# INVESTIGATING THE EFFECTS OF ELECTRONIC SELF-PORTRAYAL ON TRUST AND PERFORMANCE IN VIRTUAL TEAMS

By

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Abstract

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This research addresses the concept of electronic self-portrayal (ESP) in synchronous computer mediated communication of ad hoc virtual teams. Electronic self-portrayal is defined as the extent to which a communication system can portray the true identity of its users. A theoretical model is developed based upon which it is hypothesized that increased information available due to electronic self-portrayal will have an effect upon the trust and performance of ad hoc virtual teams. An experiment is conducted to isolate the effects of electronic self-portrayal by manipulating the graphical identification of users of a system as well as the rehearsability of the system. Rehearsability is the extent to which users are able to reread and edit their messages before submitting them to the system. The combination of both manipulations – identification and rehearsability – is found to impact trust, with partial electronic self-portrayal having a positive impact on trust. Partial electronic self-portrayal is defined as a mode of electronic self-portrayal that includes at least one form of true representation and at least one of non-disclosure. Performance reacts positively to high levels of rehearsability, and other factors are also found to impact trust and performance in ad hoc synchronous virtual teams. This research provides theoretical and practical contributions

for understanding the importance of electronic self-portrayal and rehearsability in synchronous group communication.

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# CHAPTER 1: INTRODUCTION

## 1.1 Background

Fostering trust among project team members in an organizational setting is crucial to the possibility of productive collaboration as it has been shown that trust has a positive effect on group performance (Dirks, 2000; Klimoski & Karol, 1976; McAllister, 1995; Paul & McDaniel Jr, 2004). In the current business environment where a global economy, ubiquitous networking, and ever-improving telecommunications systems facilitate physically dispersed team members interacting remotely via electronic means, the importance of electronic self-portrayal (ESP) is worthy of great scrutiny. Electronic communication often means a diminished ability to know who is really at the other end of the communication. Yet, under conditions of limited contextual information the importance of achieving trust is amplified (Jarvenpaa & Leidner, 1999) as trust could pose as an important moderator of members' behaviors and responses (Dirks & Ferrin, 2001).

The challenge of attaining trust is also increased in the computer-mediated environment. Trust has been described as a complex experience that derives from people's values, attitudes, moods and emotions (Jones & George, 1998) – all concepts that have classically been considered limited within a setting of attenuated social and communication cues that lacks the communication cues necessary for interpersonal affections (Daft & Lengel, 1986; Sproull & Kiesler, 1986). Empirical evidence of online social information sharing has prompted researchers to affirm that indeed other aspects such as timing, setting and context of interaction can overcome the constraints that media characteristics present (Jarvenpaa & Leidner, 1999). Among these aspects, electronic

self-portrayal has rarely been addressed (for an exception see Walther et al., 2001). It is expected that the extent to which a system is able to portray its users would be essential to the development of trust because in order to build cognitive-based trust, communicants gather information about each other to help them make judgments (Sarker et al., 2003). This is critical for virtual teams of participants who must interact with each other without ever meeting face-to-face. Therefore, the ability of a system to expose a user's "true identity" and portray it to the group would have profound effects upon the way the team members interact.

Social presence has been described as person-to-person awareness, or the degree of salience of another person in an interaction (Carlson & Davis, 1998; Short et al., 1976; Tu, 2002). Many studies have shown that more social presence leads to better quality communication and relationship formation. It is questionable, though, whether the ability to portray a person's true identity electronically is, in fact, the highest level of social presence, or if, perhaps, it suggests a point on a continuum where the benefits of increased identifying information begin to become attenuated and are replaced with detrimental effects on group work and team member relationships. Because electronic self-portrayal is an aspect of interaction that is integrally intertwined with media characteristics, the current research seeks to discover how a communication medium affects the portrayal of an individual's self for the purpose of fostering or discouraging a trusting relationship and achieving superior group performance.

### 1.2 Research Question

The primary focus of the current research is to investigate the extent to which changes in the characteristics of a synchronous computer-mediated communication

system related to electronic self-portrayal affect the outcomes of ad hoc groups meeting using the system. We therefore ask: will ad hoc virtual teams communicating synchronously using various modes of electronic self-portrayal in their online discussions differ in their level of trust? Will their performance be affected by different modes of electronic self-portrayal?

# CHAPTER 2: LITERATURE

Before approaching the problem at hand, it is essential to frame the context of our study by reviewing in detail the relevant literature. Following are the ideas and theories that will serve as the building blocks for the formulation of a theoretical model to guide our investigation.

## 2.1 Virtual Teams and Trust

A virtual team is described as a geographically dispersed work group that communicates electronically and is formed to accomplish specific short-term goals (Kristof et al., 1995; Powell et al., 2004; Reid et al., 1996). The dispersion that exists in virtual teams can be described based on its spatial, temporal, and configurational characteristics (O'Leary & Cummings, 2007). Outsourcing (Ross, 2006), telecommuting, global alliances, and international organizations (Snow et al., 1996) are just a few of the current business trends that have enabled the prevalence of virtual work. These, coupled with the ever-advancing technological state of networks and communication media, have created a business world where the potential to achieve in a virtual environment is more powerful than ever (Majchrzak et al., 2004; Snow et al., 1999). A virtual team *within* an organization allows for the ability to maintain the efficiency of a flatter organization without sacrificing the quality of its membership, all the while providing technological support and personal flexibility (Townsend et al., 1998). It makes possible the integration of the work of specialized employees who might be geographically dispersed using communication technologies that also help organizations avoid delays, save travel expenses, attain immediate feedback, and achieve a continuous workflow (Derosa et al., 2004). *Between* organizations, virtual teams offer the opportunity for enterprises to bring

their core competencies together in the form of "Value Added Partnerships" to take advantage of market opportunities as they arise (Kasper-Fuehrer & Ashkanasy, 2001). As a result, companies are increasingly taking advantage of the new work form (McDonough III et al., 2001).

With the increased implementation of virtual teams comes increased research on how to implement them successfully to avoid entrapment in the challenges that they present to group work (Kirkman et al., 2002; Powell et al., 2004). Researchers have scrutinized many aspects of virtual team work including inputs such as training (e.g. Warkentin & Beranek, 1999), task processes such as coordination (e.g. Chidambaram, 1996), outputs such as satisfaction and performance (e.g. Tan et al., 2000; Warkentin et al., 1997), and socio-emotional issues (Powell et al., 2004). Trust is one of the major socio-emotional issues that researchers have focused on within the study of virtual teams. It has been referred to as the "glue" that propels a team toward the successful completion of its project (Sarker et al., 2001) and has in fact proven to have positive effects on performance (McAllister, 1995; Paul & McDaniel Jr, 2004). When team members are geographically dispersed, it is trust that must hold them together in place of direct supervision or a common social and work environment (O'Hara-Deveraux & Johansen, 1994). Because the typical forms of control are difficult to apply in a distributed setting, virtual teams require interpersonal trust to "make it work" (Dani et al., 2006; Handy, 1995; Ross, 2006). Specifically, in virtual environments, trust is necessary to help a group overcome the uncertainty posed by physical distance and often complex technological communication media (Jarvenpaa & Leidner, 1999; Paul & McDaniel Jr, 2004) and the danger of the development of psychological distance within the group

(Snow et al., 1996). In order to achieve the full flexibility and responsiveness benefits of their work style, virtual teams depend on the ability to form trusting relationships quickly (Dani et al., 2006; Jarvenpaa & Leidner, 1999).

Given the crucial role that trust is purported to play in the success of virtual teams, much research examines the construct within that realm.

Interpersonal trust among team members has been defined as "the extent to which a person is confident in, and willing to act on the basis of, the words, actions, and decisions of another" (McAllister, 1995, p. 25). (Although other definitions have been proposed, this definition is the most appropriate choice in this context given the short term nature of the teams in our study. See section 2.4 below.) In a team environment, this means that trust facilitates the motivation for individuals to join efforts and work well together, thereby boosting the performance level of the team (Dirks, 1999). For a team whose task is to make a joint decision, this means that trust among team members will allow them to easily accept one another's assertions, thoughts, and experiences as valid input toward the final group decision. In a *virtual* team, this further means that the electronic communication media in use will play a crucial role in the effect that trust has on the group output in terms of the way that it can convey those assertions, thoughts, and personal experiences.

Institutional and personality factors have been said to impact the development of trust in virtual teams (Sarker et al., 2003). For this reason, constructs such as a trustor's inherent propensity to trust have often been taken into account in studies involved with trust in virtual teams (Jarvenpaa et al., 1998). Beyond that, trust has been said to exist in two varieties: cognition-based trust and affect-based trust (Lewis & Weigert, 1985).

Cognition-based trust refers to the "calculative and rational characteristics demonstrated by trustees" while affect-based trust "involves emotional elements and social skills" such as care and concern for the other parties (Kanawattanachai & Yoo, 2002, p. 190). In a temporary work group, it has been noted, the focus tends to be a professional task-oriented one, rather than social (Hiltz et al., 1986a; Meyerson et al., 1996) and therefore the dominating type of trust would be cognitive which relies on information and develops through communications among members (Kanawattanachai & Yoo, 2002). The types of cognitive information that potential trustors are looking for in their teammates have been said to include reliability (McAllister, 1995), integrity, and competence (Aubert & Kelsey, 2003; Mayer et al., 1995; Paul & McDaniel Jr, 2004). Jarvenpaa et al. famously organize the factors that affect trust in virtual teams as the "antecedents of trust" – perceived ability, perceived benevolence, and perceived integrity (Jarvenpaa et al., 1998). In forming trust, individuals seek to gain as much information as they possibly can about these three aspects of their teammates. They are more likely to trust when they have collected information that helps them feel that their teammates are competent within the relevant domain (ability); caring, concerned and unselfish (benevolence); and dependable and reliable (integrity).

Cognitive trust – the conscious choice, based on available information, of whether or not to trust – is developed based on information that is gathered and processed using three categorization processes: unit grouping, reputation categorization, and stereotyping (McKnight et al., 1988; Sarker et al., 2003). This means that potential trustors engage in cognitive processes regarding their teammates' reputations, goals, and physical appearances and interactions modes. At the outset, those with good reputations and

similar goals are more easily trusted. However, in the case of ad hoc groups – where there is no group history, working on short-term projects – where ultimate goals are less relevant, these aspects are less potent. Rather, it is the impressions formed by the appearances and communication behaviors of team members during the course of a project that proves most crucial to the development of trust. In fact, impression formation has been acknowledged as a cornerstone of social cognitive processes (Jacobson, 1999; Tidwell & Walther, 2002; Walther, 1993) – "thought focused on human interaction" (Roloff & Berger, 1982), such as developing cognitive trust.

In teams that communicate electronically, impression formation and stereotyping play an especially important role. While stereotyping specifically refers to the scenario where an "individual or a subcategory is culturally recognized as representing the category as a whole," in a more general sense it often includes other models of categorization such as prototypes, ideal types, and people we have met in our own experiences (Jacobson, 1999). Given the amount and type of information that is often absent in virtual communications (i.e. appearance, age, gender, voice, intonations, hesitations, etc.) (Sproull & Kiesler, 1986), communicants are forced to make assumptions based on the limited information that they have (Walther, 1997). Particularly, in group settings stereotyping is instrumental in the creation of a group identity that can have a significant impact on the interaction of the team members (Lea & Spears, 1992; Postmes et al., 1998). Sarker et al. divide the stereotyping that occurs in virtual teams into three categories. In virtual teams, people have been shown to create impressions based upon their teammates' actual messages, their technology-related skill level, and their physical appearance or behaviors (Sarker et al., 2003). In turn, it is

crucial to be aware of these varieties of stereotyping as social cognitive processes that impact the development of virtual team trust.

In summary, the overarching cognitive process that contributes to the development of trust in ad hoc virtual teams is information gathering based on whatever cues are available (Ramirez et al., 2002). Communicants look at each others' messages, skills, and appearances or behaviors to determine the ability, benevolence and integrity of their teammates based upon which they can decide whether or not to trust. In ad hoc virtual teams these cues can be transmitted only via the electronic representation of the communicants. Therefore, the way that a communication medium portrays its users, and hence its electronic self-portrayal, is prominent in the study of ad hoc virtual teams.

### *2.1.1. Electronic Self-Portrayal*

It has been found that people who feel able to express their "true selves" on the Internet are more likely to form close relationships (Bargh et al., 2002; McKenna et al., 2002). The ability to harness expression of true self into the characteristics of a communication system would certainly have a positive impact on the trust development of a group. Computer-Mediated Communication Systems (CMCS) literature has looked at communication technology in terms of its representation of users whether it be anonymous, textual, pictorial or even animated, as discussed below ("Representation"). It has theorized and examined the various communication cues in terms of such concepts as their feedback and symbol variety ("Media Richness/Synchronicity"). The most similar concept to electronic self-portrayal that exists in CMC research is the concept of anonymity which most often focuses on the dichotomous forms of representation: real names or pseudonyms. However, there is no research in the field that studies a

communication system in a multi-dimensional manner in terms of its ability to reveal who *really* is on the other end. This, electronic self-portrayal, is the overarching subject of the current study.

### 2.2 Virtual Communication

Any lessons that can be learned about the development of trust in groups are not complete without the description of the environment in which the group interacts. As we know, virtual communication changes the context of any interaction. For example, while stereotyping is prevalent and instrumental in any group communication (Brewer, 1996), as discussed above, it is manifested in an entirely different way when the impressions are being formed from virtual cues rather than face-to-face. Thus, the aim of any computer-supported interaction is to alter the environment in a way that will have a net positive influence on the interaction (Nunamaker et al., 1991). Ultimately, the goal of this study is to gain insight into the way that virtual communication can affect the group processes related to the development of trust. In light of the above discussion, we seek to determine in what ways a virtual setting impacts the communicants' ability to gather information about one another. Before doing so, it is important to first review some concepts that have already been learned about virtual environments. The relevant concepts about virtual group communication can be organized into two categories. First, we review the phenomena that affect individuals' behaviors. Next, we look at the features of the actual media and how they impact communications.

### *2.2.1. Personal/Interpersonal Phenomena*

The virtual environment has proven to have significant impacts on both the ways that people view themselves and the way they are viewed by their counterparts during the course of a communication session. The concepts relevant to the current research follow.

#### Self-Disclosure

Self-disclosure is the "act of revealing personal information to others" (Archer, 1980, p. 183). Over the years, research has studied the way subjects tend to reveal personal information in a computer forum. For example, psychiatric patients' responses to computerized questioning were found to be much more revealing than a comparable face-to-face interview and job applicants reported lower grades to a computer interviewer than to a human one (Sussman & Sproull, 1999). E-mail surveys have been found to elicit more revealing and less socially desirable responses than paper-and-pencil surveys (Kiesler & Sproull, 1986) and people were proven more willing to reveal personal information when filling out forms on a computer than in other modes of interviews (Weisband & Kiesler, 1996). The norm of reciprocity and aspects of the data-collection environment are thought to have a confounding effect on the tendency to disclose electronically (Joinson, 2001a; Kam & Chismar, 2003; Moon, 2000).

While these studies demonstrate an asymmetrical communication setting where a subject is being interviewed by a computer, self-disclosure has been identified in psychology literature as instrumental in symmetrical interpersonal relationships and has been described as "the cornerstone of the formation, development, and maintenance of … social relationships" (Joinson, 2001b, p. 178). The concept of self-disclosure has thus also been studied in depth within the context of computer-mediated interpersonal

relationships. It has been suggested that users are more likely to feel the freedom to self disclose to one another using computers (Weisband & Reinig, 1995) and indeed online relationships are characterized by high measures of relationship depth, which is determined in part by the amount of self-disclosure (Parks & Floyd, 1996). While the number of message boards and chat rooms that exist on the Internet where people share personal experiences and advice seems to indicate that self-disclosure does occur in electronic communication, there is empirical evidence that the use of computer-mediated communication fosters an increased level of self-disclosure over telephone and face-to-face communication (Joinson, 2001b; Tidwell & Walther, 2002). Gender and expectation of future interaction have been noted among the factors mediating the relationship between computer-mediation and self-disclosure (Savicki & Kelley, 2000; Walther, 1997). Further, it has been explained that in communication systems where identities of communicants are not revealed, communicants feel less personal risk in disclosing personal information (Matheson & Zanna, 1992).

Social Presence

Short et al. first defined the term social presence as "the salience of the other in a mediated communication and the consequent salience of their interpersonal interactions" (Short et al., 1976). The degree of social presence felt by the participants has been said to be related to the "bandwidth" (range of communication modes) that a medium provides (Rice, 1987). Settings with more modes of communication have the ability to transmit the feeling that the dispersed communicants are physically present, encouraging people to treat each other as social beings (Sia et al., 2002). This is because the verbal and visual cues are enhanced in such situations. Accordingly, as expected, face-to-face settings

have been shown to create a higher level of social presence than dispersed ones (Burke & Chidambaram, 1999; Rice, 1993; Straub & Karahanna, 1998).

Varying levels of social presence have been shown to have effects upon communication outcomes. Namely, reduced social presence has increased polarization (Sia et al., 2002), uninhibited remarks (Kiesler et al., 1985; Siegel et al., 1986), unique and high quality ideas (Valacich et al., 1994), and novel arguments (Sia et al., 2002). While these effects relate to the completion of a task itself, they are all predicated upon an effect of social presence on interpersonal interaction. For example, reduced social presence also reduces evaluation apprehension (Nunamaker et al., 1991) and creates depersonalization thereby allowing such outcomes as novel arguments and uninhibited behavior, respectively (Sia et al., 2002). In general, both Media Richness Theory (see below) and Social Presence concepts contribute to the understanding that for more ambiguous, equivocal tasks, media that have more communication cues are most appropriate (Daft & Lengel, 1986; Yoo & Alavi, 2001). This higher level of social presence allows communicants to more easily exchange ideas and resolve views and opinions among people. In contrast, tasks that involve only uncertainty and require just the quick transmission of facts are better suited to media with fewer communication cues i.e. lower social presence.

Further, in the case of the interpersonal interactions, social presence is again significant. When fewer communication cues are available, the communicants are less aware of each other and the messages tend to become impersonal (Hiltz et al., 1986b; Siegel et al., 1986; Sproull & Kiesler, 1986). The result of reduced social presence is, then, less exchange of socio-emotional content (Rice & Love, 1987) and a reduction of

interpersonal warmth and affection (Walther et al., 2001). With this background, computer mediated groups have been told to undergo training to learn to increase their social presence (Warkentin & Beranek, 1999) and concentrate on social development even within environments of relatively low social presence to combat that interpersonal impediment (Yoo & Alavi, 2001).

In general, we have seen a positive effect of increased social presence on group outcomes and relationships. However, there is some indication that even for ambiguous tasks, more communication channels are not necessarily more beneficial. In Yoo and Alavi's study, a video channel distracted participants' attention to the extent that it affected their task participation and, ultimately, performance (Yoo & Alavi, 2001). Walther et al. (2001) also point to a few cases where the video channel, although ranked high for social presence, proved to be extraneous and suggests that perhaps it is the type of communication channels that have a greater effect on the success of social presence than the quantity. Studies like these are the ones that point to the ideas that challenge the linear relationship between social presence and successful group outcomes and relationships.

Self-Awareness

It has been shown that when using computer-mediation, communicants focus more on themselves than on others (Sproull & Kiesler, 1986) and overestimate their own contribution to decision tasks (Weisband & Atwater, 1999). Kiesler et al. (1984) have noted that computer-mediated communication seems to comprise among its conditions "reduced self-awareness". Still, others have observed that computer-mediated communication made users much more self-aware (Matheson & Zanna, 1988;

Pinsonneault & Heppel, 1998). Actually, two types of self-awareness have been identified and defined.

*Private* self-awareness is "a focus on personal aspects of oneself, like perceptions, thoughts, and feelings" (Pinsonneault & Heppel, 1998). Often electronic communication takes place anonymously. Even when it doesn't, communicants commonly work under physical isolation (Spears & Lea, 1994). Both of these conditions contribute to an increased focus on one's own thoughts and feelings – heightening private self-awareness. Some consequences of high levels of private self-awareness are increased self-disclosure (Joinson, 2001b) and less interpersonal influence (Sassenberg et al., 2005).

*Public* self-awareness, on the other hand, refers to the "attention to oneself as a social object" (Pinsonneault & Heppel, 1998, p. 94). One experiencing high levels of public self-awareness is concerned with his appearance and the impressions made in social situations. Computer-mediated communication has been shown to lower public self-awareness when users are unidentified (Joinson, 2001b) which, in turn, reduces concerns with social standards, conformity, and social evaluation. Not expecting retaliation and censure, people can become disinhibited (Lea et al., 2001; Pinsonneault & Heppel, 1998), use flaming (Kiesler et al., 1984), or make extreme decisions.

### *2.2.2. Communication Technology*

Given the large variability in the characteristics of communication media, media choice has been a fertile area for research (Rice et al., 1992). The actual medium and its fit with and impact on the task at hand are often under investigation in this area (Straub & Karahanna, 1998). Discussion of the media characteristics concepts relevant to the current research follows.

Media Richness/Synchronicity

Classically, the core of research on media choice has centered around Media Richness Theory, MRT (Daft & Lengel, 1986). Building on the ideas put forth by social presence theory (see above), MRT delineates a hierarchy of communication media that are more or less "rich" depending on their ability to successfully relay the feeling that the people communicating are psychologically perceived to be physically present. This richness, in turn, affects the way people communicate using specific media. For problems that involve high levels of ambiguity, it is said that rich media, i.e. those that contain multiple cues among other criteria, should be chosen. Attempts to empirically support MRT have met with both success (e.g. Daft & Trevino, 1987; Rice et al., 1992) and failure (e.g. Dennis & Kinney, 1998; Trevino et al., 1990). The influence of factors beyond media richness such as recipient availability (Straub & Karahanna, 1998) and feedback (Dennis & Kinney, 1998) has prompted the search for alternative models of media choice (e.g. Straub & Karahanna, 1998).

The MRT line of thought has recently been enhanced as the variety of technologies available can no longer be collapsed into one descriptor and placed onto the richness scale (Dennis & Valacich, 1999; Zmud et al., 1990). Rather, Dennis and Valacich (1999) propose studying media by examining the specific capabilities that they implement. While media cannot be described as merely "rich" or "lean", there are specific characteristics, of which a medium can contain any combination, that will be effecting the way people communicate using that medium. These characteristics also define the five aspects of the synchronicity ("moving at the same rate") of the system, allowing for a new evaluation of system needs that relies on the type of communication

activities that will be taking place rather than on the type of task, as MRT suggests. The five characteristics that they identify are: immediacy of feedback, symbol variety, parallelism, rehearsability and reprocessability. Any one medium might have a high level of one characteristic while simultaneously having a high or low level of the others. Depending on the goal of the communication, they claim, should be the choice of what level (low-high) of each characteristic is present in the communication system. Of the five, highlighted in this study is the concept of *rehearsability* as we hypothesize that it is instrumental in electronic self portrayal and will impact the development of trust in a communication.

Rehearsability

Rehearsability is defined as the extent to which a system allows users to reread and edit their own messages before submitting them to be processed by the system and shown to the receivers. Although there has been no empirical research done to examine the effects of rehearsability within a communication, Walther (2001) alludes to the possibility that the amount of rehearsability that a communication system allows is part and parcel of the extent to which a communication system allows its users to create images of themselves or formulate them of others: "Users may modify their texts using CMC's affordances to inspect, edit, and revise messages before they are sent…there is no accidental transmission of unintended nonverbal behavior or physical appearance cues." (Walther et al., 2001, p. 109) A medium that has low rehearsability affords no opportunity to go back and reconsider the content, style, or diction of the communication. Rather, the contribution is transmitted to and accepted by the receiver as it is being formulated. To use an example, an asynchronous system such as E-mail would be

considered to have a high level of rehearsability because a user could spend any amount of time that he chooses formulating his messages before sending them. However, a synchronous system such as instant messaging would have a much lower level of rehearsability because the users have much less time in between messages to focus on the contents of the message. Even within synchronous systems it is feasible to have different levels of rehearsability. A synchronous system, for instance whose backspace feature was disabled would have a much lower level of rehearsability than one that allowed deleting and replacing already typed words because it lacks that option of rethinking and recomposing the messages before submitting them to be read.

The more rehearsability that exists, the more opportunity one has to reflect and focus on himself within a communication which in turn would impact the content of his messages (Joinson, 2001b). Therefore, the trust-related impact of the system's level of rehearsability would be most likely gleaned from examinations into self-awareness during computer mediated communication (Joinson, 2001b; Pinsonneault & Heppel, 1998). At the same time, the keystroke level analysis that one communicant has the opportunity to make of his virtual companions is a major source for additional cues based upon which people can form impressions of one another (Lea & Spears, 1992). Insight into the typing skills, grammar, or swiftness of communicants is a good example of the way people might make judgments of ability, benevolence and integrity (Jarvenpaa et al., 1998), based on messaging and technology-related skill stereotypes (Sarker et al., 2003). As discussed above these impressions, in turn, are key in the development of cognitive processes (Walther, 1993) such as trust development.

Representation

Another way that media characteristics are often manipulated is the manner in which the communicants are personally represented – or not represented – by the system. As it is, the computer interface has been said to be somewhat impersonal and to cause users to feel more anonymous (Hiltz & Turoff, 1978; Weisband & Reinig, 1995). Much research has shown that system-imposed anonymity further increases this effect in group work. When the sources of messages are not identified communicants feel less constrained in their behavior (Jessup et al., 1990). While this sometimes has negative results such as free-riding (Nunamaker et al., 1991; Sosik et al., 1997), flaming (Kiesler et al., 1984; Lea et al., 1992; Reinig et al., 1998; Siegel et al., 1986), and impeded information processing (Dennis, 1996), some positive effects of anonymity include exertion of greater effort, generation of more critical and probing ideas (Jessup et al., 1990), improved participation, more honest evaluations, and improved decision quality (Connolly et al., 1990; Nunamaker et al., 1991; Pinsonneault & Heppel, 1998).

