THESIS

"I SEE WHAT YOU'RE SAYING": EXAMINING SELF-DISCLOSURE AND NONVERBAL

COMMUNICATION IN DIGITAL ENVIRONMENTS

Submitted by

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ABSTRACT

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Computer-mediated environments are comfortable spaces for people to engage in interpersonal communications. By building on the theoretical arguments of computer-mediated communication scholars (Joinson, 2001; Walther, 2008), this study used a secondary dataset from the SCRIBE project, to examine chat transcripts in a content analysis. The study explored the role of self-disclosure and 15 different nonverbal cues in interpersonal communications in World of Warcraft (WoW). For the SCRIBE project, teams of 3-4 players were tasked with saving the digital city, Dalaran, from marauders (Reene et al., 2011). After gathering all SCRIBE project WoW chat transcripts, a 30% sample was used in a content analysis for self-disclosure statements. These self-disclosure statements and nonverbal cue data (collected in the SCRIBE project) were combined using statistical software, and examined with Pearson correlations, multiple linear regressions, and hierarchical regressions to show relationships. Results supported previous literature in computer-mediated interpersonal communications (Joinson, 2001), and Walther's (2008) Social Information Processing Theory (SIPT), to show players share self-disclosure statements and translate nonverbal cues for sharing relational information between players. The implications for this study are important for understanding how the interpersonal communication concepts, self-disclosure and nonverbal cues, manifest in video games such as WoW, and work together in the communication process. Future research should examine when

self-disclosure statements and nonverbal cues are used in relation to the overall communication process, and expand on key dimensions of Walther's SIPT.

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CHAPTER 1. INTRODUCTION

An individual's verbal and nonverbal communication skills can positively or negatively affect their relationships with others. Communication is a process with no time limit, countless complex variables, and conducted between at least two or more people (Stewart, 2006). Communication is constructed of verbal and nonverbal meaning-making as an ongoing process that shapes the way humans create their perception of others, and how they perceive themselves. The effectiveness in which humans communicate with one another directly impacts the well-being of an individual and collaborative efforts. Communications between individuals face-to-face had traditionally dominated the interpersonal communication field of study, but after the internet and computer-mediated communications became mainstream in the 1990's, digital environments became a flourishing environment for the focus of communication scholars to determine how communicative events and actions are translated from offline to online (Walther, 2008; Joinson, 2001; Konjin, Utz, Tanis, & Barnes, 2008). Research by Walther (2008) and Joinson (2001) established specific communicative acts, self-disclosure and nonverbal social cues, as primary communicative methods for interpersonal communication in computer-mediated communications (CMC), and crucial to impression formation and relationship development.

To research the concepts of self-disclosure and nonverbal cues in CMC, this study builds on Walther's (2008) Social Information Processing Theory (SIPT). SIPT brings an understanding of the process by which individuals develop and maintain relationships through CMC. Walther's (2008) SIPT argues that due to a lack of face-to-face nonverbal cues, people find new methods for translating cues while communicating interpersonally. CMC provides new possibilities for people to connect over great distances, and relationships in CMC can be as intimate as face-to-

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face communications, but take more time to reach the same level (Walther, 2008). If an individual is limited in the ways in which they can express themselves in CMC, they find other ways of sharing information about themselves, and Walther's (2008) research shows self-disclosure statements are a commonly used method for sharing relative and personal information online to develop and maintain relationships. With this understanding of Walther's SIPT, this study intends to examine if there is a relationship between using self-disclosure statements, and nonverbal social cues in the online video game, World of Warcraft (WoW)?

In communication research, Stewart (2006) argues self-disclosure and nonverbal cues communicate relational (or social) information about the self, and are effective in communicating emotions. Therefore, these concepts are helpful in identifying common goals, and working together to achieve them. Applying this research on self-disclosure and nonverbal cues to digital environments, such as WoW, is useful in examining how the concepts manifest online, and relationships between the two concepts in such a unique cultural environment. Developing and maintaining relationships online is an important aspect of collaborative work in modern life as people are no longer limited by geography. Further research on computer-mediated interpersonal communications will drive new theory, applications, and experiments in the quickly-growing field.

This study utilizes data from the SCRIBE project as a secondary data source for chat transcripts and nonverbal cues in WoW (Reene et al., 2011). In the SCRIBE project, researchers used pre- and post-session surveys, and constructed a controlled WoW environment for collecting a players' chat, click, and movement data to find relationships between variables. The SCRIBE research team used human and machine coding methods for variables such as

emoticons, expressions of laughter, and avatar gestures (see Appendix A), to produce a dataset for nonverbal cues used in the secondary data analysis.

A codebook designed for identifying instances of self-disclosure is the basis for a content analysis on the secondary data in this study. The codebook examined how often self-disclosure statements are used in WoW, and further analysis examines their relationship with nonverbal cues. Transcribed chat logs are an ideal source of data for a content analysis identifying instances of self-disclosure online because transcripts capture complete records of personal expressions from research participants during the communication process. I created the codebook for this content analysis (see Appendix B) for another study, VISIOS, with the help of other researchers, which is based on Altman and Taylor's (1977) and Joinson's (2001) research on self-disclosure statements.

A content analysis on interpersonal communications in CMC brings greater insight to Walther's (2008) SIPT, and contemporary digital spaces such as WoW. WoW is a modern digital environment with text-based communications (consistent with SIPT), and offers a myriad of methods for performing text- and avatar-based nonverbal cues. In WoW, the player can control the avatar's digital body, and according to Bente, Kramer, and Eschenburg (2008), avatar-mediated communications (AMC) provides nonverbal cues such as gestures, eye gaze, and physical movement to reflect offline interpersonal interactions. Identifying nonverbal cues in CMC is important to analyzing interpersonal communications as a collective and complex process between individuals, and expand on SIPT's limited perception of nonverbal cues exchanging social information.

The coding in the content analysis produced data on self-disclosure from chat transcripts in the SCRIBE project. This new self-disclosure data is examined with the nonverbal cues in WoW (also from SCRIBE), to explore relationships between the two concepts.

It is clear people share relational information in CMC, to develop and maintain relationships. AMC environments such as WoW translate these face-to-face nonverbal cues for emotions and feelings (for example: waving, celebrating, flirting) into digital gestures for people to share with others. Stewart (2006) states, "a relationship grows and develops as two people become more open about themselves to each other. *If you cannot reveal yourself, you cannot become close to others, and you cannot be valued by others for who you are"* (p. 242, author emphasis included). In all, this study recognizes the importance of interpersonal communications in digital environments for developing relationships over physical distances, and examining self-disclosure and nonverbal cues in digital environments through a content analysis is ideal for understanding how we engage interpersonally with others online.

CHAPTER 2. LITERATURE REVIEW

2.1 Communication and Meaning-Making

The ability to communicate effectively is an important aspect of everyday life. In general, each person will spend each day of their lives communicating, their fears, hopes, and every emotion in between, with others. Communication scholar, John Stewart (2006), states, "in the most general sense, the terms 'communication' and 'communicating' label *the continuous, complex, collaborative process of verbal and nonverbal meaning-making*" (p.16, author emphasis included). In recognizing communication as a continuous process, Stewart's definition is significant in understanding the process is a never-ending thread of communicative acts to make meaning of communicative events. The verbal and nonverbal cues involved in the communication process are constantly developing and changing the meaning of communicative events. When later considering a communicative event, people can identify or remember cues they missed before, and this can change the meaning of the event. The communication process is collaborative, because the communicative event can only happen between two or more people. The communication process is complex because of the many variables affecting communicative acts such as, "facial expression, tone of voice, choice of words, past history, social roles, and dozens of other factors" (Stewart, 2006, p.17). More simply, Stewart's definition of communication explains all verbal and nonverbal elements of communicative events, and determines how they shape the meaning-making process between collaborators.

In Stewart's definition of communication, the meaning-making process is an important aspect, but also the most misinterpreted. Stewart describes this process when he argues, "humans live in worlds of meaning, and communication is the process of collaboratively making these

meanings" (2006, p. 18). Communication is a process, and how individuals choose to communicate verbally and nonverbally, assigns meaning to objects, symbols, and emotions. Stewart (2006) argues the most important implication of this concept of meaning, is that no single person controls a communicative event, and thus is not solely responsible for the outcomes. In being a collaborative process, all parties involved are responsible for the meaning that is constructed through communicative events. When the constructed meaning is negative, the communication outcome can be feelings of anger, and conversely when the meaning is positive, people have feelings of happiness.

With this understanding of communication as a complex and collaborative process, it is clear communicative events are important to individuals and teams in working together toward common goals successfully and efficiently.

2.2 Interpersonal Communication

Interpersonal communications researchers use a diverse range of communicative methods to study new channels and concepts. For the last several decades, scholars interested in understanding the cognitive approaches to communication behavior researched concepts of, "interpersonal persuasion, nonverbal message transmission, interpersonal attraction, self-disclosure, and deception" (Braithwaite & Baxter, 2008, p.3). According to Braithwaite and Baxter (2008), researching these concepts divided the interest of interpersonal communication scholars, and ultimately helped develop a more comprehensive definition for interpersonal communications, and the more robust concept of communication.

Interpersonal communicative events are intimate and meaningful actions in people's lives, as the communication process is where humans create meaning out of verbal and nonverbal cues. This meaning-making process of communication is important to understand

when referencing the current research in interpersonal communications. According to Stewart (2006), interpersonal communications' main characteristic refers to the communicative act where people are contacting others "*as persons"* (p.32, author's emphasis included). In interpersonal communications, only two people are considered the collaborators, and are therefore responsible for the verbal and nonverbal cues in the communicative event. Interpersonal, is a characteristic of communication in which people are talking and listening to make the conversation personal. To maximize the presence of the personal and characterize a communicative event as interpersonal, Stewart (2006) says, "communicators give and receive or talk and listen in ways that emphasize their uniqueness, unmeasureablilty, responsiveness, reflectiveness, and addressability…" (p.38). These are the characteristics for communication to be considered interpersonal. With this understanding of interpersonal communications, the difference between impersonal and interpersonal is the personal information shared in communicative events.

Stewart (2006) discusses interpersonal communications by using his *Qualities of Communication Spectrum,* in which impersonal communications and interpersonal communications are on opposite sides, and according to this spectrum, the impersonal side is focused on communication, "based on social roles and exchanges that minimize the presence of the communicators' personal identities" (p.32). When people communicate impersonally, the people are considered interchangeable as they fill a social role. Examples of impersonal communications are interactions with people at work. When people are doing their job, they are filling a social role in a service industry. If that job is done correctly, the individual is viewed as interchangeable in the interaction. The individual is considered interchangeable because there is no personal information contributed to the interaction to develop a relationship *"as persons".*

When the communicative event turns personal, then a relationship can be developed, and the communication is considered interpersonal.

Braithwaite and Baxter (2008) describe the broadest perspective of interpersonal communications when they argue, "interpersonal communication is more than information transmission between two people. Instead it becomes the way that humans negotiate meanings, identity, and relationships through person-to-person communications" (p.4). By sending and receiving messages, collaborators in a communicative event shape the meaning of verbal and nonverbal communications. Similar to face-to-face communications, in digital environments, the main characteristics of interpersonal communications are still relevant, as people still communicate to one another as persons, and the communicative acts can be performed verbally and nonverbally (Walther, 2008).

2.3 Computer-Mediated Interpersonal Communication

Recently, the field of interpersonal communication research developed new theories with a focus on examining new communication channels in online social interactions in digital environments (Dwyer, 2007; Joinson, 2001; Konjin, Utz, Tanis, & Barnes, 2008; Walther, 2008). Interpersonal communication research in digital environments is advancing our knowledge of the techniques people use to socialize online, and the influences of working in a limiting, text-based environment, such as video games, chat rooms, and social networking websites.

