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Influence of Selected Factors on a Counselor's Attention Level to and Counseling Performance with a Virtual Human in a Virtual Counseling Session

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INFLUENCE OF SELECTED FACTORS ON A COUNSELOR'S ATTENTION LEVEL TO AND COUNSELING PERFORMANCE WITH A VIRTUAL HUMAN IN A VIRTUAL COUNSELING SESSION

by

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ABSTRACT

Virtual humans serve as role-players in social skills training environments simulating situational face-to-face conversations. Previous research indicates that virtual humans in instructional roles can increase a learner's engagement and motivation towards the training. Left unaddressed is if the learner is looking at the virtual human as one would in a human-to-human, face-to-face interaction. Using a modified version of the Emergent Leader Immersive Training Environment (ELITE-Lite), this study tracks visual attention and other behavior of 120 counselor trainees counseling a virtual human role-playing counselee. Specific study elements include: (1) the counselor's level of visual attention toward the virtual counselee; (2) how changes to the counselor's viewpoint may influence the counselor's visual focus; and (3) how levels of the virtual human's behavior may influence the counselor's visual focus. Secondary considerations include aspects of learner performance, acceptance of the virtual human, and impacts of age and rank. Result highlights indicate that counselor visual attentional behavior could be separated into two phases: when the virtual human was speaking and when not speaking. When the virtual human is speaking, the counselor's primary visual attention is on the counselee, but is also split toward pre-scripted responses required for the training session. During the non-speaking phase, the counselor's visual focus was on pre-scripted responses required for training. Some of the other findings included that participants did not consider this to be like a conversation with a human, but they indicated acceptance of the virtual human as a partner with the training environment and they considered the simulation to be a useful experience. Additionally, the

research indicates behavior may differ due to age or rank. Future study and design considerations for enhancements to social skills training environments are provided.

This dissertation is dedicated to Kitty, my loving wife. If not for her love, support, patience, and encouragement this would have never been possible.

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CHAPTER ONE: RESEARCH MOTIVATION

Introduction

In 1996 Reeves and Nass published their book, The Media Equation: How People Treat Computers, Television, and New Media Like Real People and Places, summarizing their research with the conclusion that people desire to communicate with computers and other media in natural and social ways (Reeves & Nass, 1996). The idea of talking to machines and computers is not new. Hollywood portrayed a human-like, computer named HAL in the film *2001: A Space Odyssey* (1968). Weizenbaum (1966) introduced ELIZA, a computer program that allowed humans to talk to a computer-based communications agent designed to simulate a Rogerian psychotherapist. Successful artificial dialogue systems like ELIZA have grown out of this early research (Shah, Warwick, Vallverdu, & Wu, 2016). Examples of modern agents that people interact with include Microsoft's "Clippy" (Rudman & Zajicek, 2006), Apple's Siri, Microsoft's Cortana, Amazon's Alexa, Samsung S Voice, and Google Assistant (Chen, Argentinis, & Weber, 2016; Geller, 2012; Santos-Pérez, González-Parada, & Cano-García, 2013) along with Internet agents such as "Anna" from IKEA.com and "Ask Jenn" from AlaskaAir.com. IBM developed Watson, a cognitive assistant that uses natural language processing and machine learning to answer questions using large amounts of unstructured data (IBM, 2015). Watson gain notoriety by winning on television's "Jeopardy!" (Vergano, 2011). These modern agents underscore Reeves and Nass' conclusions that people desire to communicate with computers like they communicate with each other.

As people communicate with computers in natural and social ways, there may be a need to represent the agent in a visual form. A visual representation of a conversational partner allows for the representation of both the verbal and nonverbal channels in human face-to-face communications (Cassell, 2000b). Agents assuming a human form are commonly referred to as virtual humans. Virtual humans are software entities that have both the appearance and behaviors of a live human allowing them to engage in conversational and collaborative tasks while sharing a simulated environment (Gratch et al., 2002). Also like humans, virtual human maintain their own separate beliefs, desires, goals, intentions, and attitudes (Rickel & Johnson, 1999; Traum, Swartout, Gratch, & Marsella, 2008). Adding human-like attributes makes the interaction with more natural and comfortable for the human (Sproull, Subramani, Kiesler, Walker, & Waters, 1996; Takeuchi & Naito, 1995). Research demonstrates that humans prefer agents with a human face (Graesser et al., 2004; Sproull et al., 1996; Yee, Bailenson, & Rickertsen, 2007). Also, humans are more likely to accept virtual humans displaying social behaviors (Garau et al., 2003), emotions (Beale & Creed, 2009; De Melo, Carnevale, & Gratch, 2010), and nonverbal feedback (Bickmore & Cassell, 2001; Cassell & Bickmore, 2003; Gratch et al., 2006; Kang & Gratch, 2014).

Virtual humans have been successful in education and training environments by engaging learners in conversation. As pedagogical agents, virtual humans take advantage of verbal and nonverbal communication channels while sharing the learning environment to facilitate instruction to the learner (Johnson, Rickel, & Lester, 2000; Kim & Baylor, 2006; Schroeder, Adesope, & Gilbert, 2013). In this role they provide instructional support (Baylor, 1999; Graesser et al., 2004; Johnson et al., 2000); motivate learners (Baylor & Kim, 2004; Baylor,

2011; Gulz, 2004; Kim & Baylor, 2006; Lester & Stone, 1997; Moreno et al., 2001); and improve learner performance (Goldberg & Cannon-Bowers, 2015; Veletsianos & Russell, 2014). Within learning environments and training applications, virtual humans have assumed various types of instructional roles to include instructor, tutor, coach and mentor (Baylor & Kim, 2005; Frenchette, 2008). Virtual humans are finding a role in simulations as team members, advisors, or other role-players (Hart & Proctor, 2016). Role-playing exercises are often used in the training of "soft skills" such as interviewing, communication, counseling skills, and other social interactions (Fannon, 2003; Prensky, 2000; Shearer & Davidhizar, 2003; Vincent & Shepherd, 1998). Medical training is area that has been using live role-players as "standardized patients" (Comer, 2005b; Epstein, 2007; Williams, 2004) dating back to 1964 (Talbot, Sagae, John, & Rizzo, 2012a) and has started to accept the use of virtual humans as standardized patients (Raij et al., 2007; Rizzo, Kenny, & Parsons, 2011; Talbot, Sagae, Bruce, & Rizzo, 2012). Virtual humans have been used to train law enforcement officers (Frank et al., 2002; Mykoniatis, Angelopoulou, Proctor, & Karwowski, 2014). The military is exploring the use of virtual humans in exercises as role players (Campbell, Core, et al., 2011; Johnson, 2010; Kim et al., 2009; Sotomayor & Proctor, 2009; Swartout, 2010; Traum et al., 2007).

When using virtual human role-players or virtual role-players in training simulations, they often model face-to-face conversations or situations where the trainee interacts with the virtual human in a social setting. This allows the user to build and practice appropriate social skills that are the focus of the training application (Didehbani, Allen, Kandalaft, Krawczyk, & Chapman, 2016; Hoque, Courgeon, Martin, Mutlu, & Picard, 2013; Johnsen, Raij, Stevens, Lind, & Lok, 2007; Smith, Ginger, Wright, Wright, Boteler Humm, et al., 2014; Tartaro & Cassell,

2006; Tartaro, Cassell, Ratz, Lira, & Nanclares-Nogués, 2014). Social skills training focuses on behavior modification and having the trainee choose appropriate communicative behaviors in order to achieve a goal during an interaction with another person (Segrin & Givertz, 2003; Wiemann, 1977). Many approaches to social skills training focus on situation-specific behaviors in certain social context using different components of effective communication behavior such as appropriate eye contact, facial expressions, showing interest in partner and the conversation (McFall, 1982; Segrin & Givertz, 2003). Accounting for the verbal message content and the different communication behaviors makes simulating a face-to-face conversation a difficult task (Churchill, Cook, Hodgson, & Prevost, 2000).

The need for job-related interpersonal skills cuts across many domains and professions where personal interactions are important. Job-related interpersonal skills are needed in health care, hospitality, and customer service to name a few of the larger domains (Baum, 2002; Gist, Stevens, & Bavetta, 1991; Shearer & Davidhizar, 2003; Talbot et al., 2012a). In order to adequately represent a social interaction within a simulation, the virtual human must be able to communicate using both verbal and nonverbal channels of communication (Cassell, 2000a).

Developing Army Leaders with Virtual Humans

One specific area in need of social skills training is the Army. The Army mission includes requirements for operating amongst populations with diverse religious, ethnic, and societal values (Army, 2008; "FM 3-07 Stability," 2014; "FM 3-24 Insurgencies and Countering Insurgencies," 2014). For these operations to be successful, it may require that soldiers interact with the local leaders and the population at large. Key to these operations are the social

interactions that develop relationships and can ultimately lead to the building of trust between soldiers and local residents (Jones & Muñoz, 2010; Kilcullen, 2009).

Another area within the Army requiring social skills development is leadership. Leadership development is integral to the Army's success (Army, 2015). Central to the Army's leader development process is the ability to provide feedback and assessment or counsel unit and team members. Formally, "Counseling is the process used by leaders to review with a subordinate the subordinate's demonstrated performance and potential" (Army, 2012, pg 7-10). Within the Army, a need for improvement in leader counseling has surfaced. Wellins, Rumsey, and Gilbert (1980) surveyed more than 1,300 officers, non-commissioned officers, and enlisted soldiers on issues of concern to junior officers. Among the top problems identified were junior officers' shortcomings in their interpersonal skills such as their ability to develop of relationships, instill discipline, and conduct counseling. Survey results also found that respondents felt that "training experiences dealing with realistic, job-related problems" were important. In 2010, the Center for Army Leadership completed another study that found similar results. This study reported that senior officers suggested that more courses should include hands on experiences (Hatfield, Steele, Riley, Keller-Glaze, & Fallesen, 2011).

With the results of previous surveys in mind, the Army is looking for new technologies and methods to develop counseling and other interpersonal skills in its leaders (Hays, Campbell, Trimmer, Poore, & Webb, 2012). One potential training approach is the use of virtual humans as role-players to help develop interpersonal social skills in junior leaders. "Making virtual humans look and act like people will facilitate the adult learner's need to make sense of the learning experience by providing greater realism." ("United States Army Training and Leader

Development Science and Technology (S&T) Innovations Strategy White Paper," 2010, pg. 13). This training approach requires scenarios that have specific learning objectives that support growth of interviewing and social skills (Campbell, Hays, et al., 2011).

Approaches to Characterizing Human-Virtual Human Interaction

To develop training applications that utilize virtual human role-players in simulated social skills training environments, we should first understand how humans interact with virtual humans. This section presents previous research on how humans respond to virtual humans.

Sense of Presence

Cassell, Bickmore, Campbell, Vilhjálmsson, and Yan (2000) have taken the position that the interaction between a human and virtual human can be analogous to the interaction between two humans. This interaction necessarily involves the human perceiving the virtual human within a virtual or digital immersive environment. The human's involvement and willingness to suspend their disbelief and accept the virtual human's behavior as real reflects their "presence" in the virtual environment. Presence can be defined as a person's perception that while in a virtual environment they are part of a functioning world and they can interact with it as if it were real (Sheridan, 1992; Slater, Usoh, & Steed, 1994; Witmer, 1998). One measure of the interaction between live and virtual humans is presence. Much of the literature on the use of virtual humans in learning environments focuses on the impact virtual humans have on a trainee's perception of their interactions (Lester et al., 1997; Moreno et al., 2001; Pertaub, Slater, & Barker, 2001; Yee, Bailenson, & Ducheneaut, 2009). When a person interacts with others in a virtual environment, the term "copresence" describes the sense of a connection between the

human and virtual human (Nowak & Biocca, 2003) or the sense of "being and acting with others in a virtual place" (Bailenson et al., 2005). Social presence is used to describe the perception that one is present within an interpersonal relationship (Blascovich, 2002b; Gerhard, Moore, & Hobbs, 2005).

Computer as a Social Partner

Drawing from Reeves & Nass' (1996) research concluding that people want to interact with computer generated entities or agents on a social level, researchers have studied the nature of human -computer agent relationship. Schaumburg (2001) describes two perspectives when viewing how people interact with computers. There is the cognitive view where the user is goal directed and the computer is used as a tool to accomplish an objective. In this model, the computer is measured by its efficiency and effectiveness. The alternate view is from the social perspective where the computer is considered a social actor. In this view, the computer and the agents it generates are social partners and the human user ascribes human qualities to computer. In some situations, humans often insinuate that computers act intentional and emotionally (Suchman, 1989). Some research findings support the social partner perspective in that people respond to virtual humans as if they are real (Bailenson, Blascovich, Beall, & Loomis, 2003; Bickmore, Gruber, & Picard, 2005; Cassell et al., 2002; Gratch, Wang, Gerten, Fast, & Duffy, 2007; Krämer, 2008; Lucas, Gratch, King, & Morency, 2014; Nick Yee et al., 2007). Each of these perspectives influences the design of the user interface and how the user perceives the computer. This research will consider an interface where user interacts with a virtual human role-player in a training application that simulates a social encounter.

Social Influence

Blascovich (2002) and Zanbaka (2007) research in social psychology and social influence aides in understanding the characteristics of virtual humans that influence the thoughts, feelings, decisions, attitudes, and behaviors of the people who interact with them. Blascovich (2002) defines social psychology as it relates to virtual environments as the understanding and explaining an individual's thought, feeling, and behavior influenced by either the actual presence of others or an implied presence created by virtual humans. Studying how people interact with and perceived virtual humans in virtual environments, Blascoivch's the *Threshold Model of Social Influence* (see figure 1) basically "assumes that social influence increases as a positive function of social presence." (Blascovich, 2002, p131).

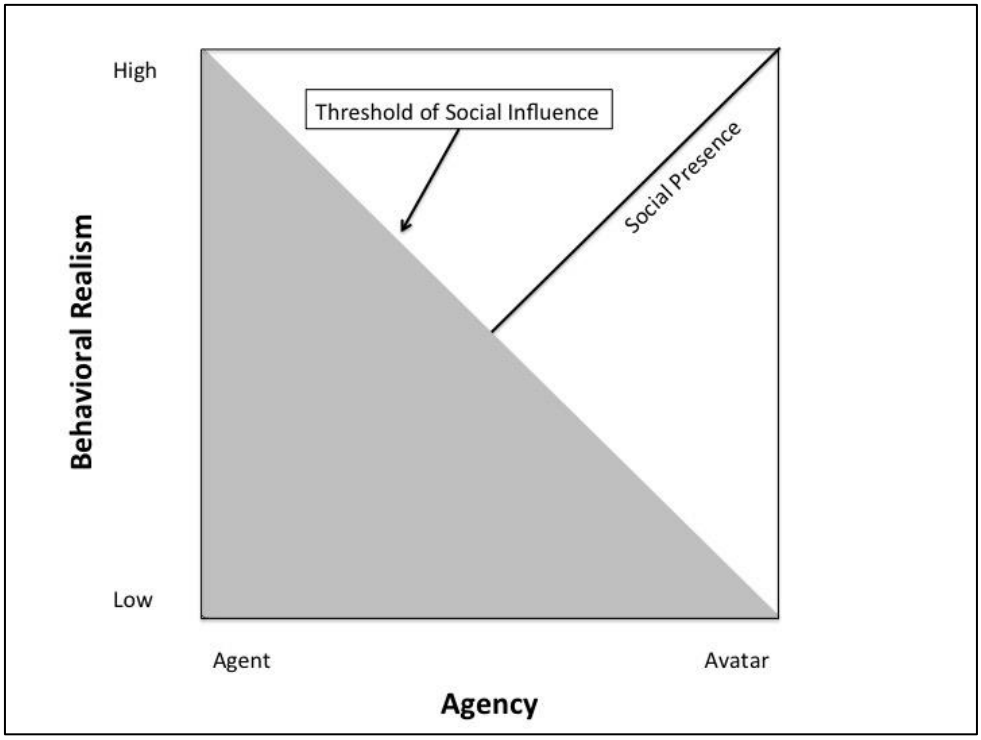

Figure 1:Blascovich's Threshold Model of Social Influence (2002).

Social presence can be described as "the degree to which a person is perceived as a 'real person' in a mediated communication" (Gunawardena & Zittle, 1997, p9). This can include the level of intimacy or interpersonal contact created from physical distance, eye contact, and smiling (Gunawardena & Zittle, 1997). Biocca, Harms, & Burgoon (2003) describe social presence as the sense of "being together" or "being with another." Blascovich (2002b) describes social presence "as a psychological state in which the individual perceives himself or herself as existing within an interpersonal environment." (p130). As one moves along the social presence continuum, they will cross some threshold where social influences will begin to occur. The model seeks to help explain how different aspects of a virtual human's design effects its ability to influence people socially. Factors related to the design of the virtual human, the context of the interaction, and the goal of the person interacting with the virtual human influence the model.

Researchers and designers alike are interested in the various elements of a virtual human's design that makes it effective in its role or application. The Threshold Model of Social Influence considers both external and internal influence factors. The internal factors are *interpersonal self-relevance* or the "importance to the individual's sense of self" (Blascovich, 2002b, p. 133). This factor is a function of an individual's goals and desires as they relate to the importance of the interpersonal interaction and relationship. The other internal factor is the *response system*. This relates to the level of behavioral responses the human experiences in the interaction ranging from automatic (unconscious) to deliberate (conscious and purposeful) (Blascovich, 2002b; Y. Wang, Khooshabeh, & Gratch, 2013). The external factors are *agency* and *communicative realism*. *Agency* is the extent an individual perceives a virtual human to represent a real person. Low agency represents the perception that the entity is completely non-

human controlled. High agency is the perception that the entity is completely controlled by a human (Blascovich, 2002b, 2002a; Guadagno, Blascovich, Bailenson, & McCall, 2007; Nowak, 2004). *Communicative realism* is the degree to which objects within the virtual environment both look and behave as they do in the physical world. This includes movement, anthropometric, and photographic realism (Y. Wang et al., 2013).

Blascovich and others are interested in how humans and virtual humans interact together. There is interest in how natural the interaction is and how different interaction types influence humans as a function of the context in which they occur. Like aspects of Blascovich's Threshold Model of Social Influence, other researchers have focused on behavior and visual realism (Bailenson et al., 2003, 2006; Dehn & van Mulken, 2000; Garau et al., 2003; MacDorman et al., 2010; Slater et al., 2009; Veletsianos, 2010; Nick Yee et al., 2007).

In the mid-90s research focused on whether a more realistic looking virtual human would provide a more believable and effective interaction. Researchers concluded that the use of a human face was more entertaining (Takeuchi & Naito, 1995), more intelligent (King & Ohya, 1996), and more engaging (Koda & Maes, 1996). This early research provided evidence that a virtual human's appearance has an effect on its influence, but these findings did not conclusively show that appearance was the only factor. Yee et al. (2007) conducted a meta-analysis involving the realism of virtual humans from 46 papers related to the subject with 25 papers providing sufficient data for a formal analysis. They conducted both a formal analysis, calculating the study effect size and significance value of aggregation, and an informal analysis using a comparison of dependent measures. From studies using subjective measures comparing low vs. high realism virtual humans, they concluded that virtual humans with a human-like visual

representation have more positive interactions. They also point out that the presence of the virtual human was more important than its appearance. Blascovich (2002b) also acknowledges the importance of the virtual human's visual realism, but he believes appearance to be less important than other factors such as the realism of the virtual human's behavior. Other researchers have also stressed the importance of behavioral realism (Bailenson et al., 2005; Bente, Kramer, Petersen, & de Ruiter, 2001; Gratch et al., 2007; Wang et al., 2013). Bailenson et al. (2003) and Garau et al. (2003) concluded that it is important to match the realism of the behaviors with the appearance. They believe a realistic virtual human is perceived to be more intelligent leading to an expectation that it is more human-like.

Theatrical or Improvisational Behavior within the Social Experience

Beyond presence and social influences, the literature supports the importance of behavioral representation when interacting with a virtual human (Choi, de Melo, Woo, & Gratch, 2012; de Melo, Gratch, & Carnevale, 2011; Garau et al., 2003; Gratch et al., 2006; Y. Wang et al., 2013). An alternate view of virtual humans as social partners is as virtual actors who behave within a theatrical or improvisational setting (da Silva, Iurgel, dos Santos, Branco, & Zagalo, 2010; Mateas & Stern, 2002). Mateas and Stern refer to these experiences as *interactive dramas* where a person interacts with inhabitants of a virtual world and experiences the story first hand. Reeves and Nass' *The Media Equation* (1996) states that people expect media to obey various social rules during an interaction or "mediated life equals real life" (p. 7). This equation has held across thirty-five studies over a broad range of social and natural experiences to include yelling at the television, interfaces that flatter the user, investigating personalities of cartoon characters,

and impacts of movies and pictures. As one considers the literature on virtual human interactions, the focus seems to concentrate on the look and behaviors of the virtual human.

An alternate view of a human interaction with media comes for how individuals interact with television or film. Almost everyone at some time in their life has yelled out answers to game shows, displeasures to a referee's call during a sporting event, or maybe even a warning to a character in a horror movie scene. While the act of the interaction is called "watching" television or a film, the viewer's attention is directed using structural elements such as cuts and different camera angles (Anderson & Lorch, 1983; Kenworthy, 2013; Lang, Zhou, Schwartz, Bolls, & Potter, 2000; Reeves & Nass, 1996). An example of the human to television interaction can be seen through educational television programs like "Sesame Street" and more recently "Dora the Explorer," "Blue's Clue," and "Clifford the Big Red Dog." These programs engage the viewer and elicit direct participation (Bavelier, Green, & Dye, 2010). One may also notice that these programs use a full range of tools available to directors to create engaging stories such as movement, camera views, and character emotion.

Influence of Camera View

The camera can be viewed as a blank canvas where the director tells the story using different heights and angles to communicate the emotions and message of the story (Bares, Thainimit, McDermott, & Boudreaux, 2000; Kenworthy, 2013). While filmmaking is an art, there are accepted techniques to making films visually interesting (Brown, 2012; Kenworthy, 2013). A technique or method directors use to convey their story is to vary the scene's visual content. A wide shot is used to establish the space or geography of the scene. This type of shot

allows the viewer to gain an understanding of where the action is taking place (Brown, 2012). Another important structural element in film is the close-up shot which is normally framed showing the top of a person's head to just below the shirt pocket area. Variations of the close-up include medium close-up (from mid-chest up), choker (from the throat up), tight close-up (from under the chin to cutting off the top of the head), and extreme close-up (normally the mouth and eyes) (Brown, 2012; Kenworthy, 2013). Close-up shots are used to direct the viewer's attention to objects of interest to include an actor's facial expressions (Kenworthy, 2013). Reeves and Nass (1996) contend that close ups can enhance a viewer's attention and memory. Wurtzel & Dominick (1971) found evidence that camera changes can influence how viewers respond to televised messages. This is supported by research from Lang, Zhou, Schwartz, Bolls, & Potter (2000) concluding that increasing the number of edits (camera changes in a visual scene) can positively impact a viewer's attention and memory. Early research with children's television showed some positive results with various factors including the use of camera techniques (Anderson & Levin, 1976). Research on viewer engagement during television commercials incadiated that increased scene changes can require redirection of one's visual attention and lead to greater engagement (Bolls, Muehling, & Yoon, 2003; Lang, Bolls, Potter, & Kawahara, 1999; Smith & Gevins, 2009). Other research showed that the use of subjective cameras (where the camera invites the audience to participate in the action, like a NASCAR dash-mounted camera or overhead cameras in the football that provide a quarterback's perspective) can create a more engaged media experience for viewers. This greater engagement has been linked to increased enjoyment (Cummins, 2009).

Influence of Acting Styles

The depiction of human behaviors is important when interacting with virtual humans (Bailenson et al., 2003; Choi et al., 2012; Garau et al., 2003; Gratch et al., 2006). Like people, a virtual human's behaviors help communicate the intended message by allowing nonverbal messages to be conveyed through facial expressions, gestures, and body language (Bailenson et al., 2005; Garau et al., 2003; Gratch et al., 2007; Tinwell, Grimshaw, Nabi, & Williams, 2011). Again, looking to film and theater methods, one could consider the virtual human as an actor within an interactive drama. While much of the literature investigates the realism of the behavior models (Bailenson et al., 2003; Bickmore & Cassell, 2001; De Melo, Carnevale, & Gratch, 2010; Gratch et al., 2006, 2007; Raij et al., 2007), it lacks in research investigating the level of exaggeration exhibited by the behavior models.

Actors often vary their acting styles to fit the presentation media. Wurtzel & Dominick (1971) reported that V. I. Pudovkin, a Russian cinemist, stressed a distinction between acting styles in film and theater. Pudovkin stressed that while on stage, an actor must be seen and heard by everyone in the theater. Wurtzel & Dominick point out that in the theater, actors must project their voices and gestures in an expansive and exaggerated manner to communicate the intended message and emotion. Cinema or film acting does not require this exaggeration because the actor's performance is captured through camera and microphone placed near the performance. In the field of acting, it has been argued that the change of medium from live theater to film offers opportunities to alter acting styles to take advantage of the larger screen and the details that can be seen using close-ups camera techniques (Quinn, 1995).

Summary

Since at least the 1960's, virtual humans have been employed and gained increasing traction in entertainment, business, scientific, and educational applications. Virtual humans are now emerging in new roles to meet the needs for social skills training. Although limited, research indicates that virtual humans can substitute for live role-players in training applications (Hays, Campbell, Trimmer, et al., 2012; Johnson & Valente, 2008; Johnson, 2014). As training applications for social skills are developed, researchers and developers need to understand how learners interact with virtual humans as role-players to maximize the learning outcomes. Since the purpose of social skills training is to introduce and develop the skills required to effectively interact in a social situation, this research aims to investigate whether learners are paying attention to a virtual human role-player within a simulated social encounter and whether paying attention to the virtual human role-player impacts the learning outcomes. With the assumption that increased attention will have a positive effect on learner performance (Lester et al., 1997; Murphy, 2011; Prensky, 2000; Ricci, Salas, & Cannon-Bowers, 1996; Veletsianos & Russell, 2014), the research also examines how the application of a methodology that employs multiple camera views and acting styles can enhance the learning for simulated job-related, social interactions.

Notional Research Questions

This research uses the ELITE Lite Army leadership training application that simulates a face-to-face counseling session between a leader and their subordinate. Considering that the intent of the ELITE Lite training application is to give junior officers experience in effective

interpersonal communication skills (Campbell, Hays, et al., 2011; Hays, Campbell, Trimmer, et al., 2012), the leader's visual attention to the subordinate is an important element of this simulated face-to-face conversation. Maintaining one's visual attention or eye contact is an important element of effective communication (Argyle & Cook, 1976; Argyle & Dean, 1965; Segrin & Givertz, 2003; Turkstra, 2005). Vertegaal, Slagter, van der Veer, & Nijholt (2001) even propose that eye gaze is a good predicator of one's attention to the conversation. Studying the impact of different types of college video lectures, Chen & Wu (2015) suggest that using eye movement measures to study visual attention towards an area of interest is an effective approach to understanding sustained attention, cognitive load, and overall learner performance. First, this research addresses anecdotal reports during the initial system testing of ELITE that learners where not looking at the virtual human, answering the question of whether a virtual human is really needed for the training. Secondly, the research will seek to provide evidence that a learner with increased visual attention on the virtual human role-player results in more positive attitude toward the training and ultimately increased learning through the application of the leadership counseling skills. This will provide evidence to support claims in the literature that increased learning is a result of increased engagement, where engagement is shown as visual attention to the virtual human role-player.

CHAPTER TWO: LITERATURE SEARCH

Summary

This chapter looks at the literature associated with the use of virtual humans for social skills training. First, a brief discussion of the social skills training and how utilizing virtual humans can train individuals how to behave and communicate appropriately in social situations. Since this research is interested in the interpersonal social skills training applications, research literature on the training effectiveness and the impacts of multimedia learning effects such as information redundancy and split-attention. Finally, research examining viewer attention to television is considered to better understand a leaner's attention levels to virtual humans in simulated social training applications.

Using Virtual Humans for Social Skills Training

Social skills are defined as specific abilities or behaviors that allow a person to competently perform specific social tasks (McFall, 1982). Spitzberg & Cupach (1989) state that social skills allow a person the ability to communicate and interact with others in an appropriate and effective way. Some approaches to social skills training focus on communicative behaviors such as use of facial expressions, showing interest in your conversation partner, and maintaining eye contact (McFall, 1982; Segrin & Givertz, 2003; Spence, 2003). Popular methods for training social skills include paper-and-pencil, role-playing, quasi-naturalistic performance observation, and rating by others (McFall, 1982). McFall points out that the most common methods are the pencil-and-paper and role-playing, with role-playing being more direct and focusing on specific situational samples of a person's performance. The advancement of agent technologies provides

the capability to use virtual humans in role-playing simulation exercises (Hart & Proctor, 2016; Johnson, 2014).

Virtual Human as Role-players in Simulated Social Encounters

As stated in the previous chapter, people react to virtual humans as if they were human (Hart, Gratch, & Marsella, 2013). This ability to interact in social ways makes them natural candidates as substitute role-players in social skills training simulations. Virtual role-players are used in a variety of training applications to include roles as medical patients (Johnsen et al., 2005; Parsons et al., 2008; Sotomayor & Proctor, 2009; Talbot et al., 2012b), potential suspects in law enforcement scenarios (Frank et al., 2002; Mykoniatis et al., 2014), and the military personnel (Campbell, Core, et al., 2011; Hays, Campbell, Trimmer, et al., 2012; Johnson, 2015; Johnson, 2010; Kim et al., 2009).

The use of virtual humans over live role players has many benefits. Virtual humans can increase the level of engagement within the training scenario or environment (Baylor & Kim, 2003; Bickmore, 2003; Goldberg & Cannon-Bowers, 2015; Gulz, 2004; Lester et al., 1997; Moreno et al., 2001; Rowe, Shores, Mott, & Lester, 2010). Using virtual role-play as alternative to live role-play allows for participants to practice social interactions in environments without fear or embarrassment (Johnson, 2014). These safe and controlled practice environments do not carry the burden of the associated financial cost of live role-players. These costs include paying for the role-playing actors' time, and possibly cost associated with transportation, lodging, and meals. Other miscellaneous cost include items such as costumes, props, etc. (Johnsen, 2008). Additional factors to consider when using virtual humans opposed to live role-players include:

the actor's availability for scheduling, the actor's ability to perform at the appropriate skill level to match the training objectives, the diversity (race, gender, culture, and language) of the live role-player pool available, and the actor's physical conditioning to provide repeated and consistent performances for the purposes of standardized feedback (Johnsen, 2008; Swartout, 2010; Swartout et al., 2001; Zanbaka, Ulinski, Goolkasian, & Hodges, 2007). Lastly, a virtual environment can provide the proper context to the training scenario over a classroom setting (Campbell, Hays, et al., 2011; Lane, Hays, Core, & Auerbach, 2013). Disadvantages with the use of virtual humans are that the technology may not be advanced enough to portray some emotional and behavioral characteristics (Johnsen, 2008) to include possible medical conditions (Talbot et al., 2012a). Computing resources are another limiting factor to the use of virtual humans in conversations. While not an embodied agent, IBM's Watson required extensive hardware and training to respond at human levels (Ferrucci et al., 2010; Shah, 2011; Vergano, 2011). Research also is needed to better understand the impact of emotional and behavioral characteristics like micro-expressions (Queiroz, Musse, & Badler, 2014); the effect of voice qualities (Kim & Baylor, 2015); and the level of visual attention given to virtual humans during simulated face-to-face conversations (Chen & Wu, 2015; Hart & Proctor, 2016).

Substituting Virtual Role-players for Live Role-players

With social skills training focusing on the communicative behaviors and the advantages of virtual human technologies, the substitution of virtual role-players raises some questions centered on the effectiveness of the virtual human role-player. Has technology advanced enough to substitute for a live role-player? Can the interaction with the virtual human role-player be effective for social skills training?

First considering the acceptance of the virtual human as a substitute for a live role-player. Much of the research on the acceptance of virtual humans is based on the research conducted by Reeves and Nass (1996) where they concluded the people have a desire to interact with computers and other media in a natural and social way. In support of their research, evidence has shown that people react socially with virtual humans (Bailenson et al., 2003; Bickmore et al., 2005; Cassell et al., 2002; Gratch et al., 2007; Krämer, 2008; Krämer, 2005; Pertaub, Slater, & Barker, 2002). Sproull, Subramani, Kieser, Walker, & Waters (1996) concluded people respond differently to a computer interface with a human face opposed to a text display. The presence of a face has also been found to be more entertaining or engaging (Gulz, 2004; Koda & Maes, 1996; Takeuchi & Naito, 1995; Yee et al., 2007). Pertaub, Slater et al. (2001) found that students giving speeches to a virtual audience had similar responses as if speaking to a real audience. Similarly, Chollet, Morency, Shapiro, Scherer, & Angeles (2015) found that practicing with interactive, virtual audiences can assist in improving a person's public speaking skills. Other research has shown that virtual humans can be an engaging (Kopp, Gesellensetter, Krämer, & Wachsmuth, 2005; Stocky & Cassell, 2002; Swartout, 2010). The training domain has found similar evidence that the presence of a virtual instructor or coach within a learning environment can be engaging (Baylor & Kim, 2003; Lester et al., 1997; Moreno et al., 2001; Rowe, Shores, Mott, & Lester, 2010) and even motivating (Baylor, 2011; Baylor & Kim, 2004; Gulz, 2004). Upon reviewing 43 studies involving the use of pedagogical agents, Schroeder et al. (2013) concluded that students learned more with the presence of an agent because students perceived they were engaged in a social interaction. With a person's desire to interact socially with computers and the research showing that humans react socially with virtual humans, one

can make the argument that humans will accept virtual humans as a social partner in a simulated conversation.

With the assumption that people accept virtual humans as social partners, can one assume that virtual humans can substitute for live role-players in social skills training? The research comparing live and virtual humans is limited (Hays, Campbell, Trimmer, et al., 2012; Johnsen et al., 2007). In one study Johnsen, Raji, Stevens, Lind, & Lok (2007) compared the clinical examination interview skills of second year medical students using both a virtual patient simulator and a live standardized patient. Based on expert reviews and evaluations of the interviews, the researchers found significant correlation in the overall rating of a student's interaction with the virtual and live patient. Johnsen et al. concluded that the "virtual human experience can be as effective as a real human experience in real world interpersonal skills education." (Johnsen et al., 2007). Hays, Campbell, Trimmer, et al. (2012) also looked at the effectiveness of a virtual role-player versus a live actor. Using both physiological data (heart rate and galvanic skin response) and self-report measures, they concluded that there was not a reliable main effect for both heart rate and galvanic skin response when comparing the encounters with virtual and live role-players. This was supported by the self-reported data leading the researchers to conclude that one-on-on, face-to-face encounter; there was no measureable difference between the encounters with virtual and live role-players. While the above examples are limited and not conclusive, the data indicates that people can have similar experiences with virtual role-players as they would life role-players allowing one to assume that virtual humans can be an effective substitute for some live role-player social skills training.

Learning Social Skills from Virtual Human Training Applications

With the acceptance of virtual humans as role-players in social simulations, designers are creating training applications to address specific social skills that include foreign culture and language (Johnson & Valente, 2008; Johnson, 2014), meetings and negotiations (Kim et al., 2009), information collection and assessment (Frank et al., 2002; Tartaro et al., 2014; Traum et al., 2007), and leadership counseling (Campbell, Core, et al., 2011; Campbell, Hays, et al., 2011). A training system's primary purpose is to be effective in training what it is designed to train. For social skills training, the purpose is to focus on social or communication skills (McFall, 1982; Segrin & Givertz, 2003).