Underlying the effects of anonymity on group work are changes in self-awareness (discussed above) (Pinsonneault & Heppel, 1998). This is because decreased focus on the salience of others and increased focus on oneself are major contributors to the disinhibition exhibited with various behaviors by anonymous communicants. In the case of the social aspects of a group communication, these factors are once again relevant. Pinsonneault and Heppel (1998) note that the importance of social evaluation is a situational variable that impacts anonymity's effect on group work. In the development of trust within a relationship, social evaluation is of utmost importance (Walther, 1993) and thus anonymity must play an important role (Lea et al., 2001).

Often a particular form of anonymity comes under investigation. Visual anonymity refers to the inability to view the other communicants via photograph or video channels (Lea et al., 2001; Walther et al., 2001). In cases of visual anonymity, much less social context information is being transmitted during the communication. The effects of this have been deindividuation, in which communicants are prone to the influence of a group identity (Spears & Lea, 1992), increased affection in long-term groups (Walther et al., 2001), and increased group attraction by enhancing group-based stereotyping (Lea et al., 2001).

In other cases, although the system portrays a pictorial image of each user, the image is fictional. These graphical images that are used to represent users in the online environment, called avatars, are not meant to imitate the real world, rather, they support interaction among large numbers of people in a common virtual space and they allow for communication without necessarily conveying identity (Donath, 2001). In fact, often, the avatar gains a special meaning within a virtual community as a symbol of identity, which users are sometimes able to manipulate with the ability to modify the appearance of the avatar (Kang & Yang, 2006). When controlled by the user, the avatar is a powerful tool for expression of self, or deception thereof (Holtjona & Nah, 2007). It is therefore important to understand the effects that communicating with fictional visual representation has on communication as some researchers have done (Kolko, 1999; Lee et al., 2005). Most research goes beyond the static avatar, concentrating on the capability of including emotion in a communication via avatar animations (e.g. Persson, 2003). However, the current study focuses on static avatars to gain insight into their usefulness and function in terms of trust development.

Similarly, anonymity might be imposed textually by revealing or repressing the names of the communicants. Often a communication system will represent its users with a pseudonym rather than a real name to hide some true identity information about the communicants. Past research has studied the impact of this type of anonymity on the resulting communication. For example, Jaffe & Lee (1999). However, to maintain the feasibility of the experimental study, the current research focuses primarily on visual, rather than textual representation of users in CMC.

### 2.3 Developing Trust in Virtual Teams

Given the above factors involved with communication in a virtual context, trust has been expected to develop in various ways in virtual teams. Classic literature in CMCS leads to the denial that any form of interpersonal relations, including trust, could form in a virtual environment. This stems from the "cues-filtered-out" approach originally described by Sproull and Kiesler (Sproull & Kiesler, 1986). The main idea there, reiterated subsequently in many different contexts, is the notion that when electronic communication is used, social context cues are attenuated causing "deregulating effects" on communication. Because text-only communication removes any indications of job rank, age, appearance, and the like, people have been shown to change their communication behaviors. For instance, exchanging new information equally (Sproull & Kiesler, 1986), delivering bad news honestly (Sussman & Sproull, 1999), maintaining composure (Reinig et al., 1998), and considering all ideas comparably (Gallupe et al., 1992; Pinsonneault et al., 1999) have all been affected by lack of social context cues. Additionally, communication cues are limited as well in computer-mediated communication. Media richness theory and the concept of social presence

point to the possibility that computer-mediated communication does not include the appropriate channels for the conveyance of interpersonal affection (Daft & Lengel, 1986; Short et al., 1976). Rather, it is more impersonal and distant (Hiltz et al., 1986b; Siegel et al., 1986; Sproull & Kiesler, 1986). Collectively, these arguments are known as deindividuation theories because they claim that loss of individuating cues creates a loss of focus on the self in favor of immersion in the group often resulting in socially unacceptable behavior (Lea et al., 2001). Such an environment, it would seem, is not conducive to the development of interpersonal trust.

However, a large number of empirical studies (e.g. Chidambaram, 1996; Walther, 1995) and theoretical works have since then shown otherwise. It has been noted that often, due to positive attitudes, a tenuous form of initial trust, coined swift trust, exists immediately even in computer-mediated groups with no group history (Jarvenpaa & Leidner, 1999; Meyerson et al., 1996). Once that initial trust exists, given time, trust-building behaviors, and other contextual factors (Jarvenpaa et al., 2004), it can be strengthened to form a trusting, cohesive, successful group (Coppola et al., 2004; Jarvenpaa & Leidner, 1999). Trust-building behaviors include continued and frequent social exchange, explicit verbal statements about commitment, support and excitement (Iacono & Weisband, 1997; Jarvenpaa & Leidner, 1999), and self-direction rather than use of behavior control mechanisms (Piccoli & Ives, 2003). Examples of contextual factors are demographic dissimilarity (Krebs et al., 2003), communication of trustworthiness, establishment of a common business understanding, and strong business ethics (Kasper-Fuehrer & Ashkanasy, 2001).

The theory of social information processing asserts that computer-mediated relationships can indeed reach the same extent as face-to-face ones, albeit at a slower rate (Walther, 1997; Wilson et al., 2006). In fact, it has even been said that communicants can reach an even greater depth of interpersonal relationships using computer-mediation than face-to-face (Walther, 1996). This hyperpersonal model is explained by way of the SIDE (Social Identification/Deindividuation Effect) theory which posits that because of attenuated interpersonal cues, the deindividuation effect (loss of personal identity in favor of a group identity) is redefined as a shift in awareness from the self to the group so that all judgements are made in terms of the group (Lea et al., 2001). As a result, people tend to categorize themselves as either similar or dissimilar to the team based on the impressions built using the limited information they have (Lea & Spears, 1992). This stereotyping comes in the form of categorical information processing, overattribution on minimal social cues, and idealization of the communication partners which in turn causes closer relationships than would otherwise develop. In fact, the phenomenon is said to weaken as more individuating information becomes available (Jacobson, 1999; Walther, 1997).

### 2.4 Scope of the Current Study

Past studies have often looked at virtual teams as being dispersed in time and space, examining the cultural and time challenges that this poses. Our study focuses on only those teams that have the ability to communicate synchronously, where teammates are separated in space but not in time. Additionally, virtual team studies have looked at teams working on projects that last for varying amounts of time. The current study is limited to the identification and examination of trust within the span of one session

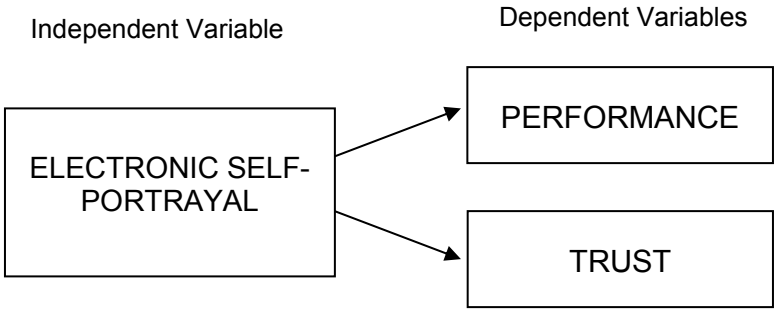
attended by a group of people who have never met before and have no expectation of meeting again, but share responsibility for the outcome of a task. (This is consistent with Powell et al.'s (2004) definition of a virtual team.) It therefore is not concerned with the temporal aspects of virtual communication that some studies focus on (Hung et al., 2004; Walther et al., 2001).

It is interesting to note that despite all of the research that has been done in this area, little empirical work has actually been done to confirm the connection between trust in virtual teams, and increased performance. For exceptions, see (Jarvenpaa & Leidner, 1999; McAllister, 1995; Paul & McDaniel Jr, 2004). Among its goals, the current study seeks to fill that gap in the study of trust within virtual teams. In addition since no other study has investigated the effects of media rehearsability on communication, this study represents the first to do so.

## CHAPTER 3: HYPOTHESES DEVELOPMENT

What we seek through the current investigation is an empirical explanation of the effects of electronic self-portrayal upon the trust and performance of virtual teams. (See Figure 3-1).

**Figure 3-1: Main Investigated Effect**

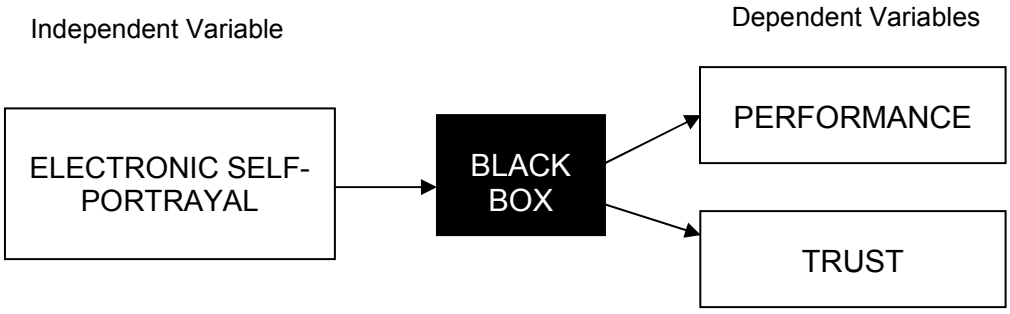



Two theoretical approaches to this goal present themselves from within the relevant literature. Our first attempt would be to parallel the concepts addressed in studies of social presence where increased communication cues create the psychological impression that virtual teammates are physically present (Daft & Lengel, 1986; Rice, 1987; Short et al., 1976). Similarly, in a scenario of increased electronic self-portrayal we might conclude that because the system is portraying more true information about the communicants, people feel closer to one another and are more likely to trust each other. However, more recent theoretical work on virtual teams favors the second approach which shows that not only is the increased portrayal not beneficial, based on Walther's hyperpersonal model (Walther, 1996) (see section 2.3 above for a detailed description of this model) it serves as additional information that acts to dispel the positive impressions that result from limited context cues. Given this premise, we expect that trust will *decrease* as a result of increasing the amount of electronic self-portrayal in the form of

information identifying the communicants. While this expectation seems counterintuitive at first glance, the following theoretical development explores the components of electronic self portrayal and how they might be implemented into the characteristics of a communication system, providing insight into how increased electronic self-portrayal impacts trust within virtual teams.

Thus, in order to fully understand the main effect, we conduct a full examination of the intermediary effects that will serve, in essence, to unpack the "black box" of what is truly happening within virtual teams under various levels of electronic self-portrayal, that impacts virtual team trust and performance. (See Figure 3-2.)

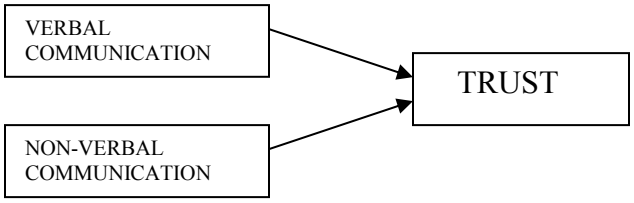
**Figure 3-2: Intermediary Investigated Effects**




The theoretical setting for this part of the study rests upon seminal ideas from sociology literature. "When an individual enters the presence of others, they commonly seek to acquire information about him…enabling others to know what they may expect from him," in our case, specifically, whether or not they may trust him (Goffman, 1959, p. 1). In ad hoc acquaintances, this information, Goffman continues, is gathered based on clues from a person's conduct and appearance allowing people to apply their previous experience with similar individuals, or they can rely on what the individual says about himself. Goffman differentiates between the expression that an individual *gives* and the one that he *gives off*, essentially describing verbal communication (what he says about

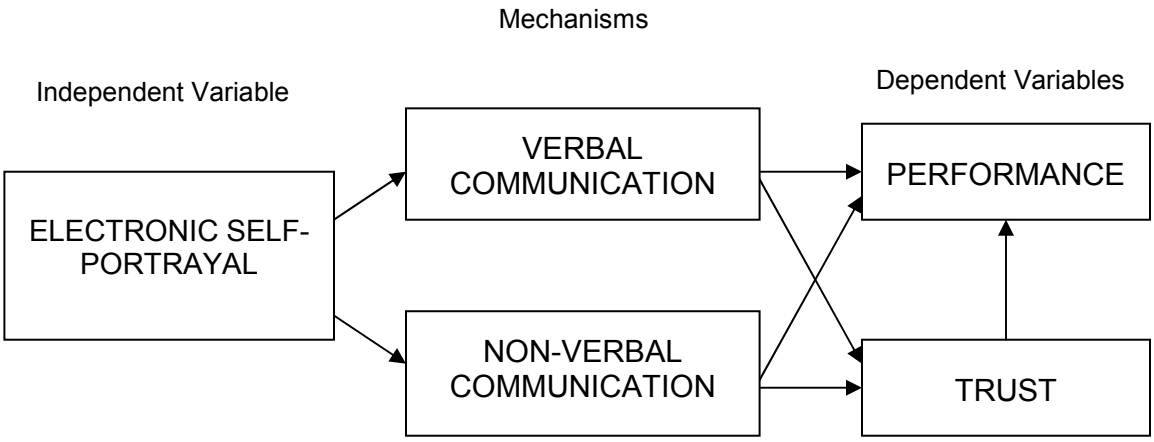
himself) versus non-verbal communication (i.e. conduct and appearance). In a face-to-face setting both are equally prominent in forming the understanding that communicants have of one another, and consequently how well they may trust each other. A model of trust in a face-to-face environment based upon these ideas is depicted in Figure 3-3.

**Figure 3-3: Trust in Face-to-face Communication**




However, as demonstrated by decades of CMCS research, the virtual communication environment operates very differently than its physical counterpart. In CMC, verbal and non-verbal communication are constrained by the characteristics of the system being used. The current research is predicated upon the principle that the extent to which a communication system impacts the content of a communication (verbal communication) as well as the non-verbal expressions that go along with the formulation of that content (similar to gestures and tone in face-to-face communication) will be the extent of its facilitation of trust among its users. Thus, aspects of verbal and non-verbal communication will be the mechanisms by which electronic self-portrayal can impact virtual team trust. (Figure 3-4.)

**Figure 3-4: Verbal and Non-verbal Mechanisms**




Although the strength of CMC systems generally lies in their ability to transmit the communication content via text-based channels, one content-based difference that has been noted in the literature is regarding disclosure of personal information. Foreshadowed by studies that indicate people disclosing personal information more readily in a computer-based medium (Kiesler & Sproull, 1986; Sussman & Sproull, 1999; Weisband & Kiesler, 1996) and the suggestion that users are more likely to feel the freedom to self-disclose to one another using computers (Weisband & Reinig, 1995), particularly those that hide identities (Matheson & Zanna, 1992), some studies attest to the fact that the use of computer-mediated communication fosters an increased level of self-disclosure over telephone and face-to-face communication (Joinson, 2001b; Tidwell & Walther, 2002). This phenomenon is attributed to "reduced evaluation anxiety, feelings of safety or invulnerability, and less concern with looking good," (Weisband & Kiesler, 1996, p. 4). Closely linked with trust (Wheeless & Grotz, 1977), ***disclosure*** will be considered the verbal mechanism by which trust is manifested within a communication medium. It is expected that increased electronic self-portrayal would have a negative effect upon disclosure as additional information about the communicants

removes the shield behind which communicants feel that they are hiding when they communicate via computer mediation (Weisband & Kiesler, 1996). In turn, trust will be diminished as well.

Classically, CMC is different from face-to-face communication in its reduced ability to provide non-verbal information. While attributes of text-only communication include task-focus and reduced evaluation apprehension (Gallupe et al., 1992; Nunamaker et al., 1991), the lack of non-verbal cues has its effects both in the way that communicants view themselves with respect to others and in the way that they view their communication partners.

Specifically, reduced non-verbal cues have caused virtual communicants' impressions of one another to become exaggerated. Categorical information processing, overattributions on minimal social cues, and idealization of the communication partners in computer-mediated communication groups are common (Walther, 1997) because in the absence of individuating cues about others, people build stereotypical impressions based on the limited information they have (Lea & Spears, 1992). Lea and Spears' (1992) SIDE (Social Identification/Deindividuation Effect) Theory posits that people tend to categorize themselves as either similar or dissimilar to the team based on these stereotypes. These feelings of similarity with others then contribute to their willingness to cooperate and trust (Jarvenpaa & Leidner, 1999). However, as more information about individuals is available, this effect is lessened (Walther, 1997). By becoming aware of individual differences as they gain more information about each other, people are less prone to making stereotypical impressions that influence them to trust. Thus, trust is expected to suffer in the face of increased electronic self-portrayal due to decreased

impressions based on ***stereotyping***. For example, virtual team members have been known to form trust in one another based upon their perception of their teammates' ability, benevolence, and integrity (Jarvenpaa, et al., 1998). In these areas, as well, impressions of others would be exaggerated until such time as the opportunity for more information-gathering dispels the misperception. Therefore, a communication system featuring an increased level of electronic self-portrayal is expected to weaken communicants' perceptions of their teammates' ability, benevolence, and integrity as compared to a lower level of electronic self-portrayal.

The level of electronic self-portrayal afforded by a communication system will also affect the outcomes of group collaboration using the system by means of the feeling of social presence that it creates – or *perceived social presence*. Not to be confused with social presence in the more general theoretical context of social presence theory, the measure of how strongly communicants feel that their communication partners are present is referred to as perceived social presence. Traditionally, systems that have more communication cues are said to encourage more perceived social presence, i.e. the feeling that the people communicating are psychologically perceived to be physically collocated (Daft & Lengel, 1986; Rice, 1987; Short et al., 1976). Certainly, increased portrayal of the individuals communicating would strengthen that feeling. For example, when a system requires greater delays between messages and their responses, it is considered to have less immediacy of feedback which contributes to the perception of low perceived social presence (Burke & Chidambaram, 1999). As will be discussed below, one of the elements of electronic self-portrayal is the ability of a medium to expose the process of message formulation to the team. This is a form of increased immediacy of feedback that

enhances perceived social presence. In turn, the increased salience of others in one's communication space would inhibit the communicants, causing them to refrain from a trusting relationship. Hence, ***perceived social presence*** acts as a mechanism by which the level of electronic self-portrayal changes the way virtual communicants view themselves in relation to their teammates thereby affecting the resulting level of trust.

Similarly, prior literature in virtual teams has examined electronic self-portrayal primarily from the perspective of anonymity. In CMC, the inability to identify the originator of the messages, and the corresponding freedom to create messages that can be posted without personal identification, has been linked to lower ***public self-awareness*** (attention to oneself as a social object) (Pinsonneault & Heppel, 1998). Anonymous communicants are not focused on their outward appearance and consequently don't seek to build a relationship with their teammates. On the other hand, if communicants are identified, social context cues are being transmitted and team members have more information with which to form impressions. Similarly, visual anonymity (absence of graphical representation) not only removes the social cues used for impression formation, it allows users to form idealized impressions based on their imagination or stereotypes (Joinson, 2001b). Photo or video images of communicants have the ability to dispel any idealized impressions (Walther et al., 2001). Avatars, on the other hand, are a means of maintaining a certain level of anonymity without losing the ability to create some kind of visual connection with other communicants and one's own presentation. Additionally, the fictional aspect would likely reinforce the trend toward idealized impressions.

In addition to the means of personal identification (or lack thereof), CMC allows members to gather information about each other based on the process of message

formulation and the content of the communication. Message creation is affected by the level of rehearsability afforded by the system**.** Rehearsability is the extent to which a communication system allows users to reread and edit their messages before submitting them to be processed by the system and shown to the receivers (Dennis & Valacich, 1999). Typically, synchronous systems are said to provide low rehearsability because they do not give the user much opportunity to reread or edit his message before submitting it. In contrast, asynchronous systems are considered to provide high rehearsability as they allow users to edit their messages, proofread them to remove grammar and spelling errors, and reflect deeper on their contributions to the group. A user who has the opportunity to fine-tune his communication because of an increased level of rehearsability is more likely to experience higher levels of ***private self-awareness***, a focus on personal aspects of oneself, like perceptions, thoughts, and feelings (Pinsonneault & Heppel, 1998). The user is likely more inwardly directed than focused on building a relationship with his team members. Consequently, public and private self-awareness are the final mechanisms by which the system's electronic self-portrayal characteristics impact virtual team outcomes.

Additionally, from the sender's perspective, increased rehearsability affords him the opportunity to engage in impression management. This form of selective self-presentation is enabled through inspection, editing and revision of messages before they are sent. Further, more time to think about the messages leads to more intended and desirable message construction (Walther et al., 2001). In a high rehearsability setting, then, more positive information is transmitted for use during impression formation.

Within synchronous systems, due to the constraints of real-time communication, a low rehearsability setting would show the rest of the team every hesitation and change that a user makes as he fine-tunes his messages. A high rehearsability synchronous setting would enable users to create and edit their messages privately and submit only the final product to the group. When the team is privy to the process of message creation by each of its members, there is an uncontrolled transmission of unintended nonverbal behavior (Walther et al., 2001). These available nonverbal cues are additional sources to gather information about each other. This, in fact, is the very non-verbal information that is used to dispel stereotypes and exaggerated impressions of ability, benevolence, and integrity.

It follows from this theoretical development that the way that a person is portrayed in an online environment is largely based upon two aspects of their online participation: "who they are" or their *Personal Representation*, and "how they formulate messages" or their *Messaging-based Representation*.

PERSONAL REPRESENTATION. Although computer mediation has been said to attenuate most social context cues (age, appearance, rank, etc.) that are available in a face-to-face environment, a computer-mediated session in which continuity of interaction is essential often provides means for identifying who the participants are so that a meaningful conversation can ensue. Personal representation is manifested in two ways: textual and graphical. A communication system might employ a textual representation of its users with each user's real name, a computer generated one, or a user-chosen pseudonym. Graphical representation of users often comes in the form of avatars that are either imported by the users or chosen from a small or large selection of possible avatars,

sometimes customizable images of people, objects, animals, or cartoons. Sometimes actual photos of the users are employed as a means of representation.

MESSAGING-BASED REPRESENTATION. In addition to providing ways to identify who the participants are, a system has the ability to present the way the user formulates messages. While content, tone, and frequency of messages are determined by the user, a system can help portray its users in terms of the way they are creating their messages. This is often manifested in the level of rehearsability afforded by the system.

In this light, we expand electronic self-portrayal in our model to include both of these dimensions – personal representation and messaging-based representation – and we hypothesize that changes in both aspects of system electronic self-portrayal will have an impact on the trust and performance of teams using those systems as follows: (See Figure 3-5.) Since, according to Walther's hyperpersonal model, and the above theoretical development, identifying information that is being transmitted through the communication channel removes the ability for communicants to idealize about one another, we predict that:

*H1. Trust will decrease when communication occurs in a low electronic self-portrayal mode as compared to a high electronic self-portrayal mode.*

Both personal and messaging-based representation can be characterized as more or less true-to-life. Personal representation that more closely portrays the way that a user really looks or really is identified in real-life, is a form of representation that is more true-to-life. A mode of personal representation that is fictional is, in comparison, less true-to-life. Likewise, the mode of messaging-based representation is more true-to-life when the real message formulation process is exposed rather than hidden as it is in a less true-to-

life mode. For example, a communication system that allows for less rehearsability is more true-to-life in comparison with one that allows for more rehearsability because low rehearsability allows the communicants to view the way that messages are being created in real-life. We therefore hypothesize that the forms of representation will impact trust based upon how true-to-life they are.

> *H1a. Communication using a more true-to-life mode of personal representation will result in less trust than will communication using a less true-to-life mode of personal representation.*
>
> *H1b. Communication using a more true-to-life mode of messaging-based representation will result in less trust than will communication using a less true-to-life mode of messaging-based representation.*

While it follows from our theoretical development that more information leads to less idealization and therefore less trust, we can't ignore the seemingly contradictory theory (Social Presence Theory) that implies that feelings of closeness that come about through increased communication information will positively impact the dynamics of an interaction. Nor can we expect the extreme instance to have the same impact as the moderate ones. For instance, we could not logically claim that knowing absolutely nothing about one's communication partners and relying completely on imagination would make one feel comfortable enough to trust. We must therefore conclude that *partial electronic self-portrayal* will have an impact different from that of more *complete electronic self-portrayal* or low electronic self-portrayal. Partial electronic self-portrayal is defined as a mode of electronic self-portrayal that includes at least one form of true representation and at least one of non-disclosure.

In any type of communication, partial self-portrayal depicts an incomplete picture of a person. We need to know both who a person is and how they express themselves in

order to truly understand with whom we are communicating. Likewise, we expect that when both aspects of electronic self portrayal are present, a person is more completely portrayed and there is much less room for idealization. With only one form of representation provided by a communication system in the most true-to-life form, self-portrayal is still incomplete so idealization can take place. Yet at the same time, *some* true information makes the communication real and communicants feel close to one another. So, while additional information reduces trust by removing idealization, we must qualify this by pointing out that if the idealization is preserved even with some information, the opportunity for trust is not lost. We predict that one form of electronic self portrayal without the other reconciles the divide between being able to idealize and feeling close. Hence we hypothesize an organismic interaction effect between personal and messaging-based representation, i.e.,

> *H1c. Communication using a more true-to-life mode of only one form of representation will result in more trust than will communication using any other combination of representation modes.*

In addition, trust itself is expected to be a contributor to the performance of a group (Dirks, 2000; Klimoski & Karol, 1976; McAllister, 1995; Paul & McDaniel Jr, 2004), particularly if the groups are performing a task for which trust is relevant. Hence we expect that:

*H2. Performance will be better when the level of trust that exists among communicants is increased.*

If trust is negatively impacted by electronic self-portrayal, it is hypothesized that performance too will decline in the face of increased electronic self-portrayal characteristics. Furthermore, it can be expected that the increased social and nonverbal

cues provided by electronic self-portrayal would pose as a distraction from the performance information and prove to negatively impact performance (Weisband & Atwater, 1999; Yoo & Alavi, 2001). Thus,

*H3. Performance will be worse when communication occurs in a low electronic self-portrayal mode as compared to a high electronic self-portrayal mode.*

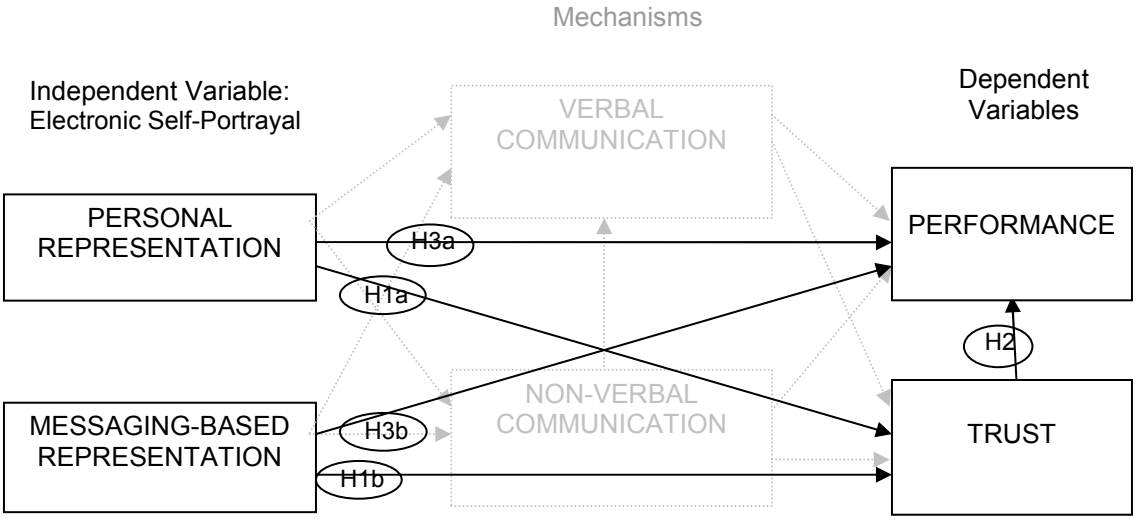
For performance as well, the expectation is developed based on how true-to-life the representation is.

