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Chad Martin Harms

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Kelly Morrison
Major professor

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**THE REDUCTION OF UNCERTAINTY IN INITIAL MULTIPLE USER
DIMENSION (MUD) INTERACTIONS**

By

Chad Martin Harms

A THESIS

**Submitted to
Michigan State University
in partial fulfillment of the requirements
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2000

ABSTRACT

THE REDUCTION OF UNCERTAINTY IN INITIAL MULTIPLE USER DIMENSION (MUD) INTERACTIONS

By

Chad Martin Harms

This study examined uncertainty reduction in a Multiple User Dimension (MUD). Subjects participated in an initial interaction with a stranger in a MUD and completed a questionnaire about the interaction. The interactions were recorded and coded for question type and sex. Results indicated that, in keeping with URT, more demographic than value/opinion questions were asked and sex was established early in the interaction. Furthermore, men reported more attributional confidence about the interaction than women, and men and women did not differ in confidence of affective qualities. Implications for technology and communication are discussed.

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This thesis is dedicated to my coach, Terry Dowd. Knowing you has only made me a better, stronger human being.

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LIST OF ABBREVIATIONS

URT.....	Uncertainty Reduction Theory
MUD.....	Multiple User Dimension
FTF.....	Face To Face
CMC.....	Computer Mediated Communication
BRB.....	Be Right Back
AFK.....	Away From Keyboard
IMHO.....	In My Humble Opinion
LTNS.....	Long Time No See
LOL.....	Laughing Out Loud
ROFL.....	Rolling On Floor Laughing
LMAO.....	Laughing My Ass Off
CLUES	Attributional Confidence Scale
CL7.....	Seven-Item Attributional Confidence Scale
HC.....	High-Context
LC.....	Low-Context

INTRODUCTION

“Don’t talk to strangers!” Parents have been telling their children this message for years, hoping to protect and keep them from harm. Through the use of computers, the immediate danger involved with talking to strangers may seem reduced. Today people are talking to others in France or in Japan, or whoever happens to be on their computer when they turn on the power.

Imagine a 46-year-old widow in Tulsa, Oklahoma. This woman has not had a physical relationship with a man in seven years. For the last seven months however she has been chatting with a male high school teacher who lost his wife to breast cancer. They met in a chat room set up for social support of those grieving for loved ones taken by cancer. For the last seven months these two individuals have laughed and cried together without even hearing the other’s voice. Every day they spend hours with each other discussing current events, telling each other about their day, and revealing personal information about each other that they had never even told their spouses. They were in love before they met face to face. They have been married for three of the most wonderful years of their lives.

Consider another pair who met over the computer. A 45-year-old man has been talking to several people when he meets a 12-year-old girl. The man is kind and befriends the girl. The girl sees no harm in talking to this man and continues to converse with him on-line. She is interested in all that he knows and all he has done. He tells her about the secret world of adults and she in turn becomes enthralled with him. The man starts to send the young girl presents,

about which she of course cannot tell her parents. He also starts to send her pictures. The man puts the girl through a series of tests to determine the level of trust they have built. At the right time he constructs a lie for the girl, invites her to meet him, and sends her a plane ticket. This man is a pedophile and this girl is a potential victim.

If you do not think these events can happen, you are mistaken. As our technology continues to advance, interactions with others via computers will increase on both business and personal levels. Understanding these interactions will be necessary in order to advance the effectiveness of communication and prevent possible hazards that may arise due to computer mediated communication.

Additionally, issues that are obvious or taken for granted in face to face (FTF) encounters become salient in computer mediated environments. For example, sex is readily apparent in FTF interactions, but not in computer mediated communication (CMC). Thus, how users reduce uncertainty about sex in CMC needs to be examined. Furthermore, computer mediated interactions do not involve as many nonverbal cues as FTF communication, and this lack of nonverbal cues may influence attributional confidence. Researchers must continue to explore CMC in order to ascertain the degree to which social science research can be applied to these virtual settings.

The present study examines how uncertainty is reduced, as well as the influence of sex and attributional confidence in initial interactions between strangers in a Multiple User Dimension. First, I will discuss MUDs, including

their general properties and the types of communication involved. Next, Uncertainty Reduction Theory (Berger and Calabrese, 1975), sex, and attributional confidence will be reviewed. Then, the methods will be described, followed by the results and discussion.

Chapter 1

LITERATURE REVIEW

Multiple User Dimensions (MUDs)

Gardner (1983) discussed one way in which we can understand the “self,” or a person’s identity. He stated:

“Rather than a central ‘core self’ which organizes one’s thoughts, behavior, and goals, the person is better thought of as a collection of relatively diverse masks, none of which takes precedence over the others, and each of which is simply called into services as needed.” (Gardner, 1983, p. 23)

This concept of self is what Multi User Dimensions (MUDs) and other types of computer mediated communication allow. It is an environment in which an individual can be whoever he or she chooses to be without fear, shame, or embarrassment. It allows disabled individuals who normally would not be able to interact with many, the opportunity to meet all kinds of people. Those with disfigurements, who previously felt the need to live a sheltered life, have found a new life in which no one judges them by their disfigurement.