Examples of Effective Virtual Role-players Training Applications

Training environments using virtual human role-players has seen positive effects (Durlach, Wansbury, & Wilkinson, 2008; Frank et al., 2002; Johnsen et al., 2007; Johnson, 2014). For example, JUST-TALK, an application designed to train law enforcement personnel how to manage encounters with the mentally ill. As the law enforcement student interacts with the virtual subject, the student uses conversational skills to stabilize the situation and assess if the virtual subject is a threat to themselves or others. A comparison of law enforcement student (n=17) mean pre- and post-test scores measuring their knowledge of mental illness rose from 56 to 95 percent after undergoing training that included an interaction with a virtual role-player (Frank et al., 2002). Another example of an application that resulted in positive training results was the "BiLat." Developed for the U.S. Army, BiLat focused on training soldiers how to conduct meetings and bilateral negotiations in a foreign culture. Again, comparing pre- and

post-test scores from a situational judgment test designed to measure a student's knowledge of bilateral negotiations in a different cultural context, Durlach et al. (2008) found significant differences for students without previous negotiation experiences. Johnson & Valente (2008) used the Tactical Language and Culture Training System to collect pre- and post-deployment data from U.S. Marine Corps units. The post-deployment data collection provided insight into the Marines' perceived benefit. Post-deployment surveys and interviews indicated that units that used the training application were able to communicate more effectively with less reliance on interpreters and that job performance was positively impacted, meeting level 4 of Kirkpatrick's four levels of learning (Johnson & Valente, 2008; Johnson, 2014). Another study that compared pre- and post-test knowledge scores conducted by Hays, Campbell, Trimmer, et al. (2012) used the Immersive Naval Officer Training System (INOTS). INOTS provides junior Naval officers experiences in counseling subordinates on performance and personal issues using a virtual human role-player as the subordinate. Researchers compared three training conditions using the INOTS training experience. The first condition provided the learner with instructional material, practice with the virtual human role-player, and an automated review of the interaction. The second condition used the same instructional material as in the first condition, but it did not include the practice session with the virtual human. The final condition was the control and used the previous course materials. Using a situational judgment test to assess comprehension and application of the knowledge, Hays et al. found that there was a significant increase in pre- and post-test scores ($F(1, 136) = 44.38$, $p < .001$) and the increase differed across the three conditions showing a reliable training effect ($F(1, 136) = 3.48$, $p = .033$). They did report that there was not a significant difference between the practice with the virtual human and the no-practice condition

suggesting that the virtual human did not make a detectable difference (Hays, Campbell, Trimmer, et al., 2012). They indicated that while the virtual human practice environment did not improve the immediate post-test scores, the practice environment with the virtual human was self-reported to be engaging and compelling. Tartaro, Cassell, Ratz, Lira, & Nanclares-Nogués (2014) evaluated the use of a virtual peer as an element of an intervention program for children with Autism Spectrum Disorder (ASD). They concluded that interacting with the virtual peer as a part of the intervention program can increase the "appropriate use of general reciprocity skills, such as asking questions, responding, and sharing information." (Tartaro et al., 2014, p. 2:23).

While the research addressing the effectiveness of using virtual humans as role-players in training applications and environments shows positive trends, it is limited and problematic. While some research points to the "usefulness" of virtual role-players in simulated social encounters, it is difficult to pin point the contribution of the virtual role-player within the entire instructional program. Hays, Campbell, Trimmer, et al. (2012) point out that their study was not counter balanced to account for different instructors because the student assignments were by class and not by individual student. They also report that the SJT used was not psychometrically analyzed allowing it to be optimally constructed to measure learning. Other examples of simulated social encounters used as a part of an overall training program making it difficult to pin point the virtual role-players contribution to learning include BiLat (Durlach et al., 2008), JUST-TALK (Frank et al., 2002), Tactical Language and Culture Training System (Johnson & Valente, 2008), and the Authorable Virtual Peer (Tartaro et al., 2014). The construction of the experiments within the greater training program made it difficult to arrive at a specific

conclusion on the effectiveness of the virtual human as a role-player within the simulated social encounter.

Virtual Humans as Conversational Partners

In the absence of a definitive answer to effectiveness of virtual humans in role-playing simulations for social skills training, one might look at the how a social interaction with a virtual human simulates a human, face-to-face conversation. Stamp (1999) identified seventeen different categories of research that examine interpersonal communication showing the complex nature of human conversation. Early communication agents, like Eliza, simply used text displays and reflected responses based on key words (Weizenbaum, 1966). This made long conversations difficult. In the 1990s, Microsoft added animations to their agent, Clippy, in order to better engage the user. The opposite effect occurred and Clippy annoyed and irritated users with constant interruptions (Whitworth, 2005). To best simulate social interactions, the virtual human must be capable of performing conversational behaviors similar to that of a human (Cassell, 2000a). These conversational behaviors go beyond the verbal content, tone, and cadence to include hand and body gestures, micro and macro facial expressions, and eye gaze and contact (Argyle & Cook, 1976; Argyle & Dean, 1965; Cassell et al., 2000; McFall, 1982; Segrin & Givertz, 2003).

A structured literature search with multiple search criteria that included "virtual human," "role-player," "social skills," "training," and "conversation," identified ten conversational virtual human instantiations from the years 2005-2016 (Hart & Proctor, 2016). Human controlled avatars were not considered. Table 1 (Hart & Proctor, 2016) provides a list of the selected

conversational virtual humans and descriptions of the communication channel capabilities. Each instantiation simulates a face-to-face encounter with the primary purpose of aiding in the development of social skills.

Table 1:Social Skills Training Applications Utilizing Virtual Role-Players (2005-2016).

System Name	Training Area	Person Communication Channels to Virtual Human	Virtual Human Communications Channels to Human
SimSensi "Ellie" (R&D prototype) (Devault et al., 2014; Morency et al., 2015)	Healthcare Interviewer (no training)	• Speech recognition • Facial expressions • Head and body movements • Camera and Kinect with MultiSense for detection of smile intensity, facial expressions, head/body movement, and gaze direction	• Pre-recorded voice responses • Virtual human representation displayed on large screen monitor (> 40 inches) with animated behaviors synchronized to speech
Virtual Reality Job Interview Trainer (VR-JIT) (Commercial product) (Smith, Ginger, Wright, Wright, Boteler Humm, et al., 2014; Smith, Ginger, Wright, Wright, Taylor, et al., 2014)	Job interview training	• Speech recognition of specific user responses are provided • No visual system	• Recorded video clips of human actor controlled by non-branching logic
Authorable Virtual Peer (AVP) (R&D prototype) (Tartaro et al., 2014)	Social interactions of children with autism spectrum disorder (ASD)	• Speech recognition and text files for users to author new content • User nonverbal behaviors observed via camera for human observer feedback and control	• Projected life-sized virtual human • Pre-recorded human voice with synchronized animated facial expressions and behaviors • GUI for selecting virtual peers social behaviors
BiLat (Government product) (Kim et al., 2009)	Negotiation in cultural context	• Menu selection of user statements • No visual system	• Virtual human displayed on desktop or laptop monitor with synchronized animations • Computer generated voice responses

System Name	Training Area	Person Communication Channels to Virtual Human	Virtual Human Communications Channels to Human
Tactical Language and Culture Training System (TLCTS) (Commercial product) (Johnson & Valente, 2008; Johnson, 2014)	Foreign language and cultural training	• Speech recognition inputs • Mouse selection of cultural gestures • No visual system	• Virtual human with synchronized animations in virtual environment on desktop monitor or laptop display • Recorded voice responses
INOTS & ELITE (Government product) (Campbell, Hays, et al., 2011; Hays, Campbell, Trimmer, et al., 2012)	Military person and performance counseling	• Speech recognition of multiple choice user statements	• Virtual human life-size screen display • Pre-recorded VH voice responses • No visual system
Job Interview Simulator (R&D prototype) (Baur, Damian, Gebhard, Porayska-Pomsta, & Andre, 2013)	Job interview skills (no training)	• Speech recognition inputs • Hand and body positions and movements • Facial expressions – smile • Voice activity • Head position • Camera and Kinect inputs for social cue recognition and nonverbal behavior analysis •	• Virtual human displayed on large screen monitor with synchronized behaviors
Public Speaking Simulator (R&D prototype) (Chollet et al., 2015)	Public speaking skills (no training)	• Facial expression • Body positions • Human speech inputs • Camera for facial expression recordings • Kinect for captures of speaker's body position – provided information and control of audience behaviors •	• Interactive virtual audience displayed on multiple large screens with varied attentive and non-attentive behaviors
My Automated Conversation Coach (MACH)	Job interview skills (no training)	• Speech recognition • Facial expression – smiles • Head positions	• Virtual human displayed on large screen monitor with synchronized behaviors • Synthesized VH voice

System Name	Training Area	Person Communication Channels to Virtual Human	Virtual Human Communications Channels to Human
(R&D prototype) (Hoque et al., 2013)		• Voice prosody • Camera for analysis of video to determine and interpret user's nonverbal behavior •	
Automated Social Skills Trainer (R&D prototype) (Tanaka et al., 2015)	Anxieties associated with social interactions	• Speech recognition • Voice volume, rate, pauses, and quality • Camera for recording of user's interaction for playback during after action review	• Virtual human displayed on monitor with synchronized behaviors

Behaviors such as gestures and facial expressions are integral, nonverbal elements of human, face-to-face conversation. The behaviors depend on the human visual system to be understood. Argyle & Cook (1976) state that 60% of a conversation uses eye gaze behaviors. Vertegaal et al. (2001) suggest that eye gaze is a good predictor of one's conversational attention. Observing the ten instantiations of virtual humans that attempt to simulate a conversation in Table 1, only six include a visual system in varying degrees. SimSensi (Devault et al., 2014; Morency et al., 2015), Job Interview Simulator (Baur et al., 2013) , and MACH (Hoque et al., 2013) attempt to closely model the visual system's role in the communication process. These systems use a camera and other sensors, along with data analysis to assess the user's state during the conversation and adjust the virtual role-player's behaviors. The Public Speaking Simulator uses a camera and Microsoft Kinect sensor as a collective visual system for the entire virtual audience allowing them to portray behaviors of different interest levels (Chollet et al., 2015). Other uses of cameras as human visual systems include the AVP (Tartaro et al., 2014). In this system, a camera allows a human observer to make behavior adjustments to the virtual role-player. While the Automated Skills Social Skills Trainer (Tanaka et al., 2015) includes a camera, its purpose is for after action review purposes opposed to controlling the virtual role-player behavior. It should be noted that virtual human camera systems provide only one-half of a conversations bidirectional channels.

Visual Attention in Conversations

During a face-to-face conversation, visual attention to the person whom one is conversing with is important (Adolphs, 1999; Argyle & Cook, 1976; Turkstra, 2005) and eye contact is seen to be an essential element of effective communication (Argyle & Dean, 1965). Mirenda,

Donnellan, and Yoder (1983) suggest that adult gaze behaviors indicate interest in the other person; communicate the nature of the interpersonal relationship; provide information about the other person's reactions; and indicate attentiveness. With a primary objective of social skills training being the development and exhibiting of appropriate communicative behaviors, one can see that knowing if the learner is visually attending to the virtual human might be important to the training. With this in mind, this research focuses on analyzing a user's virtual attention on the application interface during a simulated social encounter with a virtual role-player. Understanding the user's attention on the different areas of the application interface show the user's level of attention and interest in the conversation with the virtual role-player (C.-M. Chen & Wu, 2015; McFall, 1982; Segrin & Givertz, 2003; Wiemann, 1977).

As training applications and environments use more virtual humans for the purpose of social skills training, understanding the student's level of attention becomes important. In order to be an effective training system, one should also consider the feedback and support information a student receives during their interaction (Schell, 2008). Feedback allows the learner to understand the consequences of their actions during the encounter with the virtual human (Lester, Lobene, Mott, & Rowe, 2014). An observation of the limited number of Government or commercial training products identified in Table 1 had interface designs that includes windows displaying the virtual role-player as well as various forms of student feedback to include the text of the dialogue between the human learner and the virtual role-player. With the importance of both the verbal and nonverbal channels in communicative social skills, the potential exists for the student to focus their attention on the textual information and miss the virtual human's important

nonverbal cues. Research on multimedia learning can help provide insight into this potential interface design issue for social skills training systems.

Multimedia Learning

Multimedia learning focuses on the presentation of both visual images and verbal narrations to support the learning process (Mayer, 1997). According to Mayer the principle behind multimedia learning is that "People learn more deeply from words and pictures than from words alone." (Mayer, 2005, p.31). One might even think that adding more information is better, as in adding the text history of a dialogue for an interaction with a virtual human role-player for a simulated social interaction. Models of working memory contradict this assumption. Humans process information in two channels, auditory and visually (Kalyuga, Chandler, & Sweller, 1998; Mayer, 2005; Mayer & Johnson, 2008). According to cognitive theories, each of these channels have limited capacity for processing information and can be overloaded with redundant information (Kalyuga et al., 1998; Mayer, 2005; Moreno & Mayer, 2000; Sweller & Chandler, 1994). The addition of redundant on-screen text to narrative animations has been shown to decrease learner performance. Moreno & Mayer (2002) studied whether adding on-screen text to a narrated animation would better facilitate learning. Their study looked at four conditions: narration only; narration and text; animation and narration; and animation and narration with text. They concluded that the visual presentation of words and pictures creates a split-attention situation within the student's visual working memory and therefore negatively influences their learning. Other studies finding that learning was hindered with the addition of on-screen text to narrative graphics can be found in Mayer & Johnson (2008).

As designers and developers continue to produce social skills training applications, they need to understand how learners are interacting with the virtual humans and the supporting information being presented. Are the learners paying attention to the virtual human or do they focus on the textual information provided to support the learning? Previous research has failed to demonstrate whether or not learners are deriving benefits from attending to the virtual human's nonverbal behaviors during the simulated conversations. Frischen, Bayliss, & Tipper (2007) suggest that the study of attention using a person's gaze provides an opportunity to develop research questions around the function of visual attention. Chen & Wu (2015) suggest that the study of a learner's visual attention towards specific areas of interest is an effective approach to understand attention, cognitive load, and overall performance.

This study is concerned with the use of eye movement data to better understand usability and performance issues centered on the user's fixation as the importance of display information for a training application. Eye movement or tracking has been applied to both the analysis and control of human-computer interfaces. For control, the tracking of real time movements of the eyes can be used as inputs to a computer system to assist people with disabilities (Jacob & Karn, 2003). One of the major areas of research that has used eye trackers is Usability Engineering (Coltekin, Heil, Garlandini, & Fabrikant, 2009; Jacob & Karn, 2003; Schiessl, Duda, Thölke, & Fischer, 2003). Usability Engineering is the systematic evaluation, inspection, and inquiry of a product or system's ease of use (Coltekin et al., 2009; Nielsen, 1993). Eye trackers provide a methodology to observing user behaviors while interacting with media to better understand elements of interfaces, especially displays and visual environments (Jacob & Karn, 2003;

Schiessl et al., 2003). “The main target of the eye tracking method is to assess the allocation of visual attention on the screen.” (Schiessl et al., 2003).

Research on Visual Attention to Television

We know little about the use of virtual humans in learning environments with respect to how much to people visually attend to the virtual human avatar. Some research that may provide some insight comes from the studies investigating the presence of a virtual human. Lester’s *persona effect* research showed that the presence of a virtual human within the learning environment not only made the learning experience more positive but it motivated students as well (Lester et al., 1997). In their study, Lester et al. did not measure whether the student was visually attending to the agent nor did the study include a no-agent condition that may have provided some indication of whether the presence of the agent effected the student’s interaction or performance. Miksatko, Kipp, and Kipp (2010) studied 36 university students (50% male/50% female) using a computer based foreign language vocabulary trainer that include two conditions: one with an agent and one without. Each student had four interactions over an eight-day period. Over the four sessions, results showed that learning occurred for both the agent and no agent conditions and that both conditions were statistically equal based on a two-factor ANOVA ($F(1,3)=.35$; $p=.79$). While Miksato, Kipp, and Kipp did consider the no-agent condition, the nature of the interaction with the agent was not social. The agent condition used a female agent that featured idle movement animations and minimal pointing gestures. She provided audible feedback based on the student’s progress but did not engage in conversational behaviors. There was no bi-directional interaction where the student could communicate with

the agent. This did not allow the student to establish any type of relationship with the agent. Miksato, Kipp, and Kipp identify that future studies should consider the positive effects of relationship building and richer multimodal interactions (Miksatko et al., 2010). The agent presented in the application was a basic human agent with limited animations. Similarly Moundridou & Virvou (2002) failed to find a significant difference in agent vs. no agent conditions. Goldberg & Cannon-Bowers (2015) investigated the agent vs. no agent condition of intelligent tutors and found that student performance during the no agent condition (audio feedback only) resulted in the highest scores during the training scenario, but produced the weakest scores for learning transfer. According to Goldberg & Cannon-Bowers, a possible explanation for performance of the no agent condition is that the student is reacting to the audible feedback as if it were a part of the game opposed to an agent providing notification of explicit information that is important to the student. With this explanation, these results provide some of the first real indications without an eye tracker that the student is focused on the agent at certain times during the training. Goldberg & Cannon-Bowers also considered the cognitive load placed on the student during the interaction and found no significant differences across the four conditions. In a comparison of the two agent conditions and the no agent condition, they found that the self-reported mental demand was higher for the agent conditions. This is an indication that the presence of an agent requires increased mental effort to monitor both the training environment and the tutor feedback. A possible reason for the increased load is that the student is splitting their attention between the agent and the training scenario again showing that the student is focusing at least some attention on the agent. While this research provides indications that the student does visually attend to the agent, it should be noted that the student was not able

to communicate with the agent. Some research suggest that visual attention given to an agent while giving it is giving the student feedback might only be an orienting response due to movement or a change in the condition on the screen (Diao & Sundar, 2004; Dye, Green, & Bavelier, 2009; Posner, 1980; Thorson & Lang, 1992).

The previous virtual human research does not observe or track user vision and therefore only assumes that the users are looking at the virtual human at least to some degree. Previous virtual human research fails to demonstrate if users are developing social skills from the interaction with the virtual human or from other means. Early children's educational television had a similar issue in trying to understand the education impact programs such as "Sesame Street" had on children (Bavelier et al., 2010; Linebarger & Walker, 2005). Much of this early research involved the observation of children's television watching behaviors (Alwitt, Anderson, Lorch, & Levin, 1980; Anderson, Lorch, Field, Collins, & Nathan, 1986; Anderson & Levin, 1976). This research produced two theories on how people watch television programs. Arguably the most popular is the reactive theory stating that a person's attention is reactive and passively controlled by different characteristics of the medium (Anderson & Lorch, 1983). Singer (1980) maintains that television's appeal comes from the constant changes on the screen producing a series of orienting responses. An orienting response can be defined as "an involuntary, automatic response elicited by changes in the environment" (Lang, Geiger, Strickwerda, & Sumner, 1993). Research has shown that sound effects and scene changes to include camera cuts, zooms, and pans do elicit and maintain one's attention with viewing television (Anderson & Levin, 1976; Lang, Greenwald, Bradley, & Hamm, 1993; Reeves et al., 1985). The opposing theory developed states that one's viewing of television is an active

cognitive transaction in which the viewer's attention is held by their efforts to understand the content of the program (Anderson & Lorch, 1983). Reeves et al. (1985) state that the active theory suggest that a viewer responds to formal features only when the view believes it to be important for the comprehension of the content. Huston & Wright (1983) suggest that formal features can guide a viewer's attention and understanding of the program.

In the physical world, animals as well as humans react to moving objects as threats or opportunities (Diao & Sundar, 2004; Reeves et al., 1985; Reeves & Nass, 1996). Lang et al. (1993) studied the effects of related (cuts within the same visual scene) and unrelated television cuts (cuts between scenes of completely unrelated visual scenes) and found that both types of cuts did elicit an orienting response related to changes in one's environment. In related research, Diao & Sundar (2004) studied user reactions to Web page advertisements and they concluded that pop-up Web page produce an orienting response based on sudden changes to the visual field. Smith & Gevins (2009) studied components of a person's EEG signal while watching television commercials that varied in pace or number of cuts, zooms, pans, and scene changes within a 30 second segment. Using subjective interest scores from the participants, Smith & Gevins suggest that the more interesting commercials tend to be faster paced. They concluded from an analysis of the EEG recordings that the brain is "sensitive to the pacing of a video, and likely reflects an automatic orienting of attention" (Smith & Gevins, 2009, pg. 299).

Early research has shown that various attributes of television and film can produce orienting responses (Alwitt, Anderson, Lorch, & Levin, 1980; Anderson & Levin, 1976; Geiger & Reeves, 1993; Reeves et al., 1985). Anderson and Levin (1976) investigated various attributes of children's television and the factors that influence a child's attention. In one study ten

children (5 males/5 females) of seven different age groups (12, 18, 24, 30, 36, 42, and 48 months ±1 month) were observed while viewing "Sesame Street" Test Show 4. "Sesame Street" is constructed using short, independent segments that last from 10 to 453 seconds. The episode used for their investigation was 57 minutes long and consisted of 41 segments. For the study, children and their parents participated in a viewing room that consisted of 19-inch television, age appropriate toys, and juice and crackers. The children were free to interact with the toys and parents. The room was outfitted with two cameras to allow the experimenter to constantly view and record the child. Using the recorded videotape, an experiment observer marked the time "when the child appeared to be visually fixating on the television screen" and when they turned away (Anderson & Levin, 1976). This provided a continuous record of the child's visual attention on and off the television screen. The television program was coded by two observers who marked the presence or absence of program attributes such as gender and age of character voices, animation, sound effects, and scene changes. Of interest to this research were attributes related to camera work (pans, zooms, and cuts). Anderson and Levin concluded that attributes related to camera work had little effect on maintaining children's attention. In a similar study, Alwitt et al. (1980) used a variety of children's programs opposed to one program segment. They concluded that children's attention to television program is a function of various auditory and visual attributes. Their study found that the voices of women and children, movement, cuts, sound effects and laughter were among the attributes that increase the child's attention toward the program. Attributes such as men's voices, extended zooms, pans, and still images terminated the child's attention. This contradicts the theory that television is thought to elicit and maintain attention through the use of formal features such as movement in scenes, visual complexity, and

camera and editing techniques (zooms, pans, and cuts) (Reeves et al., 1985). This may be partly due to the differences of children and adults.

This research will focus on a learner's attention to a virtual human role-player during a simulated face-to-face interaction. Research considers questions related to the level of attention a learner pays to the virtual human role-player and the use of formal features to produce orienting responses to increase the level of attention.

As one considers the orienting response and certain attributes such as character voices, sound effects, and movement in a scene (Alwitt et al., 1980; Anderson & Levin, 1976) one might consider the actor's or actress' performance as an attribute to elicit attention. Wurtzel and Dominick (1971) studied the interaction of acting styles and director shot selection and the impact on the viewers perception of the scene. Specifically, they hypothesized that the combination of a "theater" acting style and the use of close-up shots would attract attention to the actor's behaviors and away from the message. Using an eleven-minute scene from the play *A Hatful of Rain*, they produced four versions of a scene using the same actors who were familiar with both stage and television acting. The investigation studied two variables, acting styles (theater and television) and camera shots (the use of close-ups and the use of medium shots). A close-up shot was defined as when the actor's face filled the entire screen and a medium shot was no tighter than mid-chest to the head. The subjects were college students (total n=147; full demographics were not provided) taking a communications course and were not trained in acting or television techniques. Participants evaluated the scene using 20 bi-polar adjectives using a five-point scale. The scales used included ten measured adjectives and ten dummy adjectives to camouflage the purpose of the study. An index was created, by summing the ten adjective

ratings for a possible total of 50. Using an ANOVA, Wurtzel and Dominick did not find any significant differences for either the acting or directing style with respect to the use of close-ups or medium shots. They did find a significant interaction between the directing style and acting style ($F=7.98$, $p<.01$). They found that viewer's favored the combinations of the television acting style with the use of close-ups and the theatrical acting style with the use of medium shots. They inferred that the use of close-ups helps to create an intimacy for television acting styles producing an increased level of attention by the audience. When using medium shots in combination with the more subtle television acting style, they felt that the audience might not have developed an intimacy and interest in the scene and possible felt removed from the scene. This research does not provide conclusive evidence that the one combination is better than another, but it does provide insight into how audiences might receive and pay attention to different messages. Wurtzel and Dominick provide the example of a televised political debate where one may use more close ups for a low-key candidate, but avoid using close-ups for a candidate with extreme gestures and body language.

Research Gaps

Previous research using virtual humans has not considered how much attention a user gives the virtual human or that the use of different acting styles and varying camera views might increase or maintain the visual attention during a simulated face-to-face conversation. This research aims to provide insight into whether the learner of a social skills trainer uses the virtual human non-verbal behaviors during simulated face-to-face conversations and whether techniques can be employed to maintain or increase the level of visual attention and learning performance.

Much of the early research on virtual humans centered on the presence of a virtual human in a virtual environment (Baylor, 2009; Gulz, 2004; Koda & Maes, 1996; Lester et al., 1997; Takeuchi & Naito, 1995; Walker et al., 1994). Researchers concluded that humans prefer the presence of a human-like agent and that virtual humans could even be a motivating factor within learning environments (Baylor, 2009; Lester & Stone, 1997; van Mulken et al., 1998). A study by Goldberg & Cannon-Bowers (2015) provides indication that a student provides some attention to an agent during a training scenario. What the research does not show is the level of attention humans give to virtual humans. As training applications are developed for social skills training, understanding where the learner focuses their visual attention and the impact on the learner's attitude and performance will guide future application developments.

Like many virtual human applications and virtual learning environments, television provides audio and visual information to the viewer at various levels of complexity. Early research on the attention viewers gave to television programs can provide some insight. Researchers became interested in not just the content of the programming, but shifted their interest to the properties of the television media (Alwitt et al., 1980; Collins, 1982). Based on the television's ability to have some control over children's attention, researchers studied the extent to which children's attention is regulated by different attributes of the television program. Some of these attributes investigated included sound effects, character voices, and camera cuts, pans, and zooms (Anderson & Levin, 1976; Huston & Wright, 1983; Lang et al., 1993; Reeves et al., 1985). Similar to the use of formal features Wurtzel & Dominick (1971) showed that an actor's or actress' performance and the use of formal features such as close-ups can produce an increased level of attention. This research will explore the use of techniques to attract and

maintain the learner's visual attention through the majority of the encounter with a virtual human.

CHAPTER THREE: METHODOLOGY

Chapter Summary

This chapter proposes methodology to analyze the level of learner attention to a conversational virtual human role-player when in conflict with on screen text during a simulated counseling session and the impact attention has on a leader-counselor trainee's attitude and interpersonal skills performance. The methodology proposes using non-standard versions of ELITE-Lite as the research venues. Standard ELITE-Lite simultaneously displays: (1) a virtual scene showing the virtual human initially seated across from the leader-counselor trainee; (2) textual dialog between the virtual human and the interacting counselor; (3) corresponding virtual human audible verbal responses; (4) counselor response choices; and (5) historical log of counselor past choices. This research investigates potential conflict that may split the attention of the leader-counselor trainee during the interaction. The scope of research involves utilizing non-standard versions of ELITE-Lite for analysis of levels of visual and audio factors. The non-standard versions of ELITE-Lite includes scene cuts, exaggerated gestures, and vocal performance of a virtual human in the Scene Display. These scene cuts, exaggerated gestures, and vocal performances may affect leader-counselor trainee attention, attitude, and interpersonal skills performance outcomes. The comparative methodology below proposes hypotheses, experiment participants, experimental design, and implementation procedures.

Interpersonal Skills Training Domain

The domain selected for this experiment is interpersonal skills training associated with Army leader development as discussed in Chapter 1.

Emergent Leader Immersive Training Environment (ELITE)

ELITE's design provides U.S. Army junior leaders instruction and practice opportunities for the development of basic leadership and counseling skills. ELITE provides leader-trainees with up-front instruction and example demonstrations of correct and incorrect application of the skills in addition to a practice environment. The practice environment provides leader-trainees an opportunity to practice job-related, interpersonal communication skills with an on screen virtual human and menu display, verbal responses, and a keyboard and mouse interface.

The standard version of ELITE contains three display areas or windows: Response Choice, Chat Log, and Virtual Human Role-Player (VHRP) (figure 2).

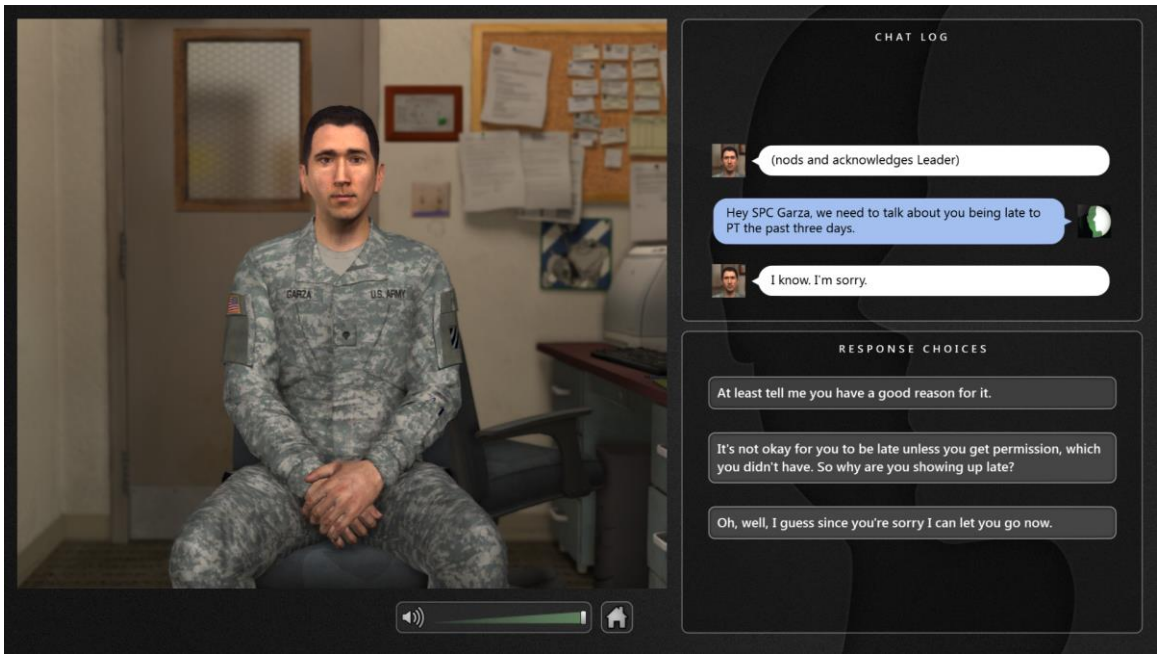

Figure 2: ELITE Lite student practice screen for interaction with the virtual human role-player.

The Response Choice window enables communications with the virtual human counselee through the selection of the student counselor's response. The Chat Log window presents a running transcript of the conversation with the virtual counselee. The VHRP window shows the virtual counselee initially seated in an office across from the counselor. Over the course of a counseling session, the physical behavior of the virtual human displays dynamically in real-time in the VHRP window with speech displaying textually in the Chat Log and concurrently over system speakers.

In this research, the virtual role-player is a computer agent visually embodied as a young enlisted soldier of male-gender in uniform in an office. The virtual role-player is artificially cognitive of a level of self-awareness and the presence of the leader-trainee as if he were a leader. Through a monitor and audio speakers ELITE presents the leader-trainee with scenarios based on real-world counseling issues such as post-deployment readjustment, alcohol-related performance, and financial troubles.

Training Objectives

The leader skills required to effectively counsel subordinates are described in *Army Leadership* (FM 6-22), Appendix B, Counseling. Using the required skills outlined in FM 6-22, Appendix B, ELITE presents two instructional frameworks to aid the student during the training. These two foundational frameworks called I-CARE and LiSA CARE. Both frameworks utilize the same CARE steps while differing in the initiation stage of the counseling session. I-CARE centers on performance issues and LiSA CARE focuses on personal issues.

I-CARE (Use for Performance Problems)

- Initiate Communication
  - State the performance issue
  - Focus on the behavioral cause
  - Ask for the person's side of the story and use LiSA
  - Confirm person is aware of the problem
  - Describe behavior impact on the individual, team, mission
  - Describe target behavior
  - Confirm performance expectations

- Check for Underlying Causes
  - Determine if there are personal problems affecting motivation and performance?
  - Does the person have the knowledge and skills needed to do the job?
  - Are organizational barriers hindering someone from doing their job?

- Ask Questions / Verify Information
  - Collect and confirm facts (5 Ws – Who, What, When, Where, Why)
  - Trust but verify

- Respond With a Course of Action
  - Identify and provide resources to resolve the problem
  - Confirm the Course of Action will be followed
  - End positively

- Evaluate by Following up

LiSA CARE (Use when presented with a personal problem)

- Listen without interruption
- Summarize in a neutral style
- Ask for confirmation of your understanding
- Follow with steps for CARE

(LiSA represents a form of active listening and can be used when the other party does not feel understood, maybe angry or frustrated, or is emotional.)

Research Questions

During early experiments with the ELITE and its sister system, INOTS, anecdotal observations and questions arose regarding the extent to which the leader-counselor trainee used the Scene Display to assess the affective state of the virtual human during the interaction. To

date, no research has investigated the amount of time spent viewing each window, and specifically the time spent viewing the virtual human playing the role of counselee. This research will investigate the questions; what amount of time does the learner spend visually attending to the virtual human in each setting? What factors or techniques may increase attention of the leader-counselor trainee on the virtual human? Does increasing leader-counselor trainee attention on the virtual human improve their attitude or increase interpersonal skills performance levels?

The tasks associated with this experiment are the same tasks performed under a standard training session. After receiving instructional material on the use of I-CARE and LiSA CARE, participants will undergo a virtual counseling session where the trainee assumes the role of the leader performing a counseling session. ELITE simulates an interpersonal conversation between a live leader and a virtual subordinate with the goal of improving interpersonal skills related to counseling. The leader-trainee must interact with a virtual role-player (counselee) who is in the virtual office of the counselor for a performance or personal issue. The leader must apply the I-CARE and LiSA CARE skills correctly to achieve an acceptable resolution. The ELITE scenarios are set up to be turn-based scenarios where the counselor responds to the actions of the subordinate counselee. ELITE textually presents three pre-scripted choices of what a counseling trainee may respond to the virtual role-player. Choices are scored as correct, mixed, and incorrect based on the learning objectives associated with I-CARE/LiSA CARE (Campbell, Hays, et al., 2011). ELITE designers constrained the simulated conversation to three choices in order to track user performance of appropriate use of learning objectives.

Experimental Objectives

Anecdotal observations during testing of the standard ELITE Lite have shown that some learners may not be paying attention to the virtual human. Not paying attention to the virtual human is in potential conflict with the skill of active listening, a key element within the Army's leadership manual. The Army describes active listening as focusing on the subordinate-counselee's complete message, both verbally and nonverbally to include maintaining eye contact, body posture, head nods, facial expressions and verbal expressions (Army, 2006, 2015). As training developers and system designers develop environments to train people in the use of social skills, there needs to be an understanding if the learners are paying attention to the expressions of the virtual humans. Or, are other interface features and information drawing the attention away from the virtual human?

This research will first gather evidence to address the anecdotal reports that learners do not attend to the virtual human. Secondly, this research will assess whether the use of formal features, such as scene cuts, exaggerated physical behaviors and voice performance, will increase the learners' visual attention to a virtual human when simulating face-to-face conversations. Lastly, the research will analyze attitude and motivation toward the training as well as the performance of learners' decisions based on the learners' in simulation response selections. It is predicted that the leaners' using the conditions with scene cuts, exaggerated behaviors, and/or voice performance will choose more response selections that are aligned with the learning objectives. Understanding the learners' reaction to the application of formal features will aid training developers and designers in creating engaging training environments.

This research will focus on the laptop version of ELITE also known as ELITE Lite. ELITE Lite is a stand-alone, laptop version designed to meet the Army Common Battle Command Equipment Standards (CBCES). The equipment used for this research exceeds the Army's CBCES:

- Manufacturer and Model: ASUS GL551J
- Processor: Intel(R) Core(TM) i7-4720QM CPU @ 2.60GHz (8 CPUs)
- Operating System: Windows 8.1 Pro, 64-bit Operating System
- Total Memory: 16.0 MB RAM
- Hard Drive: 500 GB
- System Graphics: NVDIA GeForce GTX960M, 2 GM GDDR5, 2 GB Shared
- Display Resolution: 1920 x 1080
- DirectX Version: DirectX 11
- Audio Speakers/Headphones

Additionally, the research will use non-standard versions of ELITE-Lite that contain a virtual human with levels of voice performance, exaggerated physical behavior and scene cuts. Further software modifications to both the standard and the non-standard versions of ELITE-Lite for this experiment allow presentation of the scenario as a non-branching story no matter what answer the subject counselor chooses. A specially designed non-branching scenario presents each subject (leader-trainee) with the same virtual human responses and identical decision points. The non-branching scenario allows for comparison of each subject's decision choices under the varying conditions. The scenario dialog provides consistent conversational flow at each decision while allowing the subject to choose from three different statements. The scenario used for this research centers on a performance problem requiring the use of the I-CARE framework. The leader-trainee, in the role of Platoon Leader, summons SPC Jacob Garza to

leader-trainee's office to counsel SPC Garza because he has reported late to physical training for three consecutive days.