The application of interpersonal communication research to new communication technologies is important as digital environments such as video games continue to grow as a mainstream medium for online social interactions. Recent research into the dynamic areas of online social interactions in digital environments is helping drive theory in the focused communication field of mediated-interpersonal communications (Konjin, Utz, Tanis, & Barnes,

2008). Dwyer's (2007) research identifies several features of new communication technologies, as well as the attitudes of people engaging in interpersonal relationship management. Dwyer (2007) found, "convenience, easy access, low cost and enjoyment are the main drivers when using electronic communications media to maintain social connections" (p. 9). The opportunity for global interconnectivity provided by the internet is a convenient and cheap way for making social connections, as these connections are only a few clicks away. Social connections are made in digital environments such as WoW, where players engage with the environment and other humans through digital representations as avatars.

For communication researchers, attention has focused on collaborative virtual environments (CVE's) because these environments have helpful tools for researchers in gathering data. CVE's are a more specific form of the larger definition, digital environments. In CVE's, people engage with one another through digital representation, such as avatars, where players can perform actions that reflect offline nonverbal social cues with physical gestures (for example: waving, flirting, jumping). According to Klimmt and Hartmann (2008), players direct their avatar through 3D environments, and avatars of other players can be seen on the computer screen. These nonverbal cues performed by avatars have the potential to have multiple meanings, for example, jumping can be a cue of excitement or happiness, or a signal for attention (Konjin, Utz, Tanis, & Barnes, 2008). People must use technology to communicate through digital environments, and for research purposes these spaces can be modified to capture highly-detailed logs of all verbal and nonverbal actions in real time (Konjin, Utz, Tanis, & Barnes, 2008). This unique ability to track each communicative act during a collaborative event is important to interpersonal communications and computer-mediated communications research, as it allows concepts of interpersonal communication to be examined in complete, unedited records with

statistical analysis. CVE's are ideal digital environments for examining the interpersonal communication process because individuals use both text-based and avatar-mediated communication techniques.

Walther's (2008) Social Information Processing Theory (SIPT) examines interpersonal communications in CMC, and argues when given enough time, CMC relationships can have the same depth, understanding, and intimacy as face-to-face communications. First, it is important to recognize, just as communication is a process over time, Walther's SIPT model is process as well. For example, Walther (2008) argues people develop and maintain social relationships online at a slower rate and with no help from face-to-face nonverbal cues, because they are absent. Relative to face-to-face communications, SIPT argues one reason for the slower rate of social information exchanging is because of the increased time it takes to get messages sent in the medium (Walther, 2008). People can recognize nonverbal cues in face-to-face communications, such as body language, at a much more rapid rate than CMC, because nonverbal cues are not translated to CMC in the same ways. Given enough time, "CMC is no less effective than face-to-face interaction at developing impressions and managing interpersonal relations" (Walther, 2008, p. 393). According to SIPT, interpersonal communication happens through different mechanisms online, meaning people find new ways to communicate emotions and feelings regardless of visual limitations in the medium (Walther, 2008). Walther's (2008) SIPT shows computer-mediated interpersonal communications are as meaningful as face-to-face communications process (when given enough time), and help facilitate collaboration that wouldn't be possible over large physical distances or because of personal face-to-face anxiety.

Research in computer-mediated interpersonal communications explores the unique characteristics of communicative events in a limited medium (Joinson, 2001). According to

Joinson (2001), CMC is significant in interpersonal communication research because it can provide insight into social behavior regarding communicative events that are visually anonymous and conducted in limited channels. In offline interpersonal interactions, or face-to-face communications, the ability to maintain anonymity is close to impossible unless the collaborators are being deceptive. Face-to-face communication is never visually anonymous, and this makes digital environments a unique environment for interpersonal communications with visual anonymity, and that influences communicative acts such as self-disclosure and nonverbal social norms (Joinson, 2001).

Joinson's (2001) studies show, people use more self-disclosure statements in CMC when compared to face-to-face communications. Joinson's work concludes, when people use visually anonymous forms of CMC they are more likely to use more instances of self-disclosure than people using visually non-anonymous forms of CMC (2001). Joinson (2001) shows the majority of CMC is conducted alone and often in a quiet room, and thus develops, "an introspective and/or reflective state of mind", which can result in more private self-focus (p. 189). CMC provides private self-focus, and this is one reason people tend to use higher rates of self-disclosure in CMC, according to Joinson (2001). Walther's (2008) SIPT argues, when given enough time, the visually limiting medium of CMC can be no less effective in managing and developing interpersonal communications, and Joinson (2001) shows people will use more introspective methods of communication, such as using self-disclosure statements in CMC. This literature establishes self-disclosure as an important concept in interpersonal communications in CMC for people to engage meaningfully with others.

More broadly, research in CMC has examined social behavioral norms and communicative norms in digital environments such as Second Life (SL) and WoW (Reene et al.,

2012). Reene et al. (2012) conducted the SCRIBE project in which a mixed-method approach recorded survey data, and variables for interpersonal communications in CMC. The list of variables includes text- and avatar-based nonverbal cues associated with interpersonal communications such as emoticons, laughing, or celebrating (see Appendix A). The project was conducted to identify and understand online behavior and communication variables needed for making claims regarding offline personal and behavioral characteristics. In this study, researchers found that online behavior and communicative acts are possible identifiers for offline characteristics such as education, age, gender, and social conformity (Reene et al., 2012, p.104-109). For example, Reene et al. (2012) states the act of jumping in digital environments is one of the most powerful indicators of offline characteristics, as young males jump around the environment more frequently, and even more when they score high on leadership characteristics. Based on the SCRIBE results, it is clear nonverbal cues are used frequently online, and a person's offline behavioral and personal characteristics are influencing factors in their actions in online digital environments.

In all, interpersonal communications in CMC are used to manage relationships, and self-disclosure and nonverbal cues are important to this interpersonal communications process. Research in CMC is continuing to examine offline and online factors influencing people and their engagement in these interpersonal communications.

2.4 Self-Disclosure

In communication research, self-disclosure is an important concept to the interpersonal communication process. Self-disclosure is defined as, "the act of making new or secret information about yourself known to others" (Walton & Rice, 2013, p. 1465). When an individual uses a self-disclosure statement, they are expressing their identity with personal

information to another person, and this act is useful in developing relationships. Walther (2008) argues, "disclosure increases intimacy in traditional relationships… and it is a verbal behavior that we all recognize as a means to and reflection of relationship development" (p. 399). Self-disclosure is then a self-generated message created to represent an aspect of an individual's identity in interpersonal communications.

Stewart (2006), argues effective self-disclosure is characterized by being focused on the present, sharing feelings as well as facts, containing breadth and depth, and must be cooperative and reciprocal at the early development of relationships. Self-disclosure is useful in getting to know the collaborators involved in interpersonal communications, identifying common goals, and working together to solve those common goals (Stewart, 2006). Stewart (2006) states, "a relationship grows and develops as two people become more open about themselves to each other. *If you cannot reveal yourself, you cannot become close to others, and you cannot be valued by others for who you are"* (p. 242, author emphasis included). Self-disclosure is a concept necessary for meaningful interpersonal communications by sharing identity and personal information, online or offline. Stewart (2006), states self-disclosure is beneficial to relationships as sharing intimate personal information helps improve the quality of relationship, as well as to fulfill a human need to be known and accepted. According to Joinson (2001) and Walther (2008), CMC provides the visual anonymity necessary to make individuals more inclined to sharing intimate information about themselves to make up for a lack of nonverbal cues which would normally carry expressive communicative information in face-to-face interactions. The lack of visual cues results in self-disclosure being an ideal relational or social cue for sharing personal information in computer-mediated interpersonal communications.

Aside from self-disclosure, there are few ways for an individual to share personal information about themselves in the absence of nonverbal cues typical of face-to-face communications (Walther, 2008). In a study comparing email to face-to-face communication in relation to performing a task, Walther (1996) found people used more self-disclosing statements in online communications when compared to face-to-face communication, showing how important self-disclosure statements are in CMC to developing relationships. In another study on impersonal, interpersonal, and hyperpersonal communications online, CMC interactions were more effective when using intimate social exchanges (Tidwell & Walther, 2002). Self-disclosure statements are used frequently, and are shown to be effective in interpersonal communications, thus being an important concept in computer-mediated interpersonal communications. Walther (1996) concluded that, "CMC language indicated less stress, greater expression of feelings, more positive evaluations of others and self, and more frequent reference to interpersonal issues" (p. 31). From his conclusion, Walther shows digital environments are ideal for studying self-disclosure in interpersonal communications, as they present more frequent expressions of self-disclosure for analysis with nonverbal relational cues.

2.5 Nonverbal Social Cues

Nonverbal social cues are important to CMC research, because they carry significant expressive communication cues for individuals in visually anonymous environments. Nonverbal cues manifest in several ways, such as facial expressions, body language, and interpersonal space (Walther, 2008). Stewart and Logan (2006) argue there is a spectrum between, "Primarily Verbal" and, "Primarily Nonverbal" forms of communications (p.117). Primarily Verbal communications are classified as written words, while Primarily Nonverbal communication involves gestures, facial expression, eye gaze, touch and space (Stewart & Logan, 2006). In

between these two primary methods of communication is a form Stewart and Logan (2006) refer to as *mixed*, where vocal pacing defines communicative acts, pause, loudness, pitch, and silence. According to Stewart and Logan (2006), nonverbal cues such as gestures and movements can show the relationship between communication participants by displaying dominance or submission through body positions. Briton and Hall (1995) show nonverbal cues include smiling and laughing, and can share relational information such as pleasure, cheerfulness, and congeniality. Though, nonverbal cues such as laughter are complex, because they can also signal nervousness, submission, or appeasement (Briton & Hall, 1995). It is clear, in digital environments such as WoW, individuals have many methods for digitally representing gestures, facial expressions, and movements through avatars, and sharing messages with text-based nonverbal cues.

Nonverbal cues are important to digital environments where visuals are noticeably absent when compared to face-to-face communications. Walther (2008) argues that people make first impressions based on the physical appearance of another individual offline, and the absence of these nonverbal cues in digital environments present an obstacle for an individual to overcome. Walther (2008) argues, "it is possible that a variety of nonverbal cues or cue combinations can convey a particular function" (p. 394). Nonverbal cues used in digital environments such as WoW, are expressive forms of communication where people communicate feelings and emotional expressions (Canary, Cody, & Manusov, 2006). Scholars argue nonverbal cues are relational messages that give individuals information about how to relate to others, and in these relational messages people share intimate information about themselves (Canary, Cody, & Manusov, 2006). Nonverbal cues as social messages reflect the present state of a relationship, or change a participant's relationship (Canary, Cody, & Manusov, 2006). Nonverbal cues are

expressive forms of communication sharing relational information, and relationships between self-disclosure and nonverbal cues are examined as communicative acts, with the ability to influence relationships positively or negatively. Bente, Kramer, and Eschenburg (2008) show CMC includes avatar-mediated communications (AMC), and this narrower definition more accurately describes environments where an individual's access to nonverbal cues are similar to cues in offline interpersonal communications, because they use avatars.

Outside of the nonverbal cues present in AMC, one of the most recognizable forms of nonverbal cues in digital environments is known as *emoticons*. Emoticons represent facial expressions in text, such as a smile or frown. For example, a frown is depicted as, :(where as a smile is shown as :). These types of nonverbal cues reflect a more intimate expression of social information exchange, which is consistent with the motivations to use self-disclosure statements. Table 2.1 shows the types of avatar- and text-based nonverbal cues common in AMC.

Table 2.1 Types of Nonverbal Cues in Digital Environments

Cue type	Online manifestation	Example of online manifestation
Avatar-Based Nonverbal Cues	Visual Cues Online, Gestures, Movements, Jumping.	Avatar appearance, height, attractiveness, Gestures, Movements, Jumping.
Text-Based Nonverbal Cues	Words in Texts or text that displays a nonverbal communicative act. Emoticons, laughter, exclamation points, ellipses.	(Groans) (Avatar X is waving), lol, haha, :) :P :-), …, !

Nonverbal cues in AMC are constantly changing because they are complex, collaborative, and important to developing relationships between individuals. Nonverbal cues help understand the dynamic methods and technology in AMC, and this unique environment is useful in understanding relationships between expressive communicative acts.