MUD is the acronym for Multi-User Dimension or Dungeon. MUDs of today vary from the role playing games of the past, such as Dungeons and Dragons, where individuals formed relationships with other characters, fought against enemies and completed a quest. Current MUDs are much more

sophisticated, and include virtual social environments like a shopping mall, with a variety of shops and strangers. Bennahum (1994) described MUDs as follows:

“The first MUDs were built around 1978. At the time there was a popular text-based adventure game called, appropriately Adventure, which ran on a university computer. At first, players played alone, against the machine, going from room to room collecting treasure, killing monsters, until they eventually won the game. After a while it got boring.... Then, something unexpected happened. People no longer played to win the game; they played to be with other people. A virtual community began to form.” (Bennahum, 1994, p. 22)

This notion of “community” has its skeptics and proponents. Some question the idea of a community existing within cyberspace. The skeptics believe that rather than an actual community, a sense of interdependence occurs, which creates an illusion of community, (Berry, 1993; Stoll, 1995). However, there has been overwhelming support that strong relationships do exist between individuals in cyberspace (Parks & Floyd, 1998; Rheingold, 1993). The relationships formed in cyberspace exhibit similar characteristics to relationships formed in real world face-to-face interactions such as self disclosure and interdependence. They also have strong potential to develop. The most powerful evidence, however, comes from the users themselves. Users become committed to their online relationships. They feel interdependent with one

another and help each other with problems by listening and offering advice (Parks & Floyd, 1998).

MUDs come in a variety of forms. Recent MUDs, although primarily text based in terms of the communication between individuals, increase sensory cues by incorporating sounds, visuals, and nonverbal cues. The Palace (<http://www.thepalace.com>) is a user-friendly MUD that offers its members a number of options not available in other environments. Original MUDs gave text descriptions of the rooms, corridors, and creatures within them. Now, each different Palace room offers a visual backdrop created for that particular room. Rooms vary in theme from bowling allies to deserted islands, all of which can be accessed by simply clicking a mouse button. When an individual enters a room, they are immediately given an avatar. An avatar is a visual representation of that person's online Palace entity. Avatars can be anything one's imagination can create and can be changed at any time. The avatar that everyone starts with is a smiley face, but the variety of avatars found in the Palace is countless. A user also chooses a name; this again can be changed at any point in time. From here on out the user is free to travel to almost any room they would like. They can use hot keys, or keyboard commands, that allow jumping from room to room or locating a friend and transporting their avatar directly to that room.

While communication primarily is text based, interactions associated with face-to-face communication (e.g., turn taking, spatial proximity) reflect an interactional model of communication. In this text-based environment, one person speaks, the other then reads the message sent and types a reply. John

Suler, a psychology professor at Rider University, has studied cyberspace communities for several years and explained the communication in this way:

“Text communication in a chat room or channel often assumes a staccato style. Most of the time people express what they have to say in a brief sentence or two, or in sentence fragments. ...The staccato style of speaking is very apparent in a chat room or channel where people are meeting each other for the first time. Because none of the visual cues of face-to-face encounters are available, people feel the need to quickly test the waters to determine the qualities of the users around them and whom they want to engage. Questions that would be considered less than tactful in face-to-face encounters are a bit more socially acceptable here. Terse inquiries tossed out to a fellow user, or the entire room, might include ‘Age?’, ‘M/F?’, ‘Married?’

Staccato speak also includes a wide range of acronyms, like BRB (be right back), AFK (away from keyboard), IMHO (in my humble opinion), LTNS (long time no see), and LOL (laughing out loud). Different acronyms evolve in different online cultures, but the LOL is ubiquitous. So important is the need to express pleasure and laughter that a graduated series of such expressions have evolved. "Hehe" or "hehehe" indicates a giggle or a polite/obligatory chuckle: the user finds something humorous, but not humorous enough to deserve a LOL, ROFL (rolling on floor laughing) or LMAO (laughing my ass off).”