Experimental Hypotheses

Based on the research objectives and the literature review, the following hypotheses are proposed.

Hypothesis 1

1. The leader-trainee will spend greater amounts of time visually attending to the virtual human role-player window in ELITE Lite system over the Choice and Chat windows of the tri-window display during simulated social interaction.

Previously stated anecdotal comments from users implied that at least some learners were not paying attention to the visual representation of the virtual human during the interaction. Multimedia research states that visuals and text can split a learner's attention (Chandler & Sweller, 1992; Mayer, 2005; Mayer & Johnson, 2008; Mayer & Moreno, 1998). This research will compare the percentage of time a learner visually attends to the virtual human in the scene display with the other windows showing the level of visual attention the learner gives to the virtual human.

Hypothesis 2

2a: Learners' visual attention to the virtual human role-player will increase with the application of scene cuts.

2b: Learners' visual attention to the virtual human role-player will increase with the application of exaggerated behaviors.

2c: Learners' visual attention to the virtual human role-player will increase with the application of the combination of scene cuts and exaggerated behaviors.

According to Berlyne (1960), attributes that may gain one's attention can include intensity, movement, contrast, change, novelty, unexpectedness, and incongruity. Previous research has shown that the use of formal features or program attributes can attract and hold viewer attention (Anderson & Levin, 1976; Collins, 1982b; Lang, 1990; Reeves & Nass, 1996; Tomlinson, Blumberg, & Nain, 2000). Hasson et al., (2008) used functional magnetic resonance imaging to investigate the control film has on a viewer's brain. They found that a single shot without directorial intervention was not "sufficient by itself for controlling viewer's brain activity." (p.8). Lang et al. (2000) showed that increasing the number of edits (defined as a change in camera shot to another within the same scene) increase the viewers autonomic arousal, self-reported arousal, and attention to television. They also noted that the frequency of edits is related to the viewers' arousal and attention. This research focuses on the impact of the addition of the structural elements within the training scenario. Upon favorable results from the addition of scene cuts, the frequency of the edits can be addressed in future research.

Based on the literature reviewed, it is expected that all learners experiencing a simulated social interaction with the virtual human role-player using one or more formal features will spend more time viewing the virtual human. A second expectation is that learners experiencing both the scene cuts and exaggerated behaviors will significantly spend more time viewing the virtual human than conditions with only scene cuts or exaggerated behaviors. It is also expected

that the cognitive load for learners will be significantly different for the condition showing scene cuts and exaggerated behaviors over other conditions.

Hypothesis 3

3a: Learners' positive attitude toward the training experience will increase with the application of scene cuts.

3b: Learners' positive attitude toward the training experience will increase with the application of and/or exaggerated behaviors.

3c: Learners' positive attitude toward the training experience will increase with the application of the combination of scene cuts and exaggerated behaviors.

Historical literature on the effect television production variables may have on an audience's perception and evaluation of televised messages has shown that audiences view film and stage performances differently. Based on Barrow and Westley's (1958) communication framework where the efficiency of communication is improved through the elimination of interferences and distractions (Williams, 1964; Wurtzel & Dominick, 1971), Wurtzel and Dominick investigated how coupling acting styles and variations in the camera shots impact the audiences' positive or negative perception of a brief recorded scene. The research of Wurtzel and Dominick indicate that director can achieve in intimacy with the viewer through the right combination of camera shots and acting styles. They concluded that the audience views the scene more favorably because the intimacy created gains the viewers' attention and focus.

From the early literature on television production features, one may expect that all learners experiencing a simulated social interaction with the virtual human role-player using one

or more formal features will result in a higher Perception of Interaction Index using 10 bi-polar adjective pairs. Secondly, one may expect that all learners experiencing a simulated social interaction with the virtual human role-player using one or more formal features will rate their overall experience significantly higher than the condition without any features present.

Hypothesis 4

4a: Learners' responses that are designated as "correct" will increase over responses designated as "mixed" and "incorrect" with the application of scene cuts.

4b: Learners' responses that are designated as "correct" will increase over responses designated as "mixed" and "incorrect" with the application of exaggerated behaviors structural features.

4c: Learners' responses that are designated as "correct" will increase over responses designated as "mixed" and "incorrect" with the application of the combination of scene cuts and exaggerated behaviors structural features.

This hypothesis is important because it has been established in chapter 2 that humans during a face-to-face interaction communicate through various signals that include not only the verbal content but also signals from facial expressions and gestures. One goal in using virtual human role-players within a learning environment is to allow the learner to practice skills required in certain social interactions. To practice reading facial expressions and body gestures, the learner must pay attention to the virtual human just as they would a real human.

The learner's performance for this research is defined as the number of correct responses selected based on the three choices presented at each decision point. The three choices are

designated as “Correct,” “Mixed,” and “Incorrect”. Participant responses will be scored as “1” for correct, “.5” for mixed, and “0” for incorrect responses. This hypothesis provides information to researchers and designers trying to understand how to maintain the learner’s attention during the simulated interaction can lead to increased performance. It is expected that learners experiencing the application of scene cuts and/or exaggerated behavior formal features will select more answers that are designated as “correct”.

Hypothesis 5

5a. Learning gains measured from pre- and post-exercise situational judgment test will be greatest when the leader-trainee interacts with a virtual human using both verbal and nonverbal channels for communication.

5b: Learning gains measured from pre- and post-exercise situational judgment test will be greatest when application of scene cuts and exaggerated behaviors are used.

This hypothesis goes beyond the research of whether the presence of a virtual human or agent in an environment increases learning outcomes, but it provides insight into whether paying greater attention to the virtual human will result in greater learning outcomes.

This performance measurement will assess learning gains using a situational judgment test (SJT). SJTs have been used to assist in personnel selection and prediction of job performance (Connell et al., 2007; Durlach et al., 2008). Items of the SJT present a brief scenario and then asked to rate the appropriateness of possible actions that a leader may take. Participant scores for the SJT will be compared to a “gold standard” established by a set of instructors of the Army’s leadership program of instruction. The individual participant scores for

each situation will be standardized and then correlated against the average standardized scores of the instructors producing a single participant score for the SJT between -1.0 and 1.0. This score represents the extent to which a participant's responses agrees with the expert responses with 1.0 representing a perfect agreement and -1.0 representing perfect disagreement (Durlach et al., 2008).

The SJT instrument was designed to assess the students' knowledge and understanding of the I-CARE/LiSA CARE concepts. The instrument was designed to operate on the first three levels of Bloom's taxonomy of learning (Anderson et al., 2001; Hays, Campbell, & Trimmer, 2012). The independent variables are both the acting style of the virtual role-player and the camera effects.

Hypothesis 6

6: Scene cuts, voice performance and exaggerated physical behavior in non-standard version of ELITE Lite do not introduce perceptions of artificial or negative training on the part of subjects versus perceptions of subjects experiencing a standard version of ELITE Lite.

Scene cuts, voice performance, and exaggerated physical behavior may not occur in the natural environment. Introduction of these artifacts may have unintended consequences on the perception of subjects. This research investigates this hypothesis through user feedback.

Hypothesis 7

7: Inconsistent counselee responses to leader-trainees counsel introduced by non-branching scenarios in modified versions of ELITE Lite do not introduce perceptions of artificial or negative training on the part of subjects.

Non-branching scenarios that occur no matter what the leader-trainee chooses may introduce counselee responses that are unexpected and inconsistent with the leader-trainee. Introduction of these artifacts may have unintended consequences on the perception of subjects. This research investigates this hypothesis through user feedback.

Experimental Design

The design of the experiment is a 3 x 2 between subjects design with independent variables of level of virtual human performance and the camera views. The baseline standard ELITE-Lite will simultaneously display: (1) a virtual scene showing the virtual human seat across from the leader-counselor trainee; (2) textual dialog between the virtual human and the interacting counselor; (3) virtual human audible responses; (4) counselor response choices; and (5) historical log of counselor past choices. Experimental treatment of the ELITE-Lite displays will involve: (1) a virtual scene with the virtual human expressing two levels of physical behavior (i.e. Low-key (LoKey) & Exaggerated (Exag)); (2) with corresponding textually consistent dialog (i.e. Low-key (LoKey) & Exaggerated (Exag) with corresponding punctuations as appropriate); (3) with corresponding virtual human audible verbal responses (i.e. Low-key (LoKey) & Exaggerated (Exag) with corresponding changes in audible decibel levels, tone, etc. as appropriate); (4) counselor response choices; and (5) historical log of counselor past choices. Assuming that the learners do not pay attention to the visual representation of the virtual human during the interaction based on previous anecdotal observations, the control condition will use audio and a static image of the virtual human allowing for the leader-trainee to have a visual representation of the counselee. Control groups using audio only and non-animated character

conditions of both the low-key and exaggerated audible voice performances will be included to consider how attention to the virtual human role-player influences the learner's performance. The matrix showing the independent variables is represented in figure 3, experimental conditions.

		Virtual Human Role-player Behavior Levels	
		Low-Key	Exaggerated
Counselor Views	Static Image (SI)	SILoKey	SIExag
	1 View (1V)	1VLoKey	1VExag
	2 Views including Close-up (2V)	2VLoKey	2VExag

Figure 3: Experimental conditions.

The first independent variable is the virtual human performance. This independent variable represents acting style and vocal qualities portrayed by the virtual human role-player. The study uses two styles based on the acting styles for television and theater. The low-key behaviors are neutral behaviors, gestures, voice inflections, and facial expressions. These behaviors are modeled after television performances since these performances have microphones and cameras near the actors to capture the natural subtleties in an actors gestures, facial expressions, or voice (Wurtzel & Dominick, 1971). The exaggerated behaviors are based on theater performances. During these performances actors will exaggerate gestures, voice inflections, and facial expressions in order to project their message throughout the entire theater (Wurtzel & Dominick, 1971).

The second independent variable is that of camera views. This study will use two camera view conditions. The first being on with no cuts scenes. In this camera view, the learner will experience a single camera view using a medium camera shot showing the virtual human role-player seated across from the virtual desk of the learner. The shot will include the virtual human from the above the head to the mid-body. The second condition will use cuts scenes. In television and film, cut scenes are used to direct the viewers' attention using changes in the visual scene or view. A cut scene is a transition that replaces one camera view with another (Germeys & D'Ydewalle, 2007; Reeves & Nass, 1996). Video games now use them in between game levels to add to the game's story (Sweetser & Wyeth, 2005). For this research, this condition will include both medium shots, as defined in the first condition, and close-up shots where the face will cover the entire virtual human display area (see Figure 4). Increasing the use of close-ups has been shown to increase view attention levels for television and film media (Lang et al., 2000; Reeves & Nass, 1996).

Figure 4: Video chat window views of virtual human. Left: shows a medium shot. Right: shows a close-up view.

Table 2: List of Dependent Variables

Variable	Measurement Method	Measurement Scale
Learner Attention	Eye gaze tracker	% time on display area
	Eye gaze tracker	# glances to the VH display window
	Eye gaze tracker	Avg duration of glance to VH display window
Learner Attention (Distraction)	NASA-TLX	Likert
Learner Attitude	Semantic analysis via bi-polar adjectives	Integer of 10 - 50
	Questionnaire	Likert
Learner Performance	User response decisions made based on correct, mixed, and incorrect	Categorical
	Situational Judgment Test	Difference in post- and pre-exercise scores

This research will evaluate the differences of various conditions during a learner's interaction with the virtual human role-player simulating a counseling session between a leader (the learner) and a subordinate (the virtual human). Using the learner eye gaze data, a comparison of groups assigned to each condition will be assessed for significant differences among the group means using the *F* test. The F test can be applied to this data based on its robustness with respect to non-normality (Lindman, 1974). Lindman states that most departures from normality are due to nonzero skewness or nonzero kurtosis and their effects on the F test can be ignored. Anticipating that there will be a significant difference of the group means, a factorial analysis of variance (ANOVA) will provide further information on interaction effects. An a priori power analysis using G*Power (ver 3.1.9) an estimated medium effect size of 0.25 (Cohen, 1977, 1988) a required power level of 0.80, numerator df (degrees of freedom) =2 and significance level $\alpha = 0.05$ results in a total sample size of 158 participants (Faul, Erdfelder, Buchner, & Lang, 2009; Faul, Erdfelder, Lang, & Buchner, 2007). The numerator df was arrived at using the 3x2 matrix (figure 4) with the visual factor have three conditions (Static Image, Single View, and Multiple View) and the behavior factor having two conditions (Low-key Behaviors and Exaggerated Behaviors). Using the numerator df for each factor as the number of factor levels, one arrives at 2 df for (3-1) x (2-1) (Faul et al., 2007; "G*Power 3.1 Manual," 2014; Lindman, 1974).

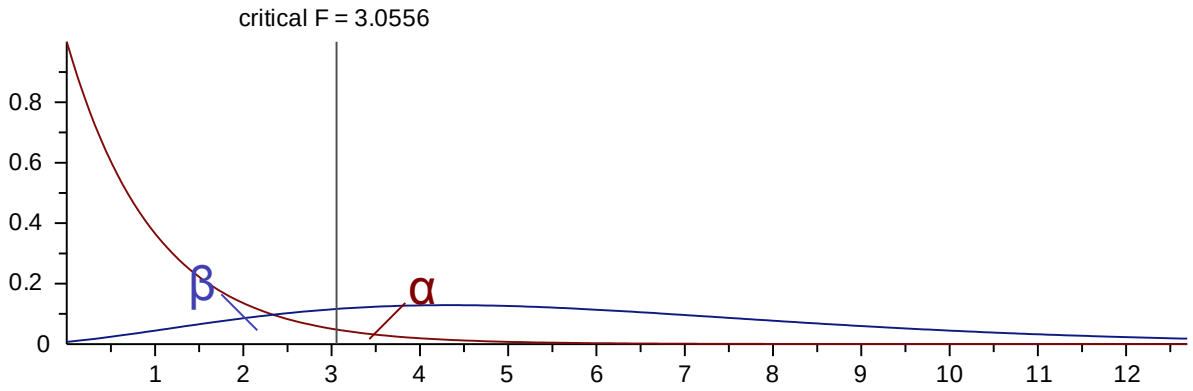

Figure 5: G*power a priori power analysis.

User responses to the NASA TLX and questionnaires will be reported as descriptive statistics to report on points of central tendency using the Wilcoxon signed-rank test. To investigate any differences in the variances amongst groups, the an ANOVA using an average of the raw scores from the six NASA TLX scales (Evans & Fendley, 2017; Hilbert & Renkl, 2009; Zhang, Ayres, & Chan, 2011) will be used.

Participants

Subjects for this research will be targeted based on experience with the military and awareness of military leadership. The criteria for participation requires that participants be over 18 years of age and have at least 20/40 corrected (self-reported) vision and normal hearing. Participants for this study will be recruited from the United States Military Academy, West Point, NY and members of the U.S. Army Reserves. West Point and ROTC cadets were chosen for this study because they are familiar with the Army's rank structure while also having limited

Army leadership experiences. U.S. Army Reserve members offer different leadership experiences allowing for comparing learning performance of junior and senior members.

Additional participants from the United States Coast Guard will be recruited. With similarities of military leadership knowledge, skills and experiences will provide a broader population for generalization of results across all branches of the military.

Current and former military members of the Army Research Laboratory (Orlando) and Program Executive Office (PEO) Simulation, Training and Instrumentation (STRI) will be recruited. These participants offer Army leadership knowledge, skills, and experiences.

Equipment and Materials

Training Materials

Study participants will interact with the ELITE Lite training application. The training is normally presented in three phases: (1) a self-paced instruction module designed to provide students with basic knowledge of counseling principles based on the I-CARE and LiSA CARE described earlier; (2) interacting with a virtual human role-player that allows for the application of the knowledge of counseling principles presented in the instructional module; and (3) an After Action Review (AAR) providing students with feedback on their performance.

There are not any anticipated expectations that participants will have problems using the ELITE Lite application. The controls for the ELITE Lite application consist of primarily the use of point and click procedures using a standard computer mouse. A keyboard is use enter the student's identity or number for data collection purposes.

Surveys

Multiple survey instruments will be utilized during this research. It is anticipated that the data collection will occur in a laboratory or classroom type of environment. A questionnaire for demographics will be administered to gather data on gender, age, length of military service, previous leadership positions and experience.

The participant's perception of the interaction will be assessed using ten bi-polar adjectives on a five-point rating scale with the value of "1" being assigned the negative end and a value of "5" being the positive end of the scale (Wurtzel & Dominick, 1971). The summation of the ten scales gives a maximum possible index of "50" for the positive end and "10" for the negative end. Previous studies have utilized bi-polar scales have been used to measure a participant's attitudinal and affective states in the areas of pleasure and arousal while viewing various forms of media (Bickmore, 2003; Bradley & Lang, 1994; Nowak & Rauh, 2006; Osgood, Suci, & Tannenbaum, 1957; Rizzo, Difede, Rothbaum, Daughtry, & Reger, 2013; William & Biggers, 1984; Wurtzel & Dominick, 1971; Yoon, Bolls, & Muehling, 1999).

Each participant was asked to describe different aspects of the interaction. The participant was asked to select an adjective that best describes aspects related to the virtual human role-player's appearance, emotion, voice (quality and lip synching), gestures, realism, user experience, and perceived usefulness.

Immediately following the interaction with the virtual human role-player, the learner will be asked to complete the NASA Task Load Index (TLX), see Appendix D. The NASA TLX will be used to assess the cognitive task load the user may experience with the variation of the camera

views and virtual human performances. This instrument has been successfully utilized to measure the mental workload associated with different visual conditions and the presentation of information for a task (Recarte, Pérez, Conchillo, & Nunes, 2008; Tang, Owen, Biocca, & Mou, 2003).

Procedure

The following steps describe the overall procedure that will be executed during this research.

Upon arrival, participants will be randomly assigned one of the six defined conditions that include the four experimental conditions or two control conditions. Next the participants will receive the informed consent describing the purpose and risks associated with the study. Participants can opt out of the study at any time. Following the participant's review and signing of the informed consent, they will be asked to complete the pre-study questionnaire the pre-exercise situational judgment test (SJT).

After completion of the pre-study questionnaire and SJT, the participant will receive instructions on how to operate the ELITE Lite software. Following the operation instructions, the learner will view the instructional material within ELITE Lite that describes the I-CARE and LiSA CARE frameworks as they are applied to leadership counseling situations within the U.S. Army. The instructional material will be presented by a virtual human presenter and includes text animations. This instructional phase will last approximately 15 minutes.

Following the presentation of the instructional material, the participant will launch the ELITE Lite practice environment starting the role-play scenario. During the scenario, the

participant will interact with the virtual human role-player using point and click movements via a standard mouse interface. The participant will use the mouse to select one of multiple choices within the "Choice" window.

Immediately following the completion of the virtual counseling session with the virtual human role-player, the learner will be asked to complete the NASA TLX instrument, followed by the post-exercise situational judgment test and post-exercise questionnaire for learner reaction. The NASA-TLX will be administered without the weighting process using the raw subscale scores (Hart, 2006).

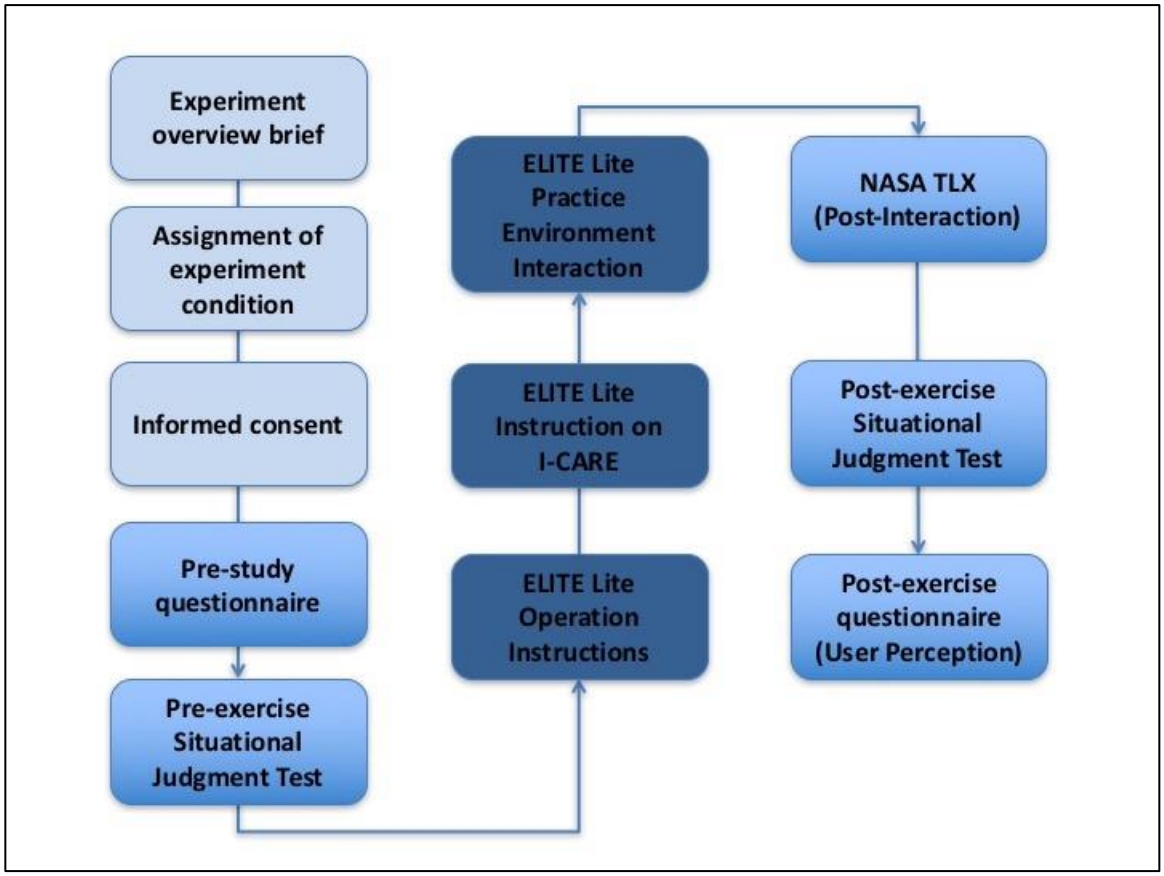

Figure 6: Experiment procedures.

Summary

In summary, this research explores the two different methods of maintaining student attention and engagement when interacting with a virtual human within the context of a simulated social interaction. The research uses a male population familiar with the military. The Army's ELITE Lite leadership training application will be used for the delivery of instruction and the execution of the simulated counseling session using a virtual human role-player. The methods to be examined are the virtual human's behaviors by modifying the virtual human performance and the camera views of the virtual human. During the interaction, the participant's eye gaze will be tracked and recorded to assess where the participant is applying visual attention. Questionnaires will be used to assess the learner's reaction and performance. ANOVAs will be used to examine the difference of the experimental methods employed during the study. The NASA TLX will be used to determine how the employment of different methods impacts the participant's cognitive load.

CHAPTER FOUR: RESULTS

Chapter Summary

This chapter reviews the results of the study including descriptive statistics, hypotheses test results and analysis of group differences. Various statistical tests are utilized based on the data distribution and assumptions. All tests were conducted using IBM SPSS Statistics Version 24 (2016). An alpha value of .05 was used to determine statistical significance for all test unless otherwise stated.

Participant Demographics and Descriptive Statistics

Participants consisted of 120 people (82% male and 18% female) with some form of military experience. This was met by completing some form of basic training providing general awareness and knowledge of military leadership, importance of physical training, and issues associated with absence of physical training. Ages ranged from 18 to 70 years old (M=30.53, SD=11.85). Participants included West Point cadets, active and reserve duty military personnel, and retired military personnel. Participants were grouped by rank category using cadets, enlisted (E1-E4), non-commissioned officers or NCOs (E5-E9), and commissioned officers (O1-O6). Rank categories included commissioned officers (13%), West Point cadets training to become commissioned officers (35%), non-commissioned officers (42%), and enlisted who may be promoted to non-commissioned officers in the future (10%). Nearly 71% of all participants reported they had served in a minimum of a team leadership role. Table 3 provides the number of reported leadership roles for each rank category.

Table 3: Self-reported leadership roles.

		Leadership Role						
Rank		Team	Squad	Platoon	Section	Company	Battalion	Regiment
Cadet (N=42)	Count	35	30	16	5	5	0	4
	% Within Rank	83.3%	71.4%	38.1%	11.9%	11.9%	0.0%	9.52%
Enlisted (N=12)	Count	4	2	2	2	1	0	0
	% Within Rank	33.3%	16.7%	16.7%	16.7%	8.3%		
NCO (N=51)	Count	43	40	21	17	9	5	2
	% Within Rank	84.3%	78.4%	41.2%	33.3%	17.6%	9.8%	3.9%
Officer (N=15)	Count	3	3	6	3	8	6	5
	% Within Rank	20.0%	20.0%	40.0%	20.0%	53.5%	40.0%	33.3%
Total	Count	85	75	45	27	23	11	11
	% Reported	70.8%	62.5%	37.5%	22.5%	19.2%	9.2%	9.2%

Using the Pre-Exercise Questionnaire (Appendix A) participants self-reported experiences using technology (Table 4) related to this study as well as counseling experiences (Table 5) and. Table 4 shows that 100% of the participants had at least "a little" experience with computers and nearly 92% reported at least "a little" experience playing video games. 79% of the participants reported having at least "a little" experience with virtual humans. Based on the self-reported data in Table 4, it is concluded that the participants were comfortable with the technology.

Table 4: Self-reported experiences using technology.

	Response Frequency			
Technology Experience	None	A Little	Some	A Lot
Experience using computers (N=120)	0	2	29	89
Experience playing video games (N=120)	10	26	49	35
Experience interacting with a virtual human (N=120)	25	44	39	12

Participants reported on counseling experiences. They were asked to describe their experiences related to counseling a subordinate, managing someone who has a performance issue, and helping a subordinate deal with a personal issue using a 4-point scale with 1 being "none," 2 being "a little," 3 being "some," and 4 being "a lot." Table 5 shows the median of the three counseling experience questions. Most counseling experience lies with commissioned officers (73.3%) and NCOs (84.3%) based on median counseling experience scores showing "some" or "a lot". Similar experience levels for cadets (50%) and enlisted (33.3%) were lower as one might expect based on leadership roles.

Table 5: Median of self-reported counseling experiences by rank categories.

	Rank Categories							
	Cadet (N=42)		Enlisted (N=12)		NCO (N=51)		Officer (N=15)	
Median Counsel Experience	Count	% Cat.	Count	% Cat.	Count	% Cat.	Count	% Cat.
A lot (4)	6	14.3	1	8.3	11	21.6	5	33.3
Some (3)	15	35.7	3	25	32	62.7	6	40
A little (2)	19	45.2	7	58.3	7	13.7	2	13.3
None (1)	2	4.8	1	8.3	1	2.0	2	13.3

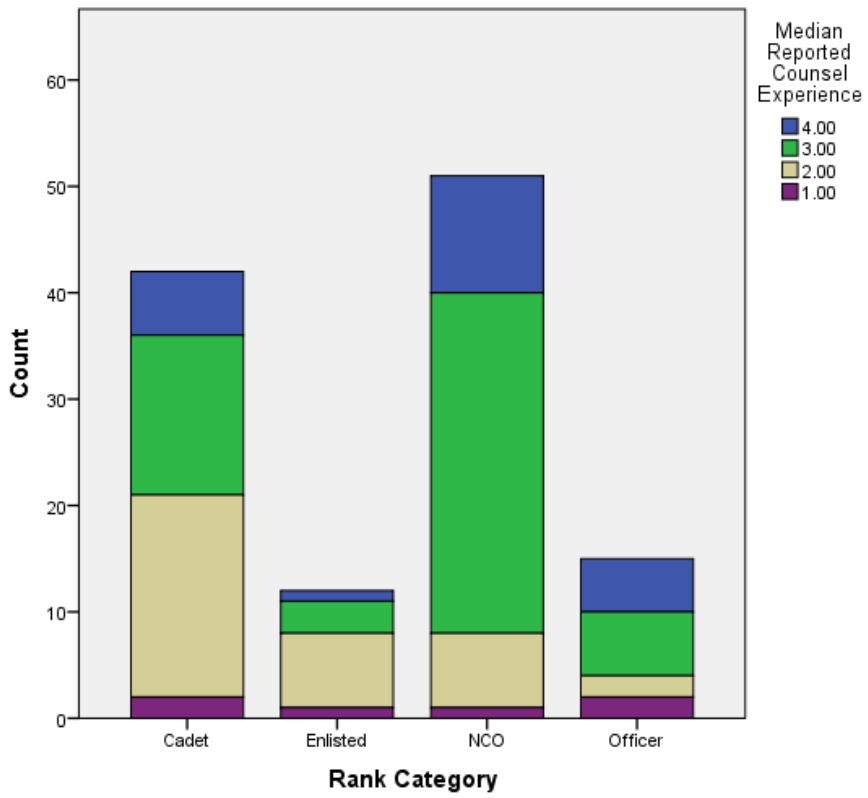

Figure 7: Median reported counseling experiences for rank categories.

The overall raw visual attention to each display window is reported in table 6 as the percentage of the time for the entire interaction.

Table 6: Raw visual attention data by total percentage of time spent on each window during the entire interaction.

	% Time		
Window	Median	Mean	STD
VHRP	16.5	17.5	.09
Choice	64	62.9	.11
Chat	10.9	11.3	.08
Off-screen	5.1	8.3	.1

Visual attention data distribution was examined because some of the statistical analysis proposed assume normal data distributions. Since the interaction is a graded exercise, the data was analyzed by phases based on when the virtual human was speaking and not speaking. Results of the Shapiro-Wilk test are provided in table 7 with significant ($p < .05$) results highlighted showing deviations from normality. Table 7 shows only several instances where the data distributions are normal.

Table 7: Test of Normality results using Shapiro-Wilks test.

		VH Speaking			VH Not Speaking		
	Display Window	S-W Stat.	df	Sig.	S-W Stat.	df	Sig.
% Visual Attention to window	VHRP	.985	120	.208	.896	120	.000*
	Choice	.981	120	.084	.843	120	.000*
	Chat	.929	120	.000*	.877	120	.000*
	Off-screen	.654	120	.000*	.653	120	.000*
Glance – Durations to window	VHRP	.931	120	.000*	.981	120	.082
	Choice	.930	120	.000*	.927	120	.000*
	Chat	.862	120	.000*	.978	120	.051
	Off-screen	.382	120	.000*	.605	120	.000*
Glance – Number of fixations on window	VHRP	.941	120	.000*	.613	120	.000*
	Choice	.986	120	.275	.726	120	.000*
	Chat	.973	120	.015*	.802	120	.000*
	Off-screen	.974	120	.019*	.750	120	.000*
Adjusted Fixation Ratio to window	VHRP	.985	120	.208	.896	120	.000*
	Choice	.981	120	.084	.843	120	.000*
	Chat	.929	120	.000*	.877	120	.000*

* indicates significant ($p < .05$) deviations from normality.

Hypothesis 1

The first hypothesis examines the amount of visual attention a participant (counselor) gives to the virtual human (counselee). The predication was that the counselor would visually attend to the counselee more than other informational windows during the simulated counseling session. To test this hypothesis, the percentage of time a counselor directed toward each of the three display windows was examined. Off-screen glances were also recorded and include

transitioning from one window to another. For this analysis, the off-screen threshold was set to 5ms. Table 8 shows the average percentage of time counselors visually attended to each window during the Speaking and Not Speaking phases of the interaction. Due to the deviations from normal data distributions for visual attention to some of the display windows, nonparametric statistical tests were used. Based on the average percentage of visual attention, the counselor spends the majority of their time attending to the VHRP during the Speaking phase and looks at the Choice window during the Not Speaking phase. A within phase trend analysis using Page's L Trend test showed that the VHRP received priority attention during the Speaking phase, while the Choice window received priority during the Not Speaking phase. This was expected counselor behavior because during a face-to-face conversation there is an expectation that the listener pay attention to the speaker (Argyle & Cook, 1976; Argyle & Dean, 1965; Cassell et al., 2000; Tickle-Degnen & Rosenthal, 1990). In this simulation during the Not Speaking phase, the counselor must review the next set of pre-scripted responses.

Table 8: Median visual attention to display windows for interaction phases.

	VHRP Speaking	**VHRP Not Speaking**
Window	Median	Medain
VHRP	40.2^{1}	3.6^{3}
Choice	29.2^{2}	83.9^{1}
Chat Log	14.3^{3}	8.0^{2}
Off-screen	7.6^{4}	3.1^{4}

Note: Results of a within phase Pages L Trend test are shown with subscripts from 1 to 4 with "1" being the greatest visual attention and "4" being the lease visual attention.

Table 9 shows statistical significance of differences in percentages between phase matched pairs of counselor attentional behavior toward each display window. Statistically all attentional behaviors differ between phases and what emerges is two completely different user behavioral phases: "Speaking" and "Not Speaking."

Table 9: Significance of differences in percentages between phase match pairs of counselor attentional behavior toward display windows.

	Wilcoxon signed-rank test			
Match Pairs	*Mdn*	*T*	Sig.	*r*
VHRP: Speaking	40.2%	0	.00	-.87
VHRP: Not Speaking	3.6%			
Choice: Speaking	29.2%	0	.00	-.87
Choice: Not Speaking	83.9%			
Chat: Speaking	14.3%	481	.00	-.75
Chat: Not Speaking	8.0%			
Off-screen: Speaking	7.6%	1246	.00	-.57
Off-screen: Not Speaking	3.1%			

Since the behaviors differ between phases, to better understand within phase differences in attentional distributions toward display windows, a Friedman's 2-way ANOVA was conducted. Results show significant differences among the four windows for the Speaking phase, $\chi^2(3) = 142.42$, $p = .000$, as well as the Not Speaking phase, $\chi^2(3) = 224.76$, $p = .000$. A pairwise comparison of attention to the windows provides insight into specific window differences. Table 10 provides the results of the within phase pairwise comparison of the attention toward the windows.

Table 10: Pairwise comparison for within phase percentage of time of user visual attention to windows.

	VHRP Speaking		**VHRP Not Speaking**	
Window Comparison	Sig.	Adj. Sig	Sig.	Adj. sig
VHRP - Choice	.010	.060	.000	.000**
VHRP - Chat	.000	.000**	.005	.031*
VHRP - Off-screen	.000	.000**	>.05	>.05
Choice - Chat	.000	.000**	.000	.000**
Choice - Off-screen	.000	.000**	.000	.000**
Chat - Off-screen	.000	.000**	.000	.001**

Statistically significant differences annotated with * ($p < .05$) or ** ($p < .01$) after applying the Bonferroni correction for multiple test.

After applying the Bonferroni correction for multiple tests (6 pairwise comparisons), the difference in the VHRP and Choice window is no longer statistically significant during the Speaking phase. This provides some indication of split-attention of the counselor attending to both the VHRP and the Choice window during the Speaking phase. In contrast during the Not Speaking phase, the statistical difference between the Choice and all other windows indicates the counselor is focusing attention to the pre-scripted responses presented in the Choice window.

Windows displayed to the counselor differ in size. To control for the chance of attending to a window due to its size (e.g. larger windows getting more attention than smaller windows

simply due to size), Louwerse, Graesser, McNamara, & Lu (2009) propose the adjusted fixation ratio (AFR). The AFR is the percentage of visual attention on a window divided by the area of that window as shown in equation 1.

AFR = % Visual Attention on Window / Area of Window *(1)*A

ratio of 1 represents eyes wandering randomly within the display area. The observed median of the calculated AFR of each window is presented in Table 11. A one sample Wilcoxon test was executed for a comparison to a AFR of 1.0. All AFRs shown in Table 11 were found to be statistically significant from 1.0 or chance. Further, the Choice window receives more visual attention than expected due to size while the VHRP and Chat windows receive less.

Table 11: Observed medians for adjusted fixation ratios for each window by phase.

Phase	Speaking	Not Speaking
Window	Mdn	Mdn
VHRP	.69**	.06**
Choice	1.4**	4.0**
Chat	.69**	.38**

** indicates statistical significance of $p < .01$compared to a ratio of 1.0.

A Wilcoxon matched pair analysis of the AFR for each window between phases confirmed the prior finding that attention to the VHRP window during the Speaking phase (*Mdn* = .69) is significantly greater than the Not Speaking phase (*Mdn* = .06, $T = 0$, $p < .01$, $r = -.87$). Likewise, the AFR between phase analysis confirmed the prior finding that attention to the

Choice window during the Not Speaking phase (*Mdn* = 4.0) is significantly greater than the Speaking phase (*Mdn* = 1.4, *T* = 0, $p < .01$, *r* = -.87).