> *H3a. Communication using a more true-to-life mode of personal representation will result in worse performance than will communication using a less true-to-life mode of personal representation.*
>
> *H3b. Communication using a more true-to-life mode of messaging-based representation will result in worse performance than will communication using a less true-to-life mode of messaging-based representation.*

Once again, partial electronic self-portrayal, creating the combination of real and idealized communication partners, produces a situation that is more conducive to the development of a successful working relationship than either extreme. We therefore expect that:

> *H3c. Communication using a more true-to-life mode of only one form of representation will result in better performance than will communication using any other combination of representation modes.*

**Figure 3-5: Proposed Theoretical Model: Main Effect**




H1c & H3c = Interaction Effect

Based on the above theoretical development we continue to elucidate the main effects by hypothesizing that they occur *via* the verbal and non-verbal mechanisms mentioned. (Figure 3-6.) The more true-to-life a form of representation is, the more information is being provided about the "true selves" of the communication participants. This transmission of increased information has various effects upon the verbal and non-verbal mechanisms of trust and performance which in turn impact team trust and performance. Hence, the verbal and non-verbal mechanisms are mediators of the relationships hypothesized above. Since it is expected that the combination of the different forms of representation (partial electronic self-portrayal) has a significant effect upon the communication processes and outcomes, it is worthwhile to hypothesize the effect that partial electronic self-portrayal will have on each of the mediating variables and in turn what the effect is on the trust and performance. In general, it is hypothesized that:

*H4-1. Verbal communication mechanism, disclosure, is a mediator of the combination of personal and messaging-based representation and trust.*

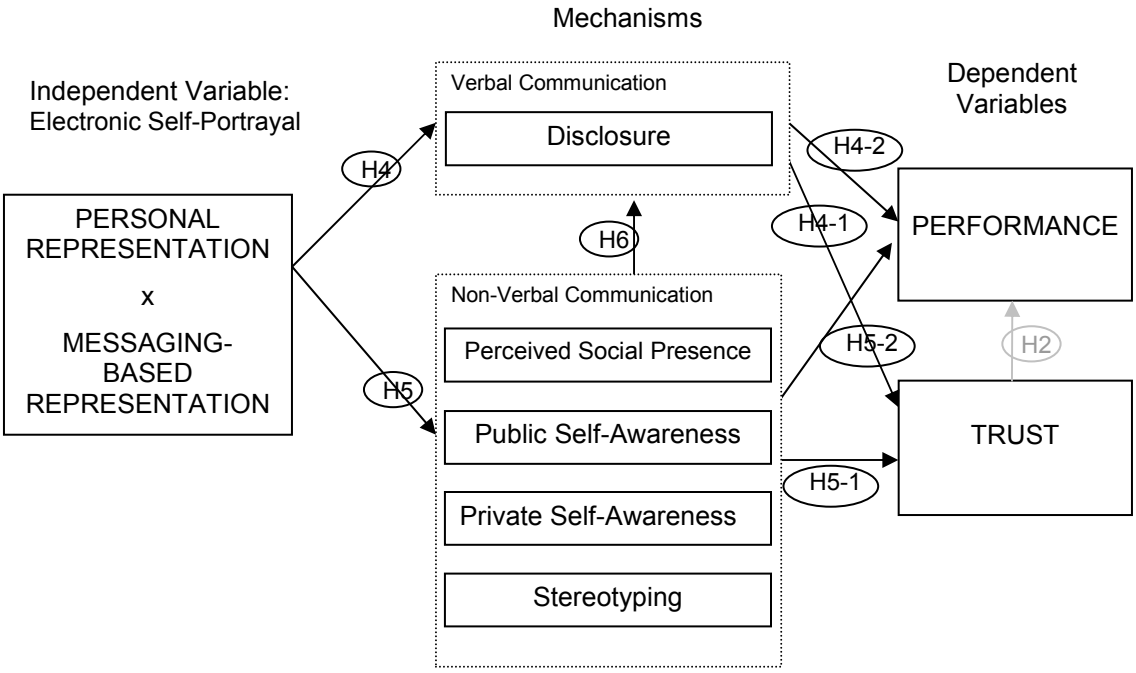
*H4-2. Verbal communication mechanism, disclosure, is a mediator of the combination of personal and messaging-based representation and performance.*

*H5-1. Non-verbal communication mechanisms (perceived social presence, private self-awareness, public self-awareness and stereotyping) are mediators of the combination of personal and messaging-based representation and trust.*

*H5-2. Non-verbal communication mechanisms (perceived social presence, private self-awareness, public self-awareness and stereotyping) are mediators of the combination of personal and messaging-based representation and performance.*

Figure 3-6 depicts the model that includes these mechanism hypotheses. For the majority of the mechanisms, partial self-portrayal creates a level of that mechanism that is moderate compared to the extreme combinations (low ESP and complete ESP). In one case, disclosure, partial self-portrayal fosters a level of the mechanism that is higher than for either of the other combinations.

**Figure 3-6: Proposed Theoretical Model: Mechanisms**




Specifically, as more identifying information becomes available, the shield behind which people feel that they are hiding when they communicate via computer mediation that causes them to self-disclose (Weisband & Kiesler, 1996) is removed. This reduced self-disclosure creates the need to be guarded which, in turn, prevents the fostering of a close personal relationship and successful performance. However, if this effect is limited by combining it with some opportunity to idealize the communication partners, the "shield" is only partially removed, and self-disclosure will occur at the appropriate levels for the formation of trust and quality performance. At the other extreme, if there is no true identifying information, about fellow teammates, a communicant feels much less desire to disclose of himself to a completely unknown entity. Consequently, it is hypothesized that:

> *H4-1a. Partial true-to-life representation will produce higher levels of self-disclosure and this will result in higher trust as compared to non-partial true-to-life representations.*

*H4-2a. Partial true-to-life representation will produce higher levels of self-disclosure and this will result in better performance as compared to non-partial true-to-life representations.*

Increased identifying information transmission can also be expected to act as the enhanced verbal and visual cues that encourage the feeling that the dispersed communicants are physically present – perceived social presence (Daft & Lengel, 1986; Rice & Love, 1987; Short et al., 1976). This would foster a fair amount of inhibition due to the prominent true-to-life presence of others within personal communication space. The discomfort, in turn, would have a negative impact on both the trust and the performance level resulting from the communication. However, once again, this effect can be put in check by combining the identifying information with some concealed identifiers. This would add some feeling of distance so that the communicant does not feel uncomfortably close to his partners. On the other extreme, with no identifying information, the perceived social presence is at such a low level that again the communicants feel uncomfortable trusting and working with their teammates. It is therefore expected that:

*H5-1a. Partial true-to-life representation will produce levels of perceived social presence that are significantly different from those produced by non-partial true-to-life representations and this will result in higher trust.*

*H5-2a. Partial true-to-life representation will produce levels of perceived social presence that are significantly different from those produced by non-partial true-to-life representations and this will result in better performance.*

Additionally, augmented communication of identifying information is expected to impact the public self-awareness experienced by the communicants. With increased electronic self-portrayal, not only do communicants gain more information about their counterparts, they become more aware of the information that is available about

themselves. They therefore have a shift in their self-focus (Pinsonneault & Heppel, 1998). More aware of themselves as social objects, communicants in turn are more apt to develop social relationships with their counterparts. Taken to the extreme, as in complete electronic self-portrayal, levels of public self-awareness are so high that communicants become too distracted by their outward appearance to trust one another and performance is also expected to suffer. Consequently,

> *H5-1b. Partial true-to-life representation will produce levels of public self-awareness that are significantly different from those produced by non-partial true-to-life representations and this will result in higher trust.*
>
> *H5-2b. Partial true-to-life representation will produce levels of public self-awareness that are significantly different from those produced by non-partial true-to-life representations and this will result in better performance.*

In terms of the communicants' focus on the personal aspects of themselves – private self-awareness – it is expected to decrease as more identifying information is available. With increased prominence of teammates and less opportunity to focus on one's own message development in a true-to-life mode of communication, once again, social relationship development takes precedence allowing trust and thereby performance to grow. However, taken to the extreme, levels of private self-awareness can get so low that it is difficult to socially interact. Hence,

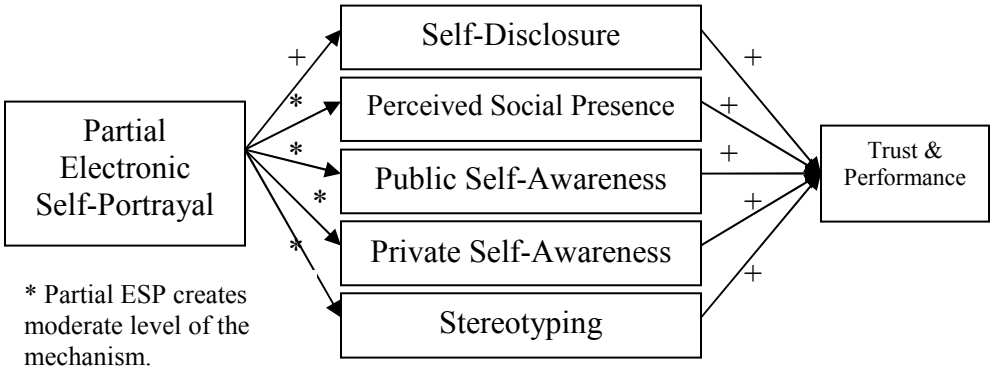
> *H5-1c. Partial true-to-life representation will produce levels of private self-awareness that are significantly different from those produced by non-partial true-to-life representations and this will result in higher trust.*
>
> *H5-2c. Partial true-to-life representation will produce levels of private self-awareness that are significantly different from those produced by non-partial true-to-life representations and this will result in better performance.*

Noting the hyperpersonal model (Walther, 1996) discussed above, we understand that idealization is common in CMC until such time as increased information about the communicants dispels those impressions. In this case, the more true-to-life information that is available, the less stereotyping based on limited information will be done. At the extremes, with *only* stereotyping or without any idealized impressions, trust is expected to suffer as is the ability to perform. Moderation of stereotyping created by partial electronic self-portrayal, with some true-to-life information and some room for idealizing, is the most conducive for trust building and performance. Thus,

> *H5-1d. Partial true-to-life representation will produce levels of stereotyping that are significantly different from those produced by non-partial true-to-life representations and this will result in higher trust.*
>
> *H5-2d. Partial true-to-life representation will produce levels of stereotyping that are significantly different from those produced by non-partial true-to-life representations and this will result in better performance.*

The mediating relationships between the verbal and non-verbal mechanisms and trust and performance described above are summarized in Figure 3-7.

**Figure 3-7: Mediators between Partial ESP and Trust**




Support for the above hypotheses would point toward what we call an "electronic self-portrayal continuum." Computer mediation provides for the ability to overcome

some of the drawbacks of face-to-face communication such as evaluation apprehension and conformance pressure (Nunamaker et al., 1991). Social presence within computer-mediated communication often enhances the online communication experience. However, Walther (2001) warns that it is the quality of the additional cues that make the difference, rather than the quantity, as social presence theorists claim (Short et al., 1976). If we increase the level of social presence to such a high state by adding more electronic self-portrayal communication cues, we introduce the risk of reestablishing the original process losses of face-to-face communication. Thus increased electronic self-portrayal is beneficial only to the extent that it does not promote feelings of such closeness that it approaches face-to-face communication.

Finally, we note the interrelationship between the verbal and non-verbal mechanisms. The electronic self-portrayal manipulations are expected to have a direct impact on both types of mechanisms – verbal and non-verbal. However, the verbal mechanism will be further impacted by the non-verbal state that is created by the electronic self-portrayal manipulations. While low rehearsability has its own impact on disclosure, the atmosphere of decreased private self-awareness that is created, in turn has an additional impact upon disclosure creating a scenario where people are not as focused on themselves, their thoughts, and their words so they are less likely to disclose personal information (Joinson, 2001b). With increased public self-awareness, focus shifts to oneself in the public realm causing him to become involved in social interaction, the cornerstone of which is self-disclosure. Increased perceived social presence is expected to introduce a degree of insecurity that will negatively impact self-disclosure. Less

stereotyping means fewer idealized impressions which also will have a negative impact on the amount of self-disclosure.

*H6. The degrees of non-verbal communication mechanisms within a communication will have a significant impact upon verbal communication.*

*H6a. The higher the level of public self-awareness, the more self-disclosure will occur within a communication.*

*H6b. The lower the level of private self-awareness, the less self-disclosure will occur within a communication.*

*H6c. The higher the level of perceived social presence, the less self-disclosure will occur within a communication.*

*H6d. The less stereotyping that occurs among communicants, the less self-disclosure will occur within a communication.*

The above hypotheses were tested using a laboratory experiment. The procedure for the experiment is described in the chapter that follows.

# CHAPTER 4: METHODOLOGY

## 4.1 Experimental Design

A controlled experiment was used to identify the effects of electronic self-portrayal on the outcomes (performance and trust) of group meetings. The experiment follows a 2x2 factorial design (Figure 4-1) where the treatments represent two forms of identification crossed with two types of rehearsability. Ad hoc groups of three participants were formed and each group was randomly assigned to a system employing an identification/rehearsability combination. The groups were then given a task to perform together using the system.

**Figure 4-1: 2x2 Factorial Design**

| | | Messaging-Based Representation | |
|---|---|---|---|
| | | High Rehearsability | Low Rehearsability |
| Personal Representation | Avatar-identified | | |
| | Photo-identified | | |

The first factor of the experiment consists of manipulating personal representation by varying the way group members are identified. While some users operated using a fictional avatar, others were represented by a photograph of themselves. Avatar-identified participants were represented with a picture of a static object (such as a snowflake) that was gender-neutral. While visual representation and textual representation are both forms of personal representation, in order to have enough power to make significant conclusions from this experimental research it was not possible to consider both forms of personal representation and the combinations thereof. Visual

representation was chosen as the manipulated form because its true-to-life mode most closely electronically simulates an actual true-to-life (or, face-to-face) experience. Therefore, in all cases, the textual representation is held constant by not revealing subjects' real names. Rather, subjects were given random fictional initials by which to refer to each other. Non-disclosure of real names was chosen for all subjects rather than disclosure in order to isolate the cause of any effects to be found.

The second factor is a manipulation of messaging-based representation and consists of two different levels of communication based upon the amount of rehearsability provided by the system: low and high. Specifically, a high rehearsability system is a messaging system where users type one entire message at a time before submitting them. In this case, users could spend a significant amount of time revising their messages before sending them to their counterparts. On the other hand, the low rehearsability system is one comparable to the UNIX chat application (Talk) where other users could see the letters appearing on the screen as their partners type them. In this treatment, all members of the conversation are privy to any hesitation or correction. This manipulation of rehearsability is novel in its ability to somewhat separate rehearsability from feedback. Most often a reduction in rehearsability comes at the expense of an extreme reduction in immediacy of feedback, such as chat versus e-mail. However, with this manipulation, both conditions experience more similar feedback since they are both synchronous communication while their levels of rehearsability vary.

In this experiment, the avatar-identified/high rehearsability condition is the one that represents low electronic self-portrayal because neither personal nor messaging-based representation is in a true-to-life mode. The avatar-identified/low rehearsability

and photo-identified/high rehearsability conditions represent partial self-disclosure because only one form of representation is in a true-to-life mode. The final condition, photo-identified/low rehearsability, represents complete electronic self-portrayal in the sense that both personal and messaging-based representation are in true-to-life modes. However, it is important to point out that they are not actually complete because the participants' names are not revealed. Rather, the latter condition is *more* complete than any of the other conditions.

### 4.2 Subjects

Subjects were recruited from the population of Baruch undergraduate students through advertising using an IRB-approved recruitment statement.[1] (See Appendix A.) All participants were offered a ten-dollar incentive for their time of about an hour. Use of human subjects and the procedure described here were approved by the Baruch College IRB.

A power analysis has shown that to detect a medium effect size (delta = .75) at an 80 percent confidence level, it is necessary to have 8 teams for each of the 4 treatments/cells, totaling 32 teams (96 subjects considering 3-subject teams). To detect a smaller effect size (delta = .50) at an 80 percent confidence level, 18 teams per treatment/cell are needed totaling 72 groups (216 subjects considering 3-subject teams). In total we would need between 96 and 216 student subjects. The total number of subjects recruited was well over this amount. (See section 5.1).

[1] This project was approved by the Baruch College Institutional Review Board (IRB# 060508) on June 14, 2006.

### 4.3 Task

Each group consisted of three participants who worked together to solve a decision-making task to which there is no demonstrably correct solution. In a business environment, this type of task is prevalent and reliant upon the level of trust within a group. Participants were asked, as a group, to use the given synchronous communication system to discuss the given case and jointly produce a written recommendation for the character in the case. The case involves a fictional character who is deciding whether or not he should download digital music through unapproved channels. For the actual text of the case see Appendix B. The task is original, however, it is modeled after the one used in (Benbunan-Fich, 1997). It represents a scenario that is current, relevant to the students who were performing it, and is ethically charged such that it fosters a rich discussion that can be further analyzed.

### 4.4 Measures

Before starting the task, users completed a questionnaire that collected measures for control variables including demographics, usage of and comfort with synchronous communication, and propensity to trust. After completing the task, participants were directed to an online questionnaire where they were asked to answer questions about their experience during the task, reflecting the constructs of our theoretical model. Outcomes of group work were measured in terms of group performance, trust among team members, and individual perceptions of the process and outcome. Perceptual measures include overall satisfaction with the process, satisfaction with the team, and perceived quality of the team's output. A manipulation check for the rehearsability treatment was also included in the post-task questionnaire. To measure actual performance, expert

judges blind to the experimental conditions evaluated the written recommendation produced by the teams. The expert judges were given a set of criteria based upon which to rate the quality of each team report. They graded each report on seven different dimensions (disclosure, presentation, strength, breadth, depth, innovativeness, and overall quality) using an online form hosted by surveymonkey.com to rate each dimension on a scale of 1-7. (See Appendix K for more information about the judges and the evaluation form.) They were blind to the experimental conditions of each group's report. Two judges independently graded every report, and a measure of inter-rater reliability substantiated the grades. A final rating was determined by conducting analyses using the average of the two judges' grades.

### 4.5 Software

The software that was employed for this task is ICQ Pro 2003b which provides the option to turn the rehearsability feature on or off by switching the layout of a real-time chat screen between *IRC-Style Layout* (high rehearsability) and *Split Layout* (low rehearsability). When the IRC-style layout is chosen, the user types his message into a text box at the bottom of the screen and presses enter when he is ready to submit the message for the rest of the group to view. See Figure A-1 in Appendix C for a screenshot of this layout. This provides for a higher level of rehearsability because the user can privately make any changes to the message, which is not shared until he makes the conscious decision that it is ready. On the other hand, when the split layout is chosen, the screen is divided into three parts. As each group member types, his keystrokes are displayed in the part designated with his user name. See Figure A-2 in Appendix C for a screenshot of this layout. A low level of rehearsability is achieved this way because each

participant can view the messages as they are being formulated keystroke by keystroke. There is no opportunity for a participant to go back and revise the message without his teammates seeing. In addition, temporal aspects of message formulation such as typing speed and hesitations are revealed to the entire group.

The pre-task and post-task questionnaires were created using SurveyMonkey.com. Subjects were directed to the questionnaire hosted by that company. The online questionnaires are streamlined with a home made web page that guides participants through the completion of the task. Subjects were presented with the avatars or photographs of the members of their group (depending on the personal representation manipulation) and were then given explicit instructions for how to begin the chat session for their randomly assigned rehearsability manipulation via these web pages.

### 4.6 Procedure

Students signed up to participate in the experiment via e-mail. At that time pictures were harvested for use in the photo-identified condition and a date and time for participation was assigned. Ad hoc groups of three were randomly formed in advance and a web page prepared for each group. All subjects participated in the study by coming to the laboratory where the experimental chat software was installed. Every effort was made to dissociate the subjects from the setting and the other subjects in the room. Each computer in the lab was enclosed by dividers so that subjects could not see or communicate with one another. Whenever possible other groups or other people were working in the room so that it was not clear to each subject who they were communicating with. Public announcements during the sessions were kept to a minimum as all instructions were self-explanatory. In fact, many students commented after

completing the experiment that they didn't know whether their teammates were in the same room.

Upon arrival, each student was handed a general instruction sheet and an index card. The general instruction sheet (see Appendix D) laid out the three parts of the experiment – the pre-task questionnaire, the task, and the post-task questionnaire. Participants were instructed to check off each step as it is completed. One person in each group who was assigned to be the *Chat Starter* was given additional instructions for starting the chat. (See Appendix E). The index card listed the participant's subject ID number, their fictional initial, and an ICQ username and password. To begin, the participant filled out the pre-task questionnaire that was preloaded in the browser of his computer. When he finished, he was automatically directed to the instructions for starting Part II – the task. There were two versions of these instructions based upon the rehearsabilty manipulation. (See appendix F).

Before beginning the task, each participant entered his subject ID number into the textbox on the web page. The prepared team web page appeared on the upper half of the screen and stayed there for the remainder of the session. The team web page showed the avatars or photos of all the team members, depending upon the personal representation manipulation. See appendix G for a sample of each of these types of pages. Each member was also given a random initial and asked to use the initials to address his teammates throughout the discussion to maintain the integrity of the manipulation. The chosen avatars are all pictures of nonliving, non-gender-specific objects to ensure a not true-to-life representation.

To begin the task, the chat starter opened a chat session by inviting each of the other two participants to join, as per the instructions. Each of the others was instructed to accept the invitation when it popped up on his screen. Team members were instructed to then select one of the two rehearsabilty settings in the chat screen depending on the messaging-based manipulation. Teams were asked to spend about 35 minutes electronically discussing the case and formulating a recommendation. The team then designates a member to follows the instructions to save the report and the chat session. All team members then followed the link to the post-task questionnaire. Once they finished filling it out, they proceeded to the facilitator for their compensation. The reports and chat transcripts were harvested from the hard drives after each session.

### 4.7 Questionnaires

*Pre-task questionnaire:* The pre-task survey instrument is designed to collect information to be used as controls. These include demographics, usage of and comfort with synchronous communication, and propensity to trust. Demographics include age, gender and academic level. To gauge how experienced participants are with synchronous communication they will be asked to report on their use, comfort, and opinion of instant messaging using the following multiple choice questions:

- How often do you communicate using instant messaging?
- With whom do you communicate using instant messaging?
- How comfortable do you feel communicating with instant messages?
- In your opinion, how does instant messaging compare to face-to-face interaction? (open-ended question)

Additionally, participants are asked to self-report how well they type.

Commonly, studies on trust also control for the individual's personality-based **propensity to trust** (Jarvenpaa et al., 1998). We use Jarvenpaa et al.'s operationalization

of this construct in its original form. Participants are asked to rate, based on a 7-point Likert scale anchored by "strongly disagree" and "strongly agree", the following statements.

- One should be very cautious when working with other students.
- Most students tell the truth about the limits of their knowledge.
- Most students can be counted on to do what they say they will do.
- If possible, it is best to avoid working with other students on projects.
- Most students are honest in describing their experience and abilities.
- Most students answer personal questions honestly.
- Most students are very competent in terms of their studies.

See appendix H for a screen shot of the pre-task questionnaire.

*Post-task questionnaire:* The post-task survey instrument is designed to assess the experience of the subjects during their online decision making session. Each of the constructs in our theoretical model is operationalized and measured. The dependent variable, trust, is measured using the unchanged instruments from Jarvenpaa et al. (1998) measuring trust, trustworthiness, ability, benevolence, and integrity. (See Appendix I.) The other dependent variable, performance, is measured in the post-task questionnaire via perception (in addition to the ratings provided by expert judges). Subjects are asked about their satisfaction with the outcome of the session.

Additionally, each of the mechanisms in the model, by way of which it has been hypothesized that electronic self-portrayal would impact trust and performance, is operationalized in the post-task survey instrument as follows:

- Subjects are asked to report on the amount of **disclosure** in which they engaged during the interaction. The instrument used to measure this construct is adapted from Laurenceau et al. (1998).

- Subjects are asked to report on the degree of social presence that they perceived during the interaction. Champness (1973) ─ cited in Short et al. (1976, p. 74) ─ created an instrument to measure perceived social presence that is very appropriate for the current case. While a commonly used instrument created by Short et al. (1976) measures the way the subjects feel about the communication system itself (personal/impersonal, sensitive/insensitive, warm/cold, sociable/unsociable), this instrument asks explicitly about how the subjects felt about the closeness of the other people using the system.