[\[http://www1.rider.edu/~suler/psycyber/texttalk.html\]](http://www1.rider.edu/~suler/psycyber/texttalk.html)

Nonverbal communication also is present, in limited forms, in these text-based environments. There are a range of sound keys that allow a user to create the sounds of applause, a burp, or even laughter. The use of these sounds is infrequent, but spontaneously a group of users may decide to produce sounds for minutes on end. Additionally, the position of the avatar is a form of nonverbal communication. By positioning one's avatar near another, it is made apparent that the "hi" coming from the avatar is directed toward that person. Also, the avatar itself communicates something about its user. Avatars often come in the form of male or female characters and may indicate a person's association with a particular group. At times, the age of a user can be estimated by their choice of avatar. Nothing is necessarily as it seems, though. Poster (1990) discussed how computer mediated communication allows individuals the ability to explore other identities without sex cues. An individual can play out a role in a virtual environment without worries of social acceptability, due to expected anonymity. Poster also suggested that a loss of actual identity, the understanding of one's self in the physical world, could be potentially harmful as individuals lose themselves in a virtual world. Individuals have the option of taking on any personality they choose to create. An older woman can be a teenager in junior high school. A young man can be a mature woman. Creativity is the only restraint.

Now that MUD's have been defined and the verbal and nonverbal features have been discussed, I will discuss Berger and Calabrese's Uncertainty Reduction Theory (URT) and relevant research.

Uncertainty Reduction Theory

The study of initial interactions between two individuals has been the focus of much research in human communication. Initial interactions have been examined in a wide range of contexts from the business interview (Jablin and Miller, 1990) to more personal romantic relationships (Knapp & Vangelisti, 1992). Regardless of the area of study or the desired end result of the interaction, two outcomes typically occur. First, a person's uncertainty about the other individual typically is reduced and second, an impression is formed of that individual.

Berger and Calabrese (1975), articulated how uncertainty is reduced between strangers in initial interactions. They suggested that:

“...interpersonal communication behavior plays at least two different roles. First, we must attempt to develop predictions about and explanations for our own and other's communication behavior; that is, communication behavior itself is something which we endeavor to predict and explain. Second, communication behavior is one vehicle through which such predictions and explanations are themselves formulated.”

(Berger and Calabrese, 1975, p. 101)

Thus, during initial interactions individuals are mainly concerned with predicting behavior, and we look to communication behaviors specifically to facilitate this process. Uncertainty reduction, according to Berger and Calabrese, consists of two processes. Proactive prediction refers to formulating and defining alternative actions an individual may choose in an upcoming interaction. Thus, proactive prediction refers to predicting what might occur. Alternatively, retroactive explanation refers to explaining behavior which already has occurred. Their work advanced 7 axioms and 21 theorems and has since been extended, with other researchers examining the relationships between uncertainty reduction and attributional confidence, culture, and context.

Clatterbuck (1979) extended URT by suggesting that the process of uncertainty reduction was not simply calculated by correctly choosing which alternative will occur or which explanation is correct. Rather, he explained it as a function of the quality of information gathered about the other individual. Clatterbuck operationalized uncertainty reduction through the attributional confidence scale (CLUES). A seven-item instrument (CL7) was developed from the axioms and theorems Berger and Calabrese originally forwarded. Attributional confidence is the certainty an individual has in their understanding of another's characteristics and behaviors. Clatterbuck found positive correlations between retroactive and proactive attributional confidence. A positive relationship between time known and attributional confidence was also evident. Weak support was found between similarity of individuals in a dyadic interaction and the attributional confidence each reported in predicting the others behavior.

Building upon Clatterbuck's (1979) attributional confidence scale, Gudykunst, Yang, and Nishida (1985) examined relationships beyond initial interaction, such as acquaintances, friends, and dating relationships, in three different countries. They combined related research (i.e. self-disclosure, self-monitoring, attraction, social anxiety, etc.) to better understand uncertainty reduction from a multi-cultural perspective. Their study supported the generalization of Uncertainty Reduction Theory across relationships and cultures. However, they found that although Clatterbuck's (1979) CL7 scale was valid and reliable, it did not represent a cross-cultural approach to the study of communication. Gudykunst and Nishida (1986) used URT to examine differences between cultures that primarily used low-context (i.e., explicit) communication and those who used high-context communication. Hall (1976) differentiated cultures according to the communication used by that particular culture.

A high-context (HC) communication or message is one in which more of the information is either in the physical context or internalized in the person, while very little is in the coded, explicit part of the message. A low-context (LC) communication is just the opposite; i.e., the mass of information is vested in the explicit code. (Hall, 1976, p 98)

Based on previous research (Gudykunst, Nishida, Koike, and Shiino, 1986), it was found that many forms of uncertainty relevant to other cultures were not present in working attributional confidence scales. Differences in communication were used to theoretically explain cultural differences. With this

differentiation of culture, Gudykunst and Nishida expanded the Clatterbuck (1979) CLUES 7-item attributional confidence scale to include items related to communication context, and in turn to culture.