Walther's (2008) SIPT provides the necessary perspective to view the differences that are important to consider when looking at digital environments as the medium for the communication process. Walther (2008) argues social information translated into verbal and textual symbols in digital environments must be considered to properly understand the communicative characteristics of the environment. Walther (2008) recognizes the limitations of the environment compared to face-to-face communications, and argues that a central argument of SIPT is the recognition of the different rates at which information is exchanged in CMC. Walther's (2008) SIPT is a useful perspective from which interpersonal communications can be analyzed over time to understand the factors influencing, either positively or negatively, relationship development and maintenance in AMC.

2.6 Self-Disclosure and Nonverbal Cues in Digital Environments

Understanding the basics of interpersonal communications online and offline shows the communicative acts, self-disclosure and nonverbal cues, are essential to effective interpersonal communication in digital environments, because these concepts are crucial in the social information exchange and impression forming process online (Walther, 2008; Joinson, 2001; Canary, Cody, & Manusov, 2006). Analysis of modern multiplayer games discovered game characteristics have a wide range of form and content in mediated interpersonal communication, and this is built into gameplay and recognized by players (Klimmt & Hartmann, 2008). The processes of social information exchange and online impression formation are important to developing and maintaining relationships online, and AMC environments such as WoW are the ideal environments for examining the role of self-disclosure and nonverbal cues because of their ability to capture and transcribe communicative events in real-time. According to Klimmt and Hartmann (2008), modern digital environments, such as WoW, provide text- and avatar-based

communications as a strategy for players to interact, and players try to assume real-world

interpersonal communication characteristics. This means, In WoW, messages composed by a

player temporarily display on the screens of all players and others can then "hear" the one

"talking" (Klimmt & Hartmann, 2008). In all, digital environments such as WoW are valuable

resources for research in computer-mediated interpersonal communications to capture a player's

use of self-disclosure statements and text- and avatar-based nonverbal cues. The communicative

acts captured, are ideal for systematic analysis of the interpersonal communication process in

AMC.

2.7 Summary and Hypothesis

Using concepts of SIPT and literature on AMC, this study examines relationships

between self-disclosure and 15 specific nonverbal cues in WoW with two main objectives for

contributing to future theory and research. These objectives further the understanding of when

and how individuals perform the communicative acts, self-disclosure, and nonverbal cues, in

AMC environments. The two goals in contributing to the literature and theory are:

1. To explore the relationship between two primary concepts of interpersonal communications, self-disclosure and nonverbal cues, in online, avatar-based interactions (Walther, 2008; Joinson, 2001; Bente, Kramer, & Eschenburg, 2008).

2. Apply research in nonverbal cues and self-disclosure to expand on the SIPT model and examine expressive communications between players developing and maintaining new relationships in AMC (Walther, 2008; Joinson, 2001).

To achieve these objectives, this study used a content analysis for self-disclosure in chat

logs from a secondary dataset collected in the SCRIBE project. Current literature identifies

nonverbal cues and self-disclosure as important variables in AMC, but falls short of considering

relationships between the concepts, and their manifestations in interpersonal communications.

This study identifies self-disclosure statements in the SCRIBE chat data, and examines

relationships between them and nonverbal cues (collected in the SCRIBE project) in AMC's.

Pearson correlations and linear regressions are used to examine relationships. The research question guiding this study is:

R1: What is the relationship between self-disclosure and nonverbal social cues in digital environments?

Modern literature shows digital environments such as WoW, include self-disclosure statements and nonverbal cues as common methods for sharing relational information and are important to interpersonal communication (Walther, 2008; Joinson, 2001; Bente, Kramer, & Eschenburg, 2008). Therefore, self-disclosure statements and nonverbal cues are examined to find relationships.

This study presents the following hypothesis:

Hypothesis I: When people use more self-disclosure statements, they also use a high quantity of the following 15 nonverbal expressions, Ellipses, Exclamation Points, Sequential Exclamation Points, Emoticons, Laughter, Jumps, Celebratory Gesture, Conventional Opening Gesture, Sad/Confused Gesture, Flirt Gesture, Funny Gesture, Agree Gesture, Smile Gesture, Other Gesture, and Aggressive Gesture, compared to people who use fewer self-disclosure statements.

CHAPTER 3. METHODS

3.1 Data Source: The Scribe Project

To research relationships between self-disclosure statements and nonverbal cues in CMC, this study used a content analysis on a secondary dataset from the SCRIBE project (Reene, et al., 2011). This data consists of complete chat transcripts, movement logs, and survey responses from 376 participants in the avatar-mediated digital environment, WoW. The SCRIBE data were the product of a multi-million-dollar research project conducted over three years, thus providing high-quality sources of data in a mainstream avatar-mediated digital environment. A content analysis of these secondary data is cost- and time-effective, but can yield significant results. Becker (2003) argues secondary data analysis is useful in developing theory, and in providing a deeper understanding of social processes. Analyzing SCRIBE data is useful in understanding relationships between nonverbal cues and self-disclosure statements as communicative acts in digital environments.

The SCRIBE study aimed to identify behavioral indicators in virtual worlds and determine whether they are predictive of real world characteristics such as gender, education, age, and leadership. It focused on providing an, "authentic game-play experience for participants while allowing for controlled and rigorous data collection" (Reene et al., 2011, p.9). Data from the SCRIBE study were gathered using a mixed methods approach by giving pre- and post-session surveys online, logging and observing participant behavior in virtual worlds during research sessions, and qualitative interviews with participants. To make data collection rigorous and game-play authentic, SCRIBE researchers developed custom game environments in the virtual worlds of Second Life and WoW.

3.2 Recruitment and Sample

Recruitment for the WoW portion of the SCRIBE study was conducted using Twitter, Facebook, and WoW forums, where players answered screening questions to determine eligibility (over 18 years old, at least six months playing WoW, not incarcerated) before filling out a 30-minute online survey. From those who completed the survey, participants were selected for availability and gender balance to participate in sessions.

It is important to recognize that the 376 participants who completed the SCRIBE research session have at least six months of experience in digital environments, and are therefore experienced in using digital environments to conduct interpersonal communications. Participants are experienced with common communication techniques in WoW, and are therefore ideal candidates to research interpersonal communications in AMC, as they do not have to learn the medium before interacting with others. Among the SCRIBE WoW participants, 87% considered themselves "gamers" and 71% of them play WoW at least three to five days per week. They had at least six months' experience in WoW, and 85% had been playing for at least four years (Reene et al., 2011). Participants are experienced at communicating in WoW, and able to participate in interpersonal communications with teammates without the limitations inherent to learning a new medium first. When new to a medium, participants have to learn more about the environment, and often take more time in being comfortable in the environment, before they utilize all the communicative abilities possible in an avatar-mediated environment. This means, because SCRIBE participants can perform gestures and other nonverbal cues, without the need for a tutorial on the space first, they are able to engage with one another immediately. Participants can freely use these norms as they would in normal gameplay, making it easier and more accessible.

The SCRIBE sample was 57% male, 43% female, with an average age of 29 years old (ranging from 18 to 59 years). They were 82% white, and 84% had completed at least some college. They used the internet at least once a day on average, and had an average of 4 years' experience in WoW.

3.3 Procedures

SCRIBE research sessions were conducted between January and April of 2012. There were 100, three- to four-person WoW groups, resulting in a total of 376 participants. The SCRIBE study instructed participants to create a new avatar and join a researcher in the WoW digital city of Dalaran. In this digital environment players were tasked with examining buildings and Non-Player Characters (NPCs), by clicking and exchanging objects to solve puzzles, and working together to complete the quest. The narrative of the session tasked participants with searching for a group of NPCs planning to destroy the digital city. Upon arrival, participants were greeted by a researcher who activated the study-specific in-game add-ons, so quest information was provided to the participants, and chat, clicks, and movement data were recorded. One researcher then accompanied participants through the challenges to provide help if needed, but interacted as little as possible with the participants. Other researchers observed unseen to take notes on the session.

After taking the 30-minute online survey, participants were assigned to groups of three to four, where participants did not know one another, and assigned a session time. SCRIBE researchers developed a custom graphical user interface with the game's add-on abilities to control the information participants saw. The interface provided quest and task information, custom buttons to click for accessing game information, and provided cut scenes and screen text

to communicate the game participants played during their sessions. This custom interface also logged participants' chat, clicks, and movements.

Figure 3.1. Screen Capture of In-Game Experience: Participants saw WoW quest windows like this one, along with custom interface buttons (upper right) used to interact with quest events in the SCRIBE study.

3.4 Scribe Variables and Coding

The SCRIBE study is the source of the secondary data, and contains 38,595 of lines of chat from participants using avatars in the digital environment, WoW. The dataset includes logs of click and movement data for each participant during their sessions (Reene, et al., 2011).

Following the completed SCRIBE research sessions, logged data were used in a content analysis for, "type of utterance" using a computer-based 2D annotation tool, the Reynard Annotation Tool (RAT), specifically developed for the project. Machine coding was also used to count occurrences of chat features such as punctuation, emoticons, capital letters, and movement variables such as entering buildings first, proximity to others, and avatar gestures such as waves

30

or bows. The SCRIBE chat codebook included over 20 categories and was based on Searle's (1969) and Austin's (1962) theoretical discourse principles, and on prior research projects in communications (Stromer-Galley et al., 2007). SCRIBE chat variables included, for example, emoticons, avatar-based gestures, laughter, and exclamations points (see Appendix A).

3.5 Measurement of Variables

This secondary data analysis provided coded nonverbal cues as a variable of interest. These coded nonverbal cues include the frequencies and categories of various nonverbal cues such as emoticons, exclamation points, and laughter. These nonverbal cues were previously measured in the SCRIBE project, so they will be used to examine relationships between nonverbal cues and the variable of interest in the new content analysis, self-disclosure, which is discussed in later in this section. Table 3.1 is a complete list of all text-based nonverbal cues and communicative acts captured in the SCRIBE project, which is used in analysis with self-disclosure statements.

Table 3.1 Text-Based Nonverbal Variables

Variable	Source	Reliability; Precision/Recall	Description
Ellipses	Chat logs	R: 1.0 P: 1.0	The count of ellipses a player uses per session.
Exclamation Points	Chat logs	R: 1.0 P: 1.0	The count of exclamation marks a player uses per session.
Sequential Exclamation Points	Chat logs	R: 1.0 P: 1.0	The count of sequential exclamation marks a player uses per session.
Emoticons	Chat logs	R: 1.0 P: 1.0	The count of emoticons, e.g. :) 0.0 :x, a player uses per session.
Laughter	Chat logs	R: 1.0 P: 1.0	The count of laughter, e.g. haha lol rofl, a player uses per session.

Table 3.2 provides a complete list of the avatar-based nonverbal cues used in this study for Pearson correlations and multiple regression analysis. In all, 15 nonverbal cues are collected and analyzed with self-disclosure statements.

Table 3.2 Avatar-Based Nonverbal Data

Variable	Source	Reliability; Machine Calculated	Description
Jumps	Session Data	-	The count of the act of jumping in session.
Celebratory Gesture	Chat logs	-	The count of nonverbal cues expressing celebration, e.g. applause, dancing.
Conventional Opening Gesture	Chat logs	-	The count of nonverbal cues expressing conventional communication opening, e.g. waving, greet, introduce.
Sad/Confused Gesture	Chat logs	-	The count of nonverbal cues expressing sadness or confusion, e.g. frown, puzzled, weep.
Flirt Gesture	Chat logs	-	The count of nonverbal cues expressing filtration, e.g. flirting, kissing, blush.
Funny Gesture	Chat logs	-	The count of nonverbal cues expressing humor, e.g. burp, chicken, pick nose.
Agree Gesture	Chat logs	-	The count of nonverbal cues expressing agreement, e.g. agree, nodding.
Smile Gesture	Chat logs	-	The count of nonverbal cues expressing smiling or happiness, e.g. chuckle, grin, excited.
Other Gesture	Chat logs	-	The count of nonverbal cues expressing other gestures, e.g. sleep, blink.
Aggressive Gesture	Chat logs	-	The count of nonverbal cues expressing aggression, e.g. growl, anger, mad.