- Subjects are asked to report on their stereotyping activities during the online session. The instrument used to measure this is adapted from Sarker et al. (2003) who created and tested an instrument to measure all the different bases of virtual team trust, one of which is cognitive processes (including unit grouping, reputation categorization, and stereotyping). Within their measurement, stereotyping is noted as having a component that is determined by the messaging behaviors of the communicants. They therefore capture the way that the content, tone, frequency, and speed of messages impacted the way subjects assessed their teammates' enthusiasm and seriousness about the project. In the current setting, we modified the items slightly to account for the impact of the two independent variables as well. For rehearsability, we added items to also capture how the typing quality effected perceptions. To account for the impact of the representation manipulation, we added items that captured how the personal representation of teammates effected participants' perceptions of them. In addition, to reflect the dependent variable at hand, we

asked about the impact of these things on perceptions of teammates' trustworthiness rather than seriousness.

- **Self-awareness** is measured with a combination of the instruments created by Matheson and Zanna (1988) and Pinsonneault and Heppel (1998) asking participants to report on their level of focus on themselves during the experiment (private self-awareness) and their level of focus on the way other people were viewing them during the session (public self-awareness).

In addition, participants are asked to report on their satisfaction with the process, outcome, and members of the team as per the 'Overall Satisfaction' instrument (Valacich et al., 1992). Finally, subjects are requested, in the post-task questionnaire to report on their level of awareness of qualities of their teammates' typing. This is to ensure that the rehearsability manipulation is in fact effective.

The wording of all items was inspected for fit with the current task and slightly modified in the cases where the task in the original study was not similar. Each instrument's items come in the form of a sentence to which the participants were asked to rate on a 7-point Likert scale to what degree they agree or disagree with the statement. For the satisfaction items the 7-point semantic differential scale is anchored with very unsatisfied/very satisfied. See appendix I for the post-task questionnaire items.

### 4.8 Pilot Studies

Before beginning the actual data collection for this experiment we conducted several pilot studies as a process of refining the experimental procedure to avoid any potential difficulties in its execution. The first phase of pilots consisted of a test of the viability of the task (see section 4.3 and appendix B). The case scenario was presented to

a Baruch undergraduate class that had been divided into groups of three students. The groups were asked to discuss the case among themselves (face-to-face) and write up (manually) a recommendation for the character. The proctor walked around the classroom listening to discussions to determine how involved and interested the students were in the discussions and how long they lasted. The written recommendations were examined for quality, breadth, and depth. Once the chat software was available, the task was further tested in this manner. Consequently, the task was modified to a version that fostered more involvement.

The second phase of pilot testing tested the viability of the technical and procedural aspects of the experiment. This phase involved 27 volunteers divided into groups of three subjects communicating using the newly installed chat software in a Baruch computer laboratory and following the online instructions. This phase of pilot testing ensured that the lab setting was usable and students were able to understand and complete their task from beginning to end. It resulted in clarifications to the instructions and some survey questions based on subject feedback. With respect to the procedure, some errors were corrected in response to the pilot. For example, many subjects were omitting an important survey question so it became clear that the survey software had to be programmed to notify users if they were missing answers. The pilot studies also prompted some technological improvements of the procedure. For example, through pilot testing, we learned that we had to program the survey software not to store the responses in cookies on the laboratory computers so that users would not overwrite the previous subject's responses.

# CHAPTER 5: ANALYSIS OF RESULTS

## 5.1 Descriptive Statistics

After the software, procedure, and task were tested and refined, a total of 91 subject groups were recruited to participate in the experiment over the span of about two months. In some of the sessions, not as many people showed up as were scheduled to participate so some of the groups were activated with only two members. Therefore, of the 91 groups, three had only two participants while the remainder had three participants, leaving a total of 270 individual participants. During one session, ICQ had not been logged out on some of the computers after the previous session. The result was that for 4 of the groups, it was not clear that the participants were actually communicating with their intended teammates. As a result, these twelve observations (4 groups) were omitted from the data set because of this technical difficulty. The pre-task surveys for two of the participants and the post-task surveys for four other participants were lost or incomplete. One other participant left before completing the task and the final questionnaire. The resulting data set to be analyzed consists, therefore, of 251 individual observations nested within 87 groups. These remaining observations were distributed among the four experimental conditions as follows. 125 participants had been identified to their teammates with an avatar. Of those, 60 were able to see the keystrokes of their teammates during the chat session (low rehearsability) while the other 60 avatar-identified participants saw only one completed message at a time (high rehearsability). The remaining 126 pariticpants were identified using a photo of themselves. 66 of these photo-identified participants also saw keystrokes while the remaining 60 did not. The

distribution of participants among the experimental conditions is summarized in Table 5-1.

**Table 5-1: Distribution of Sample by Condition**

| | High Rehearsability | Low Rehearsability | |
|---|---|---|---|
| Avatar-identified | 60 ind<br>21 grp | 65 ind<br>22 grp | 125 ind<br>43 grp |
| Photo-identified | 60 ind<br>21 grp | 66 ind<br>23 grp | 126 ind<br>44 grp |
| | 120 ind<br>42 grp | 131 ind<br>45 grp | |

*5.1.1. Demographic Information*

Since the experiment's participants were recruited via hallway flyers and classroom announcements, the sample is expected to have a similar demographic distribution to that of the general Baruch College population. Demographic information was collected via the pre-task questionnaire to ensure proper randomization of the sample. In fact, the majority of the participants (86%) were between the ages of 18 and 24 while the remainder were between ages 25 and 34. Only less than 1% of the sample was over 35 years old. The sample is equally divided between men and women. Most of the sample (95%) is undergraduate students while the remaining 5% are in graduate programs.

The pre-task questionnaire was also used to collect other relevant individual characteristics of the subjects. In order to detect any potential effects from personal experience with instant messaging, subjects were asked about their instant messaging habits. Regarding individual comfort level with instant messaging, 59% of the sample reported that they were very comfortable. 34% reported themselves as comfortable with instant messaging, while a minority considered themselves slightly uncomfortable (6%)

or very uncomfortable (2%) with instant messaging. In terms of frequency, nearly half of the sample (45%) claimed that they instant message at least every day while only 10% of the sample reported that they rarely (9%) or never (1%) instant message. Otherwise, 29% instant message a few times per week, 10% instant message a few times per month, and 5% instant message a few times per year. Of those who do instant message regularly, 96% said that they instant message with friends. 53% message with their family, 28% with colleagues, 9% with businesses, and 65% with classmates or teammates.

Subjects were also asked to describe their typing ability. Half of the subjects reported that their typing skills are good. 22% assessed their typing as excellent, while 27% reported "rough or casual" typing skills. 2% described their typing as "hunt and peck". With the majority of the sample having experience and comfort with instant messaging and about three quarters of the sample having good or excellent typing skills it is not expected that inexperience or inability would obstruct their progress during the experiment.

Propensity to trust was also measured pre-task. Using a 7-point Likert scale for an index of five items (see section 6.2 for information about the validation of this index), the mean propensity to trust was calculated as 4.09 with a standard deviation of .94.

The demographic information collected pre-task is summarized in Table 5-2.

**Table 5-2: Demographic Information**

| Characteristic | Percentages | | | Mean | Std. Dev. |
|---|---|---|---|---|---|
| Age | 18-24: 86% | 25-34:15% | 35-44:<1% | ---- | ---- |
| Gender | male: 50% | female: 50% | | ---- | ---- |
| Level | undergrad: 95% | grad: 5% | | ---- | ---- |
| IM Comfort Level | Very comfortable: 59%<br>slightly uncomfortable: 6% | comfortable: 34%<br>very uncomfortable: 2% | | 1.51 | 0.69 |
| Typing Skill | hunt and peck: 2%<br>good: 50% | rough or casual: 27%<br>excellent:22% | | ---- | ---- |
| IM Frequency | at least every day: 45%<br>few times/month: 10%<br>rarely: 9% | few times/week: 29%<br>few times/year: 5%<br>never: 1% | | ---- | ---- |
| Propensity to Trust (7 pt. scale) | ---- | | | 4.09 | 0.94 |
| IM with whom* | Friends: 96%<br>Businesses: 9% | Family: 53%<br>Classmates: 65% | Colleagues: 28% | ---- | ---- |
| * Does not add up to 100% because respondents could choose more than one response | | | | | |

### *5.1.2. Controls*

In order to ensure true randomization of the sample, it is necessary to check for any systematic differences among experimental conditions for each individual characteristic**.** Three of the individual characteristics were categorical in nature. Gender is divided between male and female categories; level is divided between undergraduate and graduate categories; and age is divided among several age range categories. (Actual age was not recorded.) Of the remaining pre-task variables, Typing Skill and IM Frequency are ordinal because they reflect an incremental progression from one response to the next. IM Comfort and Propensity to Trust are interval variables because the responses are incremental with equal intervals between responses. Each type of variable will undergo the appropriate testing to determine their distribution among conditions, as follows.

For the categorical variables, a chi-square test was used to determine if the individual characteristics were randomly distributed among conditions or if one experimental cell had a significantly greater frequency of a given characteristic than the others. Based on the frequencies per cell of each gender, level, and age range (see Table 5-3, Table 5-4, and Table 5-5) the chi square values were not found to be significant, as reported in **Table 5-6**. Therefore, none of the categorical demographic variables need to be controlled for in the experimental analysis.

**Table 5-3: Gender Frequency by Cell**

| | High Rehearsability | | Low Rehearsability | | | |
|---|---|---|---|---|---|---|
| Avatar-identified | M | F | M | F | M | F |
| | 36 | 24 | 30 | 35 | 66 | 59 |
| | 28.6% | 19.2% | 23.8% | 28% | 52.4% | 47.2% |
| Photo-identified | M | F | M | F | M | F |
| | 34 | 26 | 26 | 40 | 60 | 66 |
| | 27% | 20.8% | 20.6% | 32% | 47.6% | 52.8% |
| | M | F | M | F | M | F |
| | 70 | 50 | 56 | 75 | 126 | 125 |
| | 55.6% | 40% | 44.4% | 60% | 100% | 100% |

Percentage indicates percent of total M/F

**Table 5-4: Level Frequency by Cell**

| | High Rehearsability | | Low Rehearsability | | | |
|---|---|---|---|---|---|---|
| Avatar-identified | U | G | U | G | U | G |
| | 57 | 3 | 61 | 4 | 118 | 7 |
| | 23.9% | 25% | 25.5% | 33.3% | 49.4% | 58.3% |
| Photo-identified | U | G | U | G | U | G |
| | 58 | 2 | 63 | 3 | 121 | 5 |
| | 24.3% | 16.7% | 26.4% | 25% | 50.6% | 41.7% |
| | U | G | U | G | U | G |
| | 115 | 5 | 124 | 7 | 239 | 12 |
| | 48.1% | 42% | 51.9% | 58% | 100% | 100% |

Percentage indicates percent of total U/G

**Table 5-5: Age Range Frequency by Cell**

| | High Rehearsability | | Low Rehearsability | | | |
|---|---|---|---|---|---|---|
| Avatar-identified | 18-24 | 25-34 | 18-24 | 25-34 | 18-24 | 25-34 |
| | 49 | 11 | 54 | 10 | 103 | 21 |
| | 23% | 29.7% | 25.4% | 27% | 48.4% | 56.8% |
| Photo-identified | 18-24 | 25-34 | 18-24 | 25-34 | 18-24 | 25-34 |
| | 52 | 8 | 58 | 8 | 110 | 16 |
| | 24.4% | 21.6% | 27.2% | 44% | 51.6% | 43.2% |
| | 18-24 | 25-34 | 18-24 | 25-34 | 18-24 | 25-34 |
| | 101 | 19 | 112 | 18 | 213 | 37 |
| | 47.4% | 51% | 52.6% | 48.7% | 100% | 100% |

Percentage indicates percent of total Age Range

For the ordinal variables, Typing Skill and IM Frequency, the Kruskal-Wallis test was conducted for the same purpose, calculating a chi-square value to compare the Wilcoxon ranked order to an expected distribution. This was done in SAS using the *NPAR1WAY* procedure. Neither variable resulted in a significant chi-square value. (See **Table 5-6**.) Therefore, it is not necessary to control for either of these in the analyses that follow.

Finally, for the interval variables, IM Comfort and Propensity to Trust, an analysis of variance was conducted for the same purpose, calculating whether the means of each characteristic were significantly different among experimental cells. Neither characteristic was found to be significantly different among cells. Therefore, neither IM Comfort now Propensity to Trust will be controlled for in the following analyses.

**Table 5-6** contains a summary of the results of the tests for differences in individual characteristics among experimental conditions.

**Table 5-6: Pre-Task Differences by Condition**

| Characteristic | Test | Chi-Square Value | F | Prob |
|---|---|---|---|---|
| Age | Chi-Square | 18-24: .57<br>25-34: <.01<br>35-44: -- | ---- | 0.45<br>0.97<br>-- |
| Gender | Chi-Square | M: .02<br>F: 1.66 | ---- | 0.89<br>0.20 |
| Level | Chi-Square | Undergrad: .61<br>Grad: .12 | ---- | 0.44<br>0.72 |
| IM Frequency | Kruskal-Wallis | .98 | ---- | 0.81 |
| IM Comfort | GLM | ---- | 0.4 | 0.75 |
| Typing Ability | Kruskal-Wallis | 7.62 | ---- | 0.05 |
| Propensity to Trust | GLM | ---- | 1.3 | 0.27 |
| Prior Work* | GLM | ---- | 0.2 | 0.90 |
| * Collected post-task | | | | |

Also included in this analysis is data from one question that was actually part of the post-task questionnaire: "How many times have you worked with the people on your team before today?" Since the participants were self-selected, it was sometimes the case that people who knew each other signed up for the same session or came into the computer lab together. Every attempt was made to separate these people into different groups, or at the very least to put them into avatar-identified groups so that they might not know that they were working together. However, experience of prior work could not be completely controlled for by the experiment facilitator so GLM analysis of the responses to the above question ensures that it too is not more prevalent in some conditions than in others. (See **Table 5-6**.) In essence, the above question helped determine to what extent participants who did know who they were working with had actually worked with those people before. (If they didn't know who they were working with they were to respond that they never worked together before.) It is noteworthy that the average response to the question regarding prior work is quite low, indicating that most of the participants did not know the people with whom they were working or knew

that they had not worked together extensively in the past. Among choices 1-5 (zero/one/a few/several/many times) the mean value for prior work was 1.8 with 69% of the participants never having worked with their teammates before and another 13% only having worked with their teammates one or a few times before. This sample reflects a typical professional environment where people sometimes know each other casually but might have no prior work history together.

### 5.2 Instrument Validation

In this research each theoretical construct was operationalized and measured using a scale (or composite variable) consisting of several items in the form of survey questions. Although the scales that were used were adapted from previously used and validated scales, the validity of each scale had to be assessed to determine appropriateness for this context.

The first step was to use all of the post-task data (plus the answers to the 'Propensity to Trust' questions from the pre-task questionnaire) in a principal components analysis (PCA). This was done using proc FACTOR in SAS with a varimax rotation. PCA reduces multidimensional datasets to their underlying components by creating a correlation matrix with factor loadings for each item. The factor analysis produced 16 factors whose eigenvalues are greater than one (see **Table 5-7**), telling us that 16 components can be extracted from this data.

**Table 5-7: PCA Eigenvalues**

| | Eigenvalues |
|---|---|
| 1 | 16.8797132 |
| 2 | 6.2125082 |
| 3 | 4.4865978 |
| 4 | 2.7902442 |
| 5 | 2.6734975 |
| 6 | 2.2276483 |
| 7 | 1.7350681 |
| 8 | 1.6136108 |
| 9 | 1.4844434 |
| 10 | 1.3046944 |
| 11 | 1.2770295 |
| 12 | 1.2191794 |
| 13 | 1.1641481 |
| 14 | 1.1263818 |
| 15 | 1.1033101 |
| 16 | 1.0012634 |

Therefore, a 16 factor solution is computed yielding ten factors that include more than one item and six that have only one or zero items. An item is considered to load onto the factor for which it has the highest factor loading value. Examining the items that load onto each factor (see Table A-1 in Appendix J) it is apparent that each of the intended constructs (see Appendix I) has held up with some minor variations. For example, the items that were designed to measure perceived social presence were split up into two separate factors. One included the items that were negatively worded, while the positively worded ones grouped together on another factor. For some of the other scales, one or a few of the original items were excluded and did not load on the original factor. Each factor that was extracted and consisted of more than one item was examined and named based upon its contents. A summary of these factors and their names is given in Table 5-8. Each of these factors has the potential to be used as a scale to represent and measure a theoretical construct, given that it exhibits internal consistency. The remaining principal components consist each of only one item and therefore cannot be used as

scales, although some of them will be used within the analysis to gain an understanding of the phenomena they represent.

The next step was to compute the reliability of each of the groups of items for use as a scale, or index, within the experimental analysis. The measure of reliability describes to what extent all of the items within the scale are measuring the same phenomenon. Any scale that produces a Cronbach's Alpha coefficient of .70 or greater as a result of proc *CORR* in SAS is considered reliable. Referring to Table 5-8, it can be noted that seven out of the ten mulit-item factors extracted from PCA qualify as reliable. The items included in each of these usable scales are recorded in **Table A-2** (in Appendix J).

**Table 5-8: Scale Reliability**

| Factor Number | Scale Name | No. of Items | Cronbach's Alpha | Reliability |
|---|---|---|---|---|
| 1 | Trust | 24 | 0.96 | R |
| 2 | Stereotyping | 11 | 0.91 | R |
| 3 | Public Self-Awareness | 7 | 0.87 | R |
| 4 | Propensity to Trust | 5 | 0.79 | R |
| 5 | Satisfaction | 4 | 0.95 | R |
| 6 | Perceived Social Presence1 | 4 | 0.72 | R |
| 7 | Perceived Social Presence2 | 4 | 0.75 | R |
| 8 | Trust2 | 3 | 0.57 | NR |
| 9 | Disclosure | 2 | 0.64 | NR |
| 10 | Disclosure2 | 2 | 0.36 | NR |
| 11 | Private Self-Awareness | 1 | ---- | ---- |

R=Reliable; NR=Not Reliable
Factors 12-16 each contain only one item.

To create a composite score for each scale for use within the analyses, an average of the responses to all of the items within the scale is calculated. The response indexes for each scale are described in Table 5-9.

**Table 5-9: Description of Scale Indexes**

| Index/Variable Name | Mean | Std. Dev. | Min. | Max. |
|---|---|---|---|---|
| Trust | 4.73 | 1 | 1.42 | 7 |
| Stereotyping | 4.37 | 1.05 | 1.18 | 7 |
| Public Self-Awareness | 3.97 | 1.22 | 1 | 7 |
| Propensity to Trust | 4.09 | 0.94 | 1 | 6 |
| Satisfaction | 5.23 | 1.46 | 1 | 7 |
| Perceived Social Presence 1 | 4.08 | 1.15 | 1 | 7 |
| Perceived Social Presence 2 | 4.2 | 1.19 | 1 | 7 |
| Private Self-Awareness* | 5.07 | 1.35 | 1 | 7 |
| Disclosure* | 3.83 | 1.83 | 1 | 7 |

N=251
*only one item used; self_aware and disclose_facts

As noted above, the original scale for perceived social presence was divided by the principal components analysis into two separate factors. One reflected the positively worded items while the other contained all the negatively worded items. While both scales are reliable, the scale called 'Perceived Social Presence 2' includes items that measure a more complete conception of perceived social presence. While all of the items in *Perceived Social Presence 1* focus on interacting with the other people, *Perceived Social Presence 2* measures that in addition to the realism of the communication. Therefore, the Perceived Social Presence 2 scale will be kept for empirical testing.

### 5.3 Group Performance Measure

Group performance was measured using the written report that each group produced together in response to the task. The report represented a group recommendation to the character in the task scenario. Two independent expert raters blind to experimental conditions were recruited to assess each report and grade it on seven different dimensions: disclosure, presentation, strength, breadth, depth, innovativeness, and overall quality, using an online form to rate each dimension on a scale of 1-7. (See Appendix K for more information about the raters, the evaluation

form, and examples of actual reports.) In order to conduct analyses using these scores, a composite score was calculated using the average of the two scores. Composite scores can be used only for the dimensions for which there is a high level of agreement between the two raters. Inter-rater reliability was thus computed using the intra-class correlation coefficient (ICC). Only two of the seven dimensions produced ICC coefficients greater than .7. Therefore those two dimensions, overall quality and innovativeness, are the two dimensions that will be used for the experimental analysis. For each of the dimensions, a composite score consisting of the average of the two raters' scores was created and used in the analyses. Table 5-10 presents the inter-rater reliability scores for each of the performance dimensions and some descriptive information of the composite scores in each dimension.

**Table 5-10: Expert Ratings Information Using ICC**

| Dimension | Inter-rater Reliabiltiy | | Index Mean | Index Std Dev | Index Min | Index Max |
|---|---|---|---|---|---|---|
| Disclosure | 0.66 | NR | 3.57 | 1.88 | 1 | 7 |
| Presentation | 0.61 | NR | 4.38 | 1.34 | 1 | 7 |
| Strength | 0.58 | NR | 4.19 | 1.18 | 1.5 | 7 |
| Breadth | 0.60 | NR | 4.06 | 1.36 | 1.5 | 7 |
| Depth | 0.60 | NR | 3.86 | 1.16 | 1 | 6.5 |
| Innovativeness | 0.75 | R | 3.62 | 1.68 | 1.5 | 7 |
| Overall | 0.70 | R | 3.92 | 1.41 | 1 | 7 |

R=Reliablie; NR=Not Reliable
N=85

Although the individual data represents the responses of participants from among 87 different groups, the group reports for two of the groups were missing. Therefore, the analyses that use performance measures use a sample consisting of 85 observations. The distribution of these observations among experimental conditions is reported in Table 5-11.

**Table 5-11: Group Report Distribution by Condition**

| | High Rehearsability | Low Rehearsability | |
|---|---|---|---|
| Avatar-identified | 21 | 21 | 42 |
| Photo-identified | 20 | 23 | 43 |
| | 41 | 44 | |

## 5.4 Hypotheses Testing

Recall that the theoretical model presented in Section 4 was divided between the main effects and the intermediary effects. The main effect model includes hypotheses that describe the direct relationship between the independent variables (personal and messaging-based representation) and the dependent variables (trust and performance). The intermediary effects model proposes an explanation of how and why the main effect takes place and includes hypotheses of the mediating role of the other experimental variables.

### *5.4.1. Levels of Analysis*

Analysis of variance (ANOVA) is performed to test the hypotheses put forth in Section 4. Using SAS, the GLM procedure is used to obtain the best ANOVA results given the unbalanced nature of the design (unequal number of observations in each experimental cell) (Cody & Smith, 1997, p. 171). Since the data for the measures of trust and all of the mediating constructs were collected at the individual level, an individual level analysis is appropriate. However, because the treatments were applied in group settings, the method of analysis used here is a form of ANOVA that takes into account any effect that is attributable to the group. Hierarchical analysis of variance, or HANOVA, is the chosen method of analysis (Gallivan & Benbunan-Fich, 2005;

Walczuch & Watson, 2001). Essentially, HANOVA calculates the effect of the group and treats it as an error term, reducing the main effect to account for it. Using HANOVA, we ensure that we do not attribute any significant differences to the treatments that are instead coming from the fact that participants worked together in groups.

In contrast, the performance data for this experiment consists of one report produced by each group. Since this data is already at the group level, a regular ANOVA is conducted to test the hypotheses that involve performance. It must be noted as well that the trust data and performance data are at different levels of analysis. Therefore, in order to test the hypothesis (H2) that includes them both, the performance data was disaggregated and each group's performance score was applied to each member of the group.

### *5.4.2. Dependent Variable: Trust*

Recall that H1 predicted the main effect of personal and messaging-based representation on trust. Using HANOVA to test this hypothesis, the marginal and cell means are reported in Table 5-12. Least squares means (LSMeans) and standard errors are reported rather than arithmetic means and standard deviations because there is an unequal number of observations in each condition. In the case that the model has an unequal number of observations in each cell, LSMeans are used because the means are adjusted for the unbalanced design.

**Table 5-12: HANOVA Analysis of Trust Index**

LSMeans by Condition

| | High Rehearsability | Low Rehearsability | |
|---|---|---|---|
| Avatar-identified | LSMean 4.47<br>Std.Err. 0.12<br>N 60 | LSMean 4.95<br>Std.Err. 0.11<br>N 65 | LSMean 4.71<br>Std.Err. 0.08<br>N 125 |
| Photo-identified | LSMean 4.83<br>Std.Err. 0.12<br>N 60 | LSMean 4.64<br>Std.Err. 0.11<br>N 66 | LSMean 4.74<br>Std.Err. 0.08<br>N 126 |
| | LSMean 4.65<br>Std.Err. 0.09<br>N 120 | LSMean 4.80<br>Std.Err. 0.08<br>N 131 | |

GLM Results

| | F | P | |
|---|---|---|---|
| Model | 1.51 | 0.01 | * |
| Identification | 0.05 | 0.82 | |
| Rehearsability | 1.07 | 0.30 | |
| Interaction | 5.65 | 0.02 | * |

* Significant at the 5% level

Although the overall model is significant at $p<.02$, the means indicate very little difference between the trust levels of those who were identified using an avatar as opposed to those who were identified with a photo. Therefore,

*H1a. Communication using a more true-to-life mode of personal representation will result in less trust than will communication with a less true-to-life mode of personal representation.*

**Not Supported**

Similarly, there is no significant difference between the trust means of those who communicated with high and low levels of rehearsability. Therefore,

*H1b. Communication using a more true-to-life mode of messaging-based representation will result in less trust than will communication using a less true-to-life mode of messaging-based representation.*

**Not Supported**

However, the interaction effect between identification and rehearsability is reported to be significant at $p<.02$. This means that there is a significant difference

among the means of the four experimental conditions and that the combination of treatments is important. What we find is a classic crossover interaction effect, portrayed graphically in Figure 5-1. Users who were represented using avatars, experienced elevated levels of trust when the avatar was used in combination with low rehearsability as compared to high rehearsability. However, those whose true-to-life appearance was represented by a photo of themselves experienced decreased levels of inter-team trust when the photo was used in combination with low rehearsability as compared to high rehearsability.