Culture was not the only extension of the Uncertainty Reduction Theory; context has been examined as well. In Berger and Calabrese's (1975) original discussion of how context plays a role in uncertainty reduction they suggested that the context can provide uncertainty reducing information. For example, if an individual attends a Democratic political rally, the context reduces uncertainty by providing information about the agenda, values, and people. Rubin (1977) studied how various contexts affected both the number and types of questions asked in an initial interaction. The context varied from ambiguous to specific, and the data indicated that encounters in ambiguous contexts lasted longer and generated more demographic questions than in specific contexts. In an ambiguous context, where uncertainty is high, much of the information we base our impression of another person on tends to be demographic information. Using this limited information, persons often rely on stereotypes to complete an impression of the other. In specific contexts, more opinion and experience questions were used. In another study, Rubin (1979) found that demographic questions dominated the first third of conversations. This can be linked to Berger and Calabrese's (1975) third axiom, which stated, "High levels of uncertainty cause increases in information seeking behavior. As uncertainty levels decline, information seeking behavior decreased." (Berger and Calabrese, 1975, p. 103) Rubin's (1979) study supported Berger's (1973) earlier findings.

He found that demographic questions dominated the first few minutes of a conversation and opinion questions increased over time. This occurred when individuals were instructed to, “get to know,” another individual.

The sex of an individual also can influence uncertainty reduction. This influence is complicated by the fact that the sex an individual takes on in a MUD can be whatever that individual chooses. Though no empirical research exists as to the numbers or frequency of sex misrepresentation, it certainly occurs often. According to Turkel (1995), Habitat, a Japanese MUD, has 1.5 million users. The member registration shows a 4 to1 ratio of males to females. Inside the MUD the ratio falls to 3 males to every female. These numbers indicate (on average) that 5% of the male members are females on Habitat. As a result, sex becomes a salient issue in MUDs, as what is taken for granted in face-to-face communication becomes less apparent in these environments. As Curtis (1996) reported, the sex an individual presents affects their experience within a MUD. For example, females, because they are fewer in number, may experience special treatment and even harassment. People may not be who they define themselves to be in MUDs. These points reiterate Suler’s (1996) observation that sex is an important factor used to reduce uncertainty in MUDs.

Hypotheses

This section builds upon the context (MUDs) and theory (URT) presented earlier, and proposes four hypotheses.

The use of technology allows individuals to interact within a context (MUDs) that offers little factual information about the participants. Furthermore, MUDs are an ambiguous context where uncertainty initially is high, therefore:

H1: The proportion of demographic questions will be greater than the proportion of value/opinion questions in the first third of the interaction.

Furthermore, as previously articulated in Suler's description of staccato speak, individuals inquired about the other's sex very early on in the conversation. Wood (1997) suggested that we live in a gendered society where people want to know the sex of other people they encounter. According to West and Zimmerman (1991), individuals are overwhelmed with gender on a daily basis. Individuals display their gender through their accessories, dress and behaviors in order to maintain and establish relationships. An individual's gender, their self-perceived masculine or feminine status, may differ from their biological sex. Sex is a classification of biological characteristics, whereas gender is acquired through interaction in a social world, and can change over time (Wood, 1997). For this reason the term sex is used as opposed to the term gender. Displays of sex in face to face interactions provide uncertainty reducing information about an individual that is not readily available to those interacting in a computer mediated environment. Therefore,

H2: The sex of both individuals will be established in the first third of the interaction.

How women and men reduce uncertainty has rarely been examined. Sanders, Wiseman, and Matz (1995) had nearly 900 students fill out questionnaires in which they thought of an individual and answered questions

about that individual. In regards to attributional confidence, no difference in sex was found for how the other behaved, what the other's values were, and what the other's attitudes were. Clatterbuck (1979) found sex differences in that females expressed significantly higher attributional confidence than males. Wyer, Swan, and Gruenfeld (1995) gave a possible reason for this, showing several studies that found women seek a greater feeling of "connectedness" in conversations than males. Wood (1998) described the communication of males in terms of establishing their position with regard to others. Women, however, use communication to learn about others (Johnson, 1996). Therefore,

H3: Women will rate their attributional confidence significantly higher than men.

Other research has suggested that females report higher levels of confidence as to perceptions of another's affect (i.e., "how the other feels about me, what the other's feelings and emotions are, and how the other feels about him/herself.") (Sanders et al, 1995). This follows earlier work by Baird (1976), who concluded from a thorough review of studies on sex differences in communication, that females were more perceptive of other's emotional states. Baird also found that females relied more upon and were more sensitive to nonverbal communication than were males. This is consistent with the finding of Hall (1978), who found women better at decoding nonverbal cues than men. However, these studies have been done in face-to-face environments allowing for extensive nonverbal communication. Mehrabian (1971) described several aspects of nonverbal communication that signify liking. The other's voice quality, proximity, touching and eye contact are all nonverbal cues used to determine

affective qualities of others. Due to the decreased amount of nonverbal communication in MUD's, especially voice quality, touching and eye contact, effective perception of affective qualities will be limited. Therefore,

H4: Women and men will not significantly differ in confidence of affective qualities of uncertainty.