Friedman's ANOVA for the within phase AFR of the user's direction of attention results in similar outcomes to the percentage of time results with statistically significant differences for the Speaking phase, $\chi^2(2) = 321.12$, $p = .000$, and Not Speaking phase, $\chi^2(2) = 213.05$, $p = .000$. Results of a pairwise comparison using Wilcoxon within phase matched pairs of the AFRs are shown in Table 11.

Table 12: Pairwise comparison for within phase AFR of user visual attention.

	VHRP Speaking		**VHRP Not Speaking**	
Window Comparison	Sig.	Adj. Sig	Sig.	Adj. sig
VHRP - Choice	.000	.000**	.000	.000**
VHRP – Chat	>.05	>.05	.000	.000**
Choice - Chat	.000	.000**	.000	.000**

Statistically significant differences annotated with * ($p < .05$) or ** ($p < .01$) after applying the Bonferroni correction for multiple test.

Of note is the Speaking phase VHRP-Choice AFR comparison of counselor attentional difference is now statically significant, inferring no split attention, but with the Choice window receiving greater attention than attention on the virtual human window. This is in complete contrast with the Speaking phase VHRP-Choice time comparison without the AFR adjustment shown in Table 10. Curiously, when applying AFR, the Chat window emerges NOT statistically

different than the VHRP window. This again infers split attention, but this time with the dialog of virtual human contained in the Chat window competing with visual attention to the virtual human contained in the VHRP window.

The original hypothesis focused answering the question "does the counselor visually attend to the virtual human during the interaction?" by comparing the amount of time a user spent visually attending to each window. During the analysis, it was found that there are two separate phases of the interaction and that the counselor does appropriately attend to the information display based on conversational behaviors.

With the conclusion that users do visually attend to the virtual human, a question that arises is "does the visual attention to the virtual human vary with age or rank?" As a statistical exercise, an analysis was conducted to address these questions. Since the data distribution for the percentage of time directed to the speaking virtual human was found to be normally distributed, a one-way ANOVA was conducted using age and rank as factors. First, using the rank categories (commissioned officer, West Point cadet, NCO and enlisted) established earlier, an ANOVA of the percentage of time directed to the VHRP window resulted in no significant differences, $F(3,116) = 2.50$, $p = .063$. Levene's Test of Homogeneity of Variances did not result in significant variances between the groups ($p = .929$). An analysis of the Choice window resulted in a significant difference, $F(3,116) = 2.878$, $p = .039$ with Levene's test being not significant ($p = .514$). A Tukey HSD post hoc test indicated significant differences between the cadets and officers. Figure 8 shows the percentage of time viewing the VHRP and Choice windows during the Speaking phase separated by rank.

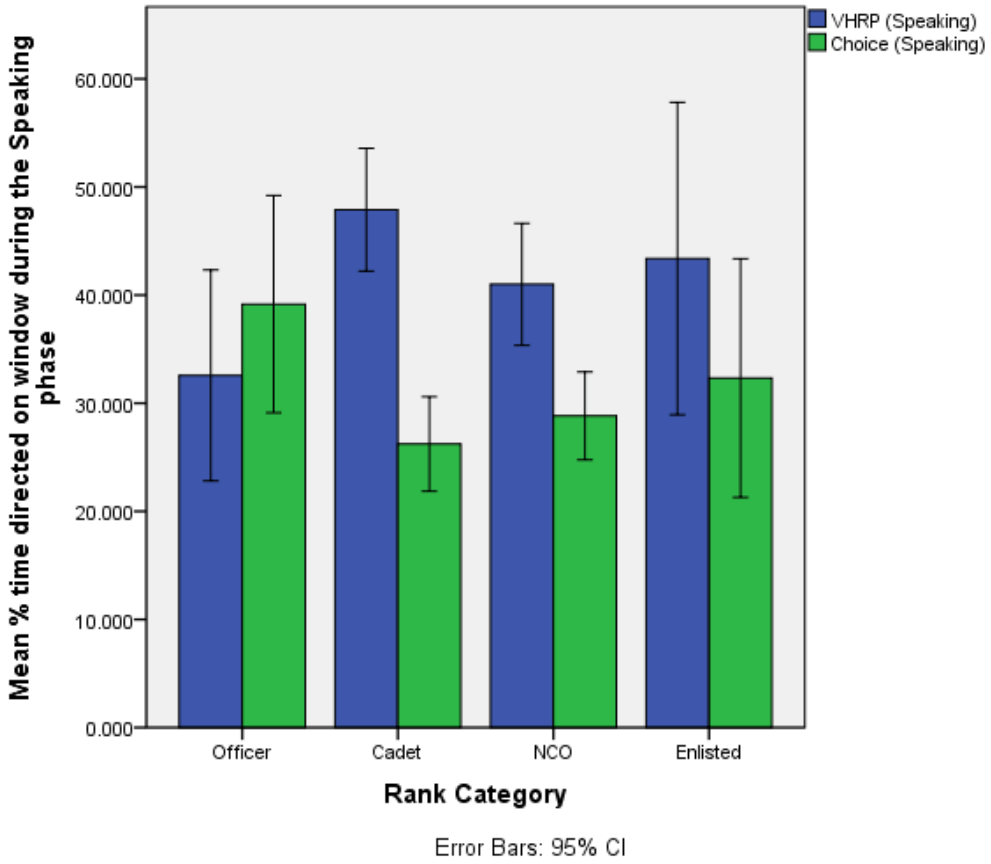

Figure 8: Percent of time spent viewing the VHRP and Choice windows during the Speaking phase separated by rank categories.

This statistical exercise indicates that rank does not influence the visual attention to the virtual human, but it does impact how the Choice window is used. Figure 8 shows the mean for the VHRP window to be greater than the Choice window for all rank categories except for the officers. Results of a pairwise t-test was conducted between the attention to the VHRP window and the Choice window for each rank category are provided in Table 13. Significant differences are shown for both the cadets and NCOs. Differences could result from experience and/or education level. These potential factors should be considered in future research.

Table 13: Paired windows test by rank during Speaking phase.

	Paired Windows Test – Speaking Phase			
	t	df	Sig.	*r*
Officer	-.769	14	.454	
Cadet	5.10	41	.000**	.62
NCO	2.76	50	.008**	.73
Enlisted	1.014	11	.333	

** Indicates significant differences of $p < .01$.

Considering age as a factor, a one-way ANOVA was conducted on the visual attention to the VHRP and Choice window with age groups of 10 years starting at 18 years reveled statistical differences for the VHRP window, $F(5,114) = 3.29$, $p = .008$, and for Choice window, $F(5,114) = 4.47$, $p = .001$. Figure 9 shows the mean percentage of time directed to the VHRP and Choice windows by 10-year age groups. Of noticeable interest is the trend indicating that the younger ages give the more attention to the VHRP window compared to the Choice window but the trend reverses at the older ages.

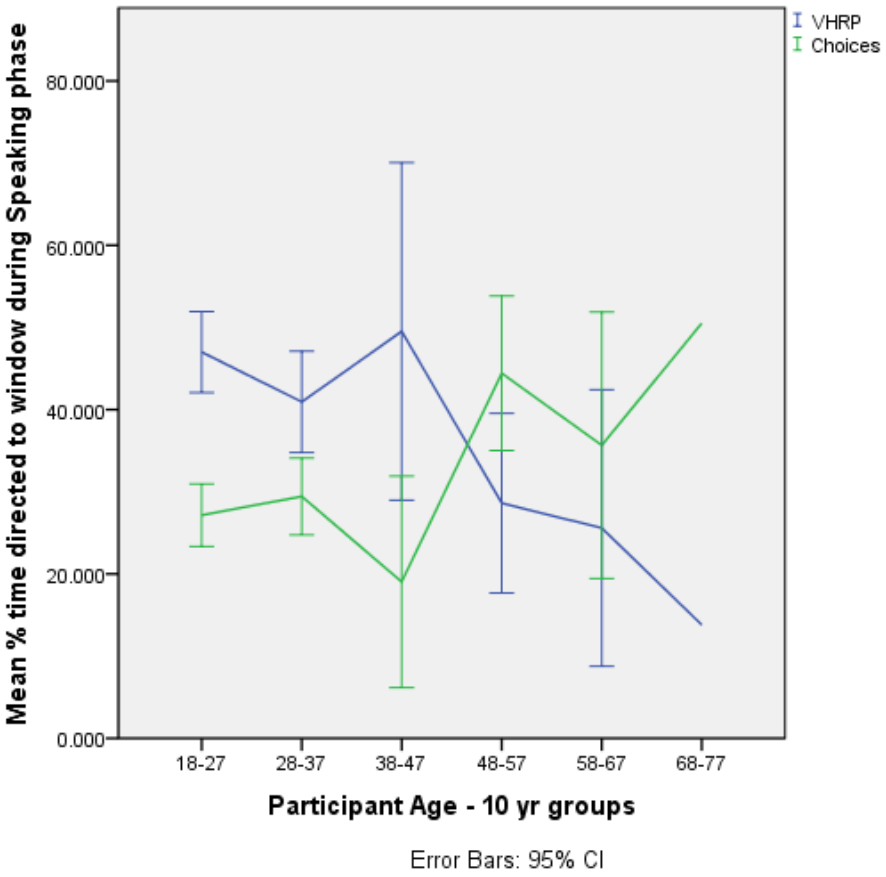

Figure 9: Percentage of time directed to VHRP and Choices windows by 10-year age groups.

Conducting a paired window comparison of the VHRP and Choice window by the 10-year age groups resulted in the two youngest groups having statistically significant difference. The 18-27 year group attended to the VHRP window (M = 47.0%, SE = 2.47%) significantly more than the Choice window (M = 27.2%, SE = 1.90%) during the Speaking phase, $t(59) = 5.12$, $p = .000$, $r = .56$. The 28-37 year group also attended to the VHRP window (M = 40.9%, SE = 3.03%) significantly more than the Choices window (M = 29.4%, SE = 2.30%) during the Speaking phase, $t(34) = 2.43$, $p = .020$, $r = .38$.

Observation of the data showed two age groupings. An ANOVA was conducted using two age groups of 18-44 (N = 101) and 45-71 (N = 19) years which resulted in significant differences, $F(1,118) = 7.02$, $p = .009$ for the VHRP window and $F(1,118) = 11.07$, $p = .001$ for the Choice window. A comparison of the attention to the VHRP and Choice windows, see figure 10, resulted in the younger age group attending to the VHRP window ($M = 44.6\%$, $SE = 1.89\%$) significantly more than the Choice window ($M = 27.6\%$, $SE = 1.44\%$) during the Speaking phase, $t(100) = 5.76$, $p = .000$, $r = .50$. There was not a significant difference ($p > .05$) in the attention between the VHRP and Choice window for the older age group. These results indicate that the younger ages did exhibit a split-attention effects. It should be noted that the number of participants in the age groups were not balanced with about 83% being in the younger grouping.

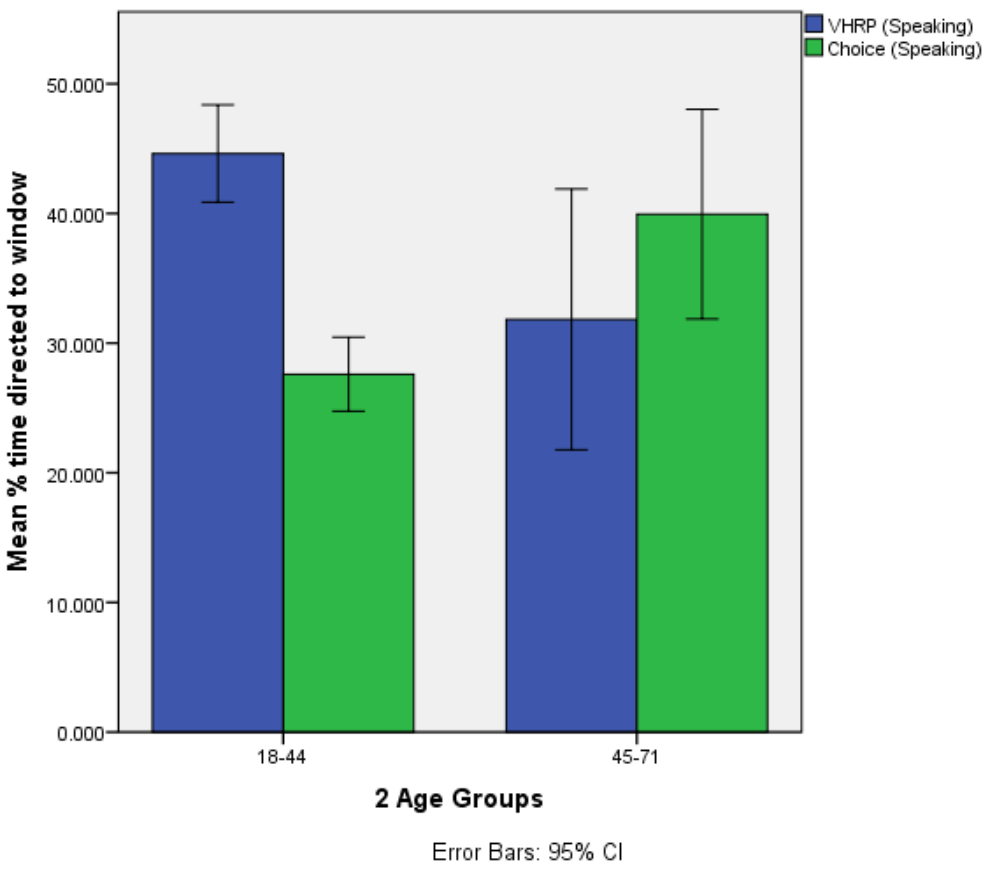

Figure 10: Comparison of percentage of time directed to VHRP and Choice windows by two age groups.

Based on the above age difference, video game experience was considered. While a Kruskal-Wallis test of attention to the VHRP window across the reported video game experience did not result in significant differences ($p > .05$), a Mann-Whitney test of video game experience of the participants showed a significant difference between the younger and older groups, $U = 605$, $p < .01$, $r = -.25$. This again indicates that age may be a factor in how people interact with the virtual human and should be considered for future research.

Hypothesis 2

The second set of hypotheses centered the influence different counselor views and/or levels of virtual human behaviors had on the counselor during the interaction. The test conditions are based on the 3x2 between subjects experimental design with three counselor views (static image, 1-view, and 2-views including close-up) and two virtual human behavioral levels (low-key and exaggerated). The predication was that the counselor would spend more time attending to the virtual human due to the use of scene cut with close-ups and/or exaggerated behaviors. The analysis centered on the Speaking phase of the interaction since the different counselor views and/or virtual human behaviors were only applied during that phase.

First, it was predicted that the learner or counselor's visual attention to the virtual human counselee would increase from the use of a scene cut to a close-up view. Previously, Table 7 showed that the data distribution for the attention to the VHRP did not significantly deviate from normality. Variances of the AFRs in the Speaking phases across the three counselor views were found to not violate the assumption of homogeneity of variances using Levene's test of homogeneity ($p = .718$). The mean AFR for each counselor view condition is shown in figure 11. A one-way ANOVA indicates significant differences between conditions, $F(2,117) = 5.26$, $p = .007$. Tukey HSD post hoc analysis showed significant differences between the static image and 1-view conditions. The 2-view condition using the scene cut to a close-up view did not increase the counselor's visual attention on the virtual human. A separate ANOVA using the static image vs. fully animated virtual human resulted in a significant difference in the AFR on the virtual human, $F(1,118) = 9.01$, $p = .003$. These results show that while there is not a significant difference between the 1-view and 2-view conditions, the users appear to prefer to

interact with an animated virtual human using both verbal and nonverbal communication behaviors.

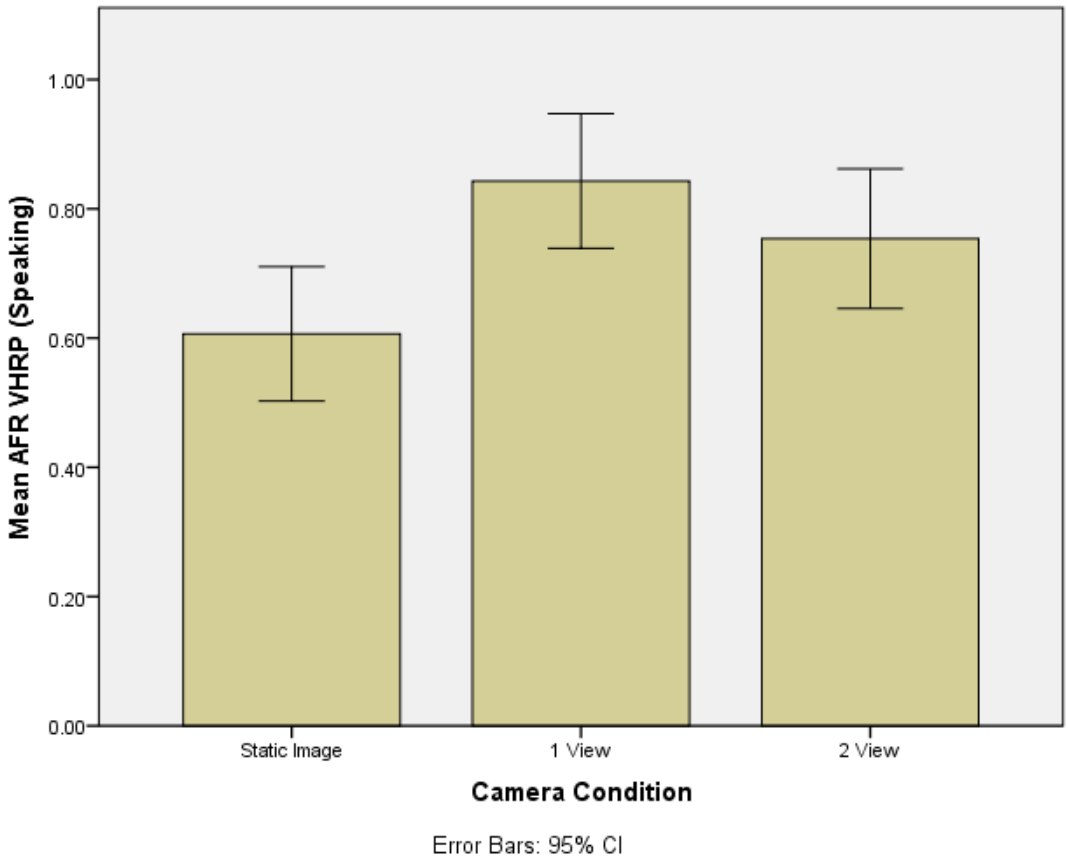

Figure 11: Mean AFR for VHRP window for the three counselor view conditions.

The second prediction was that the counselor's visual attention to the virtual human would increase from the use of exaggerated virtual human behaviors. An ANOVA of the AFR on the VHRP window with the virtual human behaviors as a factor did not result in a significant difference, $F(1, 118) = .51$, $p = .48$.

The third prediction was that the application of both a scene cut to a close-up and exaggerated behaviors would increase the counselor's visual attention to the virtual human. This time, an ANOVA of the AFR of the VHRP window across the six test conditions from the three counselor views and two virtual human behaviors was conducted. Figure 12 shows the mean AFR for the VHRP window during the Speaking phase across the six study conditions. Testing for homogeneity of variance using Levene's test found no significant differences in variances across the test conditions (p = .721).

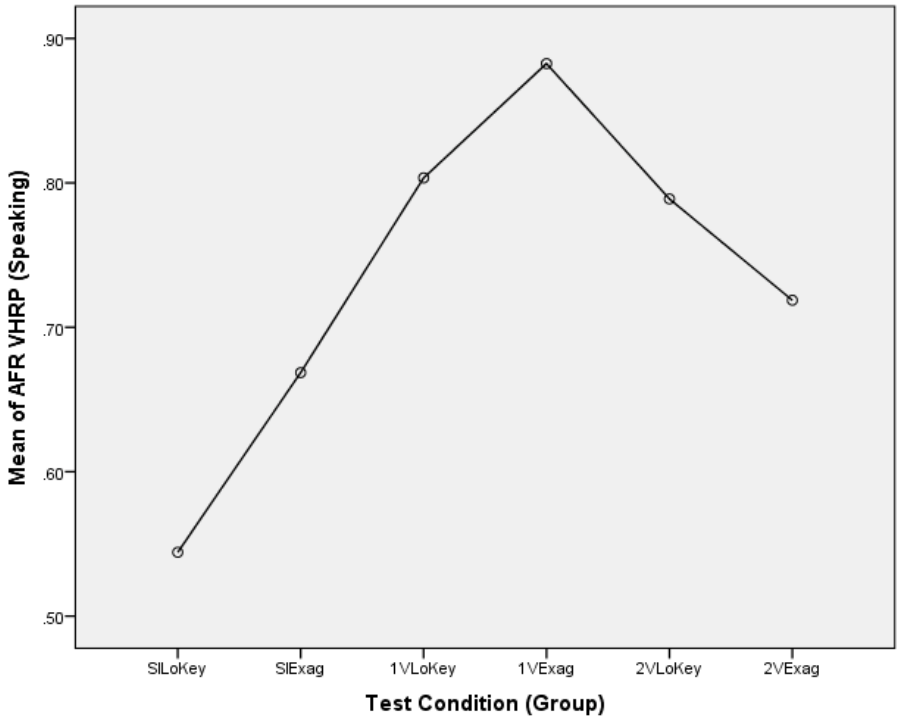

Figure 12: Adjusted fixation ratio for VHRP window during Speaking phase across six test conditions.

Results of the ANOVA showed significant differences between the test conditions, $F(5, 114) = 2.58$, $p = .03$. A Tukey HSD post hoc analysis indicated a significant difference between the SILoKey and 1VExag cases. No other significant differences were found. These results

show that the application of both a scene cut to a close-up and exaggerated virtual human behaviors do not increase the visual attention on the virtual human.

In a related statistical exercise, the number and duration of glances or visual fixations were investigated as they related to both the counselor view and virtual human behavior conditions. Analysis of the fixation data showed significant deviations from normality as presented earlier in Table 7. Statistically significant differences were found using the Kruskal-Wallis test and a post hoc Mann-Whitney test. Statistically significant differences were found for the VHRP ($H(5) = 12.4$, $p = .03$) and Choice ($H(5) = 18.5$, $p = .01$) windows. Figure 13 shows the mean fixations to the VHPR and Choice windows across the six test conditions.

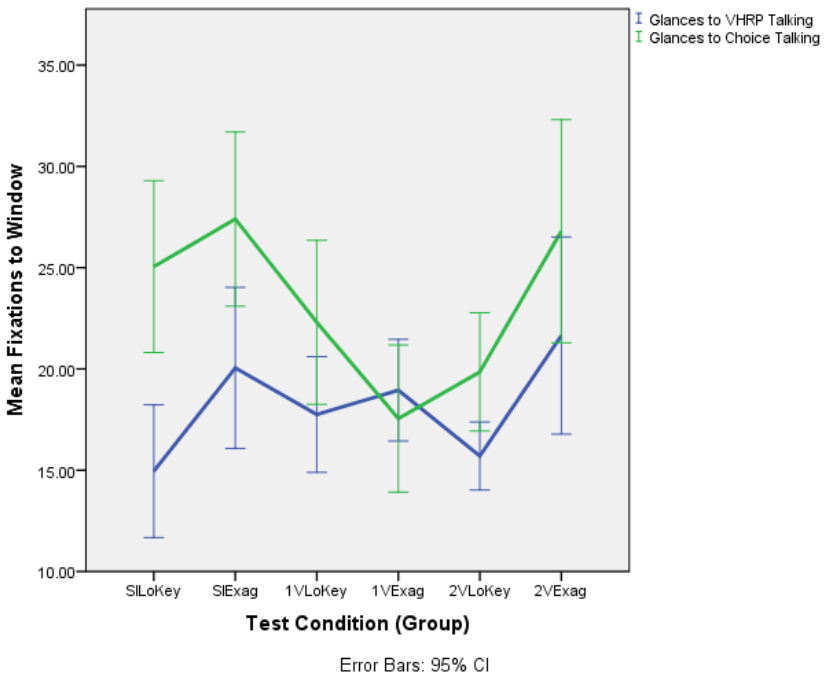

Figure 13: Mean fixations to VHRP and Choice windows during Speaking phase.

Post hoc tests did not show differences between the six conditions for the VHRP window. Statistical differences were found for the Choice window between the SIExag and IVExag conditions (p = .005).

Table 14 provides statistical significant differences comparing the three counselor view conditions and the two virtual human behavior conditions.

Table 14: Mean number of and duration of visual fixations toward the VHRP and Choices windows during the Speaking phase.

	Counselor Views			Virtual Human Behaviors	
	SI M, SD	1V M, SD	2V M, SD	LoKey M, SD	Exag M, SD
Number of Fixations					
VH Speaking					
VHRP	17.5, 8.1	18.4, 5.7	18.7, 8.2	16.1, 5.8	20.2, 8.3*
Choices	26.2, 9.1*	19.9, 8.5	23.3, 9.9	22.4, 8.2	23.9, 10.6
Duration of Fixations (s)					
VHRP Speaking					
VHRP	1.0, .5	1.3, .5**	1.2, .6	1.2, .6	1.2, .5
Choices	.59, .2	.59, .2	.64, .2	.61, .2	.60, .2

* indications statistically significant differences (p < .05) of each window across the counselor view and virtual human behavior conditions.

** indicates a statically significant difference (p < .05) between the SI and 1V counselor view conditions only.

The analysis shows that for the Speaking phase, the number of fixations are statistically greater for the exaggerated virtual human behaviors than for the low-key behaviors, $H(1) = 9.47$, $p = .002$. Considering the mean duration of each fixation on the speaking virtual human, the analysis resulted in a statically significant difference across the counselor views, $H(2) = 6.96$, p =

.03. Post hoc analysis showed that the difference was between the static image and 1-view condition, $U = 528$, $p = .009$, $r = -.24$.

These results show that while the virtual human behaviors do not influence the AFR, the number of fixations directed toward the virtual human is influenced by the exaggerated behaviors. This is an indication that the exaggerated behaviors may be a result of an orientation effect.

The NASA TLX was used to investigate if the addition of the use of scene cuts with close-ups and/or different levels of virtual human behavior increase the cognitive load of the trainee. No predications were stated as a hypothesis in chapter 3. This analysis investigated if there were differences in the reported workload of the six test conditions. Nonparametric tests were used due to the ordinal nature of the NASA TLX scales. Using an average of the six raw NASA TLX scores across the six test conditions (Evans & Fendley, 2017; Hilbert & Renkl, 2009; Zhang et al., 2011) a Kruskal-Wallis test resulted in no significant differences. These results indicate that no significant change in workload resulted from the introduction of scene cuts with close-ups and/or exaggerated virtual human behaviors. A Wilcoxon test was conducted on the individual scales to investigate how the responses differed from ambivalence. Ambivalence was zero with a 21-increment scale that ranged from -10 (very low) to 10 (very high). Table 15 provides the median and indications of significance for each NASA TLX scale.

Table 15: Medians of individual NASA TLX scales and significance from ambivalence.

	Test Condition					
	SILoKey	SIExag	1VLoKey	1VExag	2VLoKey	2VExag
NASA_TLX Scale	Asymptotic Significance (2-tail) (Median)					
Mental Demand	-4.0**	-4.5**	-4.0**	-5.5**	-4.5**	-4.0**
Physical Demand	-9.0**	-9.0**	-8.0**	-9.0**	-8.5**	-9.0**
Temporal Demand	-7.0**	-7.5**	-7.0**	-7.5**	-7.0**	-6.5**
Effort	-5.5**	-6.0**	-6.0**	-6.0**	-5.5**	-5.0**
Performance	-8.5**	-8.5**	-8.0**	-8.5**	-9.0**	-8.0**
Frustration Level	-7.0**	-8.0**	-7.0**	-8.0**	-8.0**	-8.0**

An * indicates statistical difference (*p < .05 and ** p < .01) from ambivalence. The median of sample population is provided as an indication direction and magnitude from ambivalence.

All median scores are statistically different from ambivalence and less than zero with the negative directional indications. It is concluded the participants were not ambivalent about their responses and that the cognitive workload is low to very low based on the results of table 15. It is concluded that the simulated counseling session did not require high mental demands or effort to complete the task possibly indicating that the scenario did not challenge the counselor. Due to the wording of the NASA TLX question for the Performance scale, the scale for "Performance" was reversed with "Good" on the negative end and "Poor" on the positive end in order to compare with the other scales. The score indicates that the users were not ambivalent about how they thought they performed. They indicated that they were satisfied with their performance.

Hypothesis 3

The third hypothesis focused on the user's attitude and acceptance of the virtual human as a conversational partner in the simulation. Attitude was measured using the total score from the ten bi-polar adjectives. With the ten bi-polar adjective scales ranging from 1 (negative perception) to 5 (positive perception), the total score ranged from 10 to 50, where 30 would represent ambivalence in the center of the scale. Conducting a Kruskal-Wallis test of the total bi-polar scores across the three counselor views, the two virtual human behaviors, and the six test conditions resulted in no significant differences indicating that the application of scene changes with close-ups and exaggerated virtual human behaviors did not influence the participant's attitude or perception of the interaction. A Wilcoxon signed-rank test of the total bi-polar adjective scores was conducted to determine if participants were ambivalent about their responses. Results indicated that participants were not ambivalent about their answers with a $Mdn = 39$ ($p < .05$, $r = -.67$) showing a general positive attitude or perception of the experience. It should be noted that 16 of the 120 (13.3%) participants did have a negative perception.

Related to the perception of the interaction, the acceptance of the virtual human as a partner was investigated. The level of acceptance provides an indication if the virtual human avoided the "uncanny valley" between the visual manifestations and the counselor's expectations of the virtual human's appearance, facial expressions, and gestures. As a part of the self-report post reaction survey (Appendix C) more than 97% participants reported that the saw the virtual human (117 – Yes; 1 – No; 2 – did not answer). Eighty-two percent of participants also reported that the felt like they paid attention to the virtual human. There were six questions related to the acceptance of the virtual human that showed good reliability with Cronbach's alpha = 0.90.

Responses were scored using a 7-point scale from -3 to 3 with 0 as ambivalent. A user's total acceptance score was calculated using the median score for all six questions. A Kruskal-Wallis test was conducted using the total acceptance score across the factors of counselor views, virtual human behaviors, and the six test conditions. The results showed no significant differences in for the in the total acceptance score across any of the factors. A Wilcoxon sign-rank test showed that participants were not ambivalent about their views of the virtual human, $Mdn = 1$, $z = -6.99$, $p < .05$, $r = -.66$. Eighty-eight of 120 participants recorded a median score greater than ambivalence and only 25 participants were less than ambivalent. A similar Kruskal-Wallis analysis for each of the six survey questions individually across the factors of counselor views, virtual human behaviors, and the six test conditions is provided in table 16.

Table 16: Median responses to virtual human acceptance individual questions.

Question	Counselor View			VH Behavior		Test Condition					
	SI	1V	2V	LoKey	Exag	SILokey	SIExag	1VLoKey	1VExag	2VLoKey	2VExag
Looked real	1.0**	1.0**	1.0**	1.0**	1.0**	1.0**	1.0**	1.0**	2.0**	1.0*	1.0*
Showed human-like emotion	1.0	2.0**	1.0**	1.0**	2.0**	2.0	1.0	1.0**	2.0**	1.0**	1.0*
Voice synched with lips/face	1.0*	2.0**	1.0**	1.0**	2.0**	1.0*	2.0	2.0**	2.0**	1.0**	2.0*
Had realistic gestures	1.0*	2.0**	1.0**	1.0**	2.0**	1.0*	1.0	2.0**	2.0**	1.0**	1.0*
Felt like talking to live human	0.0	1.0**	1.0	1.0*	1.0	0.0	0.0	1.0*	1.0	0.0	1.0
Useful experience	2.0**	2.0**	2.0**	2.0**	2.0**	2.0**	2.0**	2.0**	2.0**	2.0**	1.0**

An * indicates statistical difference (* $p < .05$ and ** $p < .01$) from ambivalence. The median of the sample population is provided as an indication of direction and magnitude from ambivalence (*Mdn* = 0.0)

Table 17: Kruskal-Wallis test showing significance for virtual human acceptance individual questions across the three counselor views; two virtual human behaviors; and the six test conditions.

Question	Counselor Views	VH Behaviors	Test Conditions
	Kruskal-Wallis test significance (*p*)		
Looked real	.08	.75	.35
Showed human-like emotion	.16	.51	.47
Voice synched with lips/face	.22	.74	.51
Had realistic gestures	.02*	.88	.11
Felt like talking to live human	.29	.95	.67
Useful experience	>.05	.71	.26

* indicates statistical significance of $p < .05$.

Table 16 shows that for the questions "The virtual human role-player looked like a video of a real human" and "This was a useful experience for developing leadership skills," that the participants were not ambivalent about their responses and table 17 shows that there were no significant differences across the various conditioned tested. Based on the conditions of a static and animated virtual human it would be reasonable to expect variations in the responses to the other questions since they focus on different nonverbal behaviors of the virtual human. Table 17 shows that only the question, "The virtual human role-player exhibited realistic gestures" exhibited significant differences for the 3 counselor views. A pairwise comparison showed that the difference occurs between the static image and single view (1V) conditions ($H(2) = -21.5$, $p = .013$). For the question, "The virtual human role-player showed human emotion," participants experiencing the static image were ambivalent about their responses where participants

experiencing an animated character (1V and 2V conditions) were not ambivalent and were directed toward the perception of a real human. Lastly, the question, "It seemed like I was interacting with a live human role-player," showed that participants in most conditions were ambivalent about their responses. It was noted that for the three counselor views that only the participants of the single view (1V) condition were not ambivalent about their responses. The same was found for participants of the LoKey virtual human behaviors.

Table 18: Median responses of static image (SI) and animated character (1V & 2V) conditions for virtual human acceptance individual questions.

Question	Static Image	Animated Character	Kruskal-Wallis across static image and animated character
	Median		Significance (*p*)
Looked real	1.0**	1.0**	.59
Showed human-like emotion	1.0	1.0**	.29
Voice synched with lips/face	1.0*	2.0**	.13
Had realistic gestures	1.0*	2.0**	.02*
Felt like talking to live human	0.0	1.0**	.16
Useful experience	2.0**	2.0**	.84

An * indicates statistical difference (* $p < .05$ and ** $p < .01$) from ambivalence. The median of the sample population is provided as an indication of direction and magnitude from ambivalence (*Mdn* = 0.0)

Table 18 shows the median participant responses to the individual virtual human acceptance questions separated by the static image and animated character conditions experienced. A Kruskal-Wallis test across the static image and animated character conditions indicates a significant difference for the question, "The virtual human exhibited realistic gestures," with the animated character being more realistic. While this result is expected since the static image does not exhibit any gestures, it is interesting to note that the median for the static condition is greater than ambivalence indicating a perception of human-like behaviors.

The analysis shows that that participants perceived the virtual human role-player to be simulate a social interaction with the medians being directed toward human-like behaviors. Overall, the observed median of the single view (1V) condition was greater than the observed median for the static image and multiple view (2V) conditions, but responses to individual questions about different aspects of the virtual human's nonverbal behaviors showed no statistical differences except for the perception of the gestures. A difference was found between the static images and the single view (1V) cases. This difference could be a result that the other behaviors (real appearance, showing emotion, lip-synch) were less noticeable due to a greater orientation effect from the amount of movement in the observed behavior (Diao & Sundar, 2004). It is possible that the realistic image of the virtual human and the recorded human voice provided enough perception of a human-like partner. Further research is needed to fully understand how the virtual human was perceived.

As a statistical excursion, an analysis of the individual responses was executed to determine if rank may have impacted the responses. Table 19 provides the results of a Wilcoxon signed-rank test of differences from ambivalence.

Table 19: Median responses to virtual human acceptance questions by rank.