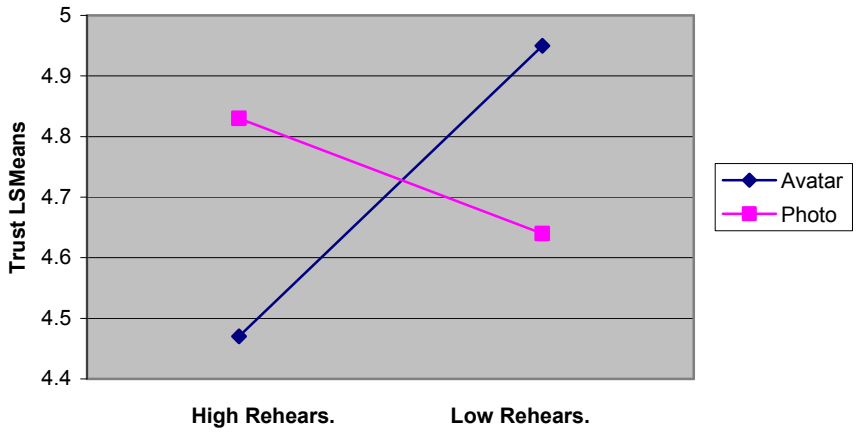



**Figure 5-1: Crossover Interaction Effect (Trust)**

To know which means are significantly different from the others, the CONTRAST statement in the SAS GLM procedure is used. To test the interaction hypothesis H1c it is necessary to determine whether the cells representing partial electronic self-portrayal have means that are significantly different from the means in the cells that represent low electronic self-portrayal in both forms of representation and high electronic self-portrayal in both forms of representation (complete electronic self-portrayal). Therefore, a contrast was set up to compare the means of cells 2 and 3 (partial

ESP) with the means of cell 1 (low ESP) and 4 (complete ESP). (For reference purposes the experimental cells are numbered as indicated in Table 5-13.)

**Table 5-13: Experimental Cell Numbering Convention**

| | High Rehearsability | Low Rehearsability |
|---|---|---|
| Avatar-identified | 1 | 2 |
| Photo-identified | 3 | 4 |

The result of this contrast indicates that in fact this difference is significant at $p<.01$ ($p=0.0068$). This indicates that when one true-to-life form of representation is present in absence of the other, trust is significantly higher as indicated by the means reported in Table 5-12. However, when both true-to-life forms of representation are absent or both true-to-life forms of representation are present at once, the level of trust is significantly lower. Therefore,

*H1c. Communication using a more true-to-life mode of only one form of representation will result in more trust than will communication using any other combination of representation modes.*

**Supported**

*5.4.3. Dependent Variable: Performance*

Recall that the theoretical model predicted that performance is influenced by the level of trust. To test this hypothesis, the SAS REG procedure was used to run a regression on the two constructs. The results of this regression indicated an $R^2$ value of .0229 and p-value of .0176 for the model. This means that while only 2.3% of the variance in performance is attributed to trust, this relationship is significant at $p<.02$. Therefore,

*H2. Performance will increase when the level of trust that exists among communicants is increased.*

**Supported**

Often, when two dependent variables are significantly correlated, they must be considered together in testing of the theoretical model. In this case, even though the correlation is significant, it is very low at only 2% which is well below the recommended correlation range of 30 to 70% for conducting multivariate analyses of variance (Maxwell, 2001). Therefore, it is acceptable to continue to conduct the analysis considering trust and performance separately as follows.

Further, it was predicted that performance would be influenced by electronic self-portrayal. To test these hypotheses ANOVA was conducted for the overall performance index. As discussed above (section 5.4.1), since performance was measured using a collaborative report for each group, the analyses for performance are conducted at the group level, hence the lower number in each cell. The resulting marginal and cell means are reported in Table 5-14.

**Table 5-14: ANOVA Analysis of Overall Performance Index**

Means by Condition

| | High Rehearsability | Low Rehearsability | |
|---|---|---|---|
| Avatar-identified | Mean 3.1<br>Std.Dev. 1.45<br>N 21 | Mean 4.31<br>Std.Dev. 1.32<br>N 21 | Mean 3.7<br>Std.Dev. 1.50<br>N 42 |
| Photo-identified | Mean 4.03<br>Std.Dev. 1.28<br>N 20 | Mean 4.22<br>Std.Dev. 1.32<br>N 23 | Mean 4.13<br>Std.Dev. 1.29<br>N 43 |
| | Mean 3.55<br>Std.Dev. 1.43<br>N 41 | Mean 4.26<br>Std.Dev. 1.31<br>N 44 | |

GLM Results

| | F | P | |
|---|---|---|---|
| Model | 3.64 | 0.02 | * |
| Identification | 2.06 | 0.16 | |
| Rehearsability | 5.81 | 0.02 | * |
| Interaction | 3.07 | 0.08 | |

Group level data; Reports for two of the original groups were missing.
* Significant at the 5% level

Examining these results, it is notable that the overall model is significant at $p<.02$. While the means indicate that, contrary to the prediction of the theoretical model, the performance of those who were identified using a photo was somewhat higher than that of those who were identified with an avatar, the difference in mean performance between these two groups is not significant ($p>.1$). Therefore,

*H3a. Communication using a more true-to-life mode of personal representation will result in worse performance than will communication using a less true-to-life mode of personal representation.*

**Not Supported**

However, there is a significant difference between the overall performance means of those who communicated using a high level of rehearsability as compared to those who used a low level of rehearsability ($p<.02$). Surprisingly, the means indicate that the effect is exactly the opposite direction of what was predicted. The implication of these surprising results will be discussed further in the next chapter. (See section 7.2.) Those who were communicating using a low level of rehearsability (could see keystrokes) performed significantly better than those who used a high level of rehearsability (could not see keystrokes). Therefore,

*H3b. Communication using a more true-to-life mode of messaging-based representation will result in worse performance than will communication using a less true-to-life mode of messaging-based representation.*

**Not Supported**

Looking at the combination of the different forms of representation, the performance means for the least true-to-life mode of both (cell 1) seem to be lower than the remaining combination. However, at $p<.1$, this difference is only marginal and therefore,

*H3c. Communication using a more true-to-life mode of only one form of representation will result in better performance than will communication using any other combination of representation modes.*

**Not Supported**

However, examining the ANOVA results produced by the alternate measure of performance, i.e., innovativeness of the group report, (see Table 5-15) it is found that the model is highly significant ($p<.001$) and the interaction effect is significant at $p<.04$.

**Table 5-15: ANOVA Analysis of Innovativeness Index**

Means by Condition

| | High Rehearsability | | Low Rehearsability | | | |
|---|---|---|---|---|---|---|
| Avatar-identified | Mean | 2.67 | Mean | 4.71 | LSMean | 3.69 |
| | Std.Dev. | 1.17 | Std.Dev. | 1.81 | Std.Dev. | 1.83 |
| | N | 21 | N | 21 | N | 42 |
| Photo-identified | Mean | 3.23 | Mean | 3.83 | LSMean | 3.55 |
| | Std.Dev. | 1.55 | Std.Err. | 1.51 | Std.Err. | 1.54 |
| | N | 20 | N | 23 | N | 43 |
| | Mean | 2.94 | Mean | 4.25 | | |
| | Std.Dev. | 1.38 | Std.Dev. | 1.70 | | |
| | N | 41 | N | 44 | | |

GLM Results

| | F | P | |
|---|---|---|---|
| Model | 6.90 | 0.0003 | *** |
| Identification | 0.25 | 0.62 | |
| Rehearsability | 15.93 | 0.0001 | *** |
| Interaction | 4.75 | 0.03 | * |

Group level data; Reports for two of the original groups were missing.
* Significant at the 5% level ***Significant at the .1% level

To determine the nature of significant interaction, once again the CONTRAST statement of the SAS GLM procedure was used. The means for innovativeness between partial electronic self-portrayal and the other combinations of representations (cells 1&4 vs. cells 2&3 in Table 5-13) were compared. The results show that the difference between the means in these two groups is significant at $p<.05$ ($p=.0322$). This tells us that innovativeness was significantly different for communication with partial self-portrayal

as opposed to communication with little electronic self-portrayal or more complete electronic self-portrayal. Looking at the plot of the cell means for innovativeness in Figure 5-2 it can be seen that with high rehearsability subjects tended to be more innovative if they had a photo; with low rehearsability they were more innovative if they were also represented with an avatar as expected. However, another significant effect is at play. The ANOVA of the innovativeness means also indicates a strong ($p<.001$) effect of rehearsability on performance, with participants having the low rehearsability treatment performing more innovatively than those who received the high rehearsability treatment. Therefore, even when identification is with a photo, the low rehearsability condition leads to more innovative performance. With the combination of these effects, only one of the partial electronic self-portrayal combinations experiences the expected effect. Hence, subjects in the avatar-low rehearsability combination create the most innovative products. (The p-value for the contrast to compare cell 2 with all of the others is .0003.)

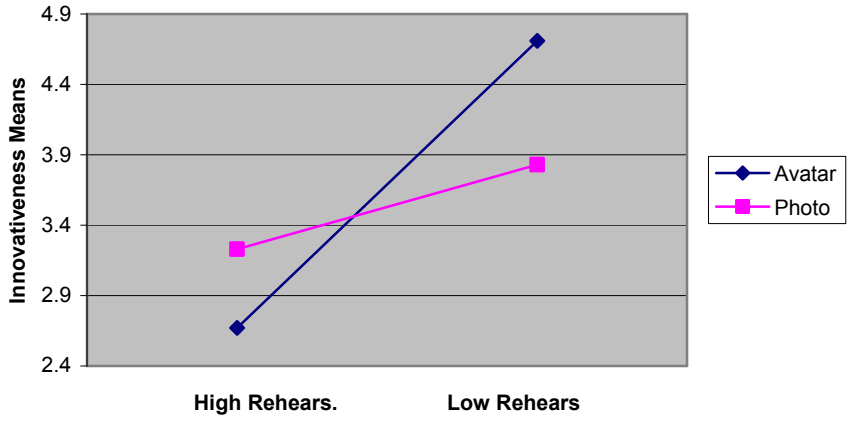
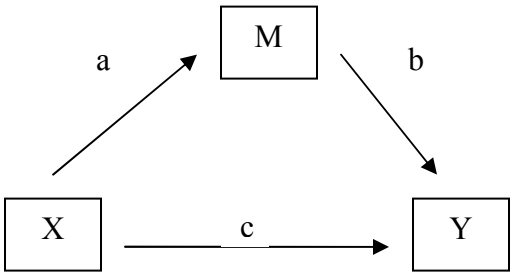



**Figure 5-2: Crossover Interaction Effect (Innovativeness)**

*5.4.4. Mediating Variables*

The second part of the theoretical model dealt with the intermediary effects to explain the main effects discussed thus far. Recall that H4 and H5 dealt with the verbal and non-verbal communication mechanisms and their role as mediators between electronic self-portrayal, and trust and performance. To test these hypotheses we need to verify three relationships, as described by Baron and Kenny for mediation (Baron & Kenny, 1986). Figure 5-3 depicts these three relationships showing construct M as a mediator between constructs X and Y. Here, X represents the independent variables of electronic self-portrayal and Y represents the dependent variables of trust and performance. Referring to Figure 5-3, relationship 'c' has already been discussed for this context in response to H1 and H3. In this section we will address relationships 'a' and 'b' for each of the proposed mediating variables.

**Figure 5-3: Mediation [adapted from Baron and Kenny, (1986)]**




To test for the relationship between the independent variables and each mediator, HANOVA was conducted. A separate HANOVA was conducted to analyze the impact of the independent variables and their interactions on each of the proposed mediators. One-item indicators were used to measure the constructs for which no multi-item scale was validated (disclosure and private self-awareness). The results of all of the HANOVAs are summarized in Table 5-16. As shown, only one of these models was

significant. The p-value for disclosure is significant at p<.02. However, all of the variance in this model is coming from the group effect and is therefore attributable to either of the two forms of representation or their combinations. Therefore, relationship 'a' for none of the mediator variables is supported.

**Table 5-16: HANOVA Analysis of Proposed Mediators**

| Proposed Mediator | F-value | p-value | |
|---|---|---|---|
| Stereotyping | 1.08 | .34 | |
| Public Self-Awareness | .83 | .83 | |
| Perceived Social Presence2 | 1.05 | .38 | |
| Private Self-Awareness[1] | 1.10 | .30 | |
| Disclosure[1] | 1.51 | .01 | * |
| Dislcosure model details | | | |
| Identification | .00 | .98 | |
| Rehearsabiltiy | .12 | .73 | |
| Ident*Rehears | .06 | .81 | |

[1]One item scales; * Significant at the 5% level

Nonetheless, relationship 'b' – the relationship between the mediators and each of the dependent variables – is tested using two multiple regressions. The model for each regression includes the effect of all of the mediating variables on one of the dependent variables. The 'trust model' tests the effect of the mediating variables on trust and the 'performance model' tests the effect of the mediating variables on overall performance. Of the two social presences scales, the one with the higher reliability statistic is chosen to be included in the model. For the trust model, the $R^2$ value indicates that 22.2% of the variance in trust is attributed to the tested mediating variables. The $R^2$ value for the performance model shows that 6% of the variance in overall performance is attributable to the proposed mediators. Both models turn out to be significant: the trust model at p<.001 and the performance model at p<.01. Stereotyping, perceived social presence and disclosure contribute to the trust model at p<.05 and public self-awareness at p<.001. Perceived social presence is the main contributor to the performance model at a

significance of p<.01. Private self-awareness does not contribute significantly to either model. The results of both of these regression models are summarized in Table 5-17 and Table 5-18.

**Table 5-17: Regression Model for Mediators on Trust**

Dependent Variable: Trust

| | coefficient | t-value | p-value | |
|---|---|---|---|---|
| Intercept | 2.58 | 6.8 | <.0001 | *** |
| Stereotyping | 0.20 | 2.65 | 0.01 | * |
| Public Self-Awareness | 0.17 | 3.2 | 0.002 | ** |
| Perceived Social presence 2 | 0.16 | 2.56 | 0.01 | * |
| Disclosure | 0.07 | 2.22 | 0.03 | * |
| Private Self-Awareness | -0.06 | -1.21 | 0.23 | |

| | |
|---|---|
| F-Value | 11.62**** |
| Model Significance | <.0001 |
| $R^2$ | 22% |

* Significant at the 5% level; ** Significant at the 1% level; ***Significant at the .1% level

**Table 5-18: Regression Model for Mediators on Performance**

Dependent Variable: Performance

| | coefficient | t-value | p-value | |
|---|---|---|---|---|
| Intercept | 3.57 | 10.16 | <.0001 | *** |
| Stereotyping | -0.04 | -0.5 | 0.62 | |
| Public Self-Awareness | -0.10 | -1.7 | 0.09 | |
| Perceived Social Presence 2 | 0.19 | 2.65 | 0.01 | * |
| Disclosure | -0.06 | -1.57 | 0.12 | |
| Private Self-Awareness | 0.07 | 1.28 | 0.2 | |

| | |
|---|---|
| F-Value | 3.14*** |
| Model Significance | 0.01 |
| $R^2$ | 6% |

* Significant at the 5% level; *** Significant at the .1% level

Referring again to the diagram by Baron and Kenny, because relationship ‘a’ is not supported for any of the proposed mediators despite the support for relationships ‘b’

and ‘c’, there is no support for the mediating role of the verbal and non-verbal mechanisms. Therefore we can state for each of the general hypotheses:

*H4-1. Verbal communication mechanism, disclosure, is a mediator of the combination of personal and messaging-based representation and trust.*

*H4-2. Verbal communication mechanism, disclosure, is a mediator of the combination of personal and messaging-based representation and performance.*

**Not Supported**

*H5-1. Non-verbal communication mechanisms (perceived social presence, private self-awareness, public self-awareness and stereotyping) are mediators of the combination of personal and messaging-based representation and trust.*

*H5-2. Non-verbal communication mechanisms (perceived social presence, private self-awareness, public self-awareness and stereotyping) are mediators of the combination of personal and messaging-based representation and performance.*

**Not Supported**

However, the last analyses are important because they show that the verbal and nonverbal constructs tested *do* play a significant role in trust and performance outcomes. Therefore, more research is needed to investigate the determinants of these set of antecedents of trust and performance that do not appear to be related to the system characteristics manipulated in this research.

### *5.4.5. Other Findings*

The last set of hypotheses predicted a relationship between the verbal and non-verbal communication mechanisms. Essentially, the expectation was for each of the non-verbal mechanisms – public self-awareness, private self-awareness, perceived social presence, stereotyping – to impact the verbal mechanism, disclosure. To test these hypotheses a multiple regression was used. The results of the regression are reported in Table 5-19.

**Table 5-19: Effect of non-verbal on verbal mechanisms**

Dependent Variable: Self-Disclosure

| | coefficient | t-value | p-value | |
|---|---|---|---|---|
| Intercept | 1.25 | 2.06 | 0.04 | |
| Stereotyping | 0.28 | 1.92 | 0.06 | |
| Public Self-Awareness | 0.32 | 3.14 | 0.002 | ** |
| Private Self-Awareness | -0.01 | 0.28 | 0.78 | |
| Perceived Social Presence 2 | 0.03 | -0.09 | 0.93 | |

| | |
|---|---|
| F-Value | 6.03*** |
| Model Significance | 0.0001 |
| $R^2$ | 9% |

**Significant at the 1% level; *** Significant at the .1% level

Analyzing this table it is seen that only public self-awareness is found to significantly contribute to the variance in self-disclosure ($p<.01$). Therefore,

*H6a. The higher the level of public self-awareness, the more self-disclosure will occur within a communication.*

**Supported**

Since the other non-verbal mechanisms do not make significant contributions to the model,

*H6b. The lower the level of private self-awareness, the less self-disclosure will occur within a communication.*

*H6c. The higher the level of perceived social presence, the less self-disclosure will occur within a communication.*

*H6d. The less stereotyping that occurs among communicants, the less self-disclosure will occur within a communication.*

**Not Supported**

Finally, the data was analyzed to determine whether or not the independent variables affected the level of subject satisfaction. The HANOVA that was conducted for this purpose results in a model that is significant at $p<.001$ as reported in Table 5-20. Looking at the means, it seems that subject satisfaction is much lower when there is low

self-portrayal than with any form of self-portrayal. However, because the effect of the group is being controlled for, most of the variance in satisfaction is attributable to the group rather than to the independent variables or the combination thereof. Hence, the group component of the model is significant $p<.001$ and none of the other components are significant. This is an indication that satisfaction depends highly on intra-group dynamics that overshadow the effects of system characteristics.

**Table 5-20: HANOVA Analysis of Satisfaction**

LSMeans by Condition

| | High Rehearsability | Low Rehearsability | |
|---|---|---|---|
| Avatar-identified | LSMean 4.80<br>Std.Err. 0.16<br>N 60 | LSMean 5.48<br>Std.Err. 0.16<br>N 65 | LSMean 5.14<br>Std.Err. 0.11<br>N 125 |
| Photo-identified | LSMean 5.32<br>Std.Err. 0.16<br>N 60 | LSMean 5.33<br>Std.Err. 0.16<br>N 66 | LSMean 5.32<br>Std.Err. 0.11<br>N 126 |
| | LSMean 5.06<br>Std.Err. 0.12<br>N 120 | LSMean 5.40<br>Std.Err. 0.11<br>N 131 | |

GLM Results

| | F | P | |
|---|---|---|---|
| Model | 1.98 | .0001 | *** |
| Identification | 0.69 | 0.41 | |
| Rehearsability | 2.37 | 0.13 | |
| Interaction | 2.23 | 0.14 | |
| Group(ID*Reh) | 1.94 | .0002 | *** |

*** Significant at the .1% level

In conclusion of this chapter, Table 5-21 summarizes the results of the test of hypotheses presented above.

**Table 5-21: Summary of the Test of Hypotheses**

| H# | Hypothesis | Result |
|---|---|---|
| H1a | Communication using a more true-to-life mode of personal representation will result in less trust than will communication with a less true-to-life mode of personal representation. | NS |
| H1b | Communication using a more true-to-life mode of messaging-based representation will result in less trust than will communication using a less true-to-life mode of messaging-based representation. | NS |
| H1c | Communication using a more true-to-life mode of only one form of representation will result in more trust than will communication using any other combination of representation modes. | S |
| H2 | Performance will increase when the level of trust that exists among communicants is increased. | S |
| H3a | Communication using a more true-to-life mode of personal representation will result in worse performance than will communication using a less true-to-life mode of personal representation. | NS |
| H3b | Communication using a more true-to-life mode of messaging-based representation will result in worse performance than will communication using a less true-to-life mode of messaging-based representation. | NS* |
| H3c | Communication using a more true-to-life mode of only one form of representation will result in better performance than will communication using any other combination of representation modes. | NS |
| H4-1 | Verbal communication mechanism, disclosure, is a mediator of the combination of personal and messaging-based representation and trust. | NS |
| H4-2 | Verbal communication mechanism, disclosure, is a mediator of the combination of personal and messaging-based representation and performance. | NS |
| H5-1 | Non-verbal communication mechanisms (perceived social presence, private self-awareness, public self-awareness and stereotyping) are mediators of the combination of personal and messaging-based representation and trust. | NS |
| H5-2 | Non-verbal communication mechanisms (perceived social presence, private self-awareness, public self-awareness and stereotyping) are mediators of the combination of personal and messaging-based representation and performance. | NS |
| H6a | The higher the level of public self-awareness, the more self-disclosure will occur within a communication. | S |
| H6b | The lower the level of private self-awareness, the less self-disclosure will occur within a communication. | NS |
| H6c | The higher the level of perceived social presence, the less self-disclosure will occur within a communication. | NS |
| H6d | The less stereotyping that occurs among communicants, the less self-disclosure will occur within a communication. | NS |

S=Supported; NS=Not Supported; * significant in the opposite of the predicted direction

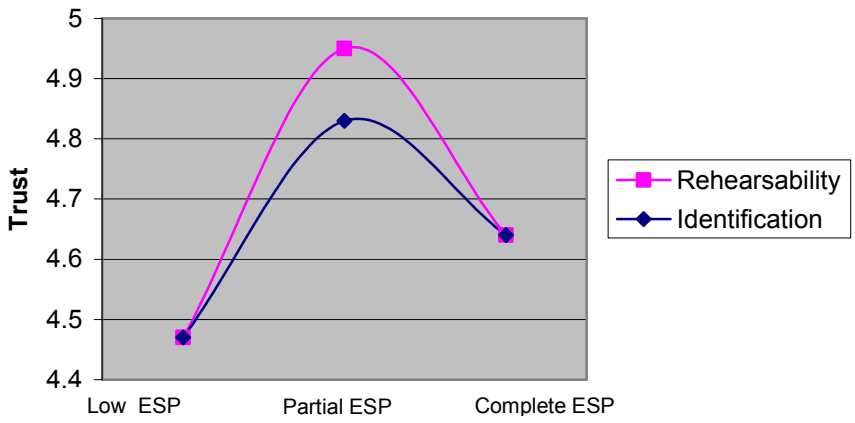
# CHAPTER 6: DISCUSSION AND CONCLUSIONS

## 6.1 Discussion

### *6.1.1. Trust*

Although there was no empirical support for the hypotheses of the main effects on trust, the significant results for the interaction effect serve to support the main concepts upon which this research is predicated. It appears from the above analysis that more complete electronic self-portrayal describes a state in which the level of true-to-life identifying information transmitted across the communication channel has a negative impact on interpersonal trust among members of ad hoc teams. Partial electronic self-portrayal is not strong enough to produce this effect. In fact, as long as there is still some room for idealizing about the true identity of the other team members, partial true-to-life information is beneficial in terms of trust development. Consequently, it seems that there is a continuum associated with electronic self-portrayal, as suggested above. In this continuum, the relationship between electronic self-portrayal and trust is positive until such time as too much identifying information begins to have a detrimental effect on inter-team trust. See Figure 6-1 for a graphical representation of this concept. Based on the results of this experiment, the combination of photo identification and low rehearsability represents a level of self-portrayal that is complete enough to reach that threshold. Future research is warranted to determine where on the continuum low rehearsability in combination with real names (rather than pseudonyms) lies.

**Figure 6-1: Electronic Self-Portrayal Continuum (Trust)**



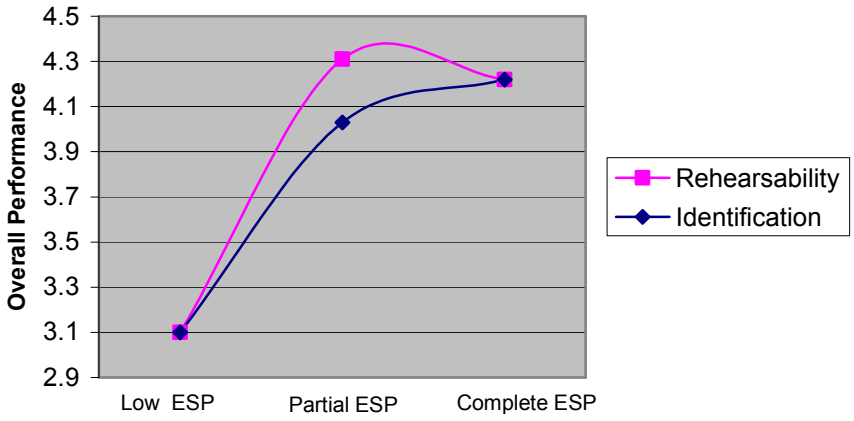

In ad hoc groups, when little information about teammates is available (avatar and high rehearsability), there is too much guesswork and trust suffers. When, however, low rehearsability is included, users sense from seeing the keystrokes that there is really a person behind that fictional avatar, and the additional non-verbal information that is being transmitted helps to boost the users' inclination to trust. In contrast, when the teammates are portrayed using real photos and they cannot see the keystrokes, they are satisfied that their teammates are real but with limited nonverbal cues being transmitted they can idealize about the messaging-based information that is missing. However, when low rehearsability is added, the users realize based on the visible message formulation process that their teammates are not all that they were imagined to be. The system has exposed the "fool behind the photo".