It should be noted that previous studies are limited with respect to the representation of sex using Uncertainty Reduction Theory. How and to what extent men and women are able to reduce their uncertainty about individuals becomes very important, especially in situations when this is not explicit in their interactional contexts (i.e., MUDs). The following section explains the methods used to examine the Uncertainty Reduction Theory in Multiple User Dimensions.

Chapter 2

METHODS

Participants and Design

Participants consisted of 190 university students. Ninety-five students were from a large midwestern university and 95 students were from a large eastern university. Participants were offered extra credit for their participation in the study. The students had not met before and were classified as strangers.

Procedure

Upon arrival, participants were greeted by the experimenter and were told that development of an online class was in progress and that communication options were being tested in order to determine a possible medium. Participants were informed that they were to "get to know" another participant. Participants were then asked to sign a consent form stating that they understood any conversation online would be recorded and would be kept confidential. After the participant completed the consent form, they went through a basic tutorial on how to use the computer software utilized in the particular study. Participants were also informed that if at any point in the study they had questions the experimenter would be of help. Next the participants were seated at a computer and entered a private 2D virtual environment (MUD). Simultaneously, at the other university the same procedure was completed and another subject also logged on to the same private 2D virtual environment (MUD). The participants were matched with others according to their sex in order to obtain equity among

male/male, female/female and female/male dyads. The participants were again reminded that the purpose of the test was to simply, "get to know" the other participants. The two participants were given 7 minutes to interact. After seven minutes participants were told to log-off the system. During the interaction the computer automatically recorded a log of the conversation. Participants were then asked to complete a questionnaire after their interaction. The questionnaire consisted of the Clatterbuck (1979) CL7 scale and the five questions added in the Gudykunst et al (1986) study. Computer experience questions were combined with demographic questions. Finally, questions as to the effectiveness and efficiency of online communication were asked. After the study was completed participants were fully debriefed via e-mail.

Coordination between both sites was imperative. The first author controlled the beginning and ending of all interactions. Assisting at the second site, an individual was always available via phone or within the virtual environment. Participants were rotated on a 20-minute cycle. Research assistants greeted and checked in participants at :00. At :05 participants were seated and began their training which lasted until :10. The computer screen was described as a virtual 2-D environment. The smiley face labeled as "*UNIVERSITY1*" was explained to be an avatar, a representation of one's virtual entity. It was explained that individuals could communicate by typing and then pressing Enter on the keyboard. Then participants were encouraged to interact with others in the virtual training room. While participants practiced interacting with each other, the first author and first assistant determined which rooms (of

the four identical rooms that existed) were to be used and which participants would be sent to which room. At the :10 point, individuals entered into their particular virtual room. Participants interacted for approximately seven minutes and were then instructed to say goodbye to their conversational partner. Participants were then escorted to a different room where they completed a questionnaire about their interaction. The final :03 were used to reset the computers to the virtual training room and the log option was reset to record the next interaction. The phone was used to coordinate the majority of the interactions, however, when the phone was not available, communicating via the virtual room was sufficient (see Appendix A for facilitator script).

Variables of Interest

There were two independent variables examined in this research. The first independent variable was the sex of the participant, either male or female. The second independent variable was the period of the conversation. Similar to Rubin (1979), periods were divided into the first third, second third and third third of the conversation. Thirds were created by dividing the total number of interacts in the conversation by three.

Demographic and value/opinion questions, as well as the interacts, were coded from transcripts of the conversations. Coders distinguished the questions asked between three separate categories; demographic, value opinion, and extra. Demographic questions included questions of sex, age, where an individual was from, what an individual studied and other information that did not involve a perceptual judgment or opinion (e.g. "Where are you from? M/F? Do

you have any brothers or sisters?”). Value/opinion questions were those that asked for perceptual judgments about a particular person, place or thing as well as direct questions about feelings (e.g. “How do you like it there? Why did you pick that major?”) Questions that were coded as extra included greetings (e.g. What’s up? How’s it going?) and questions that could not be established as demographic or value/opinion.

The first dependent variable of interest was the proportion of demographic questions in the conversation. The proportion was obtained by dividing the number of demographic questions per third by the number of interacts per third. The second dependent variable, value/opinion questions, was obtained in the same manner. The next dependent variable was the third in which the sex of the individuals was established. Sex was considered established by either the exchange of names or by direct claims by the individuals. Establishment of sex also required that the sex of both individuals be given. Attributional confidence (Clatterbuck, 1979) was the final dependent variable. Following Sanders, Wiseman, and Matz (1995), the scale was divided into two separate subscales. The first subscale dealt with affective qualities of uncertainty and was comprised of three items (i.e. “How certain are you that he/she likes you? How well can you predict his/her feelings and emotions? How much can you empathize with (share) the way he/she feels about himself/herself?”). The second subscale consisted of the remaining nine items of attributional confidence (see Appendix B for the complete questionnaire).