Table 3.3 includes all participant characteristics used in this study, and collected in the

SCRIBE project. A total of 10 demographic characteristics were collected from the SCRIBE

project, and analyzed with self-disclosure statements.

Table 3.3 Participant Characteristics

Variable	Source	Description
Chat Lines	Chat logs	The count of Chat Lines a player uses per session.
Age	Pre-Survey	Asked age and date of birth (no differences found).
Gender	Pre-Survey	Asked gender and gender at birth (no differences found).
Education	Pre-Survey	10-point answer from "Less than high school" to "Doctorate."
Vocabulary Size	Chat Logs	Count of unique words a player uses in a session.
Group Size	Session Data	Number of players in a group.
Social Conformity	Post-Survey	Average score on 2 items for Social Conformity.
Introvert Characteristics	Post-Survey	Average score on 10 items for extrovert/introvert characteristics.
Voted Leader	Post-Survey	Participant was voted the leader by the group.
Internet Experience	Pre-survey	Average score of 10 reliable items for Internet Experience.
Player Had Fun	Post-Survey	Participant reported the research study as, "fun."

3.6 Scribe Validity and Reliability

Human coding was validated by using a 10% sample and all variables analyzed by SCRIBE researchers reached at least a reliability alpha of .70 using Krippendorff's Alpha. Machine-based annotation for the SCRIBE content analysis meets the standards of reliability by matching results from a randomly selected sample of sessions where human annotators and machine annotations coded the same sessions. If any significant differences appeared between the two annotation methods, the lexicon and computer scripts for the machine-annotation were re-evaluated to meet a threshold of 80% agreement. The final level of agreement for the machine-based annotation and human annotators exceeded 90% for nearly all counts.

External validity for the SCRIBE study comes from the conceptual argument that the experiences in the study are consistent with the experiences outside of the study. The SCRIBE project focused on providing an, "authentic game-play experience for participants while allowing for controlled and rigorous data collection" (Reene et al., 2011, p.9). To make data collection rigorous and game-play authentic, SCRIBE researchers developed custom game environments in

the virtual worlds of Second Life and WoW. The participants were involved in groups and task-based challenges consistent with the experience individuals would have in WoW game-play, outside this study. Participants were filtered during recruitment to ensure they were experienced with the digital environment, and therefore participants were comfortable engaging in the environment.

Internal validity was established by using very strict protocols to protect the study from confounding variables. These strict protocols were implemented in recruitment, and the research study, where all participants experienced the same challenges.

The SCRIBE research study has several assumptions regarding participants and the research study design (Reene et al., 2011).

1. Participant behavior is consistent.
2. Participants were relying on text chat for communication.
3. Participants are using their avatar.
4. There were not radically biased responses to our recruitment.
5. People were largely honest on the surveys.
6. Context matters.
7. People treat each other as actual humans.
8. People invest in their participation in these spaces.

3.7 Content Analysis for Self-Disclosure

The chat transcripts gathered from the SCRIBE study are coded in a content analysis to identify instances of self-disclosure as a main variable of interest. Content analysis examines text in a systematic, objective, and quantitative manner (Wimmer & Dominick, 2011). Neuendorf (2002) argues content analysis is a commonly used method to analyze computer text content as the availability of computer analysis has grown, and the content is easily stored in archives. Content analysis cannot be used to make claims regarding variables outside of the rigid definitions of self-disclosure statements and nonverbal cues used in this research, as the method

is limited to the framework already established in the mutual exclusivity of the main variables (Wimmer & Dominick, 2011).

Compared to surveys and interviews where participants rely on memory to provide data for analysis, content analysis is the ideal method for this study because it examines physical chat communication directly, instead of relying on self-reported memories of self-disclosure. The chat transcripts from SCRIBE research sessions are useful in a content analysis because the rigidity of the codebook allows the researcher to systematically analyze each piece of text objectively, and with surrounding context. However, with the SCRIBE study's limited sample size ($N = 376$) and non-random recruitment, results are not generalizable to a broader population. However, the 12,555 sample lines of chat examined for this study will explore ways self-disclosure and nonverbal cues are related in virtual environments, an examination that has not been previously researched in-depth.

The content analysis of the SCRIBE secondary data identified the frequency of self-disclosure statements in an individual's WoW chat transcripts. Wimmer and Dominick's (2011) steps in content analysis will be used as a guideline for maintaining objectivity and following the scientific method. Table 3.4 provides a description of the key steps in developing and conducting a content analysis, and how these steps were conducted in the present study.

Table 3.4 Content Analysis Steps in This Study

Content Analysis Steps	Steps Followed in Study
Formulate hypothesis.	When people use more self-disclosure statements, they also use a high quantity of the following 15 nonverbal expressions, Ellipses, Exclamation Points, Sequential Exclamation Points, Emoticons, Laughter, Jumps, Celebratory Gesture, Conventional Opening Gesture, Sad/Confused Gesture, Flirt Gesture, Funny Gesture, Agree Gesture, Smile Gesture, Other Gesture, and Aggressive Gesture, compared to people who use fewer self-disclosure statements.
Define the study's universe.	The universe for this study is interpersonal communications in avatar-mediated digital environments.
Define sample from population.	Gather 30% sample of chat transcripts recorded during the SCRIBE research sessions conducted in WoW.
Define the unit of analysis.	A single line of chat for each individual. Referred to as a 'turn'.
Construct content categories for analysis.	Self-disclosure is mutually exclusive as it fits in only the definition in the VISIOS codebook.
Create system for quantification.	The level of data measurement is nominal, as the frequency of instances of self-disclosure will be counted.
Train coders.	Coders were trained using the VISIOS codebook, and intercoder reliability was calculated after the Pilot study was conducted to insure the study is reliable.
Conduct pilot study.	Pilot study was conducted by coding a 10% subsample of the English WoW chat transcripts to establish the coders and coding scheme is reliable.
Use created definitions to code the content.	VISIOS codebook was used to code the 30% sample of SCRIBE chat transcripts for self-disclosure statements.
Data analysis.	Pearson correlations determined relationship between self-disclosure and nonverbal social cues. Regressions show predictive power.
Form conclusions.	Conclusions are drawn from the relationships between the variables of interest. Conclusions show how these results are important for interpersonal communication research in digital environments.

Finally, for the content analysis, this study uses a codebook established to ensure reliability and validity. The codebook for the content analysis was developed as part of another study, VISIOS, to identify self-disclosure in online environments (See Appendix B).

3.7.1 Data Collection and Management

Data collection for this study included gathering all the SCRIBE chat transcripts and storing them on a local hard drive. A random number generator provided a total of 30 random numbers between 1 and 100 to create a 30% sample of the data. Each of the 30 sessions were separated into new Microsoft Excel files. The sample was separated by session, because the self-disclosure codebook relies on situational context to identify instances of self-disclosure. As opposed to conducting the study using chat lines to draw the sample, it would have 12,555 lines of chat, and miss the context surrounding those chat lines. Having a sample of research sessions included the surrounding context in the communication process, and the total instances of self-disclosure for each participant were combined with the original SCRIBE data, at the avatar level. The SCRIBE chat transcripts were in Microsoft Excel files, and were complete with avatar names and coded instances of nonverbal cues. Session numbers correlated to the random numbers generated, and those chat transcripts were separated to create new, separate chat transcript files. New columns were added to these session-separated chat transcripts so participant level self-disclosure data could be added to the SCRIBE data. Once all 12,555 lines of chat were coded, they then were combined into a new single file, where each line had specific participant level data. This participant level data was then imported to SPSS for analysis. The unique identifying information for the participants were removed before data was shared with the researcher for coding, so only avatar names, chat lines, nonverbal cues, and survey responses remain.

3.7.2 Measurement of Variables

Self-disclosure statements and nonverbal cues such as emoticons, gestures, and exclamations were variables in the content analysis. The SCRIBE project coded nonverbal cues

in chat transcripts, and self-disclosure was measured using the definitions in the VISIOS codebook (see Appendix B). Self-disclosure must be considered as a statement revealing personal information, and disclosing fleeting emotions was not considered self-disclosure. For example, declarations of "liking" something such as a musician, movie, or food, are considered fleeting emotions, and thus the feeling is subject to quickly change. Revealing personal information such as location, occupation, or declaration of knowledge or familiarity with a subject were thus considered self-disclosure because this personal information is more established than the fleeting feelings. From this definition, lines of chat were either coded as a 1 (self-disclosure statement) or a 0 (without a self-disclosure statement). Self-disclosure statements were then totaled for each participant, giving a single value of their frequency of using self-disclosure at the participant level.

This study's analysis is on self-disclosure statements and nonverbal cues identified in the SCRIBE secondary dataset. The SCRIBE dataset includes counts and categories of various nonverbal cues such as emoticons and gestures. These nonverbal cues were used in Pearson correlations, multiple linear regressions, and hierarchical regression analysis to explore relationships between variables.

To code the chat in the SCRIBE dataset, the study used the VISIOS self-disclosure codebook I developed with a team of researchers looking at self-disclosure in different digital media (see Appendix B). The codebook was developed based on the work of Tidwell and Walther (2002), and Joinson's (2001) content analysis on computer-mediated communication effects on self-disclosure. The coding schemes produced for these two studies define self-disclosure (see Appendix B).

For the purposes of this coding, self-disclosure is considered the expression of some aspect

of a person's identity that is new or unknown to others. The coding rules place emphasis on the

disclosure aspect, in which there may be something secret or personal about the person. The

focus is on statements that express their relationship to an identity or social category, as well as

historical and current demographic and biographical information. Coding emphasizes acts of

disclosing information or experiences that may be somewhat unique or have some risk or

vulnerability for that individual and that are enduring (rather than fleeting), and that express

behaviors that indicate someone's identity. Self-disclosure codes do ***not*** include statements that

express a person's tastes or preferences, such as, "I like Kanye." If they elaborate on that

preference, such as describing how frequently they listen to Kanye or the concerts they have

been to or songs they own, then the statement does get coded as self-disclosure, as they have

shared a greater level of relational information.

Each line of chat is coded as a "turn," which is classified as, "when a participant hits the

enter key to submit their message to the software system for another person to see" (see

Appendix B). The variable resulting from this coding is a single instance of self-disclosure.

Examples of self-disclosure are bolded below:

> *Callet.Visios: what is your academic year?*
> ***Yeris.Visios: senior yours?***
> ***Callet.Visios: junior***
> *Yeris.Visios: what are you studying*
> ***Callet.Visios: Political Science***
> ***Yeris.Visios: same***
> *Callet.Visios: oh nice!*

For the content analysis of self-disclosure, intercoder reliability was determined between

two coders (one coder was the researcher). The pilot study consisted of three randomly selected

sessions (10% subsample), and had a total of 1,044 chat lines. Agreement was calculated using

Krippendorff's alpha in SPSS and reached $a = .71$ (Hayes & Krippendorff, 2007). After reaching

intercoder agreement, the 30% sample (30 sessions) was separated by session number and placed in new Microsoft Excel files, and independently coded for self-disclosure. After the 30% sample was coded, the self-disclosure statements for each avatar were totaled. To analyze self-disclosure with nonverbal cues in the SCRIBE data, each avatar's self-disclosure statements were converted to participant-level data (i.e., each row represented one participant) and integrated with the SCRIBE dataset.

3.8 Content Analysis Validity and Reliability

The codebook developed for this project, based on the work of Walther (2002) and Joinson (2001), was refined through a series of meetings among team members to ensure reliability and effective codes during the VISIOS project, for which this codebook was developed. In the VISIOS study, three coders reached intercoder reliability on a 10% subsample with a Krippendorff's $a = .85$ for self-disclosure. Intercoder reliability was established for the current content analysis between the researcher and one other coder with $a = .71$.

