions during Interview Principle Investigator: Lacey Vander Boegh**

Tell me about your experience.

Did you like or not like the experience, if so why?

What did you like most about the experience?

What did you like least about the experience?

How were you able to interact during this experience?

How were you able to communicate?

What about it would make you want to use it or not use it again?

When you were using the technology you said _____, what did that mean?

What is it about this technology that makes it different from others?

What about this technology makes it the same as other technologies?

What was it like to control something via the internet?