Chapter 3

RESULTS

Intercoder Reliability

The first author trained multiple coders and then any discrepancies were resolved by discussion. Intercoder reliability was established by comparing the individually coded conversations and questionnaires. Reliability of conversation questions coded was found to be acceptable at ($\alpha = .88, p < .01$) for demographic and ($\alpha = .90, p < .01$) for value/opinion. Of the interactions in which sex of both individuals was established, reliability was acceptable at ($\alpha = .98, p < .01$).

Scale Reliability

Confirmatory Factor Analysis (Hunter) was used to assess the reliability of the scales. Items were analyzed for internal consistency and parallelism. The attributional confidence subscale was found to be reliable with an alpha of .88 and consisted of 9 items (see Appendix B). Affective qualities of uncertainty were reliable with an alpha of .71.

Hypothesis 1

The first hypothesis posited that there would be significantly more demographic questions than value/opinion questions in the first third of the conversations. In order to test this the interactions were first divided into thirds according to the number of interacts in the conversation. A t-test was conducted between the proportion of demographic questions ($M = .689, SD = .348$) and value/opinion questions ($M = .189, SD = .195$) in the first third of the

conversation. Data were consistent with hypothesis one in that participants asked significantly more demographic questions than value/opinion questions ($t = 9.62, p < .001$).

Hypothesis 2

The second hypothesis stated that the sex of both individuals would be established in the first third of the interaction. The proportion established in the first third ($M = .642$) was significantly higher than the proportion established in the second third ($M = .095$) ($t = 8.026, p < .001$). In addition, the proportion established in the first third ($M = .642$) was significantly higher than the last third ($M = .053$) ($t = 9.698, p < .001$). Sex was not established for both individuals in 21.06% of the conversations. The data were consistent with the hypothesis that sex would be established in the first third of the conversation. Table 1 shows the proportion of demographic and value/opinion questions by conversation thirds.

TABLE 1

THE PROPORTION OF DEMOGRAPHIC AND VALUE/OPINION QUESTIONS
BY THIRDS OF THE CONVERSATION

Conversation Thirds	Demographic Questions	Value/Opinion Questions
1	.69	.19
2	.65	.33
3	.36	.21

Hypothesis 3

The third hypothesis that claimed that women would rate their attributional confidence significantly higher than males was not supported. This hypothesis was tested by comparing the means between male and female scores on the attributional confidence subscale. T-test results indicated that males average attributional confidence ($M = 335.26$, $SD = 196.61$) differed from females average attributional confidence ($M = 282.12$, $SD = 163.86$) significantly ($t = 3.75$, $p < .05$), but in an opposite direction than that hypothesized. The data were not consistent with the hypothesis.

Hypothesis 4

Hypothesis four stated that women and men would not significantly differ in confidence of affective qualities of uncertainty. Testing this hypothesis was done comparing the averages of male and female scores on the affective attributional confidence questions. T-test results indicated the data were consistent with hypothesis four in that on average, males ($M = 113.06$, $SD = 72.44$) and females ($M = 103.19$, $SD = 65.25$) did not differ significantly ($t = .729$, $p = .394$) .

Chapter 4

Dicussion

The results suggest that demographic information about another individual is the first concern in an interaction. This type of information seems to be the most useful in reducing the uncertainty an individual has when initially interacting with a stranger. Uncertainty is increased by the ambiguity of the context in which the interaction occurs. The results of this study are consistent with earlier findings by Berger (1975) and Rubin (1979), who found that in face-to-face initial interactions between strangers, demographic information was sought first. The tendency to share equal information (reciprocity of information exchange) also stimulates the exchange of demographic questions.

The results of this study indicated that establishing the sex of the other individual at the beginning of the conversation, the first third, is considered important, if not a necessity. Specifically, the sex of the other is extremely important. The sex of the individual to whom one is conversing with can influence the conversational topics (McCroskey, Richmond, and Stewart, 1986). For example, a female may choose to discuss her relationships with another female, whereas this topic may not be suitable for a female/male interaction. Females are also more positively rated in social interactions than males (Reis, 1986; Wheeler, Reis, and Nezlek, 1983). If a male finds he is speaking with a female, he may feel that she will empathize with his situation more than a male might. According to Wood (1998), males use communication as a way to display control, independence, and status. This differs from females, who use

communication to establish and maintain relationships. These differences indicate that from the beginning of the interaction, the sex of the other individual has an impact on the communication between the two individuals. Additionally, it suggests the degree to which sex is socially construed and reliant upon visual and auditory cues. Therefore, West and Zimmerman's (1991) conception of "doing gender" is specific to FTF interactions, and future research should further explore how people "do gender" in CMC environments.