In the post-session survey for the VISIOS study, participants were asked to report their use of self-disclosure during the session. When compared with coded instances of self-disclosure, a significant correlation was found at .402 ($p < .01$). These results show participants who self-report they disclosed more information about themselves moderately correlate to the content analyzed self-disclosure. This means internal validity was confirmed, when participants say they disclosed information about themselves during the research session, coders agree by finding instances of self-disclosure for that participant. Due to this positive correlation, the VISIOS codebook is coding for self-disclosure in online chat transcripts. Thus, the codebook is an instrument that is measuring what it is supposed to measure, and confirms internal validity for the content analysis codebook.

The face validity of this content analysis for self-disclosure starts with describing the concept as clearly and concisely as possible. For example, the following statement is from the self-disclosure codebook, "I don't have much experience with online social spaces, do you?" This example of self-disclosure is consistent with the primary definition for self-disclosure in the codebook, defined there as "the act of making new or secret information about yourself known to others" (see Appendix B).

Participants are tasked with a quest similar to those normally found in WoW, and produce chat transcripts in these normal settings. Chat transcripts in a research study with settings and player conditions parallel to everyday settings in WoW properly assesses external validity. This study is confined to the limitations of the medium because the results of the study are only applicable to digital environments with avatar-mediated interpersonal communications.

This study further assessed internal validity by identifying extraneous variables, or artifacts (Wimmer & Dominick, 2011). Researcher bias is an artifact that is carefully examined in this study, where the primary method is a content analysis, where the ideal guidelines of being systematic, objective, and quantitative are followed to ensure research bias is minimal. To account for confounding variables and reach internal validity, the content analysis steps reported earlier, were strictly followed to ensure protocols were objective.

3.9 Hypothesis Testing and Data Analysis

To test the hypothesis, Pearson correlations were used to identify simple relationships between coded instances of self-disclosure and the nonverbal cues measured in the SCRIBE dataset. Multiple regression analysis determined which nonverbal cues had a significant predicting power for self-disclosure statements, and further explored relationships beyond correlations. Hierarchical regression analysis held demographic characteristics constant, and

explored relationships between nonverbal cues and self-disclosure statements, to see if

demographic characteristics masked relationships.

CHAPTER 4. RESULTS

This study examined interpersonal communications in CMC to identify relationships between self-disclosure statements and nonverbal cues. This thesis tested the hypothesis, *When people use more self-disclosure statements, they also use a high quantity of the following 15 nonverbal expressions, Ellipses, Exclamation Points, Sequential Exclamation Points, Emoticons, Laughter, Jumps, Celebratory Gesture, Conventional Opening Gesture, Sad/Confused Gesture, Flirt Gesture, Funny Gesture, Agree Gesture, Smile Gesture, Other Gesture, and Aggressive Gesture, compared to people who use fewer self-disclosure statements.* This hypothesis is tested on 15 different nonverbal communication variables, and the results are adjusted using Bonferroni adjustments to account for multiple tests.

To begin, this chapter presents descriptive statistics of the participants to understand the demographics. Then, the results of the content analysis reliability testing show intercoder agreement. First, it presents descriptive statistics of self-disclosure, and 15 variables reflecting nonverbal communication that were part of the original SCRIBE dataset. Then correlations examine the relationships between self-disclosure and each of these nonverbal behaviors. Finally, regressions are used to examine those relationships taking demographic and game experience factors into account.

4.1 Variables

The findings of this study are based on a content analysis of 30 (of 100) randomly selected research sessions from the SCRIBE project. The 30 randomly sampled research sessions contained the chat transcripts for 114 (of 376) individuals, and 12,555 (of 38,595) chat lines. Participants have at least six months of experience in digital environments, and 85% had been

playing for at least four years. The 30% sample consisted of 62% men, and 37% women, which is consistent with the full SCRIBE dataset, which had 57% men and 43% women. The remaining demographic descriptive statistics are shown in Table 4.1, and this table showed the 30% sample for this study is parallel to the full SCRIBE dataset.

Table 4.1 Sample and Census Demographic Descriptive Statistics

	Sample Mean	SCRIBE Mean	Sample SD	SCRIBE SD	Sample Min	SCRIBE Min	Sample Max	SCRIBE Max
Chat Lines	87.52	82.04	45.64	43.68	21	12	224	248
Age	29.32	28.79	8.95	8.55	18	18	57	59
Education	3.65	3.70	1.36	1.48	1	1	7	10
Vocabulary Size	249.42	248.94	107.32	109.29	63	59	498	732
Group Size	3.84	3.73	.37	.49	3	1	4	4
Social Conformity	2.83	2.82	.80	.81	1.30	1.00	4.80	5.80
Introvert Characteristics	3.01	2.96	.61	.72	1.60	1.10	4.40	5.00
Voted Leader	1.11	1.12	1.35	1.44	0	0	5	5
Internet Experience	2.68	2.70	.53	.56	1.45	1.18	4.00	4.00
Player Had Fun	2.23	2.32	.97	.95	1	1	3	3

Overall, nearly all (92%) participants used self-disclosure statements. Self-disclosure statements per session are close to normally distributed, although somewhat left skewed (skewness = 1.096; kurtosis = .823), but were relatively infrequent (M = 2.56, *SD* = 1.99 per session). Self-disclosure statements per utterance were also calculated by dividing total instances of self-disclosure by total chat lines entered by the participant (M = .034, *SD* = .028). That per utterance variable is also close to normally distributed (skewness = 1.58; kurtosis = 3.16). The minimum number of self-disclosure statements was 0, and the maximum was 9, in a single

session. Per utterance, self-disclosure statements had a minimum of 0, and a maximum of .15. A

visual representation of self-disclosure statements per session is presented in Figure 4.1.

Figure 4.1 Histogram of Self-Disclosure Statements per Session
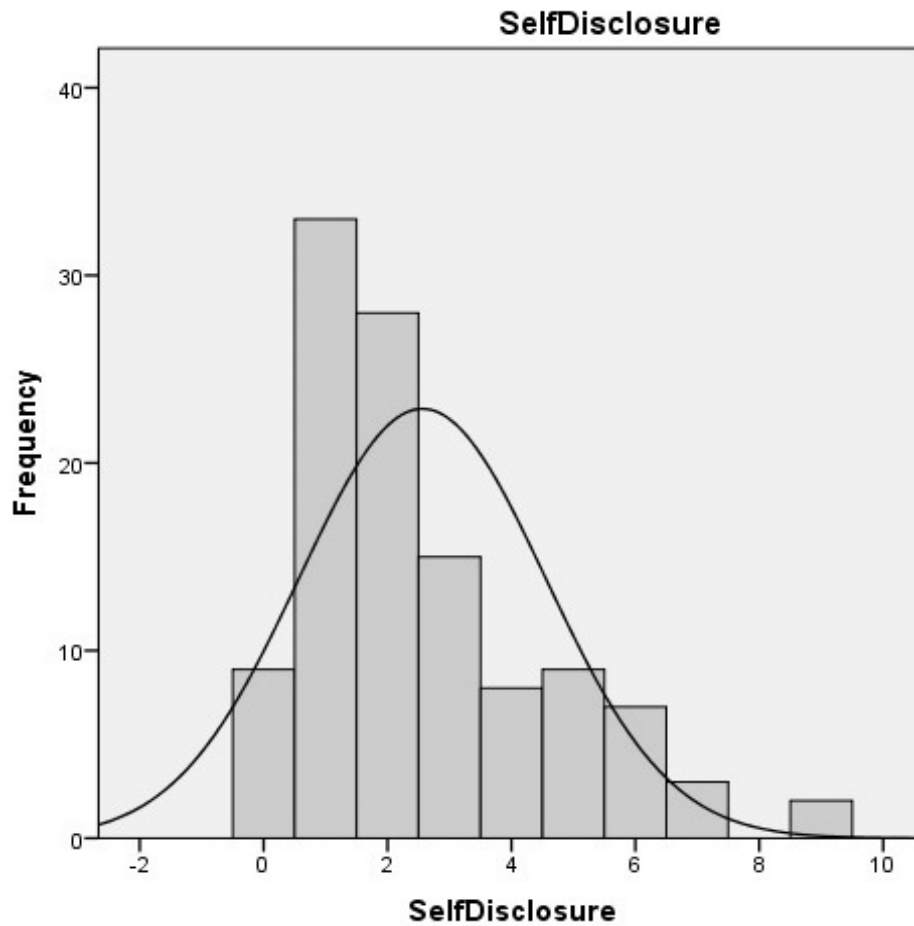
Hypothesis testing on relationships between self-disclosure and nonverbal cues were performed using Pearson correlations. For these, per utterance measures (total instances in the session divided buy total chat lines by the participant) were calculated. This approach provided a ratio figure representing a participant's use of communicative acts relative to other participants.

Table 4.2 shows the descriptive statistics of all nonverbal cues *per session*: mean, standard deviation, minimum, and maximum in the sample used for analysis.

Table 4.2 Descriptive Statistics: Nonverbal Cues per Session

	Mean	Std. Deviation	Min	Max
Jumps	97.1	131.34	0	710
Laughter	5.56	5.80	0	36
Emoticons	5.28	7.1	0	40
Exclamation Points	5.24	6.32	0	37
Ellipses	4.34	6.51	0	50
Conventional Opening Gesture	3.11	2.52	0	17
Celebratory Gesture	2.80	3.02	0	20
Other Gesture	1.05	1.25	0	5
Flirt Gesture	.90	1.23	0	6
Funny Gesture	.79	1.45	0	7
Agree Gesture	.57	1.28	0	9
Sad/Confused Gesture	.54	.89	0	4
Aggressive Gesture	.35	.70	0	4
Smile Gesture	.32	.70	0	3
Sequential Exclamation Points	.18	.63	0	4

Table 4.3 shows the descriptive statistics for all nonverbal cues *per utterance*. The most common nonverbal cues used, in both session totals and per utterance, were Jumps, Laughter, Emoticons, Exclamation points, and Ellipses. The means of self-disclosure statements and nonverbal cues, showed self-disclosure statements were used less frequently than text-based nonverbal cues, but more than avatar-based nonverbal cues. Only two avatar-mediated gestures were used more than self-disclosure: Conventional Opening Gesture, and Celebratory Gesture. After Celebratory Gestures, there is a relatively significant drop in nonverbal cue use.

Table 4.3 Descriptive Statistics: Nonverbal Cue per Utterances

	Mean	Std. Deviation	Min	Max
Jumps	1.29	1.64	0	7.89
Laughter	.066	.06	0	.32
Emoticons	.060	.07	0	.39
Exclamation Points	.058	.06	0	.37
Ellipses	.053	.06	0	.26
Conventional Opening Gesture	.046	.05	0	.39
Celebratory Gesture	.038	.03	0	.15
Other Gesture	.015	.02	0	.14
Flirt Gesture	.012	.02	0	.09
Funny Gesture	.011	.02	0	.10
Agree Gesture	.009	.03	0	.20
Sad/Confused Gesture	.007	.01	0	.09
Aggressive Gesture	.004	.01	0	.04
Smile Gesture	.004	.01	0	.07
Sequential Exclamation Points	.002	.01	0	.04

4.2 Hypothesis Testing

To test the hypothesis that self-disclosure is positively related to nonverbal cues, several testes were used. First, correlations examine simple relationships between per utterance measures. Then, regressions examine relationships among self-disclosure, nonverbal cues, demographics, and game use variables using per session measures while controlling for total chat lines.

4.3 Correlations

First, Pearson correlations identified relationships between self-disclosure and all nonverbal cues. Table 4.4 shows the results of the Pearson correlations.