	Rank Category			
	Cadet	Enlisted	NCO	Officer
Factors		(Median Score)		
Looked real	1.0**	1.0	1.0**	1.0**
Showed human-like emotion	1.5**	1.0	1.0**	2.0*
Voice synched with lips/face	1.5**	1.0	2.0**	2.0*
Had realistic gestures	1.0 **	1.5*	2.0**	1.0
Felt like talking to live human	1.0	1.0	0.0	0.0
Useful experience	2.0**	2.0**	2.0**	2.0**

An * indicates statistical difference (*$p < .05$ and ** $p < .01$) from ambivalence. The median of sample population is provided as an indication of direction and magnitude from ambivalence (*Mdn* = 0).

All rank categories except for the enlisted were not ambivalent and showed a positive direction of acceptance. The only factor "felt like talking to live human" was not significantly different from ambivalence, therefore it could not be concluded that the participants were not ambivalent about their responses. This indicates that all ranks but the enlisted participants accepted the virtual human as a partner in the simulated conversation, but they did not view it to be a real face-to-face conversation. A Mann-Whitney test comparing the enlisted responses to the other rank categories resulted in no significant differences for any of the factors.

Based on earlier analysis identifying two different age groups, an analysis similar to the rank category analysis was conducted. For both age groups, the median of each response was found to be statistically different from ambivalence except for "Had realistic gestures." Both age groups had a median response of 0 or ambivalent for that response. A Mann-Whitney test comparing median responses of both age groups did not find any statistical differences.

These results address the hypotheses related to perception and acceptance. Results indicate that application of scene cuts with close-ups and exaggerated virtual human behavior do not influence the user's perception or acceptance of the virtual human as a conversational partner within the training application. While users accept the virtual human as a training partner, they do not view the experience to be like the real face-to-face interaction. It was found that limited number of enlisted participants had a different perception of the virtual human, but this study was not able to determine the reason. Future experimentation is required. Overall, there is an indication that the users have a positive view of the experience.

Hypothesis 4

This set of hypotheses centered on the participant's or learner's performance related to the number of correct responses during the interaction. The prediction was that learners would get more "correct" responses with the application of scene cuts with close-ups, with the application of exaggerated virtual human behaviors, and with the combination of both scene cuts with close-ups and exaggerated virtual human behaviors. Besides the number of correct, mixed, and incorrect responses, a total score was calculated awarding 1.0 for correct, .5 for mixed, and 0 for incorrect responses. A maximum score of 8.0 is possible for the study scenario. Due to significant variances of homogeneity, a Kruskal-Wallis test was conducted for the number of correct, mixed, incorrect, and response total scores for the factors of the three counselor views, the two virtual human behaviors, and the six study test conditions. No significant differences were found. Table 20 provides a summary of the Kruskal-Wallis test results. The results

indicate that the application of scene cuts with close-ups and exaggerated virtual human behaviors did not influence the selection of responses.

Table 20: Results of Kruskal-Wallis test for user responses to virtual human.

Responses		# Correct		# Incorrect		# Mixed		Total Score	
	df	H stat.	Sig.	H stat.	Sig.	H stat.	Sig.	H stat.	Sig.
Counselor Views	2	3.1	.22	1.4	.5	4.9	.09	2.6	.28
VH Behaviors	1	.01	.94	.10	.75	.19	.66	.03	.86
Test Conditions	5	3.6	.61	1.7	.89	6.3	.28	2.9	.71

Further analysis of the response data showed an overall mean total score of 7.78 (SD = .40) of a the possible 8.0. This high total score indicates that the individuals are highly trained or skilled or the scenario did not challenge the learner. It may also indicate that the scenario was too short to show any differences in performance. The result of the NASA_TLX scale for "Effort" also reported a low effort was used to complete the scenario.

Of interest was investigating the difference in the static or non-animated virtual human and the animated virtual human in the 1-view and 2-view conditions. A Mann-Whitney test was conducted found only the mixed responses being statistical different, see Table 21.

Table 21: Mann-Whitney test results of counselor performance for static image vs. animated virtual human.

	Counselor Performance			
	# Correct	# Mixed	# Incorrect	Total Score
Counselor View	(M, SD)			
Static VH behavior (SI)	7.80, .41	0.10, .30	.10, .30	7.85, .32
Active VH behaviors (1V, 2V)	7.58, .73	.34, .67*	.09, .28	7.74, .44
Statistical difference indicated with * for $p < .05$ and ** for $p < .01$.				

A Mann-Whitney test was conducted for the static image and animated virtual human conditions separated by rank to further investigate the difference for the mixed responses. Only a statistically significant difference was found for NCOs. The results indicate that NCOs selected mixed responses significantly more when interacting with an animated virtual human than a static image, $U = 202.5$, $z = -2.109$, $p = .035$. This result could be an indication of a difference between theory and experience or practice on what should be said within the context of the situation.

Hypothesis 5

Related to performance, this hypothesis focused on the comparison of pre- and post-subject judgement test to assess a learner's knowledge and understanding of the concepts presented and demonstrated during the interaction. It was predicted that applying the combination of scene cuts with close-ups and exaggerated virtual human behaviors would result in the greatest gain from the pre-SJT to post-SJT scores. Analysis was conducted using the

gain/loss from the subtraction of the correlated pre-SJT score from correlated post-SJT score. A positive score indicates a gain or greater understanding and agreement with the established learning objectives and subject matter experts. Shapiro-Wilk's test for normality showed no significant deviations from normality for difference in pre- and post-SJT scores. Prior to conducting an ANOVA, Levene's test of homogeneity of variances showed significant differences in variances, $F(5,114) = 3.1$, $p = .012$ violating the assumption of homogeneity of variances. With unequal variances, a Kruskal-Wallis one-way ANOVA was conducted on the differences in the pre- and post-SJT scores across the six test conditions. No statically significant differences were found for the six test conditions, $H(5) = 3.12$, $p > .05$.

While no statistical differences were found across the groups, there was a trend of a positive difference in the comparison of pre- and post-SJT scores. Figure 14 shows the positive trend for each rank category, providing indication of learning gains or greater agreement with the established learning objectives and subject matter experts. It is noted that these are only trends from a single, short interaction and that post-SJT scores could have been influenced by the instructional video viewed after the pre-SJT and prior to the interaction. Additional experimentation is required to establish the effectiveness of the simulation.

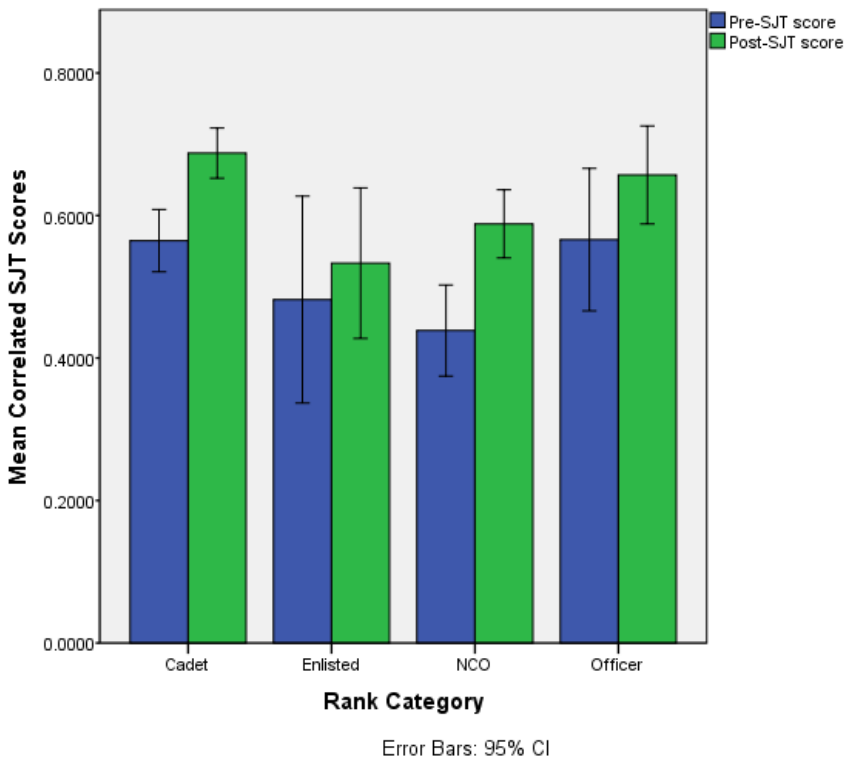

Figure 14: Comparison of pre- and post-SJT scores by rank category.

Hypothesis 6

This hypothesis explores that if the application of scene cuts with close-ups and exaggerated virtual human behaviors introduces the perception of artificial or negative training. Predictions were that the application of scene cuts with close-ups and/or exaggerated virtual human behaviors do not introduce perceptions of artificial or negative training. To address this hypothesis the focus of the analysis is on specific questions in Participant Reaction Survey (Appendix C) that were related to the participant's interaction with the virtual human.

The first part of the analysis looked at the responses and how they differed from ambivalence. The scale used was 1 being "Strongly Disagree" to 5 being "Strongly Agree" with

3 being ambivalent. Table 22 provides the median scores and indication of statistical significance from ambivalence.

Table 22: Participant reaction to interaction with virtual human counselee showing statistical difference from ambivalence.

	Test Condition					
Factors	SILoKey	SIExag	1VLoKey	1VExag	2VLoKey	2VExag
	(Median Score)					
Would have used similar dialog	4.0**	4.0**	4.0**	4.0**	4.0**	4.0**
Would have handle the conversation differently	2.0	2.0	2.0**	2.0*	2.0**	2.0**
Felt like a face-to-face conversation	4.0	3.0	3.5	3.0	3.0	4.0*
Felt like I paid attention	4.0**	4.0	4.0**	4.0**	4.0**	4.0**
Zooming in seemed artificial	3.0	3.0	3.0	3.0	3.0	3.0
Counselee's gestures seemed exaggerated	2.0*	2.0*	2.0**	2.5*	2.0**	2.0**
Counselee reacted as expected	4.0**	4.0	4.0**	4.0**	4.0**	4.0**
Views allowed me to assess the state of the counselee	3.5	3.0	4.0**	4.0**	4.0**	4.0*

An * indicates statistical difference (*p < .05 and ** p < .01) from ambivalence.
The median of sample population is provided as an indication direction and magnitude from ambivalence (*Mdn* = 3).

Like the question in Hypothesis 3, "felt like talking to live human," the responses for "felt like a face-to-face conversation" were ambivalent about their responses except for the 2VExag condition. The ambivalence in the responses is an indication that the participants did not perceive the interaction to be similar to a face-to-face conversation. With regards to possible negative training from not being able to formulate their own responses, participants were not ambivalent about their responses and indicated agreement with the statement "would have used similar dialog." Similarly, responses to "would have handled the conversation differently" showed general disagreement indicating they would have had a similar conversation. It was noted that participants of the static image were ambivalent about their responses which may relate to previous analysis showing a preference to interact with an animated virtual human. Participants were ambivalent about the artificiality from zooming in making it difficult to determine if participants found it to be artificial. Participants were not ambivalent about their responses regarding the virtual human's gestures. There was general disagreement with the statement "gestures seemed exaggerated" indicating they did not perceive any artificialities in the behaviors. This was supported by the agreement with the statement "counselee reacted as expected." These results indicate that scenario followed a similar dialog that the counselors would have utilized, and the no artificialities were perceived in the use of exaggerated virtual human behaviors.

A Kruskal-Wallis test for each factor listed in Table 22 was conducted to determine if there were statistical differences across the six test conditions. Results showed statistical difference for only one factor, "Views allowed me to assess the state of the counselee," $H(5) = 12.3$, $p < .05$. A post hoc Mann-Whitney test was used to determine conditions that exhibited

statistical differences. A Bonferroni correction was applied, and effects are reported at a .01 level of significance. Results indicate a significant difference between the SIExag and 1VLoKey conditions, $U = 95.5$, $p < .01$. While no other differences resulted from the analysis of this factor, observation of table 22 shows that participants were not ambivalent about their responses for all conditions with an animated virtual human (1V and 2V) while static image (SI) participants were ambivalent. This could indicate that they did not know how to address the question since they did not receive any non-verbal communication from the virtual human with a static image.

Hypothesis 7

This hypothesis is related to Hypothesis 6 in that it looks at perceptions of artificial or negative training that result from the scenario. The prediction was that the counselee responses from the non-branching scenario would not seem artificial or introduce perceptions of negative training. To address this hypothesis, results from Hypothesis 6 can be used with specific focus on the factors "Would have used similar dialog," "Would have handle the conversation differently," and "Counselee reacted as expected." The Kruskal-Wallis one-way ANOVA for the factors in table 22 resulted in the three factors of interest being not statistical different across the six test conditions. The previous results indicate that no perceptions of artificial or negative training were experienced.

As a statistical exercise, a Kruskal-Wallis one-way ANOVA was conducted on the three factors of interest across the six test conditions separated by rank. Results showed no significant

differences in the responses for each rank. Table 23 provides the results of a Wilcoxon test for ambivalence.

Table 23: Responses by rank to perceptions of negative training from scenario dialog.

	Rank Categories			
	Cadet	Enlisted	NCO	Officer
Factors				
Would have used similar dialog	4.0**	4.0**	4.0**	4.0**
Would have handle the conversation differently	2.0**	2.0	2.0**	2.0*
Counselee reacted as expected	4.0**	4.0*	4.0**	4.0**

An * indicates statistical difference (*$p < .05$ and ** $p < .01$) from ambivalence. The median of sample population is provided as an indication direction and magnitude from ambivalence ($Mdn = 3$).

All rank categories were not ambivalent about their response that they would have used similar dialog with the median response being "Agree" with dialog responses provided. There was also agreement among all rank categories that the counselee responded as expected. Only the enlisted category was not statistically different from ambivalence on their responses to "would have handled the conversation differently." A separate analysis using the two age groups established earlier showed no significant differences for the three factors of interest. This could be a result of experience, education, and/or military training.

CHAPTER FIVE: CONCLUSIONS

Chapter Summary

This chapter reviews the study results and discusses inferences and conclusions that can be drawn from them. Future research recommendations and lessons learned are also provided.

Summary of Results

Current technology limits the ability to conduct a real-time, bi-directional auditory and visual conversations between a virtual human and a learner. To compensate for the technological limitations, tutoring and virtual environments use different interfaces to enable human interaction with virtual humans. Compensating tri-window displays or other text-based interfaces used in many social skills training applications (Hart & Proctor, 2016) may introduce artificialities in the simulated face-to-face conversation.

The primary focus of this research investigates how users of a tri-window, simulated social skills training environment visually attend to their virtual conversational partner. The study focused on answering two research questions: (1) do learners pay attention to virtual humans in social skills training environments? (2) does the use of scene cuts with close-ups and/or the use of exaggerated virtual human behaviors influence what learners look at? Beyond the study's primary focus of the learner's visual attention, aspects of learner performance and acceptance of the virtual human were considered along with impacts of age and rank.

In light of a set of hypotheses, this research measured attentional outcomes and virtual human's behaviors that contribute to attentional outcomes in the context of a tri-window,

simulated social interaction designed for training. No noticeable issues associated with navigating the tri-window display were observed.

Hypothesis 1

Hypothesis one considers the counselor's visual attention toward the different windows of the tri-window display. Observed differences toward the various visual focus alternatives (i.e. VHRP, Chat, & Choice windows, and off screen) supports the conclusion that counselor attentional behavior can be divided into two completely different phases: a Virtual Human Speaking phase and a Virtual Human Not Speaking phase.

For the speaking phase, counselors largely visually attend to the speaking virtual human (VHRP), though less than 50% of the time. A comparative analysis showed that the difference in visual attention toward the VHRP and Choice windows is not statistically significant inferring split attention of the learner between the two windows. However, when applying the adjusted fixation ratio (AFR) technique to control for the chance of attending to a window due to its size, the level of AFR attention to the VHRP and Choice windows become statistically different, inferring no split attention. Further, more AFR attention is given to the Choice window than the VHRP window, inferring the Choice window is the primary AFR visual attentional focus rather than the VHRP window. During the Speaking phase, the Chat window was the lowest priority of the display windows. Curiously, with the remaining attentional resources, AFR attention to the Chat window emerges not statistically different than AFR attention to the VHRP window. The latter finding again infers split attention, but this time with the Chat window competing with VHRP window for the remaining visual attentional resources.

When the virtual human was not speaking, the vast majority of the attention is on the Choice window (over 80%), which is also statistically different, with and without AFR, than all other attentional focus alternatives.

Hypothesis 2a, 2b, & 2c

Hypothesis 2a considers the virtual human presentation mode (i.e. static image, a full-bodied view of an animated avatar, or an animated avatar that included scene cuts to a close-up view). It was observed that counselor visual attention to the full-bodied view of the animated avatar was greater than the visual attention to a static image. The addition of the scene cuts with close-ups to the full-bodied view of the avatar did not significantly increase the counselor's visual attention on the avatar.

Hypothesis 2b considered different levels of virtual human behavior – low-key versus exaggerated movement of arms, facial features, etcetera – has on attention. Given different levels of behavior, no statistical differences were found for the percentage of time a counselor spent visually attending to the counselee, but the exaggerated behaviors did increase the number of individual visual fixations on the virtual human.

Hypothesis 2c considered the combination of the conditions associated with the different presentation views and the levels of virtual human behavior. Results indicate that the combination of using scene cuts with close-ups and exaggerated virtual human behaviors did not increase the learner's attention to the virtual human.

As a statistical excursion, age was found to be a factor in overall attentional differences. The younger participants attended to the virtual human a greater percentage of time than the

older participants. The older participants focused on the Choice window, not the VHRP or Chat windows. Given that the only other source of information about the counselee was the audio channel, older participants may have felt they received sufficient information to successfully complete the scenario from the audio speech of the counselee and reviewing the choices presented.

Hypothesis 3a, b, & c

Hypotheses 3 a, b, & c consider attitude of participants toward the training experience. Results indicated that there were no statistical differences were found across the different counselor views, levels of virtual human behaviors, or a combination of the treatments. Analysis of the individual questions showed a difference in the 3 counselor views for the question "The virtual human role-player exhibited realistic behaviors." Results showed that participants of the static image viewed the gestures to be less real than the participants of the single view (1V) condition.

Participants viewed the simulation social interaction as a beneficial training exercise. The application of scene cuts with close-ups and/or exaggerated behaviors did not result in any significant differences in reported responses. The majority of participants felts like they paid attention to the virtual human during the interaction and were not ambivalent about their self-reported responses. In general, participants accepted the virtual human as conversational partner within the training environment, but it was noted that enlisted members were ambivalent about responses regarding acceptance of the virtual human.

Hypothesis 4a, b, & c

Hypotheses 4a, b & c consider the "correctness" of learners' responses given the different counselor views, levels of virtual human behavior, and combination of views and virtual human behaviors. No significant differences were seen between the different views, levels of virtual human behavior, or combination of views and virtual human behaviors. Overall scores were high (average of 7.78 of 8), indicating that the learners were well trained, experienced, or not challenged by the simulation's scenario. It was also observed that when interacting with an animated character, learners selected more mixed responses than learner's interacting with a static image.

Hypothesis 5

Hypothesis 5 considers the learning gains measured by the differences in the pre- and post-SJT scores. While there were no statistically significant differences in comparing the pre- and post-exercise SJT scores, observed SJT score differences showed improvement after completing the simulated counseling session regardless of the experimental test condition.

Hypothesis 6

Hypothesis 6 considers if the use of scene cuts with close-ups and exaggerated behaviors introduced perceptions of artificiality or negative training. Participants did not report any negative effects as a result of applying the use of scene cuts with close-ups and exaggerated virtual human behaviors. Self-reported responses indicate that the virtual human behaved as expected within the context of the scenario. The majority of the self-reported responses were not

ambivalent except for the questions of "Felt like a face-to-face conversation" and "Zooming in seemed artificial."

Hypothesis 7

Hypothesis 7 considers if the use of non-branching scenario dialogue by the virtual human introduced perceptions of artificiality or negative training. Similar to the results of hypothesis 6, participants did not find any negative effects associated with the scenario or non-branching dialog used. Participant responses were not ambivalent. They reported that they would have used a similar approach to the choices provided in the scenario and that the virtual human responded as they might expect.

Discussion

Without respect to a training environment, early conversational research studies indicate that people look at their conversational partner between 30% and 61% of the time (Mirenda et al., 1983). Our research indicates the nature of the tri-window display used in this training environment negatively impacts attentional outcomes as only approximately 17% of the users' time was actually visually attending to the virtual human. Wang & Gratch (2010) and Louwerse et al. (2009) are among the limited research that focuses on human attention to a virtual human while also attending to training environment requirements. Both studies indicate that the learner's primary focus was on the virtual human while it was speaking. Accepting the technology limitation or a tri-window display and stripping out attentional behavior during the non-speaking phase while the counselor in training focuses on selecting a response choice, this research observed 40.2% attentional focus on the virtual human during the speaking phase.

40.2% is within the 30% to 61% range of similar face-to-face conversational behaviors (Argyle & Cook, 1976; Argyle & Dean, 1965; Cassell et al., 2000; Tickle-Degnen & Rosenthal, 1990) and therefore may be considered to meet the desired Army leadership behavior of paying attention and showing interest in the counselee (Army, 2015). Further, Argyle & Dean (1965) state that person listening to their partner visually attend to their partner with nearly three times more eye contact compared to when they are talking to their partner. Louwerse et al., (2009) also indicate attention to a speaking character without quantification of attention during speaking and not speaking phases. Consistent with the prior literature, this research resulted in the learner looking at the speaking virtual human nearly ten times more than when the virtual human was not speaking. Notionally the speaking and non-speaking phases may be similar to conversational turn-taking behaviors (Cassell et al., 2000; Hjalmarsson, 2011; Vertegaal, Shell, Chen, & Mamuji, 2006) and indicate that the learner behaved socially toward the virtual human while not viewing the conversation as a real face-to-face encounter.

The information-reduction theory states that learners optimize information processing by neglecting task-irrelevant information and actively focusing on relevant information (Gegenfurtner, Lehtinen, & Säljö, 2011). More recently, Romero-Hall, Watson, Adcock, Bliss, & Adams Tufts (2016) used eye-trackers to record visual attention of nurses using a simulation where they had to perform a pain assessment interview and attend to virtual patients complaining of abdominal pain. While Romero-Hall et al did not report percentage of time looking at the virtual patient, they did report mean gaze times on three areas of interest during the interaction. Specifically, nurses focused on the area experiencing pain, thereby actively focusing on the most relevant information, and not the patients head and face or the interview question box for pain

assessment. Consistent with the prior literature, this research found that the counselor AFR attention during the Speaking phase is on the Choice window, actively focus on information relevant to selecting the correct response, not the window containing the virtual human or the Chat window. Actively focusing on information relevant to the exam is not inconsistent with the concept of the overriding task focus of the user. Similar to the nurses' focus on the area experiencing pain, the inference of this research is that the counselor is focused on the overriding task of selecting the correct response within the Choice window rather than exhibiting socially accepted conversational behavior. That brings up the question, what is the focus of the exam – demonstrating socially acceptable attentional behavior or correctly selecting the verbal response of the counselee? In this research, the latter was what was graded. If the exam focused more heavily on visual expressions or attributes of the counselee that indicate greater counselor attention and interest in the visual aspects of the counselee, then perhaps the counselor AFR attention level may have higher toward the VHRP window than observed. Further the information-reduction theory also may also explain attentional focus given an auditory channel, rather than the redundant Chat window. Specifically, the learner can utilize their auditory channel to listen to the virtual human's response and split their remaining visual attention between the Choice and VHRP windows or the Chat window as needed to recover missed verbal information.

Volonte, Robb, Duchowski, & Babu (2018) concluded that user attention toward a virtual human can decrease overtime with a shift from engaging in social behaviors to goal-oriented behaviors. This research did not measure visual attention overtime; however, age related attentional results may indicate that younger participants engaged in more social oriented

behavior while the older participants employed a goal-oriented approach. Another contributing factor may have been that the study scenario did not challenge older participants due to higher levels of previous counseling experiences. Romero-Hall et al. (2016) reported differences in how various experience levels of nurses interacted with virtual patient align with these results indicating that age, in so far as it also indicates experience, can be a factor in how users interact with virtual humans in simulated conversations.

Where the training goal is focused on improving the visual attention to the virtual human, potential solutions to the split-attention issue, may lie in the removal of the Choice and Chat windows. A Chat window, not typically present in a real-life counseling session, provides the counselor a written text of the counselee's words. Removing the Chat window forces counselor's reliance on and attention to the audio as well as reduces the visual dilemma and re-orientation process when a learner changes their visual attention to a different window (Huff, Bauhoff, & Schwan, 2012). Removing the Choice window requires technological advances in bi-directional conversations between people and virtual humans (Courgeon, Rautureau, Martin, & Grynszpan, 2014; Morency et al., 2015). Removing the Choice window also infers removal of presented pre-scripted responses aligned with learning objectives. Assessing counselor free form responses requires not only computer-based speech recognition and natural language understanding, but also software assessment of the conversation and counselor response with respect to training objectives and feedback to the counselor in near real-time.

A second focus of this research looked at potential changes in the learner's attentional focuses after applying scene changes and/or different virtual human behaviors. Differences found between the full bodied, single view of the virtual human and the static image can partially

be explained by previous research showing people prefer to interact with virtual humans that exhibit social behaviors, not static behavior (Atkinson, 2002; Goldberg & Cannon-Bowers, 2015; Byron Reeves & Nass, 1996; Schroeder et al., 2013; Sproull et al., 1996; Takeuchi & Naito, 1995; Von Der Pütten, Krämer, Gratch, & Kang, 2010). Scene cuts with close-ups did not significantly differ from the static image inferring that the counselor may be getting all necessary information to complete the task from the single view (1V) condition as supported by televisions active theory of viewer's visual attention (Anderson & Lorch, 1983) and goal oriented visual patterns in video game play (El-Nasr & Yan, 2006; Romero-Hall et al., 2016; Volonte et al., 2018). Secondly, the counselor might have viewed the use of scene cuts with close-ups (2V condition) as "unnatural" and therefore distracting. Further testing is needed to understand if the use of close-ups influences the counselor's/learner's judgement of the visual and behavioral representation of the character (Aldred, 2011; Ring, Utami, & Bickmore, 2014; Veletsianos, 2012) or if the close-ups distract the viewer.

Attentional influence due to different levels of the virtual human's behaviors indicated no significant changes in the learner's visual attention are consistent with Romero-Hall et al. (2016) who also found no indication of a relationship between a virtual human's emotional intensity and a participant's visual attention. The observed significant increase in the number of fixations but not their duration toward the virtual human exhibiting exaggerated behaviors may be due to be an orientation user response described by Diao & Sundar (2004); Lang, Geiger, Strickwerda, & Sumner (1993); Potter, Lynch, & Kraus (2015); Smith & Gevins (2009); (Alwitt et al., 1980; Anderson & Levin, 1976). While the animated behaviors of the virtual human may be orienting the learner's visual fixations, the learner is not maintaining focus on the character, but actively

seeking information to accomplish the task supporting a goal-oriented approach versus reacting to constant changes in scene (Anderson & Lorch, 1983; Gegenfurtner et al., 2011).

The low NASA TLX effort observed infers that the scenario selected was too easy and did not challenge the learners (Evans & Fendley, 2017). The overall high score could also indicate that the participants were highly skilled or experienced. Future research should consider longer, more complex scenarios and even the use of multiple scenarios as suggested by (Jackson, Kim, Lee, Choi, & Song, 2016).

Recent research on other training environments also indicates that learners found training with a virtual human to be beneficial (Romero-Hall et al., 2016). Proctor, Lucario, & Wiley (2008) suggest that the influence of video game exposure associated with military social cultural groupings or ranks may contribute to the difference in the enlisted and other ranks. While video game experience did not significantly differ among the different ranks, it should be noted that there were only a limited number of enlisted participants and future experimentation is needed to better understand these differences.

Conclusions

This research adds to the limited amount of literature on visual attention to virtual humans in a counselee training setting. Until virtual agents become conversationally more human-like and autonomous, designers of social skills training simulations and environments developing training applications will likely utilize multiple windows with speaking and non-speaking phases of the interaction. These types of training environments have been successful in the development of social skills for autistic children (Irish, 2013; Tartaro et al., 2014).

Expansion areas for the use of simulated social interactions including the development and practice of job interview skills (Baur, Damian, Gebhard, Porayska-Pomsta, & Andre, 2013; Smith et al., 2014); the training of educational counselors (Beidoğlu, Dinçyürek, & Akıntuğ, 2015); the development of skills associated with doctor-patient conversations (Talbot et al., 2012a); and even the use in marital (Adebiyi & Ajibola, 2015) and parental counseling (Foshee et al., 2012).

This study indicates that learners in social skills training environments use visual attentional behavior consistent with socially observed norms when interacting with the speaking virtual humans even without the learner's perception that the conversation is real. Supporting the use of social behaviors, learners prefer to interact with an animated virtual human that provides both verbal and nonverbal channels of communication. Learner's viewed the interaction as a positive experience and accepted the virtual human as a conversational partner within the training environment. None the less, the display's interface design will likely split a learner's visual attention between the virtual human display and display of information relevant to a training task, such as a written response that may be graded. Interestingly, young participants attended to the virtual human more than old participants, likely highlighting older participants selection of listening or attending to the virtual human audio content over video content.

Additional Future Research

For future research into interfaces involving multiple windows, a study de-conflicting the timing of the learner feedback and the start of the virtual human's response might provide a

better understanding of the split-attention between the VHRP and the Choice windows. Future experimentation should consider the multiple view condition with scene cuts changing the view of the virtual human without the use close-ups (Ring, Utami, Olafsson, & Bickmore, 2016). The change in view point without a close-up provides an opportunity for the orientation response while maintaining the full body view of the virtual human. This additional research could provide further insight to as to why counselor' visual focus on the speaking virtual human for the 2V condition was not statistically different from the static image.

Rapid improvements in virtual human capabilities toward real-time speech recognition and natural language understanding with dynamic response or with "wizard of Oz" experimental set-up (Rizzo et al., 2016; Robb et al., 2015; Slovák, Thieme, Tennent, Olivier, & Fitzpatrick, 2015) may enable more robust training systems without the need for fixed multiple windows. Future research on level of visual attention to virtual humans for training scenarios versus our outcomes and natural conversations would be of interest.

Learner performance training effectiveness was difficult due to the high scores posted by all participants. Future research should implement longer and more complex scenarios and even multiple interaction scores (Jackson et al., 2016).

As researchers consider future experimentation, it is also recommended that age, experience, and education be considered as research factors.

Lessons Learned on Conduct of the Experiment

Recruiting an appropriate sample proved to be difficult. Since this research focused on military issues, the sample was limited to people in the military, people who had served in the

military, or students being prepared for military service. Once military members are identified it is essential to work out a schedule with the appropriate commanding officer or senior NCO to make sure the data collection does not hinder the unit's mission or interferes with the training schedule as little as possible. Achieving the desired size of the experimental population may require a broad definition of the target audience. That may require further detailed understanding of the differences between the military branches and hierarchy. In this research, the development of the demographic question about rank, a question arose whether or not the E4 rank should be considered to be a NCO or not. E4s can be a corporal (a junior NCO) or a specialist (enlisted). After reviewing the surveys and consulting with the unit commanders, a determination was made that four of the E4-E6s held an E4 Specialist rank. Future considerations would be to ask to individual ranks (ie., E1, E2, E3, etc.) or pre-group the responses as enlisted, NCO, officer, etc. While thought to have a minimal impact to the overall results of the study with the limited number of enlisted, it does warrant further investigations with larger populations of enlisted and NCOs.

APPENDIX A: PRE-EXERCISE QUESTIONNAIRE

APPENDIX A: PRE-EXERCISE QUESTIONNAIRE

CONFIDENTIALITY: The first few questions ask you to provide information about yourself and your experience. This information is kept completely confidential. This information will only be used to compare trainees' general level of experience with their performance; nothing specific to you will be analyzed or reported. You may omit any information you do not wish to share.

1. Please write the date and time.
2. Please write your subject number in order to match up pretest and post-test responses.
3. What is your age?
4. What is your gender? Male or Female
5. What is your highest level of education?
    a. Some high school
    b. High school diploma/equivalent
    c. Some college
    d. Associate's degree
    e. Bachelor's degree
    f. Master's degree
    g. Doctoral degree
6. Were you prior enlisted? Yes or No
7. What was your path to ascension?
    a. Military Academy
    b. ROTC
    c. Officer Candidate School
    d. Other (Please specify)
8. How much experience have you had in each of the following situations? (None, A little, Some, or A lot)
    a. Using computers
    b. Playing video games
    c. Interacting with virtual humans
    d. Counseling a subordinate
    e. Managing someone who has had a performance problem
    f. Helping a subordinate deal with a personal problem
9. For the following six items, please use this scale to rate your confidence in your CURRENT ability. (1 – I am certain I cannot; 4 – I am unsure if I can; 7 – I am certain I can).
    a. Listen, with the goal of understanding, to help someone resolve personal issues.
    b. Identify the specific resources necessary to ehlp Soldiers in my unit resolve personal issues.
    c. Remain neutral and supportive even when a Soldier I'm trying to help is angry or resisting.
    d. Recognize when I need to ask more questions to verify something a Soldier tells me.

    e. Identify when a person does not know how to do something instead of not wanting to do it.
    f. Recognize when a Soldier's problem is resolved satisfactorily.
10. Please rate the following two items on the scale provided. (1 – Not at all important; 4 – somewhat important; 7 – Very Important)
    a. As an Officer, I believe interpersonal skills are:
    b. In my opinion, my supervisors believe interpersonal skills are:
11. Please indicate whether each behavior suggests that a person is listening with the goal of understanding another person's problems. (Yes or No)
    a. When the speaker finishes describing the problem, the listener suggests a reasonable solution.
    b. The listener has a neutral expression on their face.
    c. The listener occasionally interrupts the speaker in order to help the listener focus their thoughts.
    d. The listener summarizes what was said to make sure that they understand the problem.
12. Please indicate whether you should ask a Soldier questions to collect and confirm facts about a performance problem that Soldier is demonstrating. (Yes or No).
    a. The Soldier acts very confident when he addresses you.
    b. Someone tells you that the Soldier is to blame for a problem.
    c. The Soldier is only sharing information that supports his story.
    d. The Soldier has a good excuse for the problem.
13. Please indicate whether you should confront a Soldier about a performance problem that Soldier is demonstrating. (Yes or No).
    a. The Soldier is not doing his job adequately.
    b. The Soldier has a bad attitude while performing his job.
    c. The Soldier spends all his off-duty time playing video games.
    d. The Soldier uses some of his work period to study for an advancement examination.
14. Please indicate which situations require that you refer a Soldier to another person in order to address a personal problem that Soldier is having. (Yes or No).
    a. When the situation does not require you to notify the chain of command.
    b. When you don't feel that you have the time to solve the Soldier's problem.
    c. When you know there are others who are better qualified to solve the Soldier's problem.
    d. When you are not comfortable talking about the problem with the Soldier.

This questionnaire was adaptive from the University of Southern California's Institute for Creative Technologies questionnaire for the Immersive Naval Officer Training System (INOTS) and the ELITE system for the Army (Campbell, Hays, et al., 2011; Hays, Campbell, & Trimmer, 2012)

APPENDIX B: SITUATIONAL JUDGMENT TEST

APPENDIX B: SITUATIONAL JUDGMENT TEST

INSTRUCTIONS: Please read the following scenarios. For each scenario, there are several possible actions. Please rate how appropriate each action is. (You are permitted to provide the same rating to multiple actions.)

1. As a Platoon Leader, you've always had an open-door policy with your Soldiers. One of them shows up at your office without an appointment and demands to talk to you. The Soldier is very upset and emotional, and begins to yell about a problem he is encountering in his work. Please rate the following ways in which you could respond to this situation.

ACTIONS (Select one response per action)	Not Appropriate	Somewhat Appropriate	Very Appropriate
Hear the Soldier out, and then ask, "What can I do to address the problem?"			
Command the Soldier to stop yelling and show some respect			
Ask the Soldier to please come back when he is less upset and can calmly tell you about the problem			
Begin by quietly getting up and closing the door			
Listen while the Soldier yells, summarize what you understood, and ask, "Am I correct?"			
Firmly tell the Soldier that you are not the problem and so there is no need for him to yell at you.			

2. You have observed a Soldier expressing a bad attitude toward work. Her coworkers have complained to you about her behavior. When you confront her about it, she says she has problems at home that make it difficult to focus on work. Please rate the following actions you could take during your discussion with her.