The third hypothesis posited that women would rate their attributional confidence higher than males. The data were not consistent with this hypothesis. Males actually rated their attributional confidence significantly higher than females. While Clatterbuck (1979) found that females had higher attributional confidence than males, the context in which these studies were conducted was extremely different in terms of the information provided. Specifically, visual cues to an individual's age, sex, or background as well as voice or auditory cues allowing for expression and emotion were not present in these contexts. As shown earlier, research has found that females utilize nonverbal communication more than males (Baird, 1976; Hall, 1978). Perhaps the lack of nonverbal cues available in CMC suppressed the female participant's perceptions of attributional confidence. Possibly, due to the highly unbalanced ratio of males to females on-line, females felt more at risk or vulnerable in this environment, thus influencing confidence levels. The amount of time that the interaction lasted also may influence the confidence levels. Berger and Calabrese (1975) propose that the longer individuals interact, the lower their

uncertainty of the other will be due to more information being exchanged.

In particular, the lack of nonverbal cues may have impacted the affective quality of information exchanged in the interactions. Although the written word has substantial power in the emotion it can evoke, the staccato quality to the conversation may reduce the likelihood of such affect. The effect of sex in utilizing types of information may influence one's ability to confidently attribute affect to another individual.

Although the lack of nonverbal cues may have affected the attributional confidence of women and men, other aspects of the interaction should also impact their perceptions. A question exists that, although impossible to answer from the obtained data, needs to be addressed. Is it that women have lesser attributional confidence in the current context, MUD's, or is it that males have greater attributional confidence specifically in these contexts? The answer is unclear, and further research in MUD's is needed to answer this. Caldwell and Peplau (1982) found that women were more intimate in relationships than men. It has also been found that women tend to self-disclose more information than males (Sanders et al,1995). It seems logical that the seven minute interactions between participants lacked intimacy and self-disclosure. Perhaps the limited disclosure that did occur affects males and females differently, and in turn affects their attributional confidence.

Chapter 5

CONCLUSION

Limitations of the Study

Participants were told at seven minutes, to conclude their interaction. However, the conclusions varied in length. This means that some interactions lasted seven minutes and 10 seconds, and others may have lasted up to eight and a half minutes. The coordination between the two universities could not be so precise as to allow for strict identical timings. The error due to the difference in times is an important consideration.

The difference in setting also gave room for error. The setting at one university differed from that of the other university. Although this difference may not have influenced the perceptions of the participants in any significant way, it is necessary to consider all possible variations in participant perception.

Yet another limitation of this study is the generalizability of the findings. The virtual world is ever changing. The technology of tomorrow will be developed with reference to the shortcomings of today's technology. Slater and Wilbur (1997) discuss the concept of presence and its affect on perception within the virtual realm. As nonverbal and tactic cues are developed and incorporated into the virtual environment, the sense of presence an individual feels in that environment will also change.

Despite the limitations to the study, the multi-university research conducted was done with surprisingly few problems. Through proper and

lengthy forethought, potential problems were eliminated and the fluidity in which the large sample of participants was coordinated effectively. The technology used provided a look into future applications of multi-university research.

Future Research

This research has added another piece of evidence through which we may better understand and appreciate human communication. More importantly, it has raised new and exciting questions that may be expanded and examined.

For instance, what is the process by which individuals are socialized into virtual communities? The socialization of individuals into a new culture or organization may provide greater understanding as to the change in communication. Specifically, how quickly does a new member of the community acquire the terminology of the community? How do new members to a virtual community develop networks with the community? Doing a network analysis will be useful in determining how such communities develop as well as the type of communication between individuals.

Differences in the communication between males and females are small, and according to Canary and Hause (1993) far less significant than other factors. The current study differs from actual chatrooms or virtual environments due to the participants in the study. The majority of participants were novices in their use of chatrooms. This became apparent through the conversations between individuals. In a chatroom of experienced users, interacts are, as Suler (1996) explained, more staccato in form. Experienced users will know and use more

shorthand expressions to convey the same thing that novice users would write out completely. An example of this would be the question of another's sex. An experienced user would ask for this distinction by simply typing, "m/f?," whereas a novice user might type, "Are you a male or female?" First, this difference is important in that it constricts the amount of information that can be exchanged in a given amount of time. An experienced user can obtain much more information about another individual in less time. Second, this distinction raises interesting questions as to how an individual learns to communicate in a virtual environment. How long does it take an individual to acquire this knowledge? How is a novice individual perceived differently than an experience individual?

The relationships that develop on-line are another very interesting area of research that needs to be better understood. For example, is attraction to another, whom an individual has not met or possibly seen, different than attraction has been conceptualized in face-to-face interactions? This research is new and holds a vast range of questions, some of which have begun to be explored (Parks and Floyd, 1998). A particular question raised by this research is the extent to which the sex of an individual determines the conversational topics in an interaction. This could be further developed through an experiment and content analysis structured to determine conversational topics according to varying dyadic sex combinations. Hopefully, these questions will grow new questions and further expand social science research.