Table 4.4 Intercorrelation Matrix: Self-Disclosure and Nonverbal Cue per Utterances

	Self-Disclosure	Jumps	Laughter	Emoticon	Exclamation Points	Ellipses	Conventional Opening Gesture	Celebratory Gesture	Other Gesture	Flirt Gesture	Funny Gesture	Agree Gesture	Sad/Confused Gesture	Aggressive Gesture	Smile Gesture
Jumps	-.055	1													
Laughter	.278**	.038	1												
Emoticons	-.010	.038	.199*	1											
Exclamation Points	-.199*	-.043	-.057	.073	1										
Ellipses	-.048	-.117	.002	-.069	.259**	1									
Conventional Opening Gesture	-.079	-.011	.025	.000	-.008	.195*	1								
Celebratory Gesture	-.156	.148	-.045	.007	.120	.082	.190*	1							
Other Gesture	-.070	.163	-.041	-.015	-.081	.039	.176	.365**	1						
Flirt Gesture	.079	.154	.135	.081	-.001	.081	.021	.198*	.143	1					
Funny Gesture	-.097	-.046	-.073	-.073	-.044	-.057	.052	.277**	.027	.157	1				
Agree Gesture	-.058	-.037	-.078	-.019	.103	.151	.078	.241**	-.028	-.009	.258**	1			
Sad/Confused Gesture	-.145	-.018	-.095	-.018	-.023	-.115	-.048	.183	-.028	.050	.144	.299**	1		
Aggressive Gesture	-.134	.018	.014	-.024	.089	.033	.008	.267**	.148	.121	.159	.096	.509**	1	
Smile Gesture	-.003	.012	.069	.325**	-.080	.035	.225*	.096	.165	.287**	.122	.149	-.002	-.080	1
Sequential Exclamation Points	-.013	.175	.020	.086	.092	.192*	.131	.258**	.199*	.219*	.303**	.334**	-.075	.273**	.379**

*$p < .05$, **$p < .001$

Significant relationships between nonverbal cues and self-disclosure are somewhat weak ($r < .278$, $p < .05$). Laughter is the only nonverbal cue that resulted in a significant positive relationship with self-disclosure ($r = .278$, $p < .001$). This correlation shows the more a person uses self-disclosure statements, the more they expressed Laughter, thus supporting the hypothesis. Exclamation Points showed a significant negative correlation with self-disclosure ($r = -.199$, $p < .05$), showing more self-disclosure statements result in fewer Exclamation Points. The negative relationship is contrary to the hypothesized relationship.

4.4 Regressions

To further test relationships between self-disclosure and nonverbal cues, linear multiple regression was used. This approach allowed the analysis to consider other factors that potentially could drive relationships between nonverbal cues and self-disclosure.

First, assumptions used in regression analysis were tested for this dataset. A sample size of 114 participants was large enough for regression analysis, and the singularity assumption was met as independent variables are not calculated using other independent variables. Celebratory Gestures, and Sequential Exclamation Points showed several intercorrelations with other variables, so they were excluded from regression analysis, to meet the assumption of multi-collinearity.

Regression analysis used per session variables, which counts total instance of the behavior identified in the participant's session. Therefore, total chat lines were included in each model to account for the amount a participant chatted, as this varied considerably, from 21 lines to 224 lines.

The first model analyzed used self-disclosure as the outcome variable and all nonverbal cues along with chat lines as independent variables. Celebratory Gesture and Sequential

Exclamation Points were removed from analysis because of their high multi-collinearity with other nonverbal cues. Linear regression showed the predictor variables explained 35% of the variance ($R^2 = .35$, $F(14,99) = 3.79$, $p < .001$).

Laughter was the only nonverbal cue to significantly predict self-disclosure ($\beta = .32$, $p = .002$), as shown in Table 4.5, which provides regression coefficients from each independent variable. However, because examining multiple nonverbal cues reflects conducting multiple tests, the p-value threshold for significance was adjusted using Bonferroni adjustments for 14 tests. As a result, p-values greater than .004 were considered non-significant. Laughter reached this threshold for significance in this analysis.

Table 4.5 Multiple Linear Regression: Nonverbal Cues per Session Predicting Self-Disclosure

	b	β	95% CI Lower Bound	95% CI Upper Bound	p
Constant	1.055		.260	1.850	.010
Chat Lines	.020	.443	.009	.031	.000**
Jumps	-.001	-.083	-.004	.001	.354
Laughter	.110	.320	.042	.178	.002*
Emoticons	.012	.043	-.042	.066	.664
Exclamation Points	-.059	-.187	-.121	.003	.061
Ellipses	.009	.029	-.050	.068	.770
Conventional Opening Gesture	-.064	-.081	-.202	.073	.356
Other Gesture	.035	.022	-.256	.327	.810
Flirt Gesture	-.090	-.055	-.412	.233	.583
Funny Gesture	-.006	-.004	-.255	.243	.963
Agree Gesture	.062	.040	-.205	.329	.645
Sad/Confused Gesture	-.254	-.114	-.698	.189	.258
Aggression Gesture	.018	.006	-.572	.608	.952
Smile Gesture	-.322	-.113	-.889	.245	.262

To further explore relationships among self-disclosure and nonverbal cues, hierarchical regressions added demographic variables and computer/game use variables to the model. A three-step hierarchical regression was conducted with self-disclosure as the dependent variable,

and it examined the sample demographics as predictors of self-disclosure statements. Results of

Step 1 are presented in Table 4.6. Confidence intervals for each variable's contribution are also

provided.

Table 4.6 Hierarchical Regression Predicting Self-Disclosure: Step 1 Demographics

	b	β	95% CI Lower Bound	95% CI Upper Bound	SE b	p
Step 1						
Constant	2.694		-.097	5.484	1.407	.058
Age	.013	.058	-.032	.058	.023	.573
Gender	.415	.101	-.400	1.231	.411	.315
Education	-.333	-.223	-.628	-.038	.149	.027*
Social Conformity	-.215	-.088	-.693	.264	.241	.376
Introvert						
Characteristics	.330	.103	-.294	.954	.315	.297
Voted Leader	.140	.095	-.145	.425	.143	.332

Step 1 regressions did not show significance (R^2 = .082, F (6,103) = 1.53, p = .177). Only

Education predicted self-disclosure ($p < .05$) in this model, and is shown in Table 4.6, which

provides regression coefficients from each independent variable.

Step 2 adds the remaining demographic characteristics from Table 4.1, and tests if they

significantly predicted player's self-disclosure.

Step 2 regressions showed the demographic characteristic predictor variables explained 19% of the variance in self-disclosure ($R^2 = .27$, $F (4,99) = 3.61$, $p < .001$). Education and Vocabulary Size significantly predicted self-disclosure, as shown in Table 4.7, along with coefficients for all other independent variables.

Table 4.7 Hierarchical Regression Predicting Self-Disclosure: Step 2 Demographic Characteristics

Variable	b	β	95% CI Lower Bound	95% CI Upper Bound	SE_b	p
Step 2						
Constant	1.875		-3.777	7.527	2.85	.512
Age	.032	.145	-.011	.075	.022	.144
Gender	.232	.057	-.527	.992	.383	.546
Education	-.344	-.231	-.620	-.069	.139	.015*
Social Conformity	-.063	-.026	-.538	.412	.239	.793
Introvert Characteristics	.361	.113	-.235	.956	.300	.232
Voted Leader	-.149	-.102	-.437	.139	.145	.306
Group Size	-.048	-.009	-1.064	.968	.512	.926
Vocabulary Size	.008	.459	.004	.012	.002	.000**
Internet Experience	-.689	-.185	-1.393	.015	.355	.055
Player Had Fun	.047	.023	-.318	.412	.184	.799

Step 3 completes the model by adding all nonverbal cues from Table 4.5, and tests if the nonverbal cues significantly predicted a player's self-disclosure, as shown in Table 4.8.

Table 4.8 Hierarchical Regression Predicting Self-Disclosure: Step 3 Demographics, Characteristics, and Nonverbal

Variable	b	β	95% CI Lower Bound	95% CI Upper Bound	SE_b	p
Step 3						
Constant	.129		-5.785	6.042	2.97	.966
Age	.039	.175	-.006	.084	.023	.091
Gender	.250	.061	-.628	1.127	.441	.573
Education	-.310	-.208	-.611	-.009	.151	.043*
Social Conformity	-.225	-.092	-.713	.262	.245	.360
Introvert Characteristics	-.031	-.010	-.657	.595	.315	.923
Voted Leader	-.216	-.147	-.514	.083	.150	.154
Group Size	.618	.113	-.509	1.745	.567	.279
Vocabulary Size	.001	.051	-.008	.010	.004	.836
Internet Experience	-.348	-.093	-1.130	.435	.394	.380
Player Had Fun	.053	.026	-.353	.459	.204	.795
Chat Lines	.023	.521	.000	.047	.012	.050*
Jumps	.000	-.026	-.004	.003	.002	.822
Laughter	.102	.291	.023	.180	.039	.012*
Emoticons	-.009	-.031	-.071	.054	.031	.787
Exclamation Points	-.038	-.121	-.107	.032	.035	.284
Ellipses	-.011	-.035	-.074	.053	.032	.743
Conventional Opening Gesture	-.117	-.147	-.270	.037	.077	.134
Other Gesture	-.044	-.028	-.358	.270	.158	.781
Flirt Gesture	-.159	-.099	-.523	.206	.183	.389
Funny Gesture	-.025	-.017	-.325	.275	.151	.869
Agree Gesture	.004	.003	-.287	.294	.146	.979
Sad/Confused Gesture	-.209	-.095	-.666	.247	.230	.364
Aggression Gesture	.231	.083	-.429	.890	.332	.489
Smile Gesture	-.229	-.081	-.862	.403	.318	.473

The results of hierarchical regression showed nonverbal cue predictor variables explained 14% of the variance ($R^2 = .41$, $F (14,85) = 2.47$, $p = .001$). It was found Laughter significantly predicted self-disclosure ($\beta = .291$, $p = .012$). With the Bonferroni adjustment of a .004 threshold for significance, no nonverbal cues reached significance in this analysis.

4.5 Summary

Content analysis coding for self-disclosure resulted in 92% of players using self-disclosure statements. When analyzed with nonverbal cues, results showed mixed support for the hypothesis. If an individual uses more self-disclosure statements, they also use a higher rate of Laughter cues, while the more they use Exclamation Points, the less they use self-disclosure statements. Self-disclosure had a weak positive relationship with Laughter, supporting the hypothesis and a weak negative relationship with Exclamation Points, which did not support the hypothesis. Only Laughter nonverbal cues significantly predicted self-disclosure in linear multiple regressions. Hierarchical regression analysis showed Laughter nonverbal cues significantly predicted self-disclosure, though this relationship did not remain significant after the Bonferroni adjustment.

CHAPTER 5. DISCUSSION

The objective of this study was to examine self-disclosure statements and nonverbal cues in avatar-mediated communications (AMC), and explore relationships between the two concepts to contribute to further research. It hypothesized that players using more self-disclosure statements would use more nonverbal cues. Research on computer-mediated interpersonal communications found people use more introspective communicative acts, such as self-disclosure statements and nonverbal cues, to share relational information for impression formation and relationship development (Joinson, 2001; Bente, Kramer, & Eschenburg, 2008; Walther, 2008). To advance research in this field, communication variables between players need to be examined systematically (Klimmt & Hartmann, 2008). This study utilized literature on interpersonal communications in digital environments to perform a content analysis for examining self-disclosure statements and 15 unique nonverbal cues. According to Walther's (2008) SIPT, in CMC, people do not have access to the nonverbal cues present in face-to-face communications, so they use different strategies to translate the same relational cues online. In digital environments such as WoW, avatars have unique abilities to translate offline face-to-face communications to digital gestures performed by their desired digital representation.

To explore relationships between self-disclosure and nonverbal cues, this study developed and tested a content analysis scheme to identify instances of self-disclose in chat among participants. The results were examined using Pearson correlations with 15 nonverbal cues from the SCRIBE project's dataset. Then, hierarchical regression was used to control for demographic and game/internet use variables in those relationships. The hypothesis was supported for one type of nonverbal cue, laughter. In addition, interesting relationships among

self-discloser and some nonverbal behaviors emerged, including some that were the opposite of the hypothesis.

5.1 Relationship between Self-Disclosure and Nonverbal Cues

Results from Pearson correlations showed one non-disclosure variable was related to self-disclosure. Laughter cues showed a weak positive association ($r = .278$, $p < .001$) with self-disclosure, and suggested the more a person used self-disclosure statements, the more they expressed laughter cues such as "lol," or "ha ha." This supports the hypothesis for this study. These findings are consistent with the SIPT model, suggesting people share relational information about themselves in CMC, without face-to-face nonverbal cues, to develop relationships with new people (Walther, 2008). Results show players found text-based translations for laughter, and a weak positive association shows the more a player uses laughter cues, they will use slightly more self-disclosure statements.