ACTIONS (Select one response per action)	Not Appropriate	Somewhat Appropriate	Very Appropriate
Ask the Soldier whether she is aware that her attitude and behavior have negatively affected unit morale.			
Tell the Soldier that her coworkers have complained about her.			
Recommend that the Soldier seek help to solve her problems at home.			
Offer to give the Soldier time off from work until she can come back and perform her job satisfactorily.			
Explain to the Soldier that she is a valuable member of the unit and so she has to leave her problems at home.			
Tell the Soldier you want her to get back on the job and that you will be following up to see that she is performing adequately.			
Conclude by stating the level of performance you would like to see from her. To make sure she understands, ask the Soldier to repeat it back to you- and to agree to reach that goal.			

3. As a Platoon Leader, you often walk around the area where the Soldiers in your unit are working. While on duty, you notice a Soldier who is on the work center's phone every time you pass his desk. From what you understand, his job does not require the use of the phone. Please rate the following ways in which you could respond to this situation.

ACTIONS (Select one response per action)	Not Appropriate	Somewhat Appropriate	Very Appropriate
Direct the Soldier to follow you to your office and ask him, "Why are you on the phone so much?"			
Go back to your office without saying anything, and review the Soldier's Personnel Record.			
Confront the Soldier with your observation and ask him if he is aware of the problem.			
Walk by the Soldier's work center every hour and write down the time of day you noted he was on the phone.			
Go back to your office and record the performance problem in the Soldier's file.			
Discuss the matter with the Platoon Sergeant.			

4. (This scenario follows from the previous scenario.) You ask the Soldier about the excessive phone use during work hours. The Soldier responds by saying that his time on the phone is spent helping other workers accomplish their tasks. You ask the Soldier questions to get more information, such as: Who are the other Soldiers? What tasks are involved? When did they ask you to help them with the tasks? Please rate the following actions you could take after having gathered this information.

ACTIONS (Select one response per action)	Not Appropriate	Somewhat Appropriate	Very Appropriate
Say that you will confirm this information with the other Soldiers.			
Tell the Soldier you will get back to him.			
Tell the Soldier that he needs to let the other Soldiers know that they should be seeking assistance from the Team Leader instead of asking for his help.			
Set up a meeting with the Soldier to discuss this information.			

This Subject Judgment Test was developed by the University of Southern California's Institute for Creative Technologies (Campbell, Hays, et al., 2011; Hays, Campbell, & Trimmer, 2012).

APPENDIX C: PARTICIPANT REACTION

APPENDIX C: PARTICIPANT REACTION

Provide your opinion of the interaction with the virtual human role-player by circling the number that best describes the interaction.

The virtual human role-player looked like a video of a real human.

Not Human						Human
1	2	3	4	5	6	7

The virtual human role-player showed human-like emotion.

Not Human						Human
1	2	3	4	5	6	7

The virtual human role-player's voice was synched with its lips and facial movements.

Not Human						Human
1	2	3	4	5	6	7

The virtual human role-player exhibited realistic gestures.

Not Human						Human
1	2	3	4	5	6	7

It seemed that I was interacting with a live human role-player.

Not Human						Human
1	2	3	4	5	6	7

This was a useful experience for developing leadership skills.

Not Human						Human
1	2	3	4	5	6	7

Answer the following questions about the interaction with the counselee.

Did you see the counselee?

Yes No

What was the counselee's hair?

Blonde Black Red Brown

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The dialog was similar to what I would have said a subordinate in that situation.					
I would have handled the conversation for the situation differently.					
I felt like I was having a face-to-face conversation.					
I felt like I paid attention to the subordinate, counselee during the conversation.					
Zooming in on the counselee's face expected seemed artificial to me.					
The counselee's gestures seemed exaggerated to me.					
The counselee reacted to my selected statements as expected.					
The views of the virtual human allowed me to assess the state of the virtual human.					

The counselee appeared to be: (Select the best answer for each descriptor in the left hand column).

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Bored					
Frustrated					
Defensive					
Open (Honest)					
Friendly					
Interested					
Anxious					

Using the provided adjectives, describe the following aspects of your impressions of the system during the interaction with virtual human role-player in the ELITE Lite scenario. Select the rating the most closely describes your experience with each aspect of the interaction. An assigned value of "1" is the negative end of the scale and a value of "5" is the positive end of the scale.

Inferior				Superior
1	2	3	4	5
Unsuccessful				Successful
1	2	3	4	5
Bad				Good
1	2	3	4	5
Phony				Authentic
1	2	3	4	5
Meaningless				Meaningful
1	2	3	4	5
False				True
1	2	3	4	5
Incompetent				Competent
1	2	3	4	5
Not Real				Real
1	2	3	4	5
Not Effective				Effective
1	2	3	4	5
Not Convincing				Convincing
1	2	3	4	5

APPENDIX D: NASA TASK LOAD INDEX

APPENDIX D: NASA TASK LOAD INDEX

Hart and Staveland's NASA Task Load Index (TLX) method assess workload on five 7-point scales.

Name	Task ELITE Lite Experiment	Date

Rating Scale Definition of Terms.

Title	Endpoints	Description
MENTAL DEMAND	Low/High	How much mental and perceptual activity was required (e.g., thinking, deciding, calculating, remembering, looking, searching, etc.)? Was the task easy or demanding, simple or complex, exacting or forgiving
PHYSICAL DEMAND	Low/High	How much physical activity was required (e.g., pushing, pulling, turning, controlling, activating, etc.)? Was the task easy or demanding, slow or brisk, slack or strenuous, restful or laborious?
TEMPORAL DEMAND	Low/High	How much time pressure did you fell due to the rate or pace at which the tasks or task elements occurred? Was the pace slow and leisurely or rapid and frantic?
EFFORT	Low/High	How hard did you have to work (mentally and physically) to accomplish your level of performance?
PERFORMANCE	Poor/Good	How successful do you think you were in accomplishing the goals of the task set by the experimenter (or yourself)? How satisfied were you with your performance in accomplishing these goals?
FRUSTRATION LEVEL	Low/High	How insecure, discouraged, irritated, stressed and annoyed versus secure, gratified, content, relaxed and complacent did you feel during the task?

Mental Demand: How mentally demanding was the task?

Low High

Physical Demand: How physically demanding was the task?

Low High

Temporal Demand: How hurried or rushed was the pace of the task?

Low High

Performance: How successful were you in accomplishing what you were asked to do?

Good Poor

Effort: How hard did you have to work to accomplish your level of performance?

Low High

Frustration: How insecure, discouraged, irritated, stressed, and annoyed were you?

Low High

APPENDIX E: INSTITUTIONAL REVIEW BOARD APPROVAL LETTERS

University of Central Florida Institutional Review Board
Office of Research & Commercialization
12201 Research Parkway, Suite 501
Orlando, Florida 32826-3246
Telephone: 407-823-2901, 407-882-2901 or 407-882-2276
www.research.ucf.edu/compliance/irb.html

Notice that UCF will Rely Upon Other IRB for Review and Approval

From : **UCF Institutional Review Board**
FWA00000351, IRB00001138

To : **John L. Hart**

Date : **August 21, 2017**

IRB Number: **SBE-17-13382**

Study Title: **Factors Influencing Attention to a Virtual Human in a Virtual Counseling Session While Mitigating Attention Conflict with on Screen Text**

Dear Researcher:

The research protocol noted above was reviewed by the University of Central Florida IRB Designated on August 21, 2017. The UCF IRB accepts the U.S. Army Research Laboratory's Institutional Review Board review and approval of this study for the protection of human subjects in research. **The expiration date will be the date assigned by the U.S. Army Research Laboratory's Institutional Review Board and the consent process will be the process approved by that IRB.**

This project may move forward as described in the protocol. It is understood that the U.S. Army Research Laboratory's IRB is the IRB of Record for this study, but local issues involving the UCF population should be brought to the attention of the UCF IRB as well for local oversight, if needed.

All data, including signed consent forms if applicable, must be retained and secured per protocol for a minimum of five years (six if HIPAA applies) past the completion of this research. Any links to the identification of participants should be maintained and secured per protocol. Additional requirements may be imposed by your funding agency, your department, or other entities. Access to data is limited to authorized individuals listed as key study personnel.

Failure to provide a continuing review report for renewal of the study to the U.S. Army Research Laboratory's IRB could lead to study suspension, a loss of funding and/or publication possibilities, or a report of noncompliance to sponsors or funding agencies. If this study is funded by any branch of the Department of Health and Human Services (DHHS), an Office for Human Research Protections (OHRP) IRB Authorization form must be signed by the signatory officials of both institutions and a copy of the form must be kept on file at the IRB office of both institutions.

On behalf of Sophia Dziegielewski, Ph.D., L.C.S.W., UCF IRB Chair, this letter is signed by:

Signature applied by Patria Davis on 08/21/2017 03:11:20 PM EDT

IRB Manager

DEPARTMENT OF THE ARMY
U.S. ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMY RESEARCH LABORATORY
ABERDEEN PROVING GROUND MD 21005-5067

REPLY TO
ATTENTION TO

RDRL-HR 3 Oct 2016

MEMORANDUM FOR: John Hart, ARL-HRED, Orlando, FL

FROM: Daniel Cassenti, ARL IRB

SUBJECT: Approval of Research Study, ARL 16-116

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counselling Session While Mitigating Attention Conflict with on Screen Text
Submission Type: Initial Protocol
Approval Period: 13 September 2016 to 12 September 2017

The purpose of this memorandum is to notify you that the research project identified above was determined to be minimal risk and has been approved by the ARL Institutional Review Board (IRB) by expedited review under category 7 on 13 Sep 2016.

The project documents were initially reviewed on 12 Sep 2016:

- Protocol Cover Sheet
- Scientific Reviews
- Protocol
- Consent
- Appendices
- CV, CITI certificates, COI form for researchers

The IRB reviewer requested changes in order to secure approval. On 13 Sep 2016 the following modified documents were reviewed and the study was approved:

- Revised protocol
- Revised consent
- Revised recruitment material

As principal investigator, you are responsible for ensuring that the study is conducted in accordance with the final version of your protocol. You cannot delegate your

supervisory responsibility to anyone else associated with the project. If you leave the project a new principal investigator should be designated for the research. Designation of a new principal investigator should be reported to the IRB.

In addition, you must report the following to the IRB:

- You must report changes in research personnel, including the principal investigator, involved in the study.
- You must report changes in the research procedures before they are initiated. You can report minor changes by completing the ARL amendment form.
- You may make changes in research procedures implemented to eliminate immediate hazards to the subjects, but they must be reported within 10 days of their implementation on the amendment form.
- You must report completion or discontinuation of your study by submitting a completion or discontinuation report to the IRB.
- You must report plans to continue your study beyond the expiration date before you attain that date, by submission of a continuing review form 30 days before the expiration date.
- You must promptly report any injury or Unanticipated Problems Involving Risks to Participants or Others (UPIRTSO) to the IRB within 24 hours (via phone message, e-mail, or written report) of the incident. This should be followed by a full written report within 10 business days.

A UPIRTSO is defined in DODI 3216.02, Glossary as "Any incident, experience, or outcome that meets ALL three of the following conditions:

- Is unexpected (in terms of nature, severity, or frequency) given the procedures described in the research protocol documents (e.g., the IRB-approved research protocol and informed consent document) and the characteristics of the human subject population being studied.
- Is related or possibly related to participation in the research. *Possibly related* means there is a reasonable likelihood that the incident, experience, or outcome may have been caused by the procedures involved in the research.
- Suggests that the research places human subjects or others at a greater risk of harm (including physical, psychological, economic, or social harm) than was previously known or recognized, even if no harm has actually occurred.

RDRL-HR
Subject: Approval of Research Study, ARL 16-116

This approval letter was held until departmental approval was obtained from West Point. There was also an internal administrative delay in sending your approval letter.

The ARL IRB approved consent form, dated 13 September 2016, is included with this correspondence. Use this version when consenting subjects for your study.

Good luck with your research.

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DANIEL CASSENTI
ARL IRB Co-Chair

DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMY RESEARCH LABORATORY
BUILDING 459
ABERDEEN PROVING GROUND MD 21005-5425

REPLY TO
ATTENTION TO

RDRL-HR

1 December 2016

MEMORANDUM FOR: John Hart, ARL-HRED, Orlando, FL

FROM: Theresa M. Straut, Human Protection Administrator, ARL, APG, MD

SUBJECT: Approval of Research Amendment, ARL 16-116

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counseling Session While Mitigating Attention Conflict with on Screen Text

Submission Type: Amendment

Approval Period: 13 September 2016 to 12 September 2017

The purpose of this memorandum is to notify you that the amendment to the research project identified above was approved via expedited review procedures on 1 December 2016.

The following changes to your project were reviewed:

- Change in associate investigator

The following modified items were received and reviewed:

- Revised study protocol
- Revised study protocol coversheet
- Revised informed consent forms
- Study Protocol Appendices
- Roy Wall COI, CITI & CV
- 3 Scientific Reviews
- PI amendment application

As principal investigator, you are responsible for ensuring that the study is conducted in accordance with the IRB approved version of the protocol. You cannot delegate your supervisory responsibility to anyone else associated with the project. If you leave the

project a new principal investigator should be designated and the change reported to the IRB.

If you have any questions or concerns, I can be reached at 410-278-5928.

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Date: 2016.12.01 13:38:58 -05'00'

THERESA M. STRAUT, CIP, RAC
Human Protection Administrator, ARL IRB

DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMY RESEARCH LABORATORY
BUILDING 459
ABERDEEN PROVING GROUND MD 21005-5425

REPLY TO
ATTENTION TO

RDRL-HR

23 Feb 2017

MEMORANDUM FOR: John Hart, ARL-HRED, Orlando, FL

FROM: Theresa M. Straut, Human Protection Administrator, ARL, APG, MD

SUBJECT: Amendment, ARL Protocol 16-116

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counseling Session While Mitigating Attention Conflict with on Screen Text

Submission Type: Amendment
Approval Period: 13 September 2016 to 12 September 2017

The purpose of this memorandum is to notify you that the amendment to the research project identified above was approved via expedited review procedures on 23 Feb 2017.

The following changes to your project were requested:

- Increased number of participants
- Added recruitment of U.S. Army Reserve Units
- Revisions to questionnaire

The following items were received and reviewed:

- Amendment Application
- Revised protocol
- Revised Questionnaire
- Revised informed consent forms
- Revised Recruitment Documents
- Command support for U.S. Army Reserve Units

As principal investigator, you are responsible for ensuring that the study is conducted in accordance with the IRB approved version of the protocol. You cannot delegate your supervisory responsibility to anyone else associated with the project. If you leave the

project a new principal investigator should be designated and the change reported to the IRB.

If you have any questions or concerns, I can be reached at 410-278-5928 or usarmy.apg.rdecom.mbx.arl-irb-office@mail.mil.

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Date: 2017.02.23 15:14:01 -05'00'

THERESA M. STRAUT
Human Protection Administrator, ARL

DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMY RESEARCH LABORATORY
BUILDING 459
ABERDEEN PROVING GROUND MD 21005-5425

REPLY TO
ATTENTION TO

RDRL-HR

4 April 2017

MEMORANDUM FOR: John Hart, ARL-HRED, Orlando, FL

FROM: Theresa M. Straut, Human Protection Administrator, ARL, APG, MD

SUBJECT: Amendment, ARL Protocol 16-116

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counseling Session While Mitigating Attention Conflict with on Screen Text

Submission Type: Amendment
Approval Period: 13 September 2016 to 12 September 2017

The purpose of this memorandum is to notify you that the amendment to the research project identified above was approved via expedited review procedures on 31 March 2017.

The following changes to your project were requested:

- Added recruitment of U.S. Coast Guard Units

The following items were received and reviewed:

- Amendment Application
- Revised protocol
- Revised informed consent forms
- Command support for U.S. Coast Guard Units

As principal investigator, you are responsible for ensuring that the study is conducted in accordance with the IRB approved version of the protocol. You cannot delegate your supervisory responsibility to anyone else associated with the project. If you leave the project a new principal investigator should be designated and the change reported to the IRB.

RDRL-HR
SUBJECT: Approval of Research Amendment, ARL 16-116

If you have any questions or concerns, I can be reached at 410-278-5928 or usarmy.apg.rdecom.mbx.arl-irb-office@mail.mil.

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Date: 2017.04.04 15:25:01 -04'00'

THERESA M. STRAUT
Human Protection Administrator, ARL

DEPARTMENT OF THE ARMY
US ARMY RESEARCH, DEVELOPMENT AND ENGINEERING COMMAND
ARMY RESEARCH LABORATORY
BUILDING 459
ABERDEEN PROVING GROUND MD 21005-5425

REPLY TO
ATTENTION TO

RDRL-HR

20 Apr 2017

MEMORANDUM FOR: John Hart, ARL-HRED, Orlando, FL

FROM: Theresa M. Straut, Human Protection Administrator, ARL, APG, MD

SUBJECT: Amendment, ARL Protocol 16-116

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counseling Session While Mitigating Attention Conflict with on Screen Text

Submission Type: Amendment 4

Approval Period: 13 September 2016 to 12 September 2017

The purpose of this memorandum is to notify you that the amendment to the research project identified above was approved via expedited review procedures on 20 April 2017.

The following changes to your project were requested:

- Addition of research sites
- Additional recruitment pool of subjects

The following items were received and reviewed:

- Amendment Application
- Revised Protocol
- Revised informed consent forms
- Command approval

As principal investigator, you are responsible for ensuring that the study is conducted in accordance with the IRB approved version of the protocol. You cannot delegate your supervisory responsibility to anyone else associated with the project. If you leave the project a new principal investigator should be designated and the change reported to the IRB.

Additionally, administrative corrections were made to the informed consent form: Header dates were updated and the contact information for the HPA was revised. Use the new IRB approved consent for all new subjects.

If you have any questions or concerns, I can be reached at 410-278-5928 or usarmy.apg.rdecom.mbx.arl-irb-office@mail.mil.

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Date: 2017.04.20 11:48:20 -04'00'

THERESA M. STRAUT
Human Protection Administrator, ARL

APPENDIX F: COMMAND APPROVAL LETTERS

DEPARTMENT OF THE ARMY
DEPARTMENT OF BEHAVIORAL SCIENCES AND LEADERSHIP
UNITED STATES MILITARY ACADEMY
601 CULLUM ROAD
WEST POINT, NY 10996

REPLY TO
ATTENTION OF:

MADN-BSL

14 September 2016

MEMORANDUM FOR RECORD

SUBJECT: Support for ARL STTC research

1. The purpose of this memorandum is to provide my support from the Engineering Psychology Program and the Department of Behavioral Sciences and Leadership for the study, "Factors Influencing Attention Level to a Virtual Human in a Virtual Counselling Session While Mitigating Attention Conflict with on Screen Text"

2. This research effort will assist the Engineering Psychology Program and our department in developing our faculty. MAJ Charles Rowan will represent the Engineering Psychlogy Program as a part of the research team. Further, this study will benefit faculty and Cadet development while helping to support the warfighter of the future. The research team will collect and analyze data in the Engineering Psychology Program's laboratory facilities. This study has the full support of our program and department.

3. The point of contact for this memorandum is the undersigned at 845.938.5902 or ericka.rovira@usma.edu.

ERICKA ROVIRA, Ph. D.
Program Director

DEPARTMENT OF THE ARMY
2D BN 485TH REGT 1ST BDE 98TH DIV (IET)
MCCOY ARMY RESERVE CENTER
3682 WILEY DRIVE
ORLANDO, FL 32824

AFRC-TNC-BAE

14 February 2017

MEMORANDUM FOR RECORD

SUBJECT: Support for ARL Advanced Training & Simulations Division Research

1. The purpose of this memorandum is to provide my full support for Mr. John Hart to conduct SHARP "Factors Influencing Attention Level to a Virtual Human in a Virtual Counseling Session while Mitigating Attention Conflict with on Screen text" research utilizing 2-485th Regt Soldiers.

2. This research effort will benefit my Soldiers development and understanding of Army research while helping to support the warfighter of the future. The research team will collect and analyze data in the Battalion areas of the 2-485th Regt located at 3163 Wiley Drive, Orlando, FL., 32826. This study has our full support of your program and department.

3. The point of contact for this memorandum is the undersigned at james.d.nelson52.mil@mail.mil.

Digitally signed by NELSON.JAMES.DARYL.JR.1143596601
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Date: 2017.02.14 15:46:51 -05'00'

JAMES D. NELSON, Jr.
LTC, AV, USAR
Commanding

U.S. Department of Homeland Security

United States Coast Guard

Officer In Charge
United States Coast Guard
Station Ponce De Leon Inlet

2999 N. Peninsula Ave.
New Smyrna Beach, FL 32169
Staff Symbol:
Phone: (386) 428-9085

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31MAR2017

MEMORANDUM

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Reason: I am the author of this document
Date: [illegible]

From: D. R. Carrig, BMCS
CG STA Ponce De Leon Inlet

Reply to
Attn of:

To: File

Subj: SUPPORT FOR ARL ADVANCED TRAINING AND SIMULATIONS DIVISION

1. Mr. John Hart of the U. S. Army Research Laboratory has my full support and permission to conduct "Factors Influencing Attention Level to a Virtual Human in a Virtual Counseling Session while Mitigating Attention Conflict with on Screen text" using members under my command.

2. The research team will collect and analyze data on site at Coast Guard Station Ponce De Leon Inlet. Any participation done by members under command is strictly voluntary and with the understanding that unit operations take precedence.

#

RDRL-HRO 14 April 2017

MEMORANDUM FOR RECORD

SUBJECT: Support for ARL Advanced Training & Simulations Division Research

1. Subject to research protocols, this memorandum grants support and approval to conduct the research "Factors Influencing Attention Level to a Virtual Human in a Virtual Counseling Session while Mitigating Attention Conflict with on Screen Text" utilizing volunteer employees of the Army Research Laboratory in Orlando, Florida.

2. This research benefits the Army in the development of virtual humans and understanding how to utilize them effectively in training systems focused on leadership and social skills. The research team will collect the data in the SFC Smith Center located at 12423 Research Parkway, Orlando, FL 32826.

3. The point of contact for this memorandum is the undersigned.

HAROLD BUHL
COL, AR
Program Manager

DEPARTMENT OF THE ARMY
PROGRAM EXECUTIVE OFFICE
SIMULATION, TRAINING AND INSTRUMENTATION
12350 RESEARCH PARKWAY
ORLANDO, FLORIDA 32826-3276

SFAE-STRI-CoS

17 April 2017

MEMORANDUM FOR PEO STRI Project Managers and Staff

SUBJECT: Support for ARL STTC Advanced Training & Simulations Division Research

1. In accordance with the U.S. Army Research, Development and Engineering Command, Army Research Laboratory Memorandum, Subject: Approval of Research Study, ARL 16-116, dated 2 October 2016, PEO STRI personnel are authorized to voluntarily support, subject to supervisory approval and on a non-mission interference basis, for Mr. John Hart's research study, "Factors Influencing Attention Level to a Virtual Human in a Virtual Counseling Session while Mitigating Attention Conflict with on Screen Text."

2. This research effort will benefit our Soldiers' development and understanding of Army research while helping to support the warfighter of the future. This study has PEO STRI's full support.

3. The point of contact for this memorandum is the undersigned at 407-384-3770 or traci.a.jones.civ@mail.mil.

Traci A. Jones

TRACI A. JONES
Acting, Chief of Staff

APPENDIX G: INFORMED CONSENT

Site of Research: United States Military Academy, West Point, NY
McCoy Army Reserve Center, Orlando, FL
U.S. Coast Guard Ponce De Leon Inlet,
New Smyrna Beach, FL
Army Research Laboratory, Orlando, FL
University of Central Florida Partnership Building, Orlando, FL

RESEARCH PARTICIPANT CONSENT FORM ARMY RESEARCH LABORATORY

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counselling Session While Mitigating Attention Conflict with on Screen Text

Sponsor: U.S. Army Research Laboratory

Principal Investigator: Mr. John Hart
Army Research Laboratory
Human Research & Engineering Directorate
12423 Research Parkway
Orlando, FL 32826
407-208-3012; john.l.hart24.civ@mail.mil

You are being asked to participate in a research study. This consent form explains the research study and your part in it. Please read this form carefully before you decide to take part. You can take as much time as you need. Please ask questions at any time about anything you do not understand. You are a volunteer. If you agree to participate in the study, you can change your mind later. You can decide not to take part now or you can end your participation at any time later on.

Why is this research being done?

The objective of this research is to better understand the learning process during computer-based training that employs a virtual human avatar. A virtual human avatar is a computer-generated representation of a person with which the learner can interact during the course of the learning process. The research will involve evaluating research participants' actions and responses as they interact with the virtual human character.

What will happen if you join this study?

After signing this form, you will be seated at a desk and asked to complete two separate surveys providing demographics and experiences. Following the completion of the surveys, you will be seated in front of a laptop computer with an external monitor and asked to view a brief instructional video describing the learning objectives of the Emergent Leader Immersive Training

Environment (ELITE) Lite training application. After viewing the instructional material, you will be given a brief tutorial on the use of the ELITE Lite software application and then you will login to the ELITE Lite study application and interact in a simulated role-playing scenario that simulates a counseling session with a virtual subordinate unit member. The interaction requires the use of a computer mouse interface device.

After completing the simulated role-playing scenario, will you be asked to complete two different surveys describing your perceptions and attitudes during the interaction along with a final skills assessment. This will complete your participation in the study.

How much time will the study take?

Your participation in the research will take a maximum of 75 minutes.

What are the risks or discomforts of the study?

This study poses minimal risk to volunteers. The risks associated with participation in this research are the same as those associated with being seated at a desk operating a laptop computer for general purposes. The audio from the speakers and/or headphones operate at levels consistent with other commercial laptop computer/speaker combinations. The audio levels will be preset at levels with the OSHA's (Occupational Health and Safety Administration) permissible noise levels (Occupational Noise Exposure Standard 1910.95).

Are there benefits to being in the study?

There are no direct benefits to the participants in this experiment. However, the results of this study will benefit the design of future social skills training applications. Understanding how learner's interact with virtual humans can guide interface design to focus on important social communication skills and eliminate interface distractions.

Will you be paid if you join this study?

There will be no monetary compensation provided for participation in this study. Student participants may be eligible to receive extra class credit for their participation.

Will it cost you anything to be in this study?

There are no costs to participants in this research.

Why might we take you out of the study early?

Subject safety is our top priority. If we feel that you are struggling with the scenario or experiencing discomfort during experiment procedures, we will stop the study prematurely. If you are eligible for extra class credit, you will still receive it for the amount of time you participated in the experiment.

How will your privacy be protected?

Your participation in this research is confidential. A unique subject identification number will be used to identify all files and data sheets pertaining to your participation. Your name will only appear as a signature on this consent form. The subject identification number will not contain any personally identifiable information (PII), and it will not be recorded on the consent form. Your data and this consent form will be stored separately and secured in a locked cabinet at the U.S. Army Research Laboratory in Orlando, FL, and the electronic data files will be password protected. Electronic files will be retained on computer hard drives and backup drives locked in the laboratory, which is only accessible to researchers who have card swipe access to the building. Your consent form will be retained by the investigators for a minimum of 3 years.

The research staff will protect your data from disclosure to people not connected with the study. However, complete confidentiality cannot be guaranteed because officials of the U. S. Army Human Research Protections Office and the Army Research Laboratory's Institutional Review Board are permitted by law to inspect the records obtained in this study to ensure compliance with laws and regulations covering experiments using human subjects.

Where can I get more information?

You have the right to obtain answers to any questions you might have about this research both while you take part in the study and after you leave the research site. Please contact the Principal Investigator listed at the top of the first page of this consent form for more information about this study. You may also contact the Human Protections Administrator (HPA) of the Army Research Laboratory at (410) 278-5928 with questions, complaints, or concerns about this research, or if you feel this study has harmed you. The HPA can also answer questions about your rights as a research participant. You may also call the HPA's number if you cannot reach the research investigator or wish to talk to someone who is not a member of the research team.

Voluntary Participation

Your decision to be in this research is voluntary. The maximum amount of time required to complete your participation will be 75 minutes. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawal from this study will involve no penalty or loss of benefits you would receive by staying in it.

Once your questions have been answered, and you agree to continue your participation in this study, please sign below.

WE WILL GIVE YOU A COPY OF THIS CONSENT FORM

Signature of Participant Date

Signature of Person Obtaining Consent Printed Name Date

Principal Investigator: John Hart
Version Date: 28 Mar 2017
Project Number: ARL 16-116

Site of Research: United States Military Academy, West Point, NY
McCoy Army Reserve Center, Orlando, FL
U.S. Coast Guard Ponce De Leon Inlet,
New Smyrna Beach, FL

RESEARCH PARTICIPANT CONSENT FORM
ARMY RESEARCH LABORATORY

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counselling Session While Mitigating Attention Conflict with on Screen Text

Sponsor: U.S. Army Research Laboratory

Principal Investigator: Mr. John Hart
Army Research Laboratory
Human Research & Engineering Directorate
12423 Research Parkway
Orlando, FL 32826
407-208-3012; john.l.hart24.civ@mail.mil

You are being asked to participate in a research study. This consent form explains the research study and your part in it. Please read this form carefully before you decide to take part. You can take as much time as you need. Please ask questions at any time about anything you do not understand. You are a volunteer. If you agree to participate in the study, you can change your mind later. You can decide not to take part now or you can end your participation at any time later on.

Why is this research being done?

The objective of this research is to better understand the learning process during computer-based training that employs a virtual human avatar. A virtual human avatar is a computer-generated representation of a person with which the learner can interact during the course of the learning process. The research will involve evaluating research participants' actions and responses as they interact with the virtual human character.

What will happen if you join this study?

After signing this form, you will be seated at a desk and asked to complete two separate surveys providing demographics and experiences. Following the completion of the surveys, you will be seated in front of a laptop computer with an external monitor and asked to view a brief instructional video describing the learning objectives of the Emergent Leader Immersive Training Environment (ELITE) Lite training application. After viewing the instructional material, you will be given a brief tutorial on the use of the ELITE Lite software application and then you will login to the ELITE Lite study application and interact in a simulated role-playing scenario that

simulates a counseling session with a virtual subordinate unit member. The interaction requires the use of a computer mouse interface device.

After completing the simulated role-playing scenario, will you be asked to complete two different surveys describing your perceptions and attitudes during the interaction along with a final skills assessment. This will complete your participation in the study.

How much time will the study take?

Your participation in the research will take a maximum of 75 minutes.

What are the risks or discomforts of the study?

This study poses minimal risk to volunteers. The risks associated with participation in this research are the same as those associated with being seated at a desk operating a laptop computer for general purposes. The audio from the speakers and/or headphones operate at levels consistent with other commercial laptop computer/speaker combinations. The audio levels will be preset at levels with the OSHA's (Occupational Health and Safety Administration) permissible noise levels (Occupational Noise Exposure Standard 1910.95).

Are there benefits to being in the study?

There are no direct benefits to the participants in this experiment. However, the results of this study will benefit the design of future social skills training applications. Understanding how learner's interact with virtual humans can guide interface design to focus on important social communication skills and eliminate interface distractions.

Will you be paid if you join this study?

There will be no monetary compensation provided for participation in this study. Student participants may be eligible to receive extra class credit for their participation.

Will it cost you anything to be in this study?

There are no costs to participants in this research.

Why might we take you out of the study early?

Subject safety is our top priority. If we feel that you are struggling with the scenario or experiencing discomfort during experiment procedures, we will stop the study prematurely. If you are eligible for extra class credit, you will still receive it for the amount of time you participated in the experiment.

How will your privacy be protected?

Your participation in this research is confidential. A unique subject identification number will be used to identify all files and data sheets pertaining to your participation. Your name will only appear as a signature on this consent form. The subject identification number will not contain any personally identifiable information (PII), and it will not be recorded on the consent form.

Your data and this consent form will be stored separately and secured in a locked cabinet at the U.S. Army Research Laboratory in Orlando, FL, and the electronic data files will be password protected. Electronic files will be retained on computer hard drives and backup drives locked in the laboratory, which is only accessible to researchers who have card swipe access to the building. Your consent form will be retained by the investigators for a minimum of 3 years.

The research staff will protect your data from disclosure to people not connected with the study. However, complete confidentiality cannot be guaranteed because officials of the U. S. Army Human Research Protections Office and the Army Research Laboratory's Institutional Review Board are permitted by law to inspect the records obtained in this study to ensure compliance with laws and regulations covering experiments using human subjects.

Where can I get more information?

You have the right to obtain answers to any questions you might have about this research both while you take part in the study and after you leave the research site. Please contact the Principal Investigator listed at the top of the first page of this consent form for more information about this study. You may also contact the Human Protections Administrator (HPA) of the Human Research & Engineering Directorate, Institutional Review Board, at (410) 278-5928 with questions, complaints, or concerns about this research, or if you feel this study has harmed you. The chairperson can also answer questions about your rights as a research participant. You may also call the chairperson's number if you cannot reach the research investigator or wish to talk to someone who is not a member of the research team.

Voluntary Participation

Your decision to be in this research is voluntary. The maximum amount of time required to complete your participation will be 75 minutes. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawal from this study will involve no penalty or loss of benefits you would receive by staying in it.

Once your questions have been answered, and you agree to continue your participation in this study, please sign below.

WE WILL GIVE YOU A COPY OF THIS CONSENT FORM

Signature of Participant Date

Signature of Person Obtaining Consent Printed Name Date

Site of Research: United States Military Academy, West Point, NY and McCoy Army Reserve Center, Orlando, FL

RESEARCH PARTICIPANT CONSENT FORM
ARMY RESEARCH LABORATORY

Project Title: Factors Influencing Attention to a Virtual Human in a Virtual Counselling Session While Mitigating Attention Conflict with on Screen Text

Sponsor: U.S. Army Research Laboratory

Principal Investigator: Mr. John Hart
Army Research Laboratory
Human Research & Engineering Directorate
12423 Research Parkway
Orlando, FL 32826
407-208-3012; john.l.hart24.civ@mail.mil

Date: 20 February 2017

You are being asked to participate in a research study. This consent form explains the research study and your part in it. Please read this form carefully before you decide to take part. You can take as much time as you need. Please ask questions at any time about anything you do not understand. You are a volunteer. If you agree to participate in the study, you can change your mind later. You can decide not to take part now or you can end your participation at any time later on.

Why is this research being done?

The objective of this research is to better understand the learning process during computer-based training that employs a virtual human avatar. A virtual human avatar is a computer-generated representation of a person with which the learner can interact during the course of the learning process. The research will involve evaluating research participants' actions and responses as they interact with the virtual human character.

What will happen if you join this study?

After signing this form, you will be seated at a desk and asked to complete two separate surveys providing demographics and experiences. Following the completion of the surveys, you will be seated in front of a laptop computer with an external monitor and asked to view a brief instructional video describing the learning objectives of the Emergent Leader Immersive Training Environment (ELITE) Lite training application. After viewing the instructional material, you will be given a brief tutorial on the use of the ELITE Lite software application and then you will login to the ELITE Lite study application and interact in a simulated role-playing scenario that

simulates a counseling session with a virtual subordinate unit member. The interaction requires the use of a computer mouse interface device.

After completing the simulated role-playing scenario, will you be asked to complete two different surveys describing your perceptions and attitudes during the interaction along with a final skills assessment. This will complete your participation in the study.

How much time will the study take?

Your participation in the research will take a maximum of 75 minutes.

What are the risks or discomforts of the study?

This study poses minimal risk to volunteers. The risks associated with participation in this research are the same as those associated with being seated at a desk operating a laptop computer for general purposes. The audio from the speakers and/or headphones operate at levels consistent with other commercial laptop computer/speaker combinations. The audio levels will be preset at levels with the OSHA's (Occupational Health and Safety Administration) permissible noise levels (Occupational Noise Exposure Standard 1910.95).

Are there benefits to being in the study?

There are no direct benefits to the participants in this experiment. However, the results of this study will benefit the design of future social skills training applications. Understanding how learner's interact with virtual humans can guide interface design to focus on important social communication skills and eliminate interface distractions.

Will you be paid if you join this study?

There will be no monetary compensation provided for participation in this study. Student participants may be eligible to receive extra class credit for their participation.

Will it cost you anything to be in this study?

There are no costs to participants in this research.

Why might we take you out of the study early?

Subject safety is our top priority. If we feel that you are struggling with the scenario or experiencing discomfort during experiment procedures, we will stop the study prematurely. If you are eligible for extra class credit, you will still receive it for the amount of time you participated in the experiment.

How will your privacy be protected?