### *6.1.2. Performance*

Although a significant correlation between trust and performance was upheld by the experimental results, the analysis showed that performance did not follow the same pattern as trust did in response to the various modes of electronic self-portrayal. It was expected that as trust was increased or decreased, performance would reflect that shift

and also mirror the responses to the experimental conditions. However, this was not the case. In fact, not only were the performance hypotheses not supported, the analyses used to test them resulted in significant outcomes proving the opposite of what was predicted. While it was thought that increased self-portrayal would have detrimental effects on performance as it did for trust in the extreme case, it was found that overall performance was significantly better in the high ESP mode for messaging-based representation, i.e., when keystrokes were present (low rehearsability). In addition, though the interaction effect was only marginal, by examining the experimental cell means it is clear that the trend is toward the lowest level of electronic self-portrayal (avatar-high rehearsability combination) having much worse performance than any of the other conditions. This indicates that any transmission of true-identity information in either form has a positive effect on performance. See Figure 6-2 for a graphical representation of the conditional means.

**Figure 6-2: Electronic Self-Portrayal Continuum (Overall Performance)**




The explanation for this effect can be ascertained by examining it from two angles. The first is related to the nature of the experiment. The subject of the team discussion was ethically charged and relevant to most students' personal lives. It

involved the discussion of issues that are truly sensitive to the level of trust among team members. These discussions in turn became very reactive to the changes in the electronic self-portrayal of the communication system. As it has been shown, if the technological setting is right, the interpersonal exchange can flourish, and teammates feel positive and trusting toward each other. On the other hand, if too much or too little identifying information is portrayed, the interpersonal interaction suffers. In contrast, the overall quality of the report is a reflection of how well the team understood each other and developed ideas during the discussion on an intellectual rather than emotional level. In that case, to better understand each other and develop a more robust product, more identifying information is better than less with no limit for the extremes. Specifically, for rehearsability, low rehearsability is the main contributor to increased performance because the ability to see keystrokes, and the hesitations, changes of heart, and assuredness that they belie, helps team members to more easily grasp the thoughts and where they are coming from. Seeing the message formulation eliminates the need to interpret the final messages. Though to a lesser degree, seeing one another's photos also helps give context and thereby deeper understanding to the content of the discussions. While the addition of either of these pieces of information has a positive impact on performance, nothing is lost by having both types of identifying information.

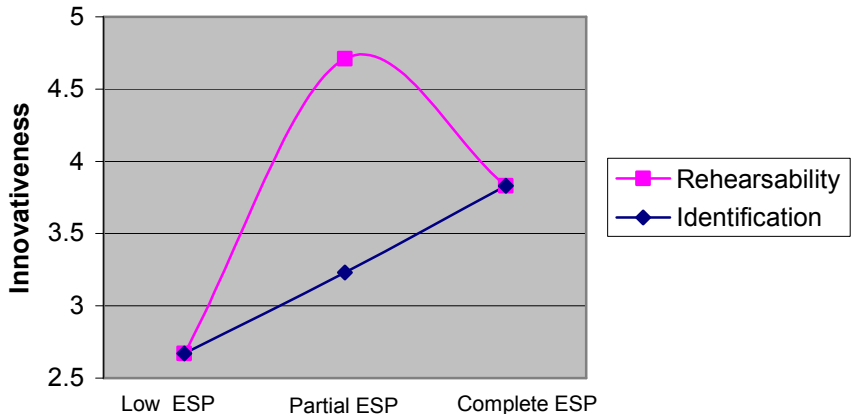
Having seen this, the second perspective is theoretical in nature. It was theorized that because trust and performance are correlated and impact one another, they would move together in response to electronic self-portrayal changes. However, the fundamental difference in the emotional and intellectual drivers of trust and performance insinuated by the experiment findings, suggests that perhaps other dynamics are also at

play affecting each of these dependent variables differently. In fact, the correlation found between trust and performance, although significant was actually extremely low. This fact, combined with the differing natures of trust development and successful performance, indicates that the models for trust and performance are not as intertwined as believed.

Having discovered that trust reacts to changes in electronic self-portrayal based on its emotional element and performance reacts based upon its intellectual component, it is interesting to observe yet another way that electronic self-portrayal impacts group outcomes by examining its effects on the innovativeness of group reports. The graph in Figure 6-3 plots the means for innovativeness based on the level of electronic self-portrayal. Examining this graph, it is clear that the interaction effect for partial electronic self-portrayal that was found for trust also exists for innovativeness. However in this case, the effect is apparent only regarding rehearsability. (I.e., innovativeness is higher in the low rehearsability-avatar partial ESP condition than in the low or complete ESP conditions.) Innovativeness in group output is dependent upon a creative element that must be brought out through the team's discussion. Creative interactions, like emotional and intellectual ones, need to have the proper technological setting in order to flourish. As with trust, too much ambiguity or too much identifying information can inhibit groups from interacting creatively. In order to foster creativity within a group, low rehearsability allows team members to actually view one another's creative thought processes encouraging even more creativity among the team. Visibility of keystrokes also gives communicants the opportunity to infuse their communication with some non-verbal cues to indicate humor, personality, or imagination. While partial electronic self-portrayal

with a photo and high rehearsability positively impacts innovativeness somewhat by removing the discomfort caused by extreme distance, the effect is not nearly as strong as when the true-to-life information is regarding the content-based aspect of the communication.

**Figure 6-3: Electronic Self-Portrayal Continuum (Innovativeness)**




### *6.1.3. Mediators*

The verbal and non-verbal communication mechanisms highlighted in this study were not proven to be mediators of the relationship between ESP and trust and performance. In order for a variable to be considered a mediator, it must be shown that the independent variables have an impact on it and that it, in turn, has an impact on the dependent variables (Baron & Kenny, 1986). In this case the mechanisms were not shown to have mediating effects on the relationship because they were not significantly impacted by electronic self-portrayal.

However, given the results of the multiple regression shown above, these mechanisms do seem to play a significant role in trust and performance in ad hoc virtual teams. These important findings mandate further exploration of these antecedents of trust

and performance and their relationship to system characteristics other than the ones manipulated in this research.

### *6.1.4. Other Findings*

Regarding the interplay between the mechanisms, the results of this experiment showed a significant correlation between public self-awareness and self-disclosure. The relationship that was found was a positive one; more public self-awareness was correlated with more self-disclosure. Since both self-disclosure and public self-awareness were found to have significant impacts upon trust but neither was affected significantly by the experimental manipulations further research is warranted to understand the direction of causality in the relationship among disclosure, public self-awareness, and trust.

It is also interesting to note that none of the other non-verbal mechanisms impacted self-disclosure. Specifically, private self-awareness did not behave in the same way. We are reminded from these results that each of the mechanisms is impacted to a different degree by each of the experimental manipulations. They all act and interact at different rates at the same time. For future research it would be worthwhile to isolate each of the mechanisms to determine its true reaction and impact in the setting of ad hoc virtual teams.

Lastly, although the low electronic self-portrayal teams seemed to have lower satisfaction, the experiment did not produce significant results in this regard because the effect of the group was being controlled for. Having gained this insight, it would be interesting for future research to examine whether the tendency of a group to be satisfied with their experience is linked in any way to the electronic self-portrayal features of the

communication system. Content analysis of the session transcripts (see section 6.5) could potentially contribute to this goal.

Keeping in mind the scope of this study (see section 2.4), it is important to note that all of the above results hold true for small teams meeting only once for a short collaboration. The results could prove to be different for larger teams or teams meeting over an extended period of time such as weeks or months. It is likely that under the latter condition, disclosure of real names would be necessary to maintain trust over time.

### 6.2 Limitations

While some of the strengths of this research derive from its experimental nature, some limitations are introduced by its laboratory setting as well. Great care was taken to ensure that team members were isolated from each other. The laboratory used had 24 personal computers and was equipped with partitions to divide the workstations and prevent face-to-face contact among participants. Every attempt was made to ensure that students did not know with whom they were chatting during the experiment by interspersing groups, separating subjects who came in together, overlapping sessions and creating physical dividers between the workstations. In fact, many verbal accounts of the experience indicated that it was not clear if all team members were in the same room.

However, some logistic and technological issues sometimes prevented the ideal experimental conditions. For example, it was somewhat difficult to schedule and handle a large number of participants in a single session and sometimes teams of only of two members were formed, though these are a small minority of the sample. In addition, the unbalanced number of observations in each condition was also unavoidable due to the nature of the experiment logistics. However, the number of subjects being higher than

expected provides more power for the statistical analyses. While the $10 incentive was designed to entice people to take their task seriously there might have been some for whom it had the opposite effect, doing the minimal job required to receive the payment.

Technological limitations included not being able to enforce that people kept the pictures of their teammates open at all times even though they were instructed to do so. However, since "meeting the group" was the first instruction to start the discussion and was fairly easy to accomplish, it is reasonably certain that the majority of the participants were looking at the photos of their teammates for at least part of the task time allotment. Still, persistent photographs are recommended for follow up experiments of this nature. In addition, due to the nature of the collaboration system, it was difficult for teams to work on their recommendations together and the job often fell upon one team member whose product did not necessarily represent that of the entire team. Although this was not part of the design, it might in fact represent the real nature of electronic work groups. It would be advisable to incorporate a collaborative writing tool or the use of a wiki to facilitate the joint production and editing of the report in future experiments.

It is also worthwhile to note that the generalization of these results to other settings and populations should be made with caution. Subjects who participated in this experiment were college students in ad hoc teams solving an ethical task relevant to their age group. Different subject pools or tasks may produce different results. As with any other experiment, some external validity was traded off in favor of higher internal validity. Furthermore, the use of a particular communication software, ICQ Pro 2003b, which supported rehearsability is also a source of limitations, as the results may not be replicable in other systems with slightly different implementations of this feature.

Despite these caveats, these results provide important implications for practice and contributions for research.

### 6.3 Contribution

This research makes a significant contribution to the literature as it conceptualizes electronic self-portrayal and examines its two dimensions (personal and messaging-based); and studies their interaction with each other and their influence on trust and performance of ad hoc virtual teams. Furthermore, while rehearsability has been discussed as a media characteristic within the context of the Media Synchronicity Theory (Dennis & Valacich, 1999), it has never been empirically tested or even implemented into a system. This research is the first to focus on the concept of rehearsability within synchronous systems and empirically test its effects. In doing so, it has found that increased rehearsability encourages more trust when applied in combination with identification via an avatar, and better group performance with more innovativeness in general.

The results of this study shed light on the relationship between social presence theory and "true identity" portrayal. Despite the tendency in CMC research to recommend more and more communication cues to bridge the distance between communicants, this research exposes the possibility that the element of distance, or "unrealism" that exists in CMC is one of its most important characteristics. While more true-to-lifeness is beneficial for group outcomes initially, at the extreme the effects are less trust and less innovativeness. The opportunity to idealize some aspects of a communicant in combination with some realism is often the way to optimize on the advantages of computer-mediated communication.

## 6.4 Implications

The results of this study also have practical implications with respect to the value of incorporating different types of identification and rehearsability into synchronous communication systems. For managers and software designers alike, it is important to know the impact of various software features. For example, it is clear based upon this study that for synchronous electronic trust-building exercises, partial electronic self-portrayal is crucial. For a synchronous electronic brainstorming session, low rehearsability in combination with avatar identification would by far be the most successful setting. In general, the rule-of-thumb to follow would be to prevent too much electronic-self portrayal as it dampens the outcomes of an ad hoc virtual team.

Verbal and written reactions to participation in the experiment included a great interest in the rehearsability feature that ICQ2003b provides, with which most users were unfamiliar. One participant summed up his impression of the rehearsabilty feature by saying, "Seeing the realtime typing was interesting because when you see people deleting their sentences and starting thoughts over it gives you a sense of any doubts they might have and how well you are doing in pleading your case." Others found it to be "annoying" because when they made a mistake, they had to delete back to the error to correct it. The general experimental results show that low rehearsability is in fact an important feature in synchronous CMC. In combination with avatar identification, it induces more team trust; performance is improved in its presence; and it is associated with more innovativeness in team collaborations especially in combination with avatar representation. Yet, by no means does low rehearsability *always* impact team interactions in a positive way. In addition, based on the experiential evidence mentioned

above, it seems that the benefit could largely depend upon personal comfort with the feature. Given all of this new insight, it is recommended that low rehearsability be implemented into synchronous collaboration systems, at least as an option, to be used when it helps benefit the group's outcome and ignored if it is creating an uncomfortable or detrimental level of "true-to-life"ness.

### 6.5 Future Research

The next phases of this project include several research directions.

As mentioned above, performance did not react to changes in electronic self-portrayal as was expected. Although it was anticipated that since trust and performance are correlated they would experience the same effects of system characteristics, the low correlation found by this study and the opposite effects of what was expected indicate that the factors discussed here and, perhaps, others are affecting performance differently from trust. Rethinking the model in terms of what has been learned through this research is a good way to get further insight into what is happening to trust and performance. For example, the mediating variables in this research model were not actually found to mediate the main relationship. However, they were found to have a significant impact upon trust and performance. Further exploration into the antecedents of these variables is appropriate to refine the current model.

Once modifications are made to the model to reflect the relationships as uncovered by this initial study, conducting a partial least squares analysis will help to validate it. In addition, the partial least squares analysis method is an ideal way to test the structural properties of the complete research model. Given the many different components that were found to impact trust and performance, PLS affords the ability to

gain insight into all of these variables at once. Since partial electronic self-portrayal is a significant variable affecting trust and performance, different combinations of opposing levels of true-to-lifeness will be affecting the dependent variables significantly. PLS will be useful in balancing and reconciling all of these variables at once to help determine which inputs will prevail in the overall effect.

Finally, ICQ Pro 2003b provides the ability to save the communication in a text file which has been collected for each of the groups in the sample. In order to triangulate the results obtained here and to gain more insight into the internal processes of the groups, these transcripts will be content analyzed. For example, to expand the depth of this study, using these transcripts, self-disclosure would be measured based upon its actual occurrence rather than with a self reported measure as was done for this research. This more accurate report of self-disclosure would potentially lead to a more clear description of the type of self-disclosure that occurs and its role within the model for electronic self-portrayal and trust. Further, an exploratory analysis of the content of the transcripts would be a source to expand the breadth of this research by discovering what other underlying phenomena are at play in the group dynamics of each experimental condition. Perhaps evidence of some of the hypothesized mediating variables will be detected, or explanations for why they were not impacted by the experimental manipulations. For example, if the subjects in all conditions were voluntarily exchanging identifying information it might explain why the experimental conditions did not have the expected impact on perceived social presence, self-awareness, and stereotyping.

Since this is the first study to systematically explore the value of the rehearsability in the context of synchronous communication systems, there is also great potential to

extend this line of research further by testing the effects of rehearsability in different settings and with different tasks. One intriguing possibility for future research is to understand why rehearsability positively impacts team performance. In addition, while in this research rehearsability was examined in combination with visual forms of personal representation, it would be interesting to investigate whether similar results are obtained when personal representation is manipulated using its textual forms.

# APPENDICES

## Appendix A – Recruitment Statement

**Informed Consent Form**

The primary purpose of this study is to examine group work with various forms of technological support. Participants will be asked to make a recommendation in a fictional case as a group using a computer-based chat system to communicate and prepare the group decision. By participating in this study, you will help advance research, gain experience in online group collaboration, and most importantly get paid well for your time. We anticipate many sessions that will take place in the Vertical Campus and require about an hour per session. A subject can only participate in one session.

Subjects do not need to bring or have anything to participate in the study. All instructions will be distributed and fully explained before the actual experiment. Participation is completely voluntary. You may discontinue participation at any time. Refusal to participate will involve no penalty. Upon completion of the experiment, you will receive $10 for your time.

All records of this study will be kept confidential. No one other than the PI (Raquel Benbunan-Fich) will have access to the data, which will be archived in a secure location after use. If desired, you may see the data collected from only your participation. Any resulting publications from this study will not identify individual participants but will refer to aggregate results.

If you have any questions regarding this research, you can call Raquel Benbunan-Fich at (646) 312-3375. If you have any questions concerning your rights as a participant in this study, you can call the CAMPUS IRB Office at (646)-312-3791.

By signing below, you understand and accept the terms of this research study as stated above and that your participation is completely voluntary.

| | |
|---|---|
| _____ | _____ |
| Student Signature | Researcher Signature |
| _____ | _____ |
| Full name (please print) | Date |

**Appendix B – The Task**

John is a sophomore in college and he is paying for his own education and living expenses in New York. It is customary at the office where he works part time to exchange gifts before the holidays. Strapped for cash, John is unable to spend enough money to buy everybody there a respectable gift. He feels he must conserve as much money as he possibly can to help pay for the textbooks and software that he needs for his classes. He knows that he will be getting a gift from each of his coworkers and doesn't want to offend them by not returning the gesture. To solve his dilemma, John downloads free but copyrighted MP3 files using one of the popular peer-to-peer sites that allow users to share music among themselves. He burns a few selections for each of his coworkers onto a CD, packages it elegantly and leaves it on their desks. He knows they will appreciate his choices of music. John feels that this is his best option even though he is aware that the source is not approved by the authorities that represent the recording industry.

Based on your knowledge and personal experience, please answer the following questions:

1. Is John right or wrong in his decision to download music and give it as a gift? Why?
2. If John had approached you with his dilemma as his friend, what would you have recommended him to do in his situation (to download or not to download)? Justify your recommendation.

# Appendix C – ICQ Pro 2003b: Layout options

**Figure A-1: IRC-Style Layot Provides High Rehearsability**

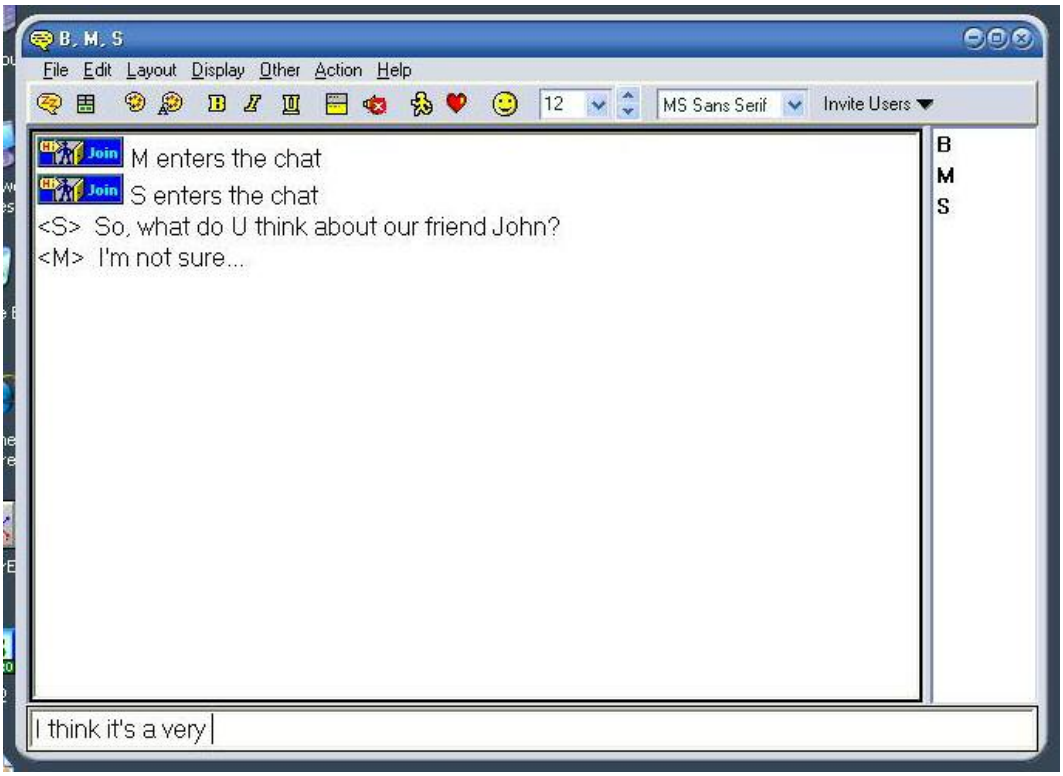
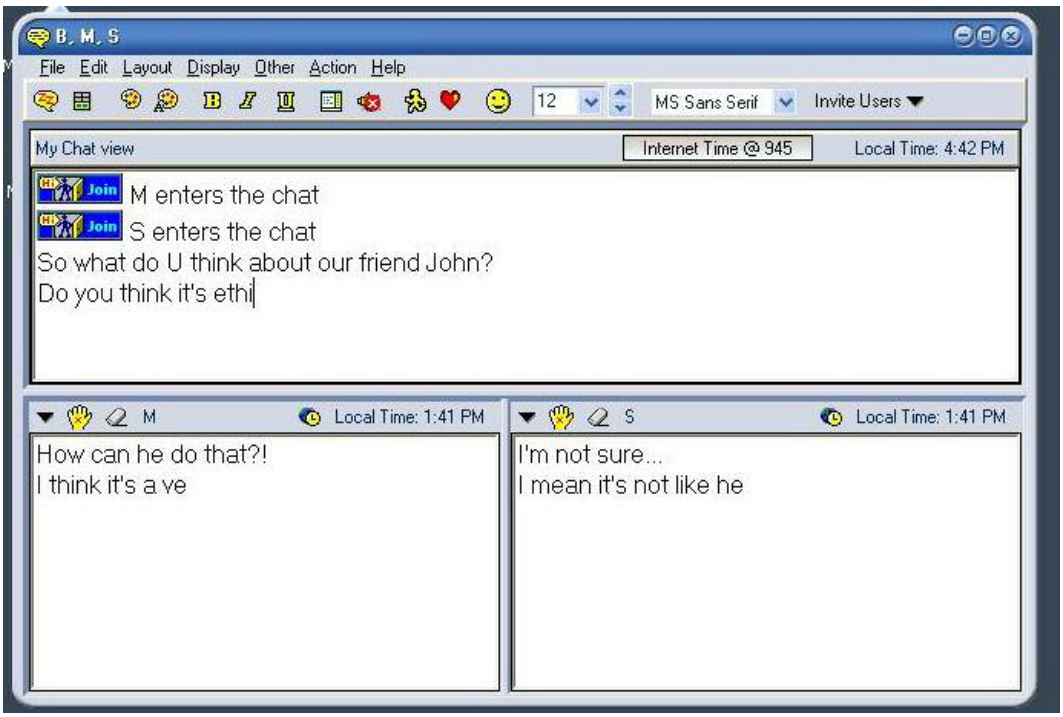



**Figure A-2: Split Layout Provides Low Rehearsability**



**Appendix D – General Instruction Sheet**

Thank you for participating in this session. It is made up of three parts. The following step-by-step instructions will explain exactly what you need to do. The entire task should take no longer than one hour. Please do not talk until the session is complete. If there are any questions, direct them to the facilitator.

Please put a check in the associated box as you complete each step.

**Part I:**

☐ Please answer all the survey questions at this site:
http://www.surveymonkey.com/s.asp?u=130642355506
This part should take approximately 5 minutes.

When you have completed the survey, continue to Part II.

**Part II:**

☐ You are part of a 3-member team. Your partners have been assigned. You must work together with them to come up with a recommendation in a fictional case. You will be communicating with them via ICQ – a chat program. If you are not automatically directed, please access the URL provided on the card you received to meet your team members, read the task, and follow detailed instructions on how to set up your chat session. This part should take about 35 minutes to complete.

One person in each group has been randomly designated as *Chat Starter* on his/her card. The Chat Starter will open the chat session. Chat starters have received additional instructions on an attached instruction sheet. Other than this, it is up to each group to organize their discussion and decide how to prepare the report.

The group will appoint one member to save the written recommendation and the chat transcript. Once this has been done, all group members should continue to Part III.

**Part III:**

☐ Please answer all the survey questions at this site:
http://www.surveymonkey.com/s.asp?u=771892391682
This survey should take about 15-20 minutes.

When you are finished, please notify the facilitator.

**Appendix E – Additional Instructions for the Chat Starter**

ADDITIONAL INSTRUCTIONS FOR THE *CHAT STARTER*:

You have been designated as the *Chat Starter* for the group.
Please refer to these instructions whenever the Chat Starter is called upon throughout the session.

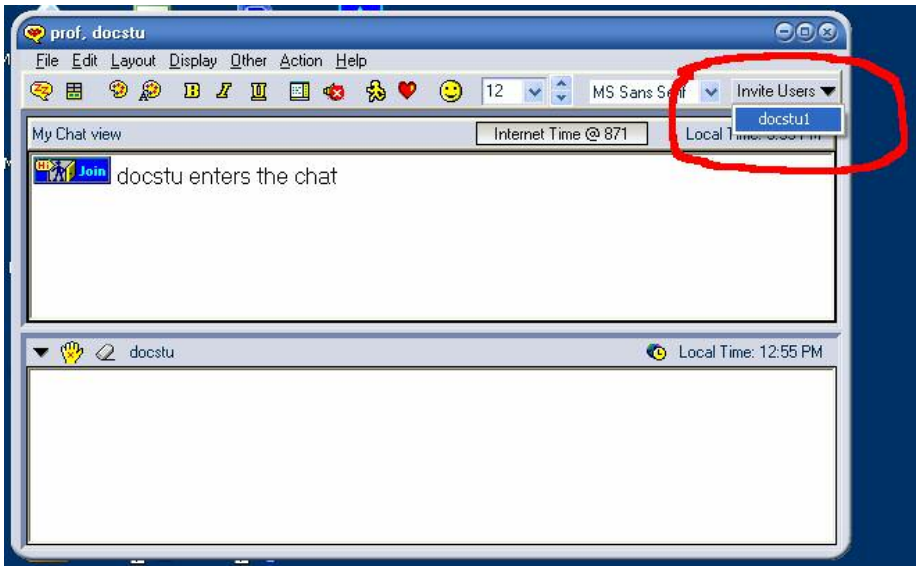
As Chat Starter you will initiate the chat session among the 3 team members.