In addition, exclamation points showed a significant weak negative association ($r = -.199$, $p < .05$) with self-disclosure, suggesting the more a person uses self-disclosure statements, the less they use exclamation points. In contrast to laughter cues, this relationship suggests there is a trade-off relationship between self-disclosure statements and exclamation points. Instead of expressing their enthusiasm or excitement for a topic using self-disclosure statements, players use more exclamation points. This negative relationship is contrary to the hypothesis. The correlation with exclamation points was no longer significant, and no other variables were correlated with self-disclosure at the Bonferroni-adjusted cut off $p < .004$.

Previous research suggests relational information is expressed in CMC using self-disclosure and shorter codes or symbols such as laughter and exclamation points are used to translate nonverbal cues (Klimmt & Hartmann, 2008; Walther, 2008). Findings suggest

expressing laughter in CMC is a strategy for prefacing or supplementing a message's meaning by providing cues as to whether to associate humor to an utterance. Adding laughter cues can change the way a message is received, and inform the recipient of a message's intended association with a cheerfulness or nervousness. However, associations between self-disclosure statements and exclamation points suggest the communicative acts are used interchangeably. Thus, when a player expresses excitement or enthusiasm with exclamation points in WoW, they perform this communicative act instead of self-disclosure statements.

Of note, 13 of 15 nonverbal cues tested with self-disclosure for correlations, yielded negative relationships. More specifically, only flirt gestures and laughter cues were positively associated with self-disclosure statements (although flirting was not found to be significant). According to Klimmt and Hartmann (2008), players communicate primarily through text, and they use shorter messages with codes and abbreviations to shorten messages. Walther's (2006) SIPT argues participants in CMC are motivated to share social information, and adapt their communications to the environment. Based on the results of this research, nonverbal cues are more widely used, and they are used instead of the more intimate relational cue, self-disclosure, when groups of strangers collaborate in WoW.

5.2 Nonverbal Cues Predicting Self-Disclosure

To further explore relationships between self-disclosure and nonverbal cues, multiple linear regression was used to examine the predictive power of nonverbal cues on self-disclosure when accounting for demographics, game activities, and game experience. The resulting model explained 35% of the variance in self-disclosure, but only chat lines and laughter nonverbal cues were significant predictors in the model. Laughter cues accounted for 11% of the variance in self-disclosure statements ($b = .11$, $\beta = .32$, $p = .002$). These findings are consistent with

Walther's (2008) SIPT, when he argues the hyperpersonal perspective would expect players to control, edit, and share more relational information about themselves to others, to develop meaningful relationships. Nonverbal literature shows laughing can indicate a wide range of relational information from pleasure, cheerfulness, and congeniality, to nervousness, submission, or appeasement (Briton & Hall, 1995). Based on the results, laughter has a small coefficient that positively associates with self-disclosure statements, and these results suggest the use of laughter cues significantly predicts a relatively small amount of the variance in self-disclosure statements. No other nonverbal cues returned significant predictive power on self-disclosure statements. This suggests, the two communicative acts (self-disclosure and laughter) work together in WoW to share social information, consistent with the process outlined in Walther's (2008) SIPT model.

Importantly, the results of this study suggest that social context, and the use of specific communicative acts do matter in influencing how often self-disclosure statements are shared. More specifically, when groups of strangers collaborate in WoW to complete a task, results of this study show they are sharing less interpersonal information, and instead share more impersonal information. Only when a player uses more laughter cues, can results predict they will use more self-disclosure statements.

5.3 Holding Demographics Constant: Nonverbal Cues Predicting Self-Disclosure

Hierarchical regression that included demographics, internet experience, and game activities demonstrated that education and vocabulary size were significant predictors of self-disclosure, but the nonverbal cues were no longer significant at a $p < .004$ threshold (Bonferroni correction). Laughter, approached significance, however, suggesting that when holding demographic, game activities, and internet experience factors constant, if a player uses laughter cues, they are 11% more likely to use self-disclosure statements.

The lack of significant relationships between nonverbal cues and self-disclosure more generally may be because players were using more impersonal than interpersonal communications in these research sessions. Stewart (2006) argued communicating impersonally means the people are interchangeable as they fill a social role. Groups of three to four strangers were tasked with saving a digital city in WoW, and it is possible players considered each other interchangeable, and therefore engaged impersonally. Stewart's (2006) research shows, when people communicate impersonally to complete the task, they are less likely to share intimate relational cues such as self-disclosure. Once participants share more personal information, they are engaging in interpersonal communications. If participants communicated impersonally, then the lack of significant relationships is most likely a result of not sharing enough relational cues. Were the participants to engage in a second session, where the groups were no longer strangers, Walther's (2008) SIPT would argue giving players more time would make them more motivated to share more relational cues, and the more relational cues there are to measure, the more likely it is that relationships would strengthen.

5.4 Role of Self-Disclosure and Nonverbal Cues in Avatar-Mediated Interpersonal Communications

In the sample of 114 participants used for this study, 8% of participants did not use a self-disclosure statement, and these findings are consistent with interpersonal communication research suggesting self-disclosure is commonly used to share relational information in digital environments (Joinson, 2001; Walther, 2008). This systematic approach showed that players used an average of two to three self-disclosure statements, and about 3.4% of their utterances were self-disclosure. A total of 15 nonverbal cues were examined. Jumps (M = 97.1), Laughter (M = 5.56), Emoticons (M = 5.28), Exclamation Points (M = 5.24), and Ellipses (M = 4.34) were the most frequently used nonverbal cues per session. Aggressive gestures (M = .35), Smile

gestures (M = .32), and Sequential Exclamation Points (M = .18) were the three least used nonverbal cues. The means of these nonverbal cues showed text-based nonverbal cues were more frequently used when compared to avatar-based nonverbal cues, suggesting players are more comfortable translating nonverbal cues to digital environments using text. According to literature (Klimmt & Hartmann, 2008), players communicate mostly through text, and they limit their communications to short messages with codes and abbreviations to shorten messages. This literature is consistent with the findings of this study, by showing why players used more text-based nonverbal cues to share social information in WoW. According to Walther (2008), using text and language are no less effective compared to face-to-face communications in sharing relational cues for impression formation and relationship development, when given enough time. Based on Walther's (2008) research, if players were given more time, the social cues shared between players, would contribute to developing relationships. In reviewing the chat logs, a small number of groups clearly engaged interpersonally, and developed meaningful relationships where players made plans to meet outside of the research session (and still in WoW). According to the SIPT model, if the sessions were longer, more of the groups would be expected to share relational information and engage interpersonally.

Overall, and consistent with the literature, this study's findings showed self-disclosure statements and nonverbal cues share social information in interpersonal communications in WoW (Tidwell & Walther, 2002; Canary, Cody, & Manusov, 2006). More specifically, findings suggest modern multiplayer games have a wide range of form and content in mediated interpersonal communication, and text- and avatar-based communications are important strategies for avatars and players to interact (Klimmt & Hartmann, 2008). This study shows participants in the research sessions were familiar with the digital space and norms for WoW, but

had not previously met the other participants, so the findings are consistent with interpersonal research, and showed players shared relational information to develop new relationships and work together to complete the task at hand (Walther, 2008).

5.5 Limitations

The content analysis is not a representative sample of all avatar-based video games, and is limited to the materials from the SCRIBE project data, thus limiting the generalizability of the results. The content analysis describes the content, and draws on literature to understand the content, but the method itself is not explanatory. This means, while the main concepts are examined systematically, the findings alone cannot explain all relationships. In addition to not being representative, interpersonal communications strategies in WoW may differ in other online games, such as Second Life or other digital spaces such as Facebook or instant messenger. The nonverbal cues used in this study is not exhaustive, and therefore results are limited to only the 15 nonverbal cues measured for analysis with self-disclosure. This study is limited to the scope of the definition of self-disclosure established in the codebook for the VISIOS study. Other researchers can use different language to define self-disclosure, and therefore the codebook would change, influencing results.

This study uses nonverbal cues such as laughter, to examine relationships with self-disclosure. It can be argued that laughter is a verbal expression whether it is used in person or online. This study used Briton and Hall's research to show nonverbal cues include laughter, as they share complex relational information such as pleasure, cheerfulness, congeniality, nervousness, submission, or appeasement (1995). This literature is used in this study to argue laughter is a nonverbal cue used for sharing a dynamic range of feelings, and not only to express the verbal action of laughing.

This study examines the unique cultural environment in WoW, and collected text communications only. In WoW, groups of players can communicate using voice, which could produce more self-disclosure statements. In general, players in familiar groups will use headphones and microphones to share voice messages. It is possible players are more likely to share relational information using voice messaging in groups they are familiar with. This study examines text-based communications between groups of strangers, so collecting text-only data accurately reflects the methods for groups of strangers to communicate and develop new relationships.

The definition of self-disclosure is purposefully conservative, and therefore potentially limits the total number of coded instances. For example, as outlined in Appendix B (pg. 4), for a statement to be considered self-disclosure, it had to reveal new information about how a person identifies, or views themselves. If a person provides a self-disclosure statement, and then continues to talk about the same piece of information, subsequent statements are not coded as self-disclosure because there is no new information being presented. This conservative approach strictly follows the literature in self-disclosure and interpersonal communications, but could arguably be too conservative, thus limiting the coded data. Finally, this study was limited by a potential lack of communications categorized as interpersonal. Meaning, players are not always motivated to make new meaningful relationships, and are more interested in the task at hand. In the SCRIBE research sessions, players were in groups of strangers, and had to work together to save the digital city of Dalaran. In this task-related relationship, it is possible players did not move their communications out of an impersonal perspective, and only shared task-related information with the purpose of completing the goals of the research session. This would

result in sharing less personal information, and therefore less relational cues such as nonverbal cues and self-disclosure statements.

5.6 Implications

The theoretical implications of this study add to literature for understanding text- and avatar-based interpersonal communicative acts in specific cultural environments such as multiplayer online games, or even specific multiplayer online games. By extending CMC research to WoW, this study was able to integrate the use of a complex and expressive avatar in considering the options players must communicate nonverbally and how they share relational information. However, this study's results suggest that the avatar remained less important for expressing personal information than traditional text adaptations such as "lol." Laughing cues are also complex, and used for a variety of emotions. For this reason, they are considered nonverbal cues. By empirically testing these types of communicative acts in WoW, this research supports implications from Walther's (2008) SIPT by showing players use self-disclosure statements and nonverbal cues in digital spaces for impression formation and relationship development. This research provides insight into a player's use of self-disclosure statements and nonverbal cues as strategies for sharing relational cues in the unique cultural environment of WoW. More specifically, results show nonverbal cues have mixed weak associations with self-disclosure statements in WoW. For example, when people use more laughter nonverbal cues, they will use more self-disclosure statements, and when they use more exclamation points, they use less self-disclosure statements. The implications of this research suggest WoW is a culturally unique environment, and nonverbal cues have complex relationships with self-disclosure statements in this setting.

Finally, this research shows there is no single relationship with all nonverbal cues and self-disclosure statements, but instead they all work together in different ways to share relational information.

CHAPTER 6. CONCLUSIONS

Interpersonal communication research in digital environments is advancing our knowledge of the techniques people use to socialize online, and the effects of working in a limiting, text-based medium, such as video games, chat rooms, and social networking websites (Dwyer, 2007; Joinson, 2001; Konjin, Utz, Tanis, & Barnes, 2008; Walther, 2008). Walther (2008) and Joinson's (2001) research established the communicative acts, self-disclosure and nonverbal cues, as the most common communicative strategies for sharing relational information in computer-mediated interpersonal communications. Because of the ubiquitous nature of online communications, these concepts are important to understand individually, as well as how they influence each other. Understanding the roles of self-disclosure statements and nonverbal cues in digital environments is important for developing relationships online.

