LET'S MAKE A CONNECTION: UNDERSTANDING HOW PHYSICALLY

INTERACTIVE TECHNOLOGY IS TAKING THE VIRTUAL TO THE PHYSICAL

by

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ABSTRACT

This study offers initial research on Physically Interactive Technology (PIT) as created by the company Reach-in.com. 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. 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.

CHAPTER ONE

Making Sense of Technology

Have you ever sat in front of a computer typing remarks to another, trying to elicit some sort of emotional response? Then when a reply appeared in the chat box you laugh, smile, and write 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, and are part of common occurrence. But what happens when a person "reaches" through the computer and physically interacts with another environment? 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 the definition of online interaction needs to change to 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, Williams & Christie, 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 or other hardware devices. 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. 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. By sense making I am referring to how 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, review some of the possible limitations of my approach, and suggest opportunities for further research in the area of PIT.

CHAPTER TWO

CMC and Presence

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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, Williams & Christie, 1976). Short, Williams, and Christie (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, et at., 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, Williams & Christie, 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, Williams & Christie, 1976; Wise, et at., 2004). This theory suggests that presence of a person differs depending on the CMC technology. For example, video, what 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, Williams, Christie, 1976). Thus, the richer the media, the more presence a person will have (Ramirez & Zhang, 2007).

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, Williams & Christie, 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 they 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 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 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 on 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 "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 physical reality (not virtual), 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.

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. The company fostering this type of technology is Reach-in.com. It is the only one of its kind, thus far. The following provides a developmental background of PIT.

 Background

 The development of PIT began as a way to make servicing large machines more affordable. Scott Harris, CEO of Reach-in, states that the business started out as an idea to remotely control manufacturing equipment. Prior to starting Reach-in he worked in semiconductor and photovoltaic manufacturing (Reach-in, 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. Reach-in 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 of the newness of the technology 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 Reach-in chatted with him to help him understand that what he saw on the screen was real, occurring in real time, and 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 he 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.

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. Reach-in 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 little 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. As far as robotics are concerned, there is nothing new or unique about robots being used in the world. 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, and participate regardless of distance. This is an enormous chasm to cross, technically speaking. With this innovation technology has transformed from a transmission process of communication to a physical interaction.

Current Applications

While Reach-in 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 unlikely 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 (2011) "[Reach-in] 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 Reach-in's homepage (www.Reach-in.com, 2011) animals and pets are not the only use for this technology. Other 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

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 that allow 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, this 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

Qualitative Research

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.

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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. 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 having 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.

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 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.

       Cool because it was real. 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.

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 another, she explained that it provides "Instantaneous travel." PIT, once again, allows participation.

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 "Aah" 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 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, 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 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, 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.

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]." 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.

There was one thing both women and men agreed upon, and was 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.

Heightened Presence and Social Cues with Physically Interactive Technology
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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.

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, Lance 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, but 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, but 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.

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APPENDIX A

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?