Your participation in this research is confidential. A unique subject identification number will be used to identify all files and data sheets pertaining to your participation. Your name will only appear as a signature on this consent form. The subject identification number will not contain

any personally identifiable information (PII), and it will not be recorded on the consent form. Your data and this consent form will be stored separately and secured in a locked cabinet at the U.S. Army Research Laboratory in Orlando, FL, and the electronic data files will be password protected. Electronic files will be retained on computer hard drives and backup drives locked in the laboratory, which is only accessible to researchers who have card swipe access to the building. Your consent form will be retained by the investigators for a minimum of 3 years.

The research staff will protect your data from disclosure to people not connected with the study. However, complete confidentiality cannot be guaranteed because officials of the U. S. Army Human Research Protections Office and the Army Research Laboratory's Institutional Review Board are permitted by law to inspect the records obtained in this study to ensure compliance with laws and regulations covering experiments using human subjects.

Where can I get more information?

You have the right to obtain answers to any questions you might have about this research both while you take part in the study and after you leave the research site. Please contact the Principal Investigator listed at the top of the first page of this consent form for more information about this study. You may also contact the Human Protections Administrator (HPA) of the Human Research Protection Program, at (410) 278-5928 with questions, complaints, or concerns about this research, or if you feel this study has harmed you. The HPA can also answer questions about your rights as a research participant. You may also call the HPA's number if you cannot reach the research investigator or wish to talk to someone who is not a member of the research team.

Voluntary Participation

Your decision to be in this research is voluntary. The maximum amount of time required to complete your participation will be 75 minutes. You can stop at any time. You do not have to answer any questions you do not want to answer. Refusal to take part in or withdrawal from this study will involve no penalty or loss of benefits you would receive by staying in it.

Once your questions have been answered, and you agree to continue your participation in this study, please sign below.

WE WILL GIVE YOU A COPY OF THIS CONSENT FORM

Signature of Participant Date

Signature of Person Obtaining Consent Printed Name Date

APPENDIX H: RAW DATA

APPENDIX H: RAW DATA

The following appendix provides the raw data collected from the self-report participant surveys and eye tracking data for the study. Study questions requiring a Yes or No response are coded as 0 for No and 1 for Yes. Gender is coded as 0 for male and 1 for female. The study test conditions are coded as:

Condition 1 = SILoKey	Counselor View	VH Behaviors
Condition 2 = SIExag	1 – Static Image	1 - LoKey
Condition 3 = 1VLoKey	2 – 1 View	2 - Exaggerated
Condition 4 = 1VExag	3 – 2 Views	
Condition 5 = 2VLoKey		
Condition 6 = 2VExag		

Table 24: Participant study conditions.

@ParticipantID	CONDITION	COUNSELOR VIEW	VH BEHAVIOR
SiLo0003	1	1	1
SiLo0006	1	1	1
SiLo0007	1	1	1
SiLo0008	1	1	1
SiLo0009	1	1	1
SiLo0010	1	1	1
SiLo0011	1	1	1
SiLo0019	1	1	1
SiEx0003	2	1	2
SiEx0004	2	1	2
SiEx0007	2	1	2
SiEx0008	2	1	2
SiEx0009	2	1	2

@ParticipantID	CONDITION	COUNSELOR VIEW	VH BEHAVIOR
SiEx0010	2	1	2
SiEx0011	2	1	2
SiEx0024	2	1	2
NcLo0007	3	2	1
NcLo0011	3	2	1
NcLo0012	3	2	1
NcLo0013	3	2	1
NcLo0020	3	2	1
NcLo0021	3	2	1
NcLo0022	3	2	1
NcLo0023	3	2	1
NcEx0011	4	2	2
NcEx0012	4	2	2
NcEx0013	4	2	2
NcEx0014	4	2	2
NcEx0023	4	2	2
CcLo0007	5	3	1
CcLo0008	5	3	1
CcLo0017	5	3	1
CcLo0019	5	3	1
CcLo0023	5	3	1
CcEx0007	6	3	2
CcEx0008	6	3	2
CcEx0009	6	3	2
CcEx0010	6	3	2
CcEx0011	6	3	2
CcEx0012	6	3	2
CcEx0013	6	3	2
CcEx0015	6	3	2
SiLo0014	1	1	1
SiEx0017	2	1	2
NcLo0018	3	2	1
NcLo0019	3	2	1
NcEx0015	4	2	2
CcLo0013	5	3	1
CcEx0001	6	3	2
CcEx0014	6	3	2
SiLo0016	1	1	1
SiEx0006	2	1	2
NcEx0006	4	2	2
CcEx0022	6	3	2
SiLo0001	1	1	1

@ParticipantID	CONDITION	COUNSELOR VIEW	VH BEHAVIOR
SiLo0002	1	1	1
SiLo0004	1	1	1
SiLo0005	1	1	1
SiLo0012	1	1	1
SiLo0013	1	1	1
SiLo0015	1	1	1
SiLo0020	1	1	1
SiEx0001	2	1	2
SiEx0002	2	1	2
SiEx0005	2	1	2
SiEx0012	2	1	2
SiEx0013	2	1	2
SiEx0016	2	1	2
SiEx0021	2	1	2
NcLo0002	3	2	1
NcLo0005	3	2	1
NcLo0006	3	2	1
NcLo0009	3	2	1
NcLo0016	3	2	1
NcLo0017	3	2	1
NcEx0004	4	2	2
NcEx0005	4	2	2
NcEx0007	4	2	2
NcEx0008	4	2	2
NcEx0016	4	2	2
NcEx0017	4	2	2
NcEx0019	4	2	2
NcEx0020	4	2	2
NcEx0021	4	2	2
NcEx0022	4	2	2
NcEx0024	4	2	2
CcLo0001	5	3	1
CcLo0002	5	3	1
CcLo0003	5	3	1
CcLo0004	5	3	1
CcLo0005	5	3	1
CcLo0006	5	3	1
CcLo0011	5	3	1
CcLo0012	5	3	1
NcEx0001	5	3	1
NcEx0002	5	3	1
NcEx0003	5	3	1

@ParticipantID	CONDITION	COUNSELOR VIEW	VH BEHAVIOR
CcEx0002	6	3	2
CcEx0003	6	3	2
CcEx0004	6	3	2
CcEx0005	6	3	2
CcEx0006	6	3	2
CcEx0017	6	3	2
CcEx0020	6	3	2
NcLo0004	3	2	1
SiLo0017	1	1	1
SiLo0018	1	1	1
SiEx0014	2	1	2
SiEx0015	2	1	2
SiEx0018	2	1	2
NcLo0015	3	2	1
NcLo0024	3	2	1
NcLo0025	3	2	1
NcEx0009	4	2	2
NcEx0010	4	2	2
CcLo0014	5	3	1
CcLo0015	5	3	1
CcLo0016	5	3	1
CcEx0018	6	3	2
CcEx0019	6	3	2

Table 25: Demographic data.

@ParticipantID	@SERVICE	AGE	GENDER	B1_RANK_CAT	B1_Prior_Enlist	B1_School_YR
SiLo0003	3	20	0	1.00	0	3
SiLo0006	3	21	0	1.00	0	3
SiLo0007	3	21	0	1.00	0	3
SiLo0008	3	24	0	1.00	0	2
SiLo0009	3	22	0	1.00	0	3
SiLo0010	3	20	0	1.00	0	3
SiLo0011	3	20	0	1.00	0	3
SiLo0019	3	19	0	1.00	0	1
SiEx0003	3	22	1	1.00	1	3
SiEx0004	3	21	0	1.00	0	3
SiEx0007	3	21	0	1.00	0	3
SiEx0008	3	22	0	1.00	0	3
SiEx0009	3	22	1	1.00	0	3
SiEx0010	3	19	0	1.00	0	1
SiEx0011	3	21	0	1.00	0	3
SiEx0024	3	19	1	1.00	0	1
NcLo0007	3	21	1	1.00	0	3
NcLo0011	3	21	0	1.00	0	3
NcLo0012	3	20	0	1.00	0	3
NcLo0013	3	19	0	1.00	0	1
NcLo0020	3	21	0	1.00	0	3
NcLo0021	3	22	0	1.00	0	3
NcLo0022	3	21	1	1.00	0	3
NcLo0023	3	21	0	1.00	0	3
NcEx0011	3	20	0	1.00	0	2
NcEx0012	3	18	0	1.00	0	1
NcEx0013	3	19	1	1.00	0	1
NcEx0014	3	23	0	1.00	0	3

@ParticipantID	@SERVICE	AGE	GENDER	B1_RANK_CAT	B1_Prior_Enlist	B1_School_YR
NcEx0023	3	22	1	1.00	0	3
CcLo0007	3	20	1	1.00	0	3
CcLo0008	3	21	1	1.00	0	3
CcLo0017	3	21	0	1.00	0	3
CcLo0019	3	19	0	1.00	0	1
CcLo0023	3	20	0	1.00	0	2
CcEx0007	3	19	1	1.00	0	1
CcEx0008	3	21	0	1.00	0	3
CcEx0009	3	22	0	1.00	0	4
CcEx0010	3	21	1	1.00	0	3
CcEx0011	3	21	0	1.00	0	3
CcEx0012	3	21	0	1.00	0	3
CcEx0013	3	22	0	1.00	0	3
CcEx0015	3	21	0	1.00	0	3
SiLo0014	2	21	0	2.00	0	--
SiEx0017	2	23	0	2.00	0	--
NcLo0018	2	19	0	2.00	0	--
NcLo0019	2	25	0	2.00	1	--
NcEx0015	2	18	0	2.00	0	--
CcLo0013	2	28	0	2.00	0	--
CcEx0001	1	36	0	2.00	1	--
CcEx0014	2	25	0	2.00	0	--
SiLo0016	5	53	0	2.00	1	--
SiEx0006	1	27	0	2.00	0	--
NcEx0006	1	20	0	2.00	0	--
CcEx0022	2	21	0	2.00	0	--
SiLo0001	1	29	0	3.00	1	--
SiLo0002	1	34	0	3.00	--	--
SiLo0004	1	45	0	3.00	0	--
SiLo0005	1	32	1	3.00	0	--
SiLo0012	2	39	0	3.00	0	--

@ParticipantID	@SERVICE	AGE	GENDER	B1_RANK_CAT	B1_Prior_Enlist	B1_School_YR
SiLo0013	2	30	0	3.00	0	--
SiLo0015	2	25	0	3.00	0	--
SiLo0020	4	30	0	3.00	1	--
SiEx0001	1	36	0	3.00	1	--
SiEx0002	1	27	0	3.00	1	--
SiEx0005	1	35	0	3.00	--	--
SiEx0012	2	29	0	3.00	0	--
SiEx0013	2	48	0	3.00	1	--
SiEx0016	2	31	0	3.00	0	--
SiEx0021	2	31	0	3.00	0	--
NcLo0002	1	28	0	3.00	--	--
NcLo0005	1	40	0	3.00	0	--
NcLo0006	1	37	1	3.00	1	--
NcLo0009	1	45	0	3.00	1	--
NcLo0016	2	29	0	3.00	0	--
NcLo0017	2	24	0	3.00	1	--
NcEx0004	1	29	0	3.00	1	--
NcEx0005	1	32	0	3.00	0	--
NcEx0007	1	44	0	3.00	0	--
NcEx0008	1	33	0	3.00	1	--
NcEx0016	2	28	0	3.00	0	--
NcEx0017	5	30	0	3.00	1	--
NcEx0019	2	29	0	3.00	1	--
NcEx0020	2	23	0	3.00	0	--
NcEx0021	2	27	1	3.00	--	--
NcEx0022	1	48	0	3.00	0	--
NcEx0024	1	51	0	3.00	1	--
CcLo0001	1	37	0	3.00	1	--
CcLo0002	1	36	0	3.00	--	--
CcLo0003	1	34	1	3.00	1	--
CcLo0004	1	34	0	3.00	1	--

@ParticipantID	@SERVICE	AGE	GENDER	B1_RANK_CAT	B1_Prior_Enlist	B1_School_YR
CcLo0005	1	24	1	3.00	1	--
CcLo0006	1	33	0	3.00	1	--
CcLo0011	2	32	0	3.00	1	--
CcLo0012	2	24	1	3.00	0	--
NcEx0001	1	50	0	3.00	1	--
NcEx0002	1	29	0	3.00	0	--
NcEx0003	1	25	0	3.00	1	--
CcEx0002	1	32	0	3.00	0	--
CcEx0003	1	29	0	3.00	1	--
CcEx0004	1	23	1	3.00	0	--
CcEx0005	1	49	0	3.00	1	--
CcEx0006	1	49	0	3.00	1	--
CcEx0017	2	31	0	3.00	0	--
CcEx0020	1	52	0	3.00	1	--
NcLo0004	1	42	0	3.00	1	--
SiLo0017	1	44	0	4.00	0	--
SiLo0018	4	52	0	4.00	0	--
SiEx0014	1	52	1	4.00	0	--
SiEx0015	1	62	0	4.00	0	--
SiEx0018	1	27	0	4.00	0	--
NcLo0015	1	53	1	4.00	0	--
NcLo0024	1	36	0	4.00	0	--
NcLo0025	1	55	0	4.00	0	--
NcEx0009	1	35	0	4.00	1	--
NcEx0010	1	38	1	4.00	0	--
CcLo0014	1	32	1	4.00	0	--
CcLo0015	1	55	0	4.00	0	--
CcLo0016	1	62	0	4.00	1	--
CcEx0018	1	60	0	4.00	1	--
CcEx0019	1	70	0	4.00	1	--

Notes for Table 26:

Service

1 – Army

2 – Coast Guard

3 – Army Cadet

4 – Navy

5 – U.S. Marine Corps

Rank Category

1 – Cadet

2 – Enlisted

3 – NCO

4 – Commissioned Officer

Cadet Year in School

1 – First

2 – Second

3 – Third

4 – Fourth

Table 26: Participant Leadership Roles

@ParticipantID	Team	Squad	Platoon	Section	Company	Regiment	Battalion
SiLo0003	1	1	--	1	--	1	--
SiLo0006	1	1	--	--	--	--	--
SiLo0007	1	1	--	1	--	--	--
SiLo0008	1	1	1	--	--	--	--
SiLo0009	1	1	--	--	--	--	--
SiLo0010	1	1	--	--	--	--	--
SiLo0011	1	--	1	--	--	--	--
SiLo0019	--	--	--	--	--	--	--
SiEx0003	1	1	--	--	1	--	--
SiEx0004	1	--	1	--	--	--	--
SiEx0007	1	1	1	--	--	1	--
SiEx0008	1	1	--	--	--	1	--
SiEx0009	1	1	--	1	--	--	--
SiEx0010	1	--	--	--	--	--	--
SiEx0011	1	1	--	--	--	--	--
SiEx0024	--	--	--	--	--	--	--
NcLo0007	1	1	--	--	1	--	--
NcLo0011	1	1	1	--	--	--	--
NcLo0012	1	1	1	--	--	--	--
NcLo0013	--	--	--	--	--	--	--
NcLo0020	1	1	--	--	--	--	--
NcLo0021	1	1	--	--	--	--	--
NcLo0022	1	1	1	--	--	--	--
NcLo0023	1	1	--	--	--	--	--
NcEx0011	1	1	1	1	1	--	--
NcEx0012	--	--	--	--	--	--	--
NcEx0013	--	--	--	--	--	--	--
NcEx0014	1	1	1	--	1	--	--

@ParticipantID	Team	Squad	Platoon	Section	Company	Regiment	Battalion
NcEx0023	1	--	1	--	--	--	--
CcLo0007	1	1	1	--	--	--	--
CcLo0008	1	1	1	--	--	--	--
CcLo0017	1	1	--	--	1	1	--
CcLo0019	--	--	--	--	--	--	--
CcLo0023	1	--	1	--	--	--	--
CcEx0007	--	--	--	--	--	--	--
CcEx0008	1	1	1	--	--	--	--
CcEx0009	1	1	--	1	--	--	--
CcEx0010	1	1	--	--	--	--	--
CcEx0011	1	1	--	--	--	--	--
CcEx0012	1	1	1	--	--	--	--
CcEx0013	1	1	--	--	--	--	--
CcEx0015	1	1	1	--	--	--	--
SiLo0014	1	1	--	1	--	--	--
SiEx0017	--	--	--	--	--	--	--
NcLo0018	--	--	--	--	--	--	--
NcLo0019	1	1	1	--	--	--	--
NcEx0015	--	--	--	--	--	--	--
CcLo0013	1	--	--	--	--	--	--
CcEx0001	--	--	1	--	--	--	--
CcEx0014	--	--	--	1	1	--	--
SiLo0016	1	--	--	--	--	--	--
SiEx0006	--	--	--	--	--	--	--
NcEx0006	--	--	--	--	--	--	--
CcEx0022	--	--	--	--	--	--	--
SiLo0001	1	1	1	--	--	--	--
SiLo0002	1	1	--	--	--	--	--
SiLo0004	1	1	1	1	1	--	--
SiLo0005	1	--	--	--	--	--	--
SiLo0012	1	1	--	--	--	--	--

@ParticipantID	Team	Squad	Platoon	Section	Company	Regiment	Battalion
SiLo0013	--	--	--	--	--	--	--
SiLo0015	1	--	--	1	--	--	--
SiLo0020	--	1	--	--	--	--	--
SiEx0001	1	--	--	--	--	--	--
SiEx0002	1	1	--	--	--	--	--
SiEx0005	1	1	1	--	--	--	--
SiEx0012	1	1	--	--	--	--	--
SiEx0013	1	1	1	1	1	--	--
SiEx0016	1	1	1	1	--	--	--
SiEx0021	1	--	--	--	--	--	--
NcLo0002	1	1	--	--	--	--	--
NcLo0005	--	--	1	1	1	--	--
NcLo0006	1	--	--	1	1	--	1
NcLo0009	1	1	1	1	1	1	1
NcLo0016	1	--	--	--	--	--	--
NcLo0017	1	1	--	--	--	--	--
NcEx0004	1	--	--	--	--	--	--
NcEx0005	1	1	--	1	--	--	--
NcEx0007	1	1	1	1	1	--	1
NcEx0008	1	1	1	1	1	--	--
NcEx0016	1	1	1	--	--	--	--
NcEx0017	1	1	--	--	--	--	--
NcEx0019	1	1	1	--	--	--	--
NcEx0020	1	1	--	--	--	--	--
NcEx0021	--	--	--	1	--	--	--
NcEx0022	1	1	1	--	--	--	--
NcEx0024	1	1	1	1	1	--	--
CcLo0001	1	1	--	--	--	--	--
CcLo0002	--	1	--	--	--	--	--
CcLo0003	1	1	1	1	--	--	--
CcLo0004	1	1	1	--	--	--	--

@ParticipantID	Team	Squad	Platoon	Section	Company	Regiment	Battalion
CcLo0005	--	1	--	--	--	--	--
CcLo0006	1	1	1	--	--	--	--
CcLo0011	1	1	1	--	--	--	--
CcLo0012	1	1	--	--	--	--	--
NcEx0001	1	1	1	--	--	--	--
NcEx0002	1	1	--	--	--	--	--
NcEx0003	1	1	--	--	--	--	--
CcEx0002	1	1	1	--	--	--	--
CcEx0003	1	1	--	1	--	--	--
CcEx0004	--	1	--	--	1	1	1
CcEx0005	1	1	1	1	--	--	--
CcEx0006	--	--	--	--	--	--	--
CcEx0017	1	1	--	--	--	--	--
CcEx0020	1	1	1	1	--	--	--
NcLo0004	1	1	--	1	--	--	1
SiLo0017	--	--	1	--	1	--	--
SiLo0018	--	--	--	--	--	--	--
SiEx0014	--	--	--	--	--	--	--
SiEx0015	1	1	1	1	1	1	1
SiEx0018	--	--	--	--	--	--	--
NcLo0015	--	--	--	--	--	--	--
NcLo0024	--	--	1	1	1	1	1
NcLo0025	--	--	1	--	1	1	1
NcEx0009	--	--	--	--	1	--	--
NcEx0010	--	--	--	--	1	1	1
CcLo0014	--	--	--	--	--	--	--
CcLo0015	--	--	--	--	--	--	--
CcLo0016	1	1	1	1	1	1	1
CcEx0018	1	1	--	--	--	--	--
CcEx0019	--	--	1	--	1	--	1

Table 27: Participant Experiences

@ParticipantID	B2_CPU_Exp	B2_VidGam_Exp	B2_VH_Exp	B2_Counsel_Exp	B2_Mng_Perf_Prob	B2_Help_Pers_Prob
SiLo0003	4	4	4	3	4	4
SiLo0006	4	3	2	2	2	2
SiLo0007	4	4	4	4	4	3
SiLo0008	4	3	2	3	2	3
SiLo0009	3	2	2	4	3	4
SiLo0010	4	4	2	3	2	2
SiLo0011	4	4	3	--	4	4
SiLo0019	4	4	4	2	2	2
SiEx0003	4	2	1	3	3	3
SiEx0004	4	2	1	3	3	3
SiEx0007	4	3	2	2	2	1
SiEx0008	4	4	3	2	3	3
SiEx0009	4	3	1	3	3	3
SiEx0010	3	4	2	2	2	2
SiEx0011	4	3	1	3	3	3
SiEx0024	4	1	2	2	1	2
NcLo0007	4	3	3	4	3	2
NcLo0011	4	3	3	3	4	3
NcLo0012	3	4	2	3	2	2
NcLo0013	4	4	3	2	2	3
NcLo0020	3	4	2	2	2	2
NcLo0021	3	4	3	3	3	3
NcLo0022	4	3	1	2	2	2
NcLo0023	4	4	3	4	2	3
NcEx0011	4	3	3	3	2	2
NcEx0012	3	2	2	1	1	1
NcEx0013	3	3	2	2	2	2
NcEx0014	4	4	2	3	3	2
NcEx0023	4	2	1	3	3	2

@ParticipantID	B2_CPU_Exp	B2_VidGam_Exp	B2_VH_Exp	B2_Counsel_Exp	B2_Mng_Perf_Prob	B2_Help_Pers_Prob
CcLo0007	4	4	2	3	2	2
CcLo0008	4	2	3	4	4	3
CcLo0017	3	3	2	2	2	2
CcLo0019	4	4	3	2	2	2
CcLo0023	4	3	3	3	3	3
CcEx0007	4	3	2	1	1	1
CcEx0008	4	4	3	4	4	4
CcEx0009	4	4	4	3	3	3
CcEx0010	4	3	2	3	2	2
CcEx0011	4	3	2	2	2	2
CcEx0012	3	3	2	2	2	2
CcEx0013	3	3	2	3	2	2
CcEx0015	4	3	3	3	3	2
SiLo0014	4	4	2	1	2	3
SiEx0017	4	3	2	1	1	1
NcLo0018	3	4	2	3	2	2
NcLo0019	3	2	2	2	2	2
NcEx0015	4	4	4	2	2	1
CcLo0013	3	3	2	2	3	2
CcEx0001	4	2	1	4	4	4
CcEx0014	4	3	2	2	2	2
SiLo0016	4	2	3	3	1	3
SiEx0006	4	3	2	3	3	4
NcEx0006	3	2	2	2	2	2
CcEx0022	4	3	2	3	3	3
SiLo0001	4	2	2	3	3	3
SiLo0002	4	1	2	3	4	3
SiLo0004	4	3	2	4	3	3
SiLo0005	4	2	1	3	3	4
SiLo0012	4	2	2	3	2	2
SiLo0013	4	3	2	3	2	3

@ParticipantID	B2_CPU_Exp	B2_VidGam_Exp	B2_VH_Exp	B2_Counsel_Exp	B2_Mng_Perf_Prob	B2_Help_Pers_Prob
SiLo0015	2	1	1	2	2	2
SiLo0020	4	4	3	2	3	3
SiEx0001	3	3	1	2	2	2
SiEx0002	3	4	1	4	4	4
SiEx0005	3	3	3	3	3	3
SiEx0012	3	2	1	3	3	3
SiEx0013	4	2	1	4	4	4
SiEx0016	3	1	1	2	3	3
SiEx0021	4	3	3	3	3	3
NcLo0002	4	3	3	3	3	4
NcLo0005	4	1	1	4	4	4
NcLo0006	4	3	3	3	3	3
NcLo0009	4	4	4	4	3	3
NcLo0016	3	3	1	3	2	3
NcLo0017	4	3	2	2	2	3
NcEx0004	4	4	1	3	3	3
NcEx0005	4	4	3	3	3	3
NcEx0007	4	3	2	4	3	4
NcEx0008	4	4	1	4	4	4
NcEx0016	4	2	3	3	2	3
NcEx0017	4	2	1	3	3	4
NcEx0019	4	2	1	3	3	3
NcEx0020	4	4	3	3	2	3
NcEx0021	4	4	3	3	4	4
NcEx0022	4	4	2	4	4	4
NcEx0024	4	3	3	4	3	3
CcLo0001	3	3	3	3	3	3
CcLo0002	3	2	3	3	2	3
CcLo0003	3	1	4	4	3	3
CcLo0004	3	3	1	2	2	3
CcLo0005	4	3	3	2	3	4

@ParticipantID	B2_CPU_Exp	B2_VidGam_Exp	B2_VH_Exp	B2_Counsel_Exp	B2_Mng_Perf_Prob	B2_Help_Pers_Prob
CcLo0006	4	3	3	4	4	4
CcLo0011	4	3	2	3	3	3
CcLo0012	4	4	4	3	2	2
NcEx0001	3	1	3	2	2	2
NcEx0002	4	4	4	4	4	3
NcEx0003	3	3	3	4	3	3
CcEx0002	3	1	1	4	4	4
CcEx0003	4	3	2	4	3	2
CcEx0004	4	4	4	3	1	4
CcEx0005	3	1	1	4	4	3
CcEx0006	2	2	1	1	1	1
CcEx0017	3	4	3	4	3	3
CcEx0020	4	3	2	4	3	3
NcLo0004	4	3	2	4	3	2
SiLo0017	4	3	3	4	4	4
SiLo0018	4	2	2	4	3	3
SiEx0014	4	3	3	3	3	3
SiEx0015	4	3	4	4	4	4
SiEx0018	4	4	3	2	2	2
NcLo0015	4	2	1	1	1	1
NcLo0024	4	3	3	4	3	3
NcLo0025	4	2	2	4	4	4
NcEx0009	4	4	4	4	3	3
NcEx0010	4	1	3	4	2	3
CcLo0014	4	3	3	1	2	2
CcLo0015	4	3	2	2	1	1
CcLo0016	4	2	3	4	4	4
CcEx0018	4	2	2	3	3	3
CcEx0019	4	2	3	4	4	4

Table 28: Participant Confidence

@ParticipantID	Listen	ID_Resources	Remain _Neutral	Ask_More_Quest	ID_Lack_of_knowledge	Recog_Prob_Solved
SiLo0003	6	5	5	5	6	5
SiLo0006	6	4	7	5	--	5
SiLo0007	7	5	6	7	7	7
SiLo0008	6	5	6	4	4	5
SiLo0009	7	6	6	7	6	6
SiLo0010	6	5	4	3	4	4
SiLo0011	6	5	5	5	5	6
SiLo0019	5	5	6	5	5	6
SiEx0003	7	7	7	7	7	6
SiEx0004	6	4	5	5	4	4
SiEx0007	6	5	5	4	5	3
SiEx0008	6	5	5	6	4	5
SiEx0009	7	6	6	5	4	5
SiEx0010	7	7	6	6	6	6
SiEx0011	6	4	5	5	6	5
SiEx0024	6	5	6	5	5	5
NcLo0007	6	6	6	5	6	5
NcLo0011	6	4	6	6	5	4
NcLo0012	5	3	6	4	5	4
NcLo0013	6	3	6	4	5	3
NcLo0020	6	4	6	3	2	3
NcLo0021	7	6	6	6	6	6
NcLo0022	5	5	4	5	5	5
NcLo0023	6	5	5	6	5	6
NcEx0011	5	5	6	6	5	6
NcEx0012	5	4	4	4	4	4
NcEx0013	6	5	5	5	6	6
NcEx0014	6	6	5	5	6	6
NcEx0023	7	5	6	7	4	5
CcLo0007	6	5	6	7	5	5

@ParticipantID	Listen	ID_Resources	Remain _Neutral	Ask_More_Quest	ID_Lack_of_knowledge	Recog_Prob_Solved
CcLo0008	6	7	6	7	6	5
CcLo0017	5	5	6	6	5	6
CcLo0019	6	6	6	5	6	6
CcLo0023	7	6	6	6	6	6
CcEx0007	7	6	6	6	6	5
CcEx0008	6	6	6	7	5	6
CcEx0009	6	6	6	7	7	7
CcEx0010	5	6	3	5	4	6
CcEx0011	7	6	5	4	5	4
CcEx0012	6	4	7	6	5	5
CcEx0013	6	5	6	6	6	6
CcEx0015	5	6	6	5	5	5
SiLo0014	4	2	5	5	6	5
SiEx0017	6	2	5	6	4	6
NcLo0018	6	6	6	6	6	6
NcLo0019	7	6	7	7	6	7
NcEx0015	6	4	5	6	6	5
CcLo0013	5	4	5	4	5	5
CcEx0001	7	7	7	7	7	7
CcEx0014	5	5	5	5	5	5
SiLo0016	6	4	6	4	4	5
SiEx0006	7	6	6	7	7	6
NcEx0006	6	6	6	7	5	6
CcEx0022	7	5	7	7	7	7
SiLo0001	7	5	6	5	5	5
SiLo0002	6	6	6	7	6	6
SiLo0004	7	7	7	7	7	7
SiLo0005	7	7	7	7	7	7
SiLo0012	7	7	7	7	7	7
SiLo0013	6	6	6	6	6	6
SiLo0015	6	6	6	6	7	7
SiLo0020	7	7	7	7	7	7

@ParticipantID	Listen	ID_Resources	Remain _Neutral	Ask_More_Quest	ID_Lack_of_knowledge	Recog_Prob_Solved
SiEx0001	7	5	6	4	5	7
SiEx0002	7	7	6	7	7	6
SiEx0005	7	7	7	7	7	7
SiEx0012	6	6	5	7	4	5
SiEx0013	7	7	7	7	7	7
SiEx0016	6	6	6	7	7	6
SiEx0021	7	7	7	7	6	6
NcLo0002	6	6	6	6	6	6
NcLo0005	7	7	7	7	7	7
NcLo0006	7	4	7	7	4	4
NcLo0009	7	7	7	7	7	7
NcLo0016	6	5	6	6	5	5
NcLo0017	6	6	6	6	5	6
NcEx0004	6	6	7	7	6	6
NcEx0005	7	6	7	7	7	7
NcEx0007	7	7	4	7	7	7
NcEx0008	7	7	2	7	7	7
NcEx0016	6	6	5	6	6	5
NcEx0017	7	7	7	6	6	6
NcEx0019	7	6	6	6	6	6
NcEx0020	7	6	5	6	6	6
NcEx0021	7	7	7	7	7	7
NcEx0022	7	7	7	7	7	7
NcEx0024	6	6	6	6	6	6
CcLo0001	5	5	5	5	5	5
CcLo0002	4	4	4	4	4	4
CcLo0003	7	6	7	6	6	6
CcLo0004	7	7	7	7	7	7
CcLo0005	7	6	6	7	6	7
CcLo0006	7	6	6	6	6	6
CcLo0011	7	6	6	6	6	6
CcLo0012	5	4	6	6	6	5

@ParticipantID	Listen	ID_Resources	Remain _Neutral	Ask_More_Quest	ID_Lack_of_knowledge	Recog_Prob_Solved
NcEx0001	7	7	7	7	7	7
NcEx0002	7	7	6	6	7	6
NcEx0003	7	7	7	7	7	7
CcEx0002	7	7	7	7	7	7
CcEx0003	6	7	6	7	6	6
CcEx0004	7	7	7	7	7	7
CcEx0005	7	6	6	6	7	6
CcEx0006	4	4	4	6	4	4
CcEx0017	6	6	6	6	7	6
CcEx0020	7	6	6	6	6	6
NcLo0004	6	6	6	6	6	6
SiLo0017	7	6	5	6	6	6
SiLo0018	6	5	5	6	4	5
SiEx0014	7	6	6	5	5	5
SiEx0015	7	7	7	7	7	7
SiEx0018	5	4	5	6	5	4
NcLo0015	7	4	7	7	4	4
NcLo0024	7	7	7	7	4	7
NcLo0025	7	6	7	7	6	6
NcEx0009	7	7	6	7	6	7
NcEx0010	6	7	7	6	6	6
CcLo0014	6	6	7	3	5	4
CcLo0015	6	6	6	6	5	6
CcLo0016	7	7	7	7	7	7
CcEx0018	7	7	6	6	6	6
CcEx0019	7	7	7	7	7	7

Table 29: Participant Performance Data

@ParticipantID	#_Correct	#_Incorrect	#_Mixed	PERF SCORE	Rsp_1	Rsp_2	Rsp_3	Rsp_4	Rsp_5	Rsp_6	Rsp_7	Rsp_8
SiLo0003	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0006	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0007	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0008	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0009	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0010	7	1	0	7.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
SiLo0011	7	1	0	7.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
SiLo0019	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0003	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0004	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0007	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0008	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0009	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0010	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0011	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0024	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0007	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0011	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0012	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0013	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0020	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0021	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0022	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0023	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0011	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0012	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0013	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0014	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0023	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

@ParticipantID	#_Correct	#_Incorrect	#_Mixed	PERF SCORE	Rsp_1	Rsp_2	Rsp_3	Rsp_4	Rsp_5	Rsp_6	Rsp_7	Rsp_8
CcLo0007	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0008	7	1	0	7.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
CcLo0017	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0019	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0023	7	1	0	7.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
CcEx0007	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0008	6	1	1	6.5	1.0	1.0	1.0	1.0	1.0	0.5	1.0	0.0
CcEx0009	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0010	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0011	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0012	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0013	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0015	7	0	1	7.5	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0
SiLo0014	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0017	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0018	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0019	7	0	1	7.5	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0
NcEx0015	6	1	1	6.5	1.0	0.5	1.0	1.0	0.0	1.0	1.0	1.0
CcLo0013	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0001	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0014	7	0	1	7.5	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0
SiLo0016	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0006	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0006	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0022	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0001	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0002	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0004	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0005	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0012	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0013	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

@ParticipantID	#_Correct	#_Incorrect	#_Mixed	PERF SCORE	Rsp_1	Rsp_2	Rsp_3	Rsp_4	Rsp_5	Rsp_6	Rsp_7	Rsp_8
SiLo0015	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0020	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0001	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0002	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0005	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0012	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0013	7	1	0	7.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
SiEx0016	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0021	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0002	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0005	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0006	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0009	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0016	7	1	0	7.0	1.0	1.0	1.0	1.0	0.0	1.0	1.0	1.0
NcLo0017	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0004	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0005	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0007	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0008	4	0	4	6.0	1.0	1.0	1.0	0.5	0.5	1.0	0.5	0.5
NcEx0016	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0017	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0019	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0020	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0021	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0022	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0024	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0001	7	0	1	7.5	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0
CcLo0002	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0003	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0004	7	0	1	7.5	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0
CcLo0005	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0

@ParticipantID	#_Correct	#_Incorrect	#_Mixed	PERF SCORE	Rsp_1	Rsp_2	Rsp_3	Rsp_4	Rsp_5	Rsp_6	Rsp_7	Rsp_8
CcLo0006	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0011	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0012	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0001	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0002	7	1	0	7.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.0
NcEx0003	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0002	7	0	1	7.5	1.0	1.0	1.0	0.5	1.0	1.0	1.0	1.0
CcEx0003	7	1	0	7.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
CcEx0004	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0005	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0006	7	0	1	7.5	1.0	1.0	1.0	1.0	1.0	0.5	1.0	1.0
CcEx0017	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0020	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0004	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0017	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiLo0018	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0014	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
SiEx0015	7	1	0	7.0	1.0	1.0	0.0	1.0	1.0	1.0	1.0	1.0
SiEx0018	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0015	5	0	3	6.5	1.0	1.0	0.5	0.5	1.0	0.5	1.0	1.0
NcLo0024	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcLo0025	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0009	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
NcEx0010	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0014	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0015	7	0	1	7.5	1.0	0.5	1.0	1.0	1.0	1.0	1.0	1.0
CcLo0016	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0018	8	0	0	8.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
CcEx0019	7	0	1	7.5	1.0	1.0	1.0	1.0	1.0	1.0	0.5	1.0

Table 30: Pre- and Post-Subject Judgement Test Scores – Situations 1 and 2.