APPENDICES

APPENDIX A

Facilitator script

This script will be used to facilitate research studying interaction in a Multi-User Domain. A MUD is an advanced chat room on the Internet. The MUD being utilized in this study is a user-friendly 2D environment in which participants can interact. Participants will sign up for times to come into the lab and complete the study. Upon arriving at the designated room, participants will be asked to sign a consent form explaining their rights. Participants will then be escorted to a computer by a research assistant who will explain basic functions of The Palace and allow participants to perform such basic functions. The script for the research assistants has been developed using instructions offered in The Practice Palace, an introductory Palace offering basic function instruction. The script is as follows:

At the end to the previous sample, reset log in the *Intro Palace* Avatar should appear in the room and should be green/red in color.

TO PARTICIPANT> what you will be doing today is talking with another individual on the computer and simply *getting to know them*. We are interested in examining impression formation of others over the Internet. I will go through some basic functions of this program step by step with you. After we go through the introduction I will put you on a different computer that is connected to the Internet and you will be able to talk with the other person at another Eastern university. If you have questions at any point I am here to help.

Seat participant at the introduction computer.

TO PARTICIPANT> This is your Avatar, which is your face when chatting with people in a room.

TO PARTICIPANT> You talk to other people by typing a message and pressing enter. Go ahead and try it now.

TO PARTICIPANT> You can move around the screen by clicking. Try clicking anywhere in the screen to see your avatar move.

TO PARTICIPANT> A log is kept so you are able to read messages that you may have missed while typing.

TO PARTICIPANT> Do you have any questions at this time? Okay, it will just take a minute to make sure the other computer is ready. I' ll be right back.

Look at other computer to see if Cornell is in place and ready.

TO PARTICIPANT> If you would come with me.

TO PARTICIPANT> Once again, you are represented by the _____ colored avatar. Please spend 7 minutes *getting to know* this other individual. After seven minutes I will come back and have you logoff.

7 minutes

TO PARTICIPANT> 7 minutes has passed, please go ahead and end your conversation with the other person and come with me.

Take participant to next room to fill out questionnaire.

TO PARTICIPANT> Now to finish up, I have a short questionnaire for you to fill out. Please make sure to read the instructions carefully and take your time.

APPENDIX B

COMPLETE QUESTIONNAIRE

In the first part of this questionnaire, please think of the interaction you have just experienced. Take time to read the instructions and answer the following questions.

Instructions: Using the following scale, for each question please indicate how confident you are in your abilities to answer, or predict, the correct response to the question based on the computer interaction you just had. On these questions, the answers should be written as a percentage, anywhere from 0% to 100%. For example, if you are totally confident that you know a particular fact, you write 100%. If you were slightly less confident, you might put a number like 93%. On the other hand, if you were not at all confident you might place a very low percentage, like 5% in the answer blank. If you absolutely are unable to answer a question, and the answer would be a guess for which you had no basis at all, you would write 0%. Remember, you may use any evidence as a basis for your guess, even if the person has not explicitly told you the answer. We are interested in your ability to form first impressions of others.

0% -----	50% -----	100%
unable to	moderately	completely
answer	confident	confident

1. How confident are you of your general ability to predict how he/she will behave? _____
2. How certain are you that he/she likes you? _____
3. How accurate are you at predicting the values he/she holds? _____
4. How accurate are you at predicting his/her attitudes? _____
5. How well can you predict his/her feelings and emotions? _____
6. How much can you empathize with (share) the way he/she feels about himself/herself? _____

7. How well do you know him/her? _____
8. How certain are you of his/her background? _____
9. How certain are you that he/she will behave in a socially appropriate way when this is important? _____
10. How certain are you that he/she can understand your feelings when you do not verbally express them? _____
11. How certain are you that you understand what this person means when you communicate? _____
12. How confident are you that this person will be patient with you when you communicate? _____

This last part of the questionnaire asks you a few questions about yourself. Please provide the requested information in the space provided or circle all that apply.

1. Age? _____
2. Sex:
 - a. Male
 - b. Female
3. Do you own a personal computer?
 - a. yes
 - b. no

4. What types of communication operations do you perform on a computer?
(circle all that apply)

- a. e-mail
- b. on-line shopping
- c. surfing the web
- d. chat rooms
- e. on-line magazines
- f. virtual reality environments
- g. on-line games
- h. news groups
- i. other? _____

5. How often do you access your e-mail?

- a. never
- b. seldom
- c. once a week
- d. more than once a week, but not daily
- e. daily
- f. multiple times a day

6. In a typical week, how much time do you spend surfing the Internet?

- a. 0 hours a week
- b. less than 2 hour per week
- c. more than 2 hour per week but less than 5 hours
- d. more than 5 hours per week

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