**Set Up the Chat Session:**

1. Right-click on the first team member in your contact list. Choose "Send/Start ICQ chat" from the menu that appears. 

2. Click "send" on the chat request window that appears. When your teammate has accepted the chat, a chat window will open.

3. When the chat window is open, invite the third team member by clicking “Invite users” from the top of the chat screen and choosing the third member’s name.




4. Continue with step #5 in the online instructions.

# Appendix F – Part II: Task Instructions

**Figure A-3: High Rehearsability Task Instructions**

## Part II: Team Collaboration

### MEET YOUR TEAM

To view the members of your team, enter your subject ID number _____ and click [Meet My Team]

### YOUR TASK

You will be communicating with your 2 teammates via ICQ chat. Your goal is to, as a group, produce a report of no more than ONE page describing your recommendation for the character in the following fictional case:

> *John is a sophomore in college and he is paying for his own education and living expenses in New York. Daily, he commutes by train from his part time job to attend evening classes at the college. To help him unwind and shift modes, he enjoys listening to music on his hand-me-down MP3 player during his commute. Strapped for cash, John is unable to invest money in CD's to enhance his limited music collection. He feels he must conserve as much money as he possibly can to help pay for the textbooks and software that he needs for his classes. John feels that his best option is to download free but copyrighted MP3 files using one of the popular peer-to-peer sites that allow users to share music among themselves, even though he is aware that they are not approved by the authorities that represent the recording industry.*
>
> *This semester John has been invited to a classmate's party. He welcomes the break from his everyday routine and the opportunity to hang out with his friends but he feels uncomfortable showing up without a gift. Having used the last of his spending money on his regular expenses, John burns a dozen of his friend's favorite selections from his own downloaded MP3 collection onto a CD and brings it with him to the party. The CD turns out to be a big hit among the party guests.*

In your report, make sure that you provide answers to the following questions based on your knowledge, personal experience, and group consensus:

1. Is John right or wrong in his decision to download music and give it as a gift? Why?
2. If John had approached you with his dilemma as his friend, what would you have recommended him to do in his situation (to download or not to download)? Justify your recommendation.
3. Was John's friend right or wrong in his decision to play the music at the party? If you were him, how would you have dealt with the situation?
4. What do you think should be done with the CD after the party is over? Why?

The written recommendation must be a well-constructed report in paragraph form. It should consist of well thought out responses that capture the issues raised in the group discussion. Do not write bullet points. Your report should be about one page in length (about 400 words). Try to convince your reader that your recommendation is the right one.

All members of the group should participate in creating the recommendation. The team will designate one member to save the team's output into a MS Word document.

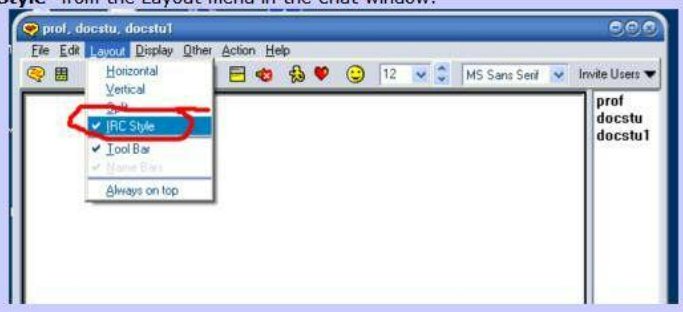
### START COMMUNICATING

1. Double click the ICQ shortcut on your desktop.  The login screen for ICQ Pro will appear.
2. Enter the username and password given on your card. Click "Connect". A window listing your teammates will appear. If it does not appear click on the green flower  in the icon tray at the bottom right of your screen.
3. If your subject number (on your card) ends with a "1", you are the Chat Starter and you have received additional instructions to set up the chat session at this point. If you have received them, refer to the additional instructions at this point. If you have NOT received additional instructions, please do NOT initiate communication. WAIT for a chat request from your teammate.

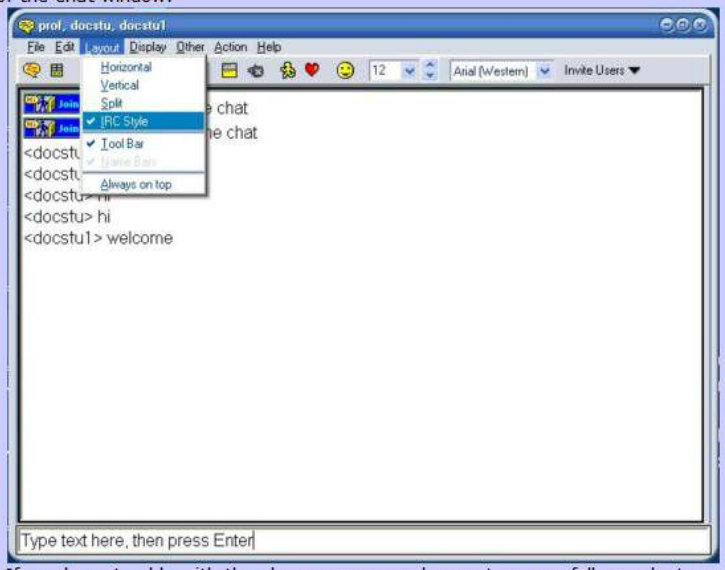
4. If you are NOT the chat starter (you have not received additional instructions and your subject ID number does not end with the number "1"), when a chat request window opens on your screen, click "accept" to accept the chat.


A chat window will open.

5. ALL PARTICIPANTS -- DO NOT SKIP THIS STEP: Make sure your chat window is in the proper layout by choosing "**IRC Style**" from the Layout menu in the chat window.




6. Once all three group members have joined the chat session, try it out. Each group member types his/her messages in the text box at the very bottom of the chat screen. After pressing "Enter", each message appears in the main section of the chat window.




If you have trouble with the above process and cannot successfully conduct a conversation, notify the facilitator. If you can successfully conduct a conversation, start on the task detailed above. **Remember that all the content of your discussion will remain completely confidential and will be used for research purposes only**. Spend about 35 minutes discussing the case and producing your report. All team members should participate in the formulation of the report. Choose among yourselves one member to record and save the contents of the report and the chat session to a MS Word file according to the directions below.

## DON'T FORGET TO SAVE YOUR REPORT AND YOUR CHAT SESSION

**Final Report:**

1. On your desktop, find the shortcut to the MS Word file named "Recommendation" and double click it to open. It should be empty. This is the file that you will put your group's final report into.
2. Put your subject ID number on the first line of the document.
3. Once you have compiled the group's final report in that file and all members agree on its contents, click "Save AS" from the File menu to save the document. Put your subject ID number in the filename: Recommendation_<yourSubjectIDNumber>. Do not change the location/folder of the file.

**Chat Transcript:**

1. When you close the chat window, you will see a pop-up screen asking if you want to save the chat session. Click OK.
2. Browse to the "Digital Music Recommendation" folder on drive "D:".
3. Name the document with your subject ID number in the filename: ChatSession_<yourSubjectIDNumber>.
4. Click OK to save the transcript.

## WHEN YOU ARE FINISHED

After the report and chat session have been saved, ALL group members, please fill out the survey for part III. You can access the survey by clicking this link: Post-Task Survey

**Figure A-4: Low Rehearsability Task Instructions**

## Part II: Team Collaboration

### MEET YOUR TEAM

To view the members of your team, enter your subject ID number _____ and click Meet My Team

### YOUR TASK

You will be communicating with your 2 teammates via ICQ chat. Your goal is to, as a group, produce a report of no more than ONE page describing your recommendation for the character in the following fictional case:

*John is a sophomore in college and he is paying for his own education and living expenses in New York. Daily, he commutes by train from his part time job to attend evening classes at the college. To help him unwind and shift modes, he enjoys listening to music on his hand-me-down MP3 player during his commute. Strapped for cash, John is unable to invest money in CD's to enhance his limited music collection. He feels he must conserve as much money as he possibly can to help pay for the textbooks and software that he needs for his classes. John feels that his best option is to download free but copyrighted MP3 files using one of the popular peer-to-peer sites that allow users to share music among themselves, even though he is aware that they are not approved by the authorities that represent the recording industry.*

*This semester John has been invited to a classmate's party. He welcomes the break from his everyday routine and the opportunity to hang out with his friends but he feels uncomfortable showing up without a gift. Having used the last of his spending money on his regular expenses, John burns a dozen of his friend's favorite selections from his own downloaded MP3 collection onto a CD and brings it with him to the party. The CD turns out to be a big hit among the party guests.*

In your report, make sure that you provide answers to the following questions based on your knowledge, personal experience, and group consensus:

1. Is John right or wrong in his decision to download music and give it as a gift? Why?
2. If John had approached you with his dilemma as his friend, what would you have recommended him to do in his situation (to download or not to download)? Justify your recommendation.
3. Was John's friend right or wrong in his decision to play the music at the party? If you were him, how would you have dealt with the situation?
4. What do you think should be done with the CD after the party is over? Why?

The written recommendation must be a well-constructed report in paragraph form. It should consist of well thought out responses that capture the issues raised in the group discussion. Do not write bullet points. Your report should be about one page in length (about 400 words). Try to convince your reader that your recommendation is the right one.

All members of the group should participate in creating the recommendation. The team will designate one member to save the team's output into a MS Word document.

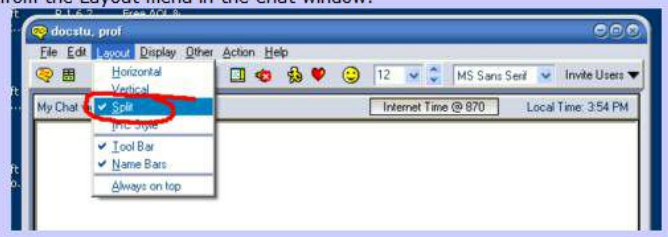
### START COMMUNICATING

1. Double click the ICQ shortcut on your desktop. The login screen for ICQ Pro will appear.
2. Enter the username and password given on your card. Click "Connect". A window listing your teammates will appear. If it does not appear click on the green flower in the icon tray at the bottom right of your screen.
3. If your subject number (on your card) ends with a "1", you are the Chat Starter and you have received additional instructions to set up the chat session at this point. If you have received them, refer to the additional instructions at this point. If you have NOT received additional instructions, please do NOT initiate communication. WAIT for a chat request from your teammate.

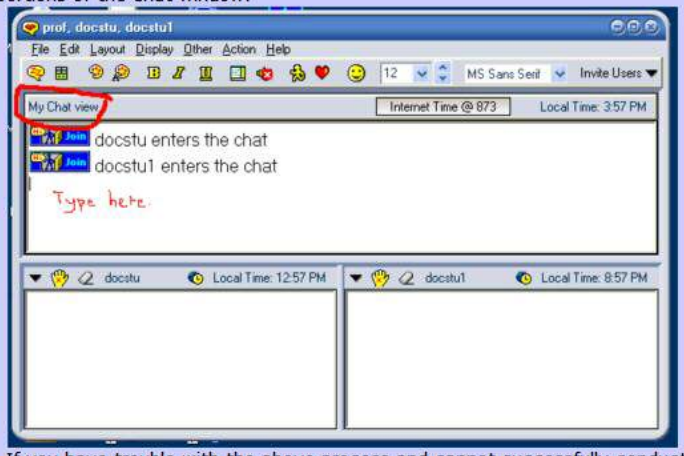
4. If you are NOT the chat starter (you have not received additional instructions and your subject ID number does not end with the number "1"), when a chat request window opens on your screen, click "accept" to accept the chat.


A chat window will open.

5. ALL PARTICIPANTS -- DO NOT SKIP THIS STEP: Make sure your chat window is in the proper layout by choosing "**Split**" from the Layout menu in the chat window.




6. Once all three group members have joined the chat session, try it out. Each person types his/her message in the portion of the window labeled "My chat view". You can simultaneously read each of your teammates' messages in the other two portions of the chat window.




If you have trouble with the above process and cannot successfully conduct a conversation, notify the facilitator. If you can successfully conduct a conversation, start on the task detailed above. **Remember that all the content of your discussion will remain completely confidential and will be used for research purposes only**. Spend about 35 minutes discussing the case and producing your report. All team members should participate in the formulation of the report. Choose among yourselves one member to record and save the contents of the report and the chat session to a MS Word file according to the directions below.

## DON'T FORGET TO SAVE YOUR REPORT AND YOUR CHAT SESSION

**Final Report:**

1. On your desktop, find the shortcut to the MS Word file named "Recommendation" and double click it to open. It should be empty. This is the file that you will put your group's final report into.
2. Put your subject ID number on the first line of the document.
3. Once you have compiled the group's final report in that file and all members agree on its contents, click "Save AS" from the File menu to save the document. Put your subject ID number in the filename: Recommendation_<yourSubjectIDNumber>. Do not change the location/folder of the file.

**Chat Transcript:**

1. When you close the chat window, you will see a pop-up screen asking if you want to save the chat session. Click OK.
2. Browse to the "Digital Music Recommendation" folder on drive "D:".
3. Name the document with your subject ID number in the filename: ChatSession_<yourSubjectIDNumber>.
4. Click OK to save the transcript.

## WHEN YOU ARE FINISHED

After the report and chat session have been saved, ALL group members, please fill out the survey for part III. You can access the survey by clicking this link: Post-Task Survey

## Appendix G – Sample Team Web Pages

**Figure A-5: Sample Avatar-Identified Team Web Page**

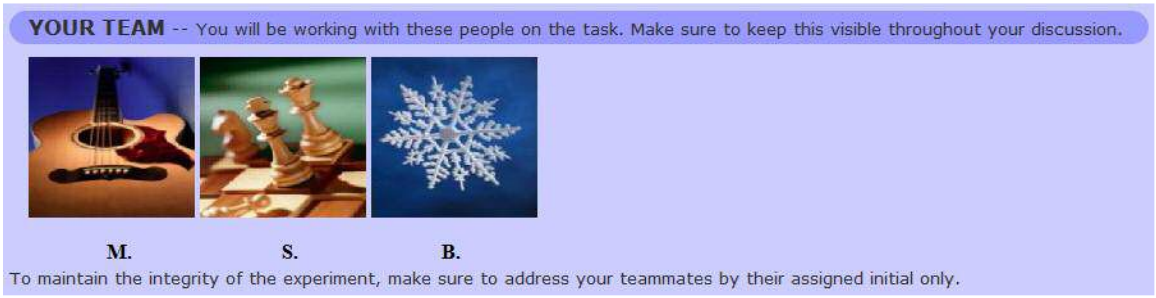



**Figure A-6: Sample Photo-Identified Team Web Page**


*To maintain the privacy of the subjects, public celebrity photos are used in the sample.

## Appendix H – Pre-Task Questionnaire

**Part I: Pre-Task Questionnaire**

**2. Subject ID number (from your handout)**

**3. Age**

18-24 25-34 35-44 45-54 55 & older

**4. Gender**

Male Female

**5. Level**

Undergraduate Graduate

**6. How often do you communicate using instant messaging?**

- at least every day
- a few times per week
- a few times per month
- a few times per year
- rarely
- never

**7. With whom do you communicate using instant messaging? (Check all that apply.)**

Friends Family Colleagues Businesses Classmates/Teammates

**8. How comfortable do you feel communicating with instant messages?**

- Very comfortable
- Comfortable
- Slightly uncomfortable
- Very uncomfortable

**9. In your opinion, how does instant messaging compare to face-to-face interaction?**

**10. How well do you type?**

- hunt and peck
- rough or casual typing
- good typing
- excellent typing (>30 wpm error-free)

**11. When it comes to working with other students, to what extent do you agree which each of the following statements?**

| | Strongly Disagree 1 | Disagree 2 | Somewhat Disagree 3 | Neutral 4 | Somewhwat Agree 5 | Agree 6 | Strongly Agree 7 |
|---|---|---|---|---|---|---|---|
| One should be very cautious when working with other students. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Most students tell the truth about the limits of their knowledge. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Most students can be counted on to do what they say they will do. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| If possible, it is best to avoid working with other students on projects. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Most students are honest in describing their experience and abilities. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Most students answer personal questions honestly. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |
| Most students are very competent in terms of their studies. | ○ | ○ | ○ | ○ | ○ | ○ | ○ |

**Appendix I – Post-Task Questionnaire**

**MECHANISMS:**

- **Disclosure**

[Adapted from "Self-Disclosure" (Laurenceau et al., 1998).]

- During the discussion, my teammates and I disclosed our emotions.
- During the discussion, my teammates and I disclosed our thoughts.
- During the discussion, my teammates and I disclosed facts about ourselves.

- **Perceived Social Presence**

[From Champness (1973), in Short, et. al (1976).]

- One does not get a good enough idea of how people at the other end are reacting.
- One gets no real impression of personal contact with the people at the other end of the link.
- One can easily assess the other people's reactions to what has been said.
- It provides a great sense of realism.
- One gets a good feel of the people at the other end.
- It isn't at all like a face-to-face meeting.
- It was just as though we were all in the same room.
- People at the other end do not seem real.
- I would be happy to use the system for a meeting in which I intended to persuade other people.
- I could not get to know people very well if I would meet them over this system.

- **Stereotyping**

[Adapted from "Message-based Stereotyping" (Sarker et al., 2003).]

*Message-based:*

- From the contents of posted messages, I can get an impression of my remote team members' *enthusiasm* about the task.
- From the contents of posted messages, I can get an impression of my remote team members' *trustworthiness*.
- From the tone of posted messages, I can get an impression of my remote team members' *enthusiasm* about the task.
- From the tone of posted messages, I can get an impression of my remote team members' *trustworthiness*.
- From the frequency of posted messages, I can get an impression of my remote team members' *enthusiasm* about the task.
- From the frequency of posted messages, I can get an impression of my remote team members' *trustworthiness*.
- From the speed of posted messages, I can get an impression of my remote team members' *enthusiasm* about the task.

- From the speed of posted messages, I can get an impression of my remote team members' *trustworthiness*.
- From the typing quality of posted messages, I can get an impression of my remote team members' *enthusiasm* about the task.
- From the typing quality of posted messages, I can get an impression of my remote team members' *trustworthiness*.

*Personal:*

- From the picture/avatar/screen name representing my remote team members, I can get an impression of their enthusiasm about the task.
- From the picture/avatar/screen name representing my remote team members, I can get an impression of their *trustworthiness*.

- **Self-awareness**

[From Joinson, (2001b) and Matheson and Zanna (1988).]

*Private self-awareness*:

- In this experiment I've generally been very aware of myself, my own perspective and attitudes.
- Rather than thinking about myself in this experiment, my mind has been distracted by my task, my group members, and what is going on around me. (reverse scored).

*Public self-awareness*:

- In this experiment I have wondered about the way I've responded and presented myself in comparison to others.
- In this experiment, I have been thoughtful of how well I may get along with my discussion partner if we meet in the future.

[From Pinsonneault and Heppel, (1998).]
During the Experiment…

- I was concerned about my style of doing things
- I was concerned about the way I presented myself
- I was self-conscious about the way I was identified
- I was worried about making a good impression
- I was concerned about what other people thought of me

**DEPENDENT VARIABLE:**

- **Trust** [From Jarvenapaa et al. (1998)]

*Trust:*

- If I had my way, I wouldn't let the other team members have any influence over issues that are important to this decision.

- I would be comfortable giving the other team members complete responsibility for making this decision.
- I really wish I had a good way to oversee the work of the other team members during this experiment.
- I would be comfortable giving the other team members a task that was critical to this decision even if I could not monitor them.

*Trustworthiness:*

- Members of my workgroup showed a great deal of integrity.
- I can rely on those with whom I worked in this group.
- Overall, the people in my group are very trustworthy.
- We were considerate of one another's feelings in this work group.
- The people in my group are friendly.
- There was no "team spirit" in my group.
- There is a noticeable lack of confidence among those with whom I worked on this decision.
- We had confidence in one another in this group.

*Ability:*

- I feel very confident about the other team members' skills.
- The other team members have much knowledge about the decision that had to be made.
- The other team members have specialized capabilities that can increase our performance.
- The other team members are well qualified.
- The other team members are very capable of contributing to this decision.
- The other team members seem to be successful in the activities they undertake.

*Benevolence:*

- The other team members were very concerned about the ability of the team to get along.
- The issues involved in this decision are very important to the other team members.
- The other team members would not knowingly do anything to disrupt or slow down the decision making process.
- The other team members are concerned about what is important to the team.
- The other team members will do everything within their capacity to help the team perform.

*Integrity:*

- The other team members try hard to be fair in dealing with one another.
- The other team members have a strong sense of commitment.
- I like the values of the members of this team.
- The other team members do not behave in a consistent manner.
- The other team members display a solid work ethic.

**OTHER MEASURES:**

- **Overall Satisfaction**

[From Jarvenpaa et al. (2004).]

- How satisfied were you with your team's process?
- How satisfied were you with the outcome of your team's project?
- How satisfied were you with the other members in your team?
- Overall, how satisfied were you with participating in this virtual team collaboration?

- **Manipulation Check for Rehearsability**
  - During the discussion, I was aware of my teammates' typos.
  - During the discussion, I was aware of my teammates' typing speed.
  - During the discussion, I was aware of the quality of my teammates' messages.