This study explored the relationships between self-disclosure and nonverbal cues in digital environments. After examining associations between self-disclosure and 15 unique nonverbal cues in WoW, this project found that self-disclosure statements and nonverbal cues are frequently used, and two specific nonverbal cues (laughter and exclamation points) were related to use of self-disclosure statements, but in opposite directions: more laugher corresponded with more self-disclosure, but fewer exclamation points corresponded with more self-disclosure. This suggests that different types of nonverbal cues may be used in distinctly different ways. This study contributes to literature on sharing relational information for impression formation and relationship development in avatar-mediated interpersonal communications.

These results suggest future research potential for interpersonal communicative acts in WoW. This study's results, and Walther's (2008) SIPT showed video games are important

environments for impression formation and relationship development in modern society. Literature shows digital environments such as WoW provide a space for private self-focus, and the results of this research showed players use can use that private self-focus to share relational information such as self-disclosure and nonverbal cues (Joinson, 2001). Understanding the communicative acts associated with sharing personal information shows potential for understanding the relationships between each other, and the unique cultural environment such as WoW in interpersonal communications.

Future research should expand on the SIPT model by examining the timestamps of self-disclosure statements and nonverbal social cues, and when they occur over the course of the research session. Walther's (2008) SIPT examines interpersonal communications in CMC, and argues when given enough time, CMC relationships can have the same depth, understanding, and intimacy as face-to-face communications. According to Walther (2008), one reason for the slower rate of social information exchanging is because of the increased time it takes to get messages sent in the medium. Given enough time, "CMC is no less effective than face-to-face interaction at developing impressions and managing interpersonal relations" (Walther, 2008, p. 393). Findings could indicate exactly when people communicate personal information in a research session, and if there are patterns consistent with the expectations of Walther's (2008) SIPT.

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APPENDICES

Appendix A: Complete List of Scribe Text- and Avatar- Based Nonverbal Variables and Participant Characteristics Studied

Table 3.1 Text-Based Nonverbal Variables

Variable	Source	Description
Ellipses	Chat logs	The count of ellipses a player uses per session.
Exclamation Marks	Chat logs	The count of exclamation marks a player uses per session.
Sequential Exclamation marks	Chat logs	The count of sequential exclamation marks a player uses per session.
Emoticons	Chat logs	The count of emoticons, e.g. :) 0.0 :x, a player uses per session.
Laughter	Chat logs	The count of laughter, e.g. haha lol rofl, a player uses per session.

Table 3.2 Avatar-Based Nonverbal Data

Variable	Source	Description
Jumps	Session Data	The count of the act of jumping in session.
Celebratory Gesture	Chat logs	The count of nonverbal cues expressing celebration, e.g. applause, dancing.
Conventional Opening Gesture	Chat logs	The count of nonverbal cues expressing conventional communication opening, e.g. waving, greet, introduce.
Sad/Confused Gesture	Chat logs	The count of nonverbal cues expressing sadness or confusion, e.g. frown, puzzled, weep.
Flirt Gesture	Chat logs	The count of nonverbal cues expressing filtration, e.g. flirting, kissing, blush.
Funny Gesture	Chat logs	The count of nonverbal cues expressing humor, e.g. burp, chicken, pick nose.
Agree Gesture	Chat logs	The count of nonverbal cues expressing agreement, e.g. agree, nodding.
Smile Gesture	Chat logs	The count of nonverbal cues expressing smiling or happiness, e.g. chuckle, grin, excited.
Other Gesture	Chat logs	The count of nonverbal cues expressing other gestures, e.g. sleep, blink.
Aggressive Gesture	Chat logs	The count of nonverbal cues expressing aggression, e.g. growl, anger, mad.

Table 3.2 Participant Characteristics.

Variable	Source	Description
Chat Lines	Chat logs	The count of Chat Lines a player uses per session.
Age	Pre-Survey	Asked age and date of birth (no differences found).
Gender	Pre-Survey	Asked gender and gender at birth (no differences found).
Education	Pre-Survey	10-point answer from "Less than high school" to "Doctorate."
Vocabulary Size	Chat Logs	Count of unique words a player uses in a session.
Group Size	Session Data	Number of players in a group.
Social Conformity	Post-Survey	Average score on 2 items for Social Conformity.
Introvert Characteristics	Post-Survey	Average score on 10 items for extrovert/introvert characteristics.
Voted Leader	Post-Survey	Participant was voted the leader by the group.
Internet Experience	Pre-Survey	Average score of 10 reliable items for Internet Experience.
Player Had Fun	Post-Survey	Participant reported the research study as, "fun."

Appendix B: Self-Disclosure Codebook

Several complementary definitions exist of self-disclosure. They include the following:

- The act of making new or secret information about yourself known to others – Walton & Rice 2013.
- What individuals verbally reveal about themselves to others (including thoughts, feelings, and experiences) – Derlega, Metts, Petronio, Margulis 1993.
- "the act of making yourself manifest, showing yourself so others can perceive you" – Jourard 1971.
- Personal information (verbally) communicated to another person, including descriptive information (one's political party) and evaluative information (how one feels about the election) that would not otherwise be easily known or discovered. – Cozby 1973.
- Self-disclosure is that which a person knowingly communicates to another about him or herself which is publicly known – Worthy, Gary, & Kahn 1969 via Tidwell & Walther.

For the purposes of our coding, we consider self-disclosure as the expression of some aspect of a person's identity that is new or unknown to others. We place emphasis on the disclosure aspect, in which there may be something secret or personal about the person. The focus is on statements that express their relationship to an identity or social category, as well as historical and current demographic and biographical information. We focus on acts of disclosing information or experiences that may be somewhat unique or have some risk or vulnerability for that individual and that are enduring (rather than fleeting), and that express behaviors that indicate someone's identity. We exclude as self-disclosure statements that express a person's tastes or preferences, such as "I like Kanye." If they elaborate on that preference, such as describing how frequently they listen to Kanye or the concerts they have been to or songs they own, then the statement does get coded as self-disclosure.

The unit of analysis is the turn. A turn is understood as when a participant hits the enter key to submit their message to the software system for another person to see.

Be aware that sometimes synchronous chat is not in sequence because turn taking does not happen in the same way as face-to-face. Consider the context of the exchange when tagging the statement.

For assigned all code categories below, be sure to read the turn. Take into consideration the prior and subsequent turns to help contextualize and understand the message being coded. Focus primarily on the meaning of the message, not on its form when assigning code categories.

Code Categories

A) Self-Disclosure (1 = yes; 0 = no)

Self-disclosure: 1=yes
Self-disclosure messages reveal personal information (typically facts, but sometimes values and opinions, depending on the context) about the speaker, including revelations about their past history and actions, current status and situation, and that of their family. This includes values and opinion statements when some aspect of their self or identity is expressed. This also includes self-disclosure that is offered when asked (e.g. Q: "Where do you live?" A:"Fort Collins."). Speculation of their future state or identity is not considered self-disclosure. Self-disclosure includes questions that reveal information about themselves. Declarations of knowledge or familiarity (**or the lack of such**) with a general body of knowledge or hobby count or experiences (such as locations in the country) as self-disclosure.

> *Examples of self-disclosure (highlighted in yellow):*
> *a)*
> ***TakaVisios: I don't have much experience with online social spaces, do you?***
> ***NindereVisios: I have some experience. Not in places like minecraft but on online forums.***
> *TakaVisios: What are your thoughts on it?*
> *NindereVisios: It is nice to talk to people about common topics.*
> ***NindereVisios: I just rarely play online because people like being a pain.***
> *NindereVisios: Too many trolls on the internet.*
>
> *b)*
> *Callet.Visios: what is your academic year?*
> ***Yeris.Visios: senior yours?***
> ***Callet.Visios: junior***
> *Yeris.Visios: what are you studying*
> ***Callet.Visios: Political Science***
> ***Yeris.Visios: same***
> *Callet.Visios: oh nice!*
>
> *c)*
> *Nindere.Visios: Well, I think we're supposed to play 2 games of 20 questions*
> *Nindere.Visios: Who should guess first?*
> ***Taka.Visios: Yeah I think so lol Are you doing this for extra credit too?***
> Are you doing this for extra credit is not self-disclosure. The "too" is what invites self-disclosure.

d)

Taka.Visios: would a pregnant woman count as one or two people?

Nindere.Visios: I was just wondering that.

Nindere.Visios: hmmm. don't want to offend anyone, but one.

e)

Nindere.Visios: I thought the experiment might have been to see how mad I get when you say no to all questions. haha. hmmm...

Nindere.Visios: do we have them here in fort collins?

Taka.Visios: yes, but i don't know where fort collins is haha

f)

TakaVisios: ever play minecraft?

NindereVisios: nope, never even heard of it

TakaVisios: it's popular in that you can build things. I've never played.... don't really get the point

This particular example is tagged as self-disclosure because of "I've never played …. don't really get the point."

g)

TakaVisios: so who's first?

NindereVisios: Well I think Obama definitely

TakaVisios: Agreed

NindereVisios: Great, this is pretty easy

TakaVisios: ha ha

TakaVisios: who else...

NindereVisios: Im not very familiar with relevant and important people in the world

This particular example is tagged because of the remarkable way that the statement of not being familiar is framed.

h)

TakaVisios: What shool were you again?

NindereVisios: Colorado State

TakaVisios: The one with the bison/buffalo mascot? International Relations

NindereVisios: Ew no thats CU boulder

NindereVisios: we hate them

NindereVisios: we are the rams

TakaVisios: Ha ha! Sorry. I feel like that the fidderence between Ohio and Ohio State

i)
YerisVisios: President Obama is my first pick
CalletVisios: I choose harry potter
YerisVisios: Okay, I'm not a huge Harry Potter fine, but he's good to stay lol
YerisVisios: What about Beyonce? She's pretty cool.

j)
Callet.Visios: i don't know haha anyone you like?
Yeris.Visios: I dont really know much about music .. :(
Callet.Visios: ive been listening to ed sherran lately i could get stuck in a room with him haha

k
CalletVisios: where are you doing this experiment?
YerisVisios: extra credit for a class
CalletVisios: Me too, for Colorado State University?
YerisVisios: no i go to Syracuse

Self-disclosure: 0=no
Non-self-disclosure messages are statements of opinion or value, propositions or assertions, especially those that are related to the task. If participants provide a self-disclosure statement, and then continue to talk about it, subsequent statements are not coded as self-disclosure, but there is nothing new (e.g. they disclose that they are an Ellen fan, and then later talk about wanting to get on the show, and missing watching it. The later messages would not count as self-disclosure).

Examples of Non-self-disclosure:
a)
Yeris.Visios: ok have you been given the discussion question?
Callet.Visios: not yet, no
Yeris.Visios: ask your lab assistant?
Yeris.Visios: I just got it
Callet.Visios: ok I just got it
Callet.Visios: well, I guess my first pick would have to be a doctor

b)
Callet.Visios: we could kill two birds with one stone and choose a female docotr
Callet.Visios: doctor*
Yeris.Visios: agreed

c)
Yeris.Visios: elephant?
Callet.Visios: no
Yeris.Visios: zebra?
Callet.Visios: YESSSS!!!!!!!!!!
Yeris.Visios: omg I've been thinking about it a while but I didnt say it

d)
Yeris.Visios: haha, I think we should have 5 people from different aspects of society, so that afterwards they can reconstruct the world

e)
YerisVisios: Hi is someone there?
CalletVisios: Hi sorry I'm kinda trying to figure this thing out...
YerisVisios: It's confusing.

f)
I like Kanye

g)
TakaVisios: do you go to SU or are you out in Colorado?

h)
TakaVisios: ever play minecraft?
NindereVisios: nope, never even heard of it

i)
NindereVisios: so where is SU?
TakaVisios: In the geographic middle of Upstate NY

j)
TakaVisios: i guess u are also a participant of this thing
NindereVisios: yes i am

k)
TakaVisios: Are you doing this for extra credit?
NindereVisios: yep

l)
TakaVisios: you ever play this game before?
NindereVisios: never