## Appendix J – Additional Tables

**Table A-1: 16 Factor PCA Solution**

| Item | Factor Number | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Confident_About_Others_Skills | **0.83** | 0.05 | 0.10 | 0.04 | 0.06 | 0.05 | 0.09 | -0.02 | -0.02 | 0.06 | 0.08 | 0.02 | -0.03 | -0.01 | 0.06 | 0.03 |
| Others_Capable_of_Contributing | **0.80** | -0.01 | 0.08 | 0.02 | 0.07 | -0.08 | -0.06 | 0.06 | -0.01 | 0.14 | 0.10 | -0.08 | -0.01 | -0.05 | -0.08 | -0.08 |
| Others_Did_All_to_Help | **0.80** | 0.02 | 0.03 | -0.01 | 0.13 | -0.07 | 0.04 | 0.10 | -0.04 | 0.11 | 0.03 | 0.03 | -0.06 | 0.04 | -0.11 | 0.00 |
| Confidence | **0.79** | 0.18 | -0.04 | 0.00 | 0.11 | 0.02 | 0.01 | 0.09 | 0.09 | 0.04 | 0.01 | -0.01 | 0.02 | -0.03 | 0.01 | -0.03 |
| Others_Are_Qualified | **0.78** | 0.14 | 0.15 | -0.01 | 0.05 | 0.00 | 0.05 | 0.09 | -0.01 | 0.06 | 0.07 | -0.04 | 0.09 | 0.02 | -0.10 | 0.01 |
| Others_Have_Commitment | **0.77** | 0.09 | 0.14 | 0.02 | 0.16 | 0.03 | 0.07 | 0.00 | 0.00 | 0.02 | 0.01 | 0.03 | -0.07 | 0.12 | -0.03 | -0.09 |
| Considerate | **0.74** | 0.14 | 0.03 | 0.04 | 0.07 | 0.07 | 0.04 | -0.08 | 0.08 | 0.07 | 0.03 | 0.05 | 0.00 | -0.15 | -0.02 | -0.10 |
| Integrity_Of_Others | **0.74** | 0.07 | 0.09 | 0.08 | 0.09 | -0.07 | 0.12 | 0.10 | 0.05 | -0.16 | -0.16 | -0.17 | 0.07 | -0.05 | -0.01 | -0.01 |
| Friendly | **0.73** | 0.04 | -0.06 | -0.07 | 0.13 | -0.02 | 0.00 | 0.12 | 0.06 | 0.00 | 0.08 | -0.02 | 0.04 | 0.00 | -0.01 | -0.03 |
| Like_Team_Values | **0.73** | 0.07 | -0.05 | 0.07 | 0.10 | -0.03 | 0.10 | -0.04 | 0.17 | -0.04 | -0.01 | 0.00 | -0.08 | 0.04 | 0.12 | 0.20 |
| Overall_Trust_Others | **0.73** | 0.25 | 0.03 | 0.13 | 0.08 | -0.05 | -0.04 | 0.00 | 0.08 | -0.11 | -0.11 | 0.14 | 0.02 | -0.02 | 0.07 | 0.18 |
| Others_Have_Work_Ethic | **0.72** | 0.06 | 0.10 | 0.02 | 0.11 | 0.00 | 0.11 | 0.12 | 0.01 | -0.11 | 0.06 | -0.05 | -0.04 | 0.02 | 0.02 | -0.04 |
| Rely_On_Group | **0.71** | 0.15 | 0.05 | 0.11 | 0.08 | 0.09 | -0.12 | -0.02 | 0.07 | -0.03 | -0.08 | 0.14 | 0.10 | -0.01 | -0.01 | 0.30 |
| Others_Seem_Successful | **0.69** | 0.12 | 0.19 | 0.15 | 0.06 | -0.06 | -0.01 | 0.10 | -0.04 | 0.09 | 0.08 | -0.13 | -0.11 | 0.10 | 0.06 | 0.02 |
| Others_Have_Capabilities | **0.67** | 0.13 | 0.08 | 0.01 | -0.03 | -0.12 | 0.16 | -0.10 | -0.06 | 0.03 | -0.11 | 0.09 | -0.06 | 0.25 | 0.13 | 0.09 |
| Others_Fair | **0.67** | 0.04 | -0.05 | 0.00 | 0.07 | 0.03 | 0.07 | 0.03 | -0.07 | 0.01 | 0.22 | 0.02 | 0.04 | -0.04 | -0.22 | -0.28 |
| Others_Concerned_What_Important | **0.66** | 0.04 | 0.15 | 0.14 | 0.15 | -0.06 | -0.03 | -0.11 | -0.01 | 0.04 | 0.06 | 0.25 | -0.03 | 0.03 | 0.11 | 0.12 |
| Others_Have_Knowledge | **0.64** | 0.23 | 0.09 | -0.03 | -0.04 | -0.02 | -0.12 | -0.09 | 0.01 | 0.17 | 0.04 | -0.16 | -0.03 | 0.16 | -0.10 | 0.03 |
| OK_Giving_Others_Task | **0.61** | 0.08 | 0.06 | 0.02 | 0.02 | -0.07 | 0.20 | 0.04 | 0.06 | 0.04 | -0.01 | 0.14 | 0.00 | -0.10 | -0.06 | 0.47 |
| OK_If_Others_Decide | **0.58** | 0.06 | 0.06 | 0.01 | -0.14 | -0.14 | 0.00 | 0.06 | 0.05 | 0.05 | -0.15 | 0.08 | 0.16 | -0.06 | -0.24 | 0.38 |
| Issues_Important_to_Others | **0.57** | 0.22 | 0.15 | -0.03 | -0.24 | 0.04 | 0.07 | -0.15 | 0.02 | 0.12 | 0.07 | 0.01 | -0.07 | 0.06 | 0.09 | -0.21 |
| Others_Concerned_Getting_Along | **0.50** | 0.05 | 0.12 | 0.14 | -0.09 | -0.18 | 0.23 | -0.24 | 0.11 | 0.12 | -0.08 | 0.34 | -0.01 | 0.03 | -0.03 | -0.17 |
| Others_Would_Not_Disrupt | **0.42** | 0.14 | -0.03 | 0.13 | 0.22 | -0.16 | 0.15 | 0.16 | -0.01 | 0.03 | 0.24 | 0.21 | 0.14 | -0.20 | -0.38 | 0.04 |
| r_No_team_spirit | **0.40** | 0.14 | -0.04 | -0.09 | 0.33 | 0.12 | -0.15 | 0.23 | 0.23 | 0.22 | -0.04 | 0.23 | 0.03 | 0.10 | 0.15 | -0.26 |
| Freq_Trust_Impression | 0.08 | **0.78** | 0.06 | 0.02 | -0.03 | -0.06 | 0.08 | -0.12 | 0.01 | -0.02 | -0.07 | 0.10 | 0.00 | 0.05 | -0.08 | 0.04 |
| Tone_Trust_Impression | 0.07 | **0.76** | 0.07 | 0.23 | -0.13 | -0.10 | 0.09 | 0.12 | 0.06 | -0.06 | -0.17 | 0.02 | 0.09 | -0.10 | -0.03 | -0.08 |
| Contents_Trust_Impression | 0.11 | **0.75** | 0.07 | 0.22 | -0.02 | -0.06 | 0.22 | 0.06 | 0.08 | -0.08 | -0.03 | -0.06 | 0.09 | 0.03 | -0.06 | -0.11 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Typing_Enthusiasm_Impression | 0.13 | **0.74** | 0.03 | 0.09 | 0.11 | -0.02 | -0.09 | 0.02 | 0.03 | 0.09 | 0.03 | -0.05 | -0.15 | 0.02 | -0.05 | 0.15 |
| Typing_Trust_Impression | 0.10 | **0.73** | 0.10 | 0.17 | 0.05 | 0.03 | 0.04 | -0.13 | 0.11 | -0.15 | -0.17 | 0.02 | -0.17 | 0.06 | 0.06 | -0.02 |
| Speed_Trust_Impression | 0.14 | **0.72** | 0.14 | 0.02 | 0.01 | -0.18 | 0.18 | -0.15 | -0.02 | 0.04 | -0.01 | 0.13 | -0.02 | 0.00 | 0.03 | -0.03 |
| Freq_Enthusiasm_Impression | 0.17 | **0.66** | -0.08 | -0.10 | 0.12 | -0.01 | 0.10 | -0.06 | 0.01 | 0.02 | 0.37 | -0.04 | 0.04 | 0.12 | 0.00 | 0.20 |
| Tone_Enthusiasm_Impression | 0.26 | **0.64** | 0.01 | 0.00 | 0.12 | -0.11 | 0.00 | 0.13 | 0.06 | 0.10 | 0.34 | 0.00 | 0.16 | -0.18 | -0.04 | -0.03 |
| Speed_Enthusiasm_Impression | 0.15 | **0.61** | 0.02 | -0.07 | 0.09 | 0.01 | 0.06 | -0.16 | -0.01 | 0.03 | 0.47 | -0.13 | -0.11 | 0.17 | -0.03 | 0.05 |
| Contents_Enthusiasm_Impression | 0.25 | **0.60** | 0.13 | 0.03 | 0.03 | 0.01 | 0.01 | 0.10 | 0.09 | 0.16 | 0.31 | -0.11 | 0.00 | -0.16 | -0.01 | -0.08 |
| Gets_Good_Feel_of_Ppl | 0.29 | **0.51** | -0.01 | 0.05 | 0.00 | 0.14 | 0.42 | 0.04 | 0.04 | -0.05 | 0.13 | 0.17 | 0.01 | -0.03 | 0.04 | -0.21 |
| Concerned_About_Way_Presented | 0.16 | 0.04 | **0.80** | 0.10 | 0.02 | -0.07 | -0.07 | -0.12 | 0.02 | 0.02 | 0.10 | -0.06 | 0.05 | -0.04 | 0.00 | 0.09 |
| Concerned_What_Others_Thought | 0.19 | 0.06 | **0.79** | -0.02 | 0.01 | -0.05 | -0.13 | -0.11 | 0.03 | -0.08 | 0.04 | 0.01 | 0.05 | -0.09 | -0.13 | 0.00 |
| Myself_in_Comparison | 0.03 | 0.08 | **0.78** | -0.06 | -0.03 | -0.02 | 0.16 | -0.01 | 0.00 | 0.11 | 0.04 | 0.01 | -0.09 | 0.05 | 0.01 | -0.08 |
| Worried_About_Impression | 0.20 | 0.09 | **0.77** | 0.08 | 0.11 | -0.12 | -0.03 | -0.02 | 0.03 | -0.01 | 0.02 | 0.02 | 0.00 | -0.03 | -0.14 | 0.02 |
| Concerned_About_Style | 0.11 | 0.03 | **0.75** | 0.12 | -0.05 | -0.07 | 0.12 | -0.01 | 0.06 | 0.17 | -0.10 | 0.00 | 0.01 | -0.02 | 0.01 | 0.05 |
| Self_Conscious | -0.01 | 0.04 | **0.72** | 0.07 | 0.05 | -0.08 | -0.03 | 0.08 | 0.23 | -0.21 | 0.04 | 0.03 | 0.02 | 0.00 | -0.02 | -0.04 |
| Thoughtful_About_Future | 0.19 | 0.15 | **0.41** | 0.11 | -0.03 | 0.13 | -0.08 | -0.13 | 0.07 | 0.38 | 0.15 | 0.18 | -0.41 | 0.02 | -0.05 | 0.00 |
| Students_honest_abilities | 0.04 | 0.11 | 0.07 | **0.79** | 0.03 | 0.06 | -0.07 | -0.06 | -0.09 | 0.20 | 0.05 | 0.07 | 0.10 | -0.04 | -0.05 | 0.02 |
| Students_honest_personal | -0.05 | 0.20 | 0.13 | **0.75** | 0.02 | 0.02 | -0.11 | 0.05 | 0.14 | -0.11 | 0.05 | -0.05 | -0.06 | 0.03 | 0.08 | 0.08 |
| Students_counted_on | 0.16 | 0.06 | 0.01 | **0.74** | -0.03 | 0.00 | 0.17 | -0.06 | 0.00 | -0.10 | 0.01 | 0.08 | 0.05 | -0.02 | 0.00 | 0.01 |
| Students_Truth_knowledge | 0.10 | 0.04 | 0.05 | **0.70** | 0.00 | 0.08 | 0.11 | -0.02 | 0.05 | 0.10 | -0.09 | -0.06 | -0.13 | 0.00 | -0.07 | -0.15 |
| Students_competent | 0.10 | 0.21 | 0.09 | **0.55** | 0.07 | -0.16 | -0.05 | 0.01 | -0.11 | -0.10 | 0.04 | -0.07 | -0.15 | 0.39 | 0.04 | 0.14 |
| Process_Satisfied | 0.59 | 0.06 | 0.07 | 0.06 | **0.71** | -0.07 | 0.11 | 0.05 | 0.03 | 0.03 | 0.01 | -0.05 | 0.02 | -0.03 | -0.03 | 0.01 |
| Outcome_Satisfied | 0.57 | 0.06 | 0.04 | 0.05 | **0.70** | -0.02 | 0.06 | 0.02 | -0.01 | 0.03 | -0.02 | -0.08 | 0.01 | -0.07 | -0.06 | -0.04 |
| Overall_Satisfied | 0.51 | 0.11 | 0.04 | 0.03 | **0.70** | -0.01 | 0.08 | 0.02 | -0.05 | 0.08 | 0.06 | 0.00 | -0.04 | -0.07 | -0.01 | 0.05 |
| Team_Satisfied | 0.64 | 0.09 | 0.04 | 0.00 | **0.64** | -0.09 | 0.07 | 0.08 | 0.08 | 0.02 | -0.03 | -0.01 | 0.01 | -0.04 | -0.05 | 0.02 |
| r_No_Real_Impression_of_Contact | -0.08 | 0.00 | -0.14 | 0.04 | -0.19 | **0.74** | 0.06 | -0.01 | -0.11 | 0.10 | -0.04 | 0.01 | -0.01 | 0.03 | -0.16 | -0.11 |
| r_Could_Not_know_Well | -0.12 | -0.18 | -0.07 | 0.02 | 0.03 | **0.73** | 0.04 | 0.11 | 0.06 | -0.01 | 0.01 | 0.09 | -0.10 | -0.01 | 0.23 | 0.11 |
| r_Not_Good_Idea_Others_Reactions | -0.08 | 0.01 | -0.05 | 0.06 | -0.02 | **0.70** | 0.05 | -0.05 | 0.06 | -0.03 | -0.09 | 0.18 | 0.14 | -0.16 | 0.18 | -0.15 |
| r_Do_Not_Seem_Real | 0.09 | -0.11 | -0.21 | -0.01 | 0.17 | **0.58** | 0.08 | 0.17 | -0.04 | -0.01 | 0.16 | -0.16 | 0.12 | 0.13 | -0.10 | 0.14 |
| Happy_to_Use | 0.16 | 0.39 | -0.02 | 0.02 | 0.06 | 0.07 | **0.67** | 0.02 | 0.08 | -0.08 | 0.07 | -0.10 | -0.09 | 0.05 | 0.05 | -0.03 |
| Easily_Assess_Reactions | 0.08 | 0.48 | 0.07 | 0.13 | 0.01 | 0.08 | **0.53** | -0.03 | -0.02 | 0.03 | 0.08 | -0.12 | -0.05 | 0.01 | -0.16 | 0.03 |
| Great_Realism | 0.16 | 0.38 | 0.01 | 0.06 | 0.06 | 0.17 | **0.51** | -0.03 | -0.01 | 0.25 | 0.02 | 0.35 | -0.08 | 0.03 | -0.15 | 0.04 |
| As_If_Same_Room | 0.21 | 0.38 | 0.01 | -0.03 | 0.23 | 0.11 | **0.49** | -0.01 | -0.01 | 0.02 | -0.06 | 0.11 | 0.05 | -0.01 | 0.16 | 0.27 |
| r_Others_Not_consistent | 0.18 | -0.03 | -0.05 | 0.00 | 0.09 | -0.04 | 0.03 | **0.73** | 0.00 | -0.02 | 0.13 | 0.13 | -0.05 | 0.06 | 0.13 | -0.10 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| r_Prefer_no_influence_of_others | 0.16 | -0.08 | -0.10 | -0.07 | -0.01 | 0.19 | -0.05 | **0.71** | -0.17 | 0.19 | -0.04 | -0.05 | -0.01 | 0.05 | -0.05 | 0.19 |
| r_Wish_could_oversee | -0.13 | -0.19 | -0.07 | -0.13 | 0.16 | 0.27 | 0.08 | **0.45** | -0.17 | -0.02 | -0.29 | -0.41 | 0.00 | -0.07 | 0.02 | -0.10 |
| Disclose_Facts | 0.18 | 0.10 | 0.15 | 0.02 | 0.02 | -0.03 | -0.01 | -0.08 | **0.77** | -0.03 | 0.09 | 0.07 | -0.09 | 0.17 | -0.04 | 0.01 |
| Disclose_Emotions | 0.03 | 0.16 | 0.22 | 0.01 | 0.00 | 0.00 | 0.08 | -0.09 | **0.77** | 0.21 | -0.04 | -0.07 | 0.05 | -0.17 | -0.06 | 0.02 |
| Disclose_Thoughts | 0.27 | -0.03 | 0.08 | 0.06 | 0.10 | -0.07 | 0.09 | 0.14 | 0.16 | **0.70** | 0.11 | -0.18 | 0.07 | -0.12 | 0.19 | 0.03 |
| r_Lack_confidence | 0.08 | -0.02 | -0.05 | -0.06 | 0.40 | 0.19 | -0.11 | 0.30 | 0.10 | **0.45** | -0.04 | 0.17 | -0.04 | 0.20 | -0.14 | -0.07 |
| Self_Aware | 0.03 | 0.13 | 0.43 | 0.07 | -0.07 | -0.02 | 0.11 | 0.14 | 0.07 | 0.09 | **0.61** | -0.02 | -0.07 | -0.08 | 0.08 | -0.11 |
| r_Not_Like_FacetoFace | -0.06 | -0.08 | -0.02 | -0.05 | -0.02 | 0.40 | 0.00 | 0.16 | -0.05 | -0.14 | -0.10 | **0.63** | -0.05 | -0.04 | 0.01 | 0.06 |
| r_cautious_others | -0.03 | -0.05 | 0.05 | -0.07 | 0.00 | 0.11 | -0.10 | -0.09 | -0.03 | 0.04 | -0.02 | -0.01 | **0.85** | 0.20 | 0.07 | 0.03 |
| r_avoid_students | 0.09 | 0.00 | -0.15 | 0.06 | -0.09 | -0.02 | 0.06 | 0.11 | 0.04 | -0.02 | -0.02 | 0.00 | 0.25 | **0.77** | 0.00 | -0.06 |
| r_Distracted | -0.02 | -0.12 | -0.27 | -0.02 | -0.07 | 0.10 | 0.00 | 0.11 | -0.10 | 0.09 | 0.06 | 0.02 | 0.12 | -0.01 | **0.73** | -0.03 |

**Table A-2: Index Items**

| Index/Variable Name | Survey Items |
|---|---|
| Trust | I feel very confident about the other team members' skills.<br>The other team members are very capable of contributing to this decision.<br>The other team members will do everything within their capacity to help the team perform.<br>We had confidence in one another in this group.<br>The other team members are well qualified.<br>The other team members have a strong sense of commitment.<br>We were considerate of one another's feelings in this work group.<br>Members of my workgroup showed a great deal of integrity.<br>The people in my group are friendly.<br>I like the values of the members of this team.<br>Overall, the people in my group are very trustworthy.<br>The other team members display a solid work ethic.<br>I can rely on those with whom I worked in this group.<br>The other team members seem to be successful in the activities they undertake.<br>The other team members have specialized capabilities that can increase our performance.<br>The other team members try hard to be fair in dealing with one another.<br>The other team members are concerned about what is important to the team.<br>The other team members have much knowledge about the decision that had to be made.<br>I would be comfortable giving the other team members a task that was critical to this decision even if I could not monitor them.<br>I would be comfortable giving the other team members complete responsibility for making this decision.<br>The issues involved in this decision are very important to the other team members.<br>The other team members were very concerned about the ability of the team to get along.<br>The other team members would not knowingly do anything to disrupt or slow down the decision making process.<br>There was no "team spirit" in my group. |
| Stereotyping | From the contents of posted messages, I can get an impression of my remote team members' enthusiasm about the task.<br>From the contents of posted messages, I can get an impression of my remote team members' trustworthiness.<br>From the tone of posted messages, I can get an impression of my remote team members' enthusiasm about the task.<br>From the tone of posted messages, I can get an impression of my remote team members' trustworthiness.<br>From the frequency of posted messages, I can get an impression of my remote team members' enthusiasm about the task.<br>From the frequency of posted messages, I can get an impression of my remote team members' trustworthiness.<br>From the speed of posted messages, I can get an impression of my remote team members' enthusiasm about the task.<br>From the speed of posted messages, I can get an impression of my remote team members' trustworthiness.<br>From the typing quality of posted messages, I can get an impression of my remote team members' enthusiasm about the task. |

| | |
|---|---|
| | From the typing quality of posted messages, I can get an impression of my remote team members' trustworthiness.<br>One gets a good feel of the people at the other end. |
| Public Self-awareness | In this experiment I have wondered about the way I've responded and presented myself in comparison to others.<br>In this experiment, I have been thoughtful of how well I may get along with my discussion partner if we meet in the future.<br>I was concerned about my style of doing things<br>I was concerned about the way I presented myself<br>I was self-conscious about the way I was identified<br>I was worried about making a good impression<br>I was concerned about what other people thought of me |
| Propensity to Trust | Most students tell the truth about the limits of their knowledge.<br>Most students can be counted on to do what they say they will do.<br>Most students are honest in describing their experience and abilities.<br>Most students answer personal questions honestly.<br>Most students are very competent in terms of their studies. |
| Satisfaction | How satisfied were you with your team's process?<br>How satisfied were you with the outcome of your team's project?<br>How satisfied were you with the other members in your team?<br>Overall, how satisfied were you with participating in this virtual team collaboration? |
| Perceived Social Presence 1 | One gets no real impression of personal contact with the people at the other end of the link.<br>I could not get to know people very well if I would meet them over this system.<br>One does not get a good enough idea of how people at the other end are reacting.<br>People at the other end do not seem real. |
| Perceived Social Presence 2 | I would be happy to use the system for a meeting in which I intended to persuade other people.<br>One can easily assess the other people's reactions to what has been said.<br>It provides a great sense of realism.<br>It was just as though we were all in the same room. |
| Private Self-Awareness | In this experiment I've generally been very aware of myself, my own perspective and attitudes. |
| Disclosure | During the discussion, my teammates and I disclosed facts about ourselves |
| For each statement participants were asked to indicate the extent to which they agree or disagree with each statement. (1=Strongly Disagree; 7=Strongly Agree) Negatively worded items were reverse scored. | |

## Appendix K – Report Grading Information

Sample Reports

*Sample report with one of the highest overall grades:*

The act of downloading music has been a highly debated subject. There are many reasons why it should be allowed and many reasons why it shouldn't even be considered. While many argue that it is simply unfair to those who dedicated hard work and time to the creation of the music to make a living, there are those who also get publicity from it. In addition to the fact that downloading allows for an artist to become known by the public, it also provides the access of music to those who are tied down like John. However, the law has clearly defined it as illegal and John was aware of that. He knew the conditions and will be held responsible for his actions if it comes down to that. Thus we have decided that he should have not even considered downloading the music.

While downloading and burning a CD was a great gift idea, all that John has worked hard for can possibly go down the drain considering that there are severe penalties for violating the piracy law. John is obviously a devoted, hardworking student and he should have taken this into account. John should have also considered that if this person was so much of a friend he would not have minded if John had showed up to the party with out a gift. If he felt that it was necessary though, we would have recommended perhaps borrowing CD's from the library for his friend.

In our opinion, John's friend had every right to play the CD; after all it was a gift to him. He doesn't know where it came from and possibly doesn't even care. As far as what happens to the CD from this point, we have all agreed that it really doesn't matter what is done with it. Weather it is kept or thrown out, John can still be penalized for violating the piracy law. Getting rid of the CD does not turn back time. Hence it would have been best if John thought through his decision more thoroughly than he did because the law is the law and it's not going to change so that he can do a nice deed or what not.

*Sample report with an average overall grade:*

John is not wrong to download music to a CD for a gift. He was downloading the music anyway, which is what everyone does in college. Also, he was not making a profit off of the CD he made. In fact, he was saving himself money since he was struggling financially.

The recommendation that we would give John for his dilemma would be to burn the music that he downloaded onto a CD as a present and to continue downloading since it is not a problem to us. Whether or not John could have afforded to buy a present, the gift is a good idea because it is well thought out and creative since anyone could have just bought a CD.

It is okay for John's friend to play the CD in the party since everyone is college students who are familiar with listening to burned CDs from online, as long as the music sounds good of course. Besides, it is now his friend's CD and he can do whatever he wants with it in his party. If it were me, I would do the same thing. Everyone likes the music and of course they are all alright with the music coming from a burned disc since most college students burn downloaded music on discs all the time.

The friend should keep the CD since it was a gift from John. It would not be considerate if John took the CD back form him because he thought that it might be wrong to keep a burned

CD. It is nothing to be guilty or ashamed about since it is a very common practice amongst young people.

*Sample report with one of the lowest overall grades:*

Myself, B, and S all agree that John is right in his decision to download music for free and give it as a gift because he can not afford to buy CD's. If John had approached us with his dilemma, we would have recommended him to do to the same thing which is to download the music because we would probably do the same thing. John's friend was right in his decision to play the music at the party. If we were John's friends we would have done the same thing as John's friend and play the music at the party. After the party is over we feel that John's friend should keep the CD since it was a gift.

Profiles of the Expert Judges

Judge #1:

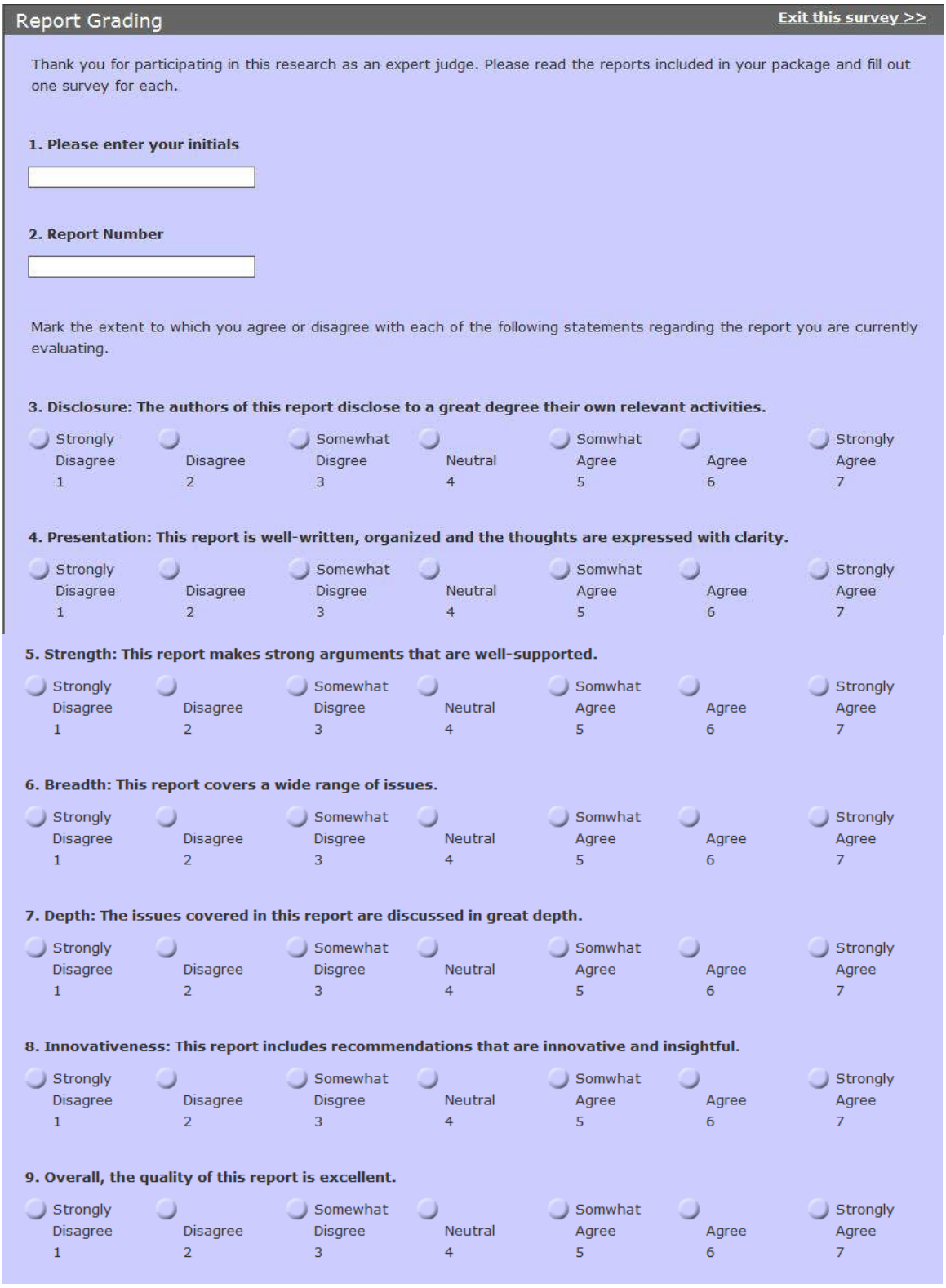
BS in Mathematics
PhD in Operations Research
30 years experience as professor of quantitative analysis and computing and decision sciences
Partner of business consulting company

Judge #2:

Bachelor's in Liberal Arts
MS in Financial Engineering
Certified Financial Analyst
Analyst for a financial institution

Evaluation Form

**Figure A-7: Report Grader Evaluation Form**



Report Grading — Exit this survey >>

Thank you for participating in this research as an expert judge. Please read the reports included in your package and fill out one survey for each.

**1. Please enter your initials**

**2. Report Number**

Mark the extent to which you agree or disagree with each of the following statements regarding the report you are currently evaluating.

**3. Disclosure: The authors of this report disclose to a great degree their own relevant activities.**

**4. Presentation: This report is well-written, organized and the thoughts are expressed with clarity.**

**5. Strength: This report makes strong arguments that are well-supported.**

**6. Breadth: This report covers a wide range of issues.**

**7. Depth: The issues covered in this report are discussed in great depth.**

**8. Innovativeness: This report includes recommendations that are innovative and insightful.**

**9. Overall, the quality of this report is excellent.**

Strongly Disagree 1 | Disagree 2 | Somewhat Disgree 3 | Neutral 4 | Somwhat Agree 5 | Agree 6 | Strongly Agree 7

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