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
KEY		2	1	1	2	3	1	3	1	3	1	1	3	3
CcEx0001	Post	2	1	1	1	3	1	3	1	3	1	3	3	2
CcEx0001	Pre	2	2	1	1	3	3	3	3	3	1	3	3	3
CcEx0002	Post	2	1	1	2	3	2	3	1	2	1	3	3	3
CcEx0002	Pre	2	1	1	2	2	3	3	1	2	1	1	2	2
CcEx0003	Post	2	1	1	2	2	2	1	2	3	1	1		3
CcEx0003	Pre	2	3	1	2	1	1	2	2	2	1	1	2	2
CcEx0004	Post	2	2	1	2	3	1	1	1	3	1	1	1	3
CcEx0004	Pre	2	1	1	2	3	3	3	2	3	1	1	2	1
CcEx0005	Post	2	1	1	2	3	2	3	1	3	1	1	2	3
CcEx0005	Pre	2	2	1	2	3	3	2	1	3	1	1	1	2
CcEx0006	Post	2	3	1	2	1	3	2	1	3	1	1	1	1
CcEx0006	Pre	1	2	1	2	2	2	1	2	1	1	1	3	1
CcEx0007	Post	2	1	1	2	3	1	3	1	2	1	3	3	3
CcEx0007	Pre	2	1	1	2	3	1	3	1	2	1	3	2	3
CcEx0008	Post	2	1	1	2	3	2	3	1	3	1	3	3	3
CcEx0008	Pre	2	1	1	2	2	3	3	2	3	1	1	2	3
CcEx0009	Post	2	1	1	1	3	1	3	1	2	3	3	3	3
CcEx0009	Pre	2	2	1	1	3	1	2	1	2	3	3	2	3
CcEx0010	Post	2	1	1	2	3	1	3	2	3	1	1	3	3
CcEx0010	Pre	2	1	3	2	3	1	2	2	3	1	1	3	3
CcEx0011	Post	2	1	1	2	3	2	3	3	3	3	1	3	3
CcEx0011	Pre	2	2	1	2	3	2	2	2	3	1	1	2	3
CcEx0012	Post	2	1	1	1	2	3	2	1	3	1	1	3	3
CcEx0012	Pre	2	2	1	1	2	3	2	1	3	1	1	2	3
CcEx0013	Post	2	1	1	2	3	1	3	1	2	3	1	2	2
CcEx0013	Pre	2	1	1	2	3	1	2	2	3	3	1	2	2
CcEx0014	Post	2	2	1	2	2	2	2	1	1	2	1	2	2
CcEx0014	Pre	2	2	1	1	2	1	3	1	1	2	2	1	2

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
CcEx0015	Post	2	1	1	2	3	2	1	1	1	1	1	3	3
CcEx0015	Pre	2	1	1	2	3	1	1	1	3	3	1	3	1
CcEx0017	Post	2	1	1	2	3	2	2	1	3	1	1	2	1
CcEx0017	Pre	2	1	1	2	1	2	2	1	3	1	1	1	1
CcEx0018	Post	2	1	1	2	3	1	3	1	3	1	1	3	3
CcEx0018	Pre	2	2	1	2	3	1	3	2	3	1	1	2	2
CcEx0019	Post	2	1	1	2	3	1	3	1	2	1	3	3	3
CcEx0019	Pre	2	1	1	2	3	1	3	1	2	1	1	1	1
CcEx0020	Post	2	1	1	2	3	1	3	3	3	1	1	3	3
CcEx0020	Pre	2	1	1	2	3	1	3	3	3	1	1	3	3
CcEx0022	Post	2	2	1	2	2	1	3	2	3	2	3	2	2
CcEx0022	Pre	2	2	1	2	3	2	2	2	3	2	3	2	2
CcLo0001	Post	2	2	1	2	2	2	2	3	2	1	1	3	2
CcLo0001	Pre	2	2	1	2	2	2	2	2	2	1	1	2	2
CcLo0002	Post	1	2	1	1	1	2	2	1	2	1	1	2	2
CcLo0002	Pre	1	2	1	1	1	2	2	1	2	1	1	2	2
CcLo0003	Post	2	2	1	2	2	1	3	1	2	1	1	1	2
CcLo0003	Pre	2	2	1	2	2	1	3	1	2	1	1	1	2
CcLo0004	Post	2	2	1		3	1	3	2	1	1	1	2	3
CcLo0004	Pre	2	2	1	2	2	1	3	1	3	1	1	1	2
CcLo0005	Post	2	3	3	2	3	3	1	2	3	1	3	3	3
CcLo0005	Pre	2	2	3	2	3	3	2	2	3	1	3	3	3
CcLo0006	Post	2	2	1	2	2	2	2	2	3	1	1	3	3
CcLo0006	Pre	2	2	3	2	3	2	2	2	3	1	1	3	3
CcLo0007	Post	2	1	1	2	3	1	3	1	3	1	3	3	3
CcLo0007	Pre	2	1	1	2	2	1	3	1	2	1	1	1	3
CcLo0008	Post	2	1	1	2	3	1	2	1	3	1	1	3	3
CcLo0008	Pre	2	1	1	2	3	1	1	1	2	3	1	3	3
CcLo0011	Post	2	1	1	2	2	1	2	1	2	2	2	2	3
CcLo0011	Pre	2	1	1	2	2	1	2	2	2	2	2	1	2
CcLo0012	Post	2	1	1	2	3	3	3	1	3	1	1	3	3

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
CcLo0012	Pre	2	2	1	1	3	3	3	1	3	1	1	2	3
CcLo0013	Post	2	2	1	2	3	1	3	2	2	1	1	2	2
CcLo0013	Pre	2	2	1	2	3	1	3	2	2	1	1	2	2
CcLo0014	Post	2	1	1	2	3	1	3	2	2	1	1	3	3
CcLo0014	Pre	2	1	1	2	3	1	2	1	2	1	1	3	3
CcLo0015	Post	1	1	1	1	3	1	3	1	1	1	1	2	3
CcLo0015	Pre	2	1	1	1	2	1	3	2	2	1	1	1	2
CcLo0016	Post	1	1	1	1	3	2	3	1	2	1	1	1	3
CcLo0016	Pre	1	1	1	2	2	3	1	3	1	1	1	3	1
CcLo0017	Post	2	2	1	2	3	1	2	2	2	1	1	3	3
CcLo0017	Pre	2	2	1	2	2	1	2	2	3	1	1	2	3
CcLo0019	Post	2	1	1	2	3	1	3	1	3	3	3	3	3
CcLo0019	Pre	2	1	1	2	2	1	3	2	3	1	3	2	3
CcLo0023	Post	2	1	1	2	3	1	3	1	3	1	1	3	3
CcLo0023	Pre	2	1	1	2	3	1	3	1	3	1	1	1	2
NcEx0001	Post	2	2	1	2	2	2	2	2	2	1	1	2	2
NcEx0001	Pre	2	3	3	2	3	3	2	2	2	1	1	2	2
NcEx0002	Post	2	1	1	2	3	1	2	1	1	1	1	2	1
NcEx0002	Pre	2	1	1	2	3	2	2	1	2	3	1	1	1
NcEx0003	Post	2	1	1	2	3	1	3	1	3	3	1	3	3
NcEx0003	Pre	2	1	1	2	3	1	3	1	3	3	1	1	3
NcEx0004	Post	2	1	1	2	2	1	2	1	3	1	1	3	2
NcEx0004	Pre	2	1	1	2	1	1	2	1	3	1	1	1	1
NcEx0005	Post	2	1	1	2	1	1	2	1	2	1	1	1	3
NcEx0005	Pre	2	2	3	2	1	1	2	1	3	1	1	1	2
NcEx0006	Post	2	2	1	1	3	1	3	1	3	1	1	3	3
NcEx0006	Pre	2	3	1	1	3	1	2	1	3	1	1	3	3
NcEx0007	Post	2	1	1	2	2	2	2	2	3	1	1	2	3
NcEx0007	Pre	2	2	1	2	2	1	2	2	1	1	1	1	2
NcEx0008	Post	2	2	1	2	3	1	3	3	3	1	3	3	3
NcEx0008	Pre	2	3	1	2	3	2	3	3	3	1	1	3	3

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
NcEx0009	Post	2	1	1	2	3	2	2	1	3	1	1	2	3
NcEx0009	Pre	2	2	1	2	1	2	2	1	3	1	1	1	2
NcEx0010	Post	2	1	1	2	3	1	2	1	2	3	3	2	3
NcEx0010	Pre	2	3	1	2	1	1	3	1	2	1	3	2	2
NcEx0011	Post	2	1	1	2	3	1	3	1	2	1	3	2	3
NcEx0011	Pre	2	1	1	2	2	1	3	2	3	1	3	2	3
NcEx0012	Post	2	1	1	2	3	1	3	1	2	1	1	3	3
NcEx0012	Pre	2	1	3	2	3	2	3	2	3	1	1	2	3
NcEx0013	Post	2	1	1	2	3	2	1	1	1	1	1	3	2
NcEx0013	Pre	2	2	3	2	2	2	1	1	2	1	1	3	3
NcEx0014	Post	1	1	1	2	3	1	1	1	3		1	3	2
NcEx0014	Pre	2	1	1	2	2	1	2	1	3	1	1	2	2
NcEx0015	Post	2	1	1	2	3	1	3	2	2	3	3	2	3
NcEx0015	Pre	2	1	1	2	3	2	3	2	2	2	2	1	3
NcEx0016	Post	2	1	1	2	2	1	1	1	2	2	1	3	3
NcEx0016	Pre	2	1	1	2	3	1	1	1	1	2	1	1	2
NcEx0017	Post	2	1	1	2	3	1	3	1	3	1	1	2	3
NcEx0017	Pre	2	1	1	2	3	1	3	1	3	1	1	2	1
NcEx0019	Post	2	3	1	2	2	2	3	1	2	1	3	2	3
NcEx0019	Pre	2	3	1	2	1	3	3	1	3	1	1	2	3
NcEx0020	Post	2	2	1	2	3	2	2	1	2	1	3	2	3
NcEx0020	Pre	2	2	1	2	3	1	3	1	2	1	3	1	2
NcEx0021	Post	2	1	1	2	3	1	3	2	2	3	1	3	3
NcEx0021	Pre	2	1	1	2	3	1	1	1	2	3	1	2	3
NcEx0022	Post	2	1	1	2	3	2	3	3	3	1	1	3	3
NcEx0022	Pre	2	1	1	2	3	2	3	3	2	1	1	2	3
NcEx0023	Post	2	1	1	2	3	1	3	1	3	1	1	2	3
NcEx0023	Pre	2	1	1	2	3	1	3	1	3	1	1	2	3
NcEx0024	Post	2	2	1	1	3	2	2	1	2	1	1	3	3
NcEx0024	Pre	2	2	1	1	2	2	2	1	2	1	1	2	3
NcLo0002	Post	2	2	1	2	1	3	3	1	3	3	1	1	3

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
NcLo0002	Pre	2	3	1	2	1	2	1	2	2	3	1		3
NcLo0004	Post	2	2	1	2	3	1	2	1	2	1	1	1	3
NcLo0004	Pre	2	2	1	2	2	1	3	1	3	1	1	1	2
NcLo0005	Post	2	1	1	2	2	1	1	1	2	1	3	3	3
NcLo0005	Pre	2	1	1	2	2	1	2	1	3	1	1	2	3
NcLo0006	Post	2	2	1	2	2	1	2	1	3	3	1	2	3
NcLo0006	Pre	2	2	1	2	2	1	2	1	3	3	3	2	2
NcLo0007	Post	2	1	1	1	3	2	2	1	3	1	3	3	3
NcLo0007	Pre	2	2	1	1	3	1	2	1	3	3	3	2	3
NcLo0009	Post	2	2	1	2	3	3	3	1	3	1	1	3	3
NcLo0009	Pre	2	2	1	2	2	3	3	3	3	1	1	1	3
NcLo0011	Post	2	2	1	2	2	1							
NcLo0011	Pre	2	2	1	2	2	1	2	2	3	1	1	2	2
NcLo0012	Post	2	1	1	2	3	2	2	1	2	1	1	3	3
NcLo0012	Pre	2	2	1	2	3	2	2	1	3	1	1	3	3
NcLo0013	Post	2	1	1	2	3	1	3	1	2	1	3	3	3
NcLo0013	Pre	2	1	1	2	3	1	3	1	2	1	3	3	3
NcLo0015	Post	2	1	1	2	3	1	1	1	1	1	1	1	3
NcLo0015	Pre	2	1	1	2	3	1	3	1	3	1	1	1	3
NcLo0016	Post	2	3	1	1	2	2	3	2	1	1	1	3	2
NcLo0016	Pre	2	3	1	1	1	1	2	3	2	3	1	2	2
NcLo0017	Post	2	1	1	2	2	1	2	1	2	1	1	2	3
NcLo0017	Pre	2	1	1	2	3	1	1	1	2	1	3	3	3
NcLo0018	Post	2	3	3	2	1	3	3	2	3	2	3	3	3
NcLo0018	Pre	2	1	1	2	1	3	2	2	2	2	3	3	3
NcLo0019	Post	2	1	1	1	2	1	1	1	3	3	1	2	2
NcLo0019	Pre	2	2	1	1	2	1	3	1	3	3	1	2	2
NcLo0020	Post	2	2	1	2	3	3	3	2	3	1	3	3	3
NcLo0020	Pre	2	2	1	2	3	1	3	2	2	1	3	3	3
NcLo0021	Post	2	1	1	1	3	2	3	2	3	1	3	3	3
NcLo0021	Pre	2	1	1	1	2	2	2	1	3	1	1	2	3

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
NcLo0022	Post	2	1	1	2	3	1	3	1	3	3	1	3	3
NcLo0022	Pre	2	2	1	2	3	3	3	1	1	1	1	1	1
NcLo0023	Post	2	1	1	2	3	1	1	1	3	1	1	3	3
NcLo0023	Pre	2	2	1	2	3	2	2	1	3	1	1	2	3
NcLo0024	Post	2	1	1	2	3	1	3	3	3	1	3	3	3
NcLo0024	Pre	2	1	1	2	3	1	2	2	3	1	1	2	2
NcLo0025	Post	2	1	1	2	3	1	2	2	3	1	3	3	3
NcLo0025	Pre	2	2	1	2	3	2	3	2	3	1	1	2	3
SiEx0001	Post	2	1	1	2	2	3	3	3	3	1		2	3
SiEx0001	Pre	2	1	1	1	1	3	2	2	1	1	3	1	2
SiEx0002	Post	2	2	1	1	2	2	3	1	2	1	3	2	3
SiEx0002	Pre	2	3	3	2	1	3	3	1	2	1	3	2	3
SiEx0003	Post	2	1	1	2	3	1	3	1	3	1	3	3	3
SiEx0003	Pre	2	1	1	2	3	1	2	1	3	1	1	3	3
SiEx0004	Post	2	1	1	2	3	1	3	1	3	1	3	2	3
SiEx0004	Pre	2	1	1	2	3	1	2	1	2	1	1	2	3
SiEx0005	Post	2	2	1	2	2	2	2	2	2	1	1	2	2
SiEx0005	Pre	2	2	1	2	3	2	3	2	3	1	1	2	2
SiEx0006	Post	2	3	3	2	3	1	3	1	3	1	1	3	3
SiEx0006	Pre	2	3	1	2	3	1	2	2	2	1	3	1	2
SiEx0007	Post	2	3	1	2	3	1	1	1	2	1	3	3	3
SiEx0007	Pre	2	1	1	2	3	1	2	1	3	1	3	3	3
SiEx0008	Post	2	2	1	2	3	1	1	2	2	1	1	3	3
SiEx0008	Pre	2	3	1	2	3	1	2	3	2	1	1	2	2
SiEx0009	Post	2	1	1	2	3	1	2	2	3	1	1	3	3
SiEx0009	Pre	2	2	3	2	2	1	2	2	3	1	1	2	3
SiEx0010	Post	2	1	1	2	3	1	3	1	2	1	1	2	1
SiEx0010	Pre	2	1	1	2	2	1	3	1	3	1	1	3	2
SiEx0011	Post	2	1	1	2	3	1	3	1	3	1	1	3	3
SiEx0011	Pre	2	2	1	2	3	2	2	1	3	1	3	1	2
SiEx0012	Post	2	1	1	2	3	1	3	1	3	3	2	3	3

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
SiEx0012	Pre	2	2	1	2	3	2	2	1	2	2	2	1	3
SiEx0013	Post	2	2	1	2	2	1	3	2	3	2	1	3	3
SiEx0013	Pre	2	1	1	2	2	1	3	2	3	2	1	1	2
SiEx0014	Post	2	1	1	2	3	2	3	1	3	1	1	3	3
SiEx0014	Pre	2	1	1	2	3	1	3	1	3	1	1	1	2
SiEx0015	Post	2	3	3	2	3	2	3	3	2	1	1	2	3
SiEx0015	Pre	2	3	1	2	3	2	3	3	3	1	1	2	3
SiEx0016	Post	2	1	1	2	3	1	2	1	3	1	1	1	3
SiEx0016	Pre	2	1	1	2	3	1	2	1	3	1	1	1	3
SiEx0017	Post	2	2	1	2	3	2	2	2	3	2	2	2	3
SiEx0017	Pre	2	2	1	2	2	3	2	2	3	2	2	1	2
SiEx0018	Post	2	1	1	2	3	1	2	1	3	1	1	1	2
SiEx0018	Pre	2	1	1	2	3	1	1	1	3	1	1	1	2
SiEx0021	Post	2	2	1	2	2	2	3	3	3	1	3	2	3
SiEx0021	Pre	2	3	1	2	2	2	3	3	3	1	1	1	3
SiEx0024	Post	2	1	1	2	3	1	2	1	2	1	3	3	3
SiEx0024	Pre	2	1	3	2	2	1	3	1	3	3	1	2	2
SiLo0001	Post	2	1	1	2	3	1	3	1	3	1	1	2	2
SiLo0001	Pre	2	2	3	2	2	2	2	2	3		1	2	2
SiLo0002	Post	2	2	1	2	3	1	3	2	3	1	1	3	3
SiLo0002	Pre	2	2	1	2	3	1	3	2	3	1	1	2	3
SiLo0003	Post	2	2	1	2	1	2	3	3	2	1	1	3	3
SiLo0003	Pre	2	1	1	2	1	3	3	3	3	1	1	2	3
SiLo0004	Post	2	1	1	2	2	1	3	3	3	1	1	2	3
SiLo0004	Pre	2	2	1	2	2	1	2	2	3	1	1	1	3
SiLo0005	Post	2	2	1	2	3	1	2	2	3	1	1	3	3
SiLo0005	Pre	2	2	1	2	3	1	2	2	3	1	1	3	3
SiLo0006	Post	2	1	1	2	3	1	2	1	2	1	3	3	2
SiLo0006	Pre	2	1	1	2	3	1	2	1	3	1	1	2	3
SiLo0007	Post	2	1	1	2	2	2	3	2	3	1	1	3	3
SiLo0007	Pre	2	2	1	2	3	1	3	2	3	1	1	2	2

USER_ID	PRE- / POST-	1Q1	1Q2	1Q3	1Q4	1Q5	1Q6	2Q1	2Q2	2Q3	2Q4	2Q5	2Q6	2Q7
SiLo0008	Post	2	1	1	2	3	1	3	2	3	1	3	3	3
SiLo0008	Pre	2	2	1	2	2	1	3	2	3	1	1	3	3
SiLo0009	Post	2	1	1	2	3	2	3	1	2	1	3	3	3
SiLo0009	Pre	2	1	1	2	3	3	2	1	3	1	3	1	3
SiLo0010	Post	2	1	1	2	3	1	3	1	3	1	1	2	1
SiLo0010	Pre	2	1	1	2	3	1	3	1	3	1	1	1	1
SiLo0011	Post	2	1	1	2	3	1	3	1	3	1	1	1	3
SiLo0011	Pre	2	1	1	2	3	1	2	1	3	1	1	1	1
SiLo0012	Post	2	2	1	2	3	1	3	3	3	2	2	2	3
SiLo0012	Pre	2	2	1	2	3	1	2	2	2	2	2	2	3
SiLo0013	Post	2	1	1	2	3	1	1	1	3	2	2	3	3
SiLo0013	Pre	2	2	1	2	3	2	2	1	3	2	3	3	3
SiLo0014	Post	2	1	1	1	1	1	3	1	1	1	1	1	3
SiLo0014	Pre	2	1	1	2	2	1	3	1	3	1	3	2	2
SiLo0015	Post	2	1	1	2	3	1	2	1	3	3	1	2	2
SiLo0015	Pre	2	1	1	2	2	1	2	1	3	1	1	2	2
SiLo0016	Post	2	1	1	2	3	1	3	2	3	1	3	3	3
SiLo0016	Pre	2	1	1	2	3	1	3	2	3	1	1	2	3
SiLo0017	Post	2	2	1	1	2	2	3	2	3	1	1	2	3
SiLo0017	Pre	2	2	1	1	2	2	2	2	3	1	1	2	3
SiLo0018	Post	3	1	1	2	3	1	3	1	2	1	1	3	3
SiLo0018	Pre	3	2	1	2	3	1	2	1	3	1	1	3	3
SiLo0019	Post	2	1	1	2	3	1	3	1	1	1	1	3	3
SiLo0019	Pre	2	2	1	1	2	2	2	1	2	1	1	1	3
SiLo0020	Post	2	2	1	2	2	1	2	1	2	1	1	1	2
SiLo0020	Pre	2	2	1	2	3	1	2	1	2	1	1	1	1

Table 31: Pre- and Post-Subject Judgement Test Scores – Situations 3 and 4.

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
KEY		1	1	3	1	1	3	2	3	3	
CcEx0001	Post	2	1	3	1	1	2	3	1	3	0.6480
CcEx0001	Pre	2	2	3	2	2	3	2	1	3	0.4061
CcEx0002	Post	2	2	3	2	2	3	1		3	0.6874
CcEx0002	Pre		1	3	2	1	3	3	1	2	0.5318
CcEx0003	Post	1	2	3	2	1	2	2	2	3	0.6351
CcEx0003	Pre	2	2	2	2	2	2	2	2	2	0.1819
CcEx0004	Post	1	1	1	1	1	3	1	1	1	0.4689
CcEx0004	Pre	1	1	3	1	1	3	1	1	3	0.5979
CcEx0005	Post	2	2	2	1	2	3	2	3	3	0.8325
CcEx0005	Pre	2	2	2	1	2	3	2	3	3	0.5304
CcEx0006	Post	3	1	3	2	2	3	1	3	3	0.2206
CcEx0006	Pre	1	1	1	1	1	1	1	1	1	0.0281
CcEx0007	Post	2	1	3	1	1	2	2	3	2	0.7694
CcEx0007	Pre	2	1	3	1	2	3	1	3	2	0.7101
CcEx0008	Post	1	3	2	3	3	3	1	3	2	0.4745
CcEx0008	Pre	1	3	2	2	3	3	3	3	3	0.5075
CcEx0009	Post	3	2	3	1	1	2	1	2	3	0.5046
CcEx0009	Pre	3	1	3	2	1	2	1	3	2	0.3683
CcEx0010	Post	3	1	3	1	1	2	2	3	3	0.8393
CcEx0010	Pre	1	2	2	1	1	3	3	2	3	0.7155
CcEx0011	Post	2	1	3	1	1	3	3	3	3	0.7536
CcEx0011	Pre	3	1	3	1	1	3	3	3	2	0.6853
CcEx0012	Post	2	2	2	2	1	2	2	3	2	0.5953
CcEx0012	Pre	3	1	2	2	1	2	2	3	2	0.4616
CcEx0013	Post	3	1	3	1	1	2	2	2	3	0.6123
CcEx0013	Pre	3	1	2	1	1	2	2	2	3	0.5284
CcEx0014	Post	2	2	2	2	2	3	1	2	2	0.2819
CcEx0014	Pre	1	2	3	2	2	3	2	3	2	0.4139

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
CcEx0015	Post	3	1	3	1	1	3	3	3	2	0.5936
CcEx0015	Pre	2	1	3	2	1	3	3	2	2	0.5145
CcEx0017	Post	2	3	2	1	1	3	2	3	2	0.5738
CcEx0017	Pre	2	3	2	2	1	3	2	3	3	0.3668
CcEx0018	Post	3	2	3	1	1	3	2	1	3	0.7579
CcEx0018	Pre	2	2	2	3	1	3	2	3	2	0.6277
CcEx0019	Post	3	1	1	1	1	3	1	3	3	0.6307
CcEx0019	Pre	1	1	1	1	1	3	1	3	2	0.6603
CcEx0020	Post	3	1	3	2	1	3	2	3	3	0.7838
CcEx0020	Pre	3	1	3	2	1	3	2	2	2	0.6983
CcEx0022	Post	2	1	3	2	2	3	2	1	3	0.4465
CcEx0022	Pre	2	2	2	2	2	3	2	1	3	0.2806
CcLo0001	Post	2	3	2	3	2	2	2	2	2	0.0911
CcLo0001	Pre	2	2	2	2	2	2	2	2	2	0.4086
CcLo0002	Post	2	1	2	2	1	2	1	2	2	0.4470
CcLo0002	Pre	2	1	2	2	1	2	1	2	2	0.4470
CcLo0003	Post	1	2	2	1	2	3				0.6094
CcLo0003	Pre	1	2	2	1	2	3	2	2	1	0.5182
CcLo0004	Post	1	3	3	3	3	3	1	3	3	0.4595
CcLo0004	Pre	2	1	3	3	3	3	1	3	3	0.5168
CcLo0005	Post	3	2	3	2	2	3	3	3	3	0.2648
CcLo0005	Pre	3	2		2	3	3	3	2	3	0.2684
CcLo0006	Post	2	2	3	2	2	3	2	2	3	0.7160
CcLo0006	Pre	3	2	2	2	2	3	2	3	2	0.4982
CcLo0007	Post	2	2	3	2	1	3	2	2	3	0.7899
CcLo0007	Pre	1	2	3	2	1	3	3	3	3	0.7455
CcLo0008	Post	2	2	3	1	1	3	3	2	3	0.8613
CcLo0008	Pre	2	2	3	1	1	3	3	3	3	0.6719
CcLo0011	Post	2	2	2	1	1	2	2	2	3	0.6659
CcLo0011	Pre	2	2	3	1	2	2	2	2	2	0.3819
CcLo0012	Post	2	1	3	1	1	3	2	2	3	0.8393

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
CcLo0012	Pre	1	1	3	1	1	2	2	2	2	0.7134
CcLo0013	Post	2	2	2	2	1	2	2	2	2	0.6141
CcLo0013	Pre	2	2	3	2	1	2	2	3	3	0.7263
CcLo0014	Post	1	2	3	1	3	3	2	3	3	0.8138
CcLo0014	Pre	1	2	3	1	3	3	2	2	3	0.7694
CcLo0015	Post	2	1	3	2	1	1	1	3	3	0.6552
CcLo0015	Pre	1	2	2	2	1	2	2	2	3	0.5957
CcLo0016	Post	1	1	1	1	1	3	1	3	1	0.6161
CcLo0016	Pre	1	1	1	1	1	3	1	3	1	0.2072
CcLo0017	Post	2	2	3	2	1	3	2	3	2	0.7665
CcLo0017	Pre	2	1	2	2	2	3	2	2	2	0.6497
CcLo0019	Post	2	1	3	1	1	2	2	3	2	0.6983
CcLo0019	Pre	2	2	3	1	2	3	2	3	2	0.6742
CcLo0023	Post	3	2	3	2	1	2	1	3	3	0.7835
CcLo0023	Pre	2	2	3	2	1	3	1	3	2	0.7134
NcEx0001	Post	2	2	2	2	2	2	2	2	2	0.4086
NcEx0001	Pre	2	2	2	2	2	2	2	2	2	0.0087
NcEx0002	Post	3	1	3	2	2	3	1	3	3	0.5183
NcEx0002	Pre	3	2		1	2	3	1	1	3	0.1706
NcEx0003	Post	3	1	3	1	1	3	1	2	3	0.7410
NcEx0003	Pre	3	1	3	1	1	3	2	2	1	0.5392
NcEx0004	Post	1	1	1	1	1	3	2	2	2	0.8026
NcEx0004	Pre	1	1	1	1	1	3	2	2	2	0.5569
NcEx0005	Post	1	1	2	2	2	3	3	2	2	0.5376
NcEx0005	Pre	1	1	2	2	1	3	3	3	3	0.4729
NcEx0006	Post	2	1	3	3	3	3	2	2	3	0.6844
NcEx0006	Pre	2	2	3	2	2	3	1	2	3	0.6561
NcEx0007	Post	2	1	2	2	1	3	3	2	3	0.6908
NcEx0007	Pre	2	1	2	2	2	3	2	2	2	0.3394
NcEx0008	Post	3	1	3	3	3	3	2	3	3	0.5294
NcEx0008	Pre	3	1	3	3	3	3	2	3	3	0.5294

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
NcEx0009	Post	3	1	2	1	1	3	1	3	3	0.7455
NcEx0009	Pre	3	1	2	1	1	2	3	3	3	0.4299
NcEx0010	Post	3	1	3	1	2	3	1	3	3	0.5250
NcEx0010	Pre	3	1	2	2	2	3	3	2	2	0.1989
NcEx0011	Post	3	1	3	1	1	2	2	1	3	0.5723
NcEx0011	Pre	2	1	3	1	1	2	3	2	2	0.6353
NcEx0012	Post	2	1	3	2	1	2	2	3	3	0.8882
NcEx0012	Pre	3	2	3	2	1	2	3	3	3	0.6057
NcEx0013	Post	2	1	3	1	1	3	2	3	3	0.6946
NcEx0013	Pre	3	2	3	2	2	3	2	3	3	0.4229
NcEx0014	Post	1	2	3	2	2	3	1	3	3	0.7114
NcEx0014	Pre	3	2	3	2	2	3	2	2	3	0.6214
NcEx0015	Post	3	1	3	1	1	3	2	3	3	0.5984
NcEx0015	Pre	2	2	2	1	1	3	2	2	3	0.5811
NcEx0016	Post	3	2	2	1	1	3	1	2	3	0.5560
NcEx0016	Pre	2	2	2	2	1	3	2	3	2	0.4086
NcEx0017	Post	1	2	3	1	1	3	2	3	3	0.9458
NcEx0017	Pre	1	1	2	1	1	3	2	2	3	0.8319
NcEx0019	Post	3	2	3	1	1	3	2	3	2	0.4619
NcEx0019	Pre	3	2	2	1	1	3	2	3	2	0.4185
NcEx0020	Post	2	1	3	1	1	2	1	3	3	0.6353
NcEx0020	Pre	3	1	3	1	1	3	1	3	3	0.5553
NcEx0021	Post	3	1	3	1	1	3	2	3	3	0.7408
NcEx0021	Pre	1	1	2	2	1	3	2	1	2	0.5048
NcEx0022	Post	3	2	3	2	1	3	1	2	3	0.6572
NcEx0022	Pre	3	2	3	2	1	3	2	1	3	0.4999
NcEx0023	Post	2	1	3	2	1	3	2	3	2	0.8882
NcEx0023	Pre	2	1	3	3	2	2	2	2	2	0.6991
NcEx0024	Post	1	2	2	2	1	3	2	1	3	0.6385
NcEx0024	Pre	1	2	2	2	2	3	2	1	3	0.5143
NcLo0002	Post	3	1	3	2	1	3	3	3	3	0.3969

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
NcLo0002	Pre	2	1	2	2	2	3	2	1	2	-0.0144
NcLo0004	Post	1	1	1	2	1	2	2	2	3	0.6076
NcLo0004	Pre	1	1	2	1	1	2	2	3	3	0.7661
NcLo0005	Post	2	1	3	1	1	3	1	3	3	0.6690
NcLo0005	Pre	3	1	3	1	1	3	1	3	2	0.7534
NcLo0006	Post	2	2	2	1	2	3	2	3	3	0.6277
NcLo0006	Pre	2	3	2	1	2	3	3	3	3	0.3545
NcLo0007	Post	3	2	3	1	1	1	2	3	2	0.5168
NcLo0007	Pre	2	3	3	2	1	3	3	3	2	0.4458
NcLo0009	Post	1	3	3	2	1	3	1	3	3	0.7285
NcLo0009	Pre	1	2	2	2	3	3	3	2	3	0.3267
NcLo0011	Post							3	2	3	0.6124
NcLo0011	Pre	2	2	2	2	2	2	2	2	3	0.5627
NcLo0012	Post	3	2	2	2	1	3	2	2	3	0.6631
NcLo0012	Pre	2	3	2	2	1	3	2	2	2	0.6277
NcLo0013	Post	3	1	3	1	1	2	1	2	3	0.6669
NcLo0013	Pre	3	1	3	1	1	2	3	2	2	0.6316
NcLo0015	Post	1	3	1	1	1	1	2	3	3	0.3868
NcLo0015	Pre	1	2	1	1	2	3	1	3	3	0.7084
NcLo0016	Post	3	2	3	2	1	3	2	2	3	0.3858
NcLo0016	Pre	3	1	3	2	1	3	2	2	3	0.1842
NcLo0017	Post	1	2	2	2	1	2	2	1	2	0.6587
NcLo0017	Pre	2	2	1	2	1	2	2	1	2	0.3183
NcLo0018	Post	3	2	3	1	1	2	2	3	2	0.1630
NcLo0018	Pre	2	1	3	2	2	2	2	3	3	0.3625
NcLo0019	Post	1	1	2	1	1	2	2	1	2	0.4889
NcLo0019	Pre	2	1	3	1	1	3	2	2	3	0.6741
NcLo0020	Post	2	2	3	2	2	2	2	3	2	0.5675
NcLo0020	Pre	2	2	3	2	1	2	2	3	1	0.5406
NcLo0021	Post	3	1	3	2	1	3	3	2	3	0.6475
NcLo0021	Pre	3	2	1	2	2	2	3	2	2	0.3433

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
NcLo0022	Post	1	1	3	1	1	1	3	3	3	0.7704
NcLo0022	Pre	3	1	2	2	1	2	2	2	3	0.2407
NcLo0023	Post	2	2	3	1	1	3	3	2	3	0.7784
NcLo0023	Pre	2	2	3	1	1	3	2	2	1	0.6621
NcLo0024	Post	3	1	3	1	2	3	1	3	3	0.6645
NcLo0024	Pre	3	1	3	1	2	3	1	3	3	0.7101
NcLo0025	Post	3	2	3	1	1	2	1	3	3	0.6405
NcLo0025	Pre	2	3	3	2	1	3	2	2	3	0.6966
SiEx0001	Post	2	1	3	2	2	3	3	2	3	0.5487
SiEx0001	Pre	1	2	1	3	3	2	2	1	3	-0.2608
SiEx0002	Post	2	1	3	1	2	3	1	3	3	0.6139
SiEx0002	Pre	3	1	3	1	2	3	1	3	2	0.1870
SiEx0003	Post	3	1	3	2	1	3	3	3	1	0.6465
SiEx0003	Pre	2	1	3	1	1	3	3	2	1	0.7818
SiEx0004	Post	3	2	3	2	1	3	1	3	2	0.6405
SiEx0004	Pre	3	3	2	2	1	2	1	3	2	0.5090
SiEx0005	Post	2	2	2	2	2	2	2	2	2	0.4086
SiEx0005	Pre	2	2	2	2	2	2	2	2	2	0.5626
SiEx0006	Post	3	2	2	1	2	3	1	2	3	0.5397
SiEx0006	Pre	2	3	1	2	3	3	1	3	3	0.0674
SiEx0007	Post	2	2	3	2	1	3	2	3	2	0.4999
SiEx0007	Pre	2	2	3		1	3	3	3	2	0.7410
SiEx0008	Post	2	2	3	2	2	3	2	3	3	0.6742
SiEx0008	Pre	2	2	3	2	1	3	3	1	3	0.3858
SiEx0009	Post	3	3	3	2	1	3	3	2	3	0.6572
SiEx0009	Pre	3	3	2	2	1	3	3	2	3	0.3545
SiEx0010	Post	3	1	2	1	1	3	2	1	3	0.5895
SiEx0010	Pre	1	1	1	1	1	3	1	1	3	0.7471
SiEx0011	Post	3	2	3	1	1	3	1	2	3	0.8121
SiEx0011	Pre	2	3	2	1	1	3	2	3	2	0.3978
SiEx0012	Post	3	1	3	1	1	3	1	3	2	0.7123

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
SiEx0012	Pre	2	2	3	1	2	3	2	3	3	0.5931
SiEx0013	Post	3	1	3	1	1	2	1	3	2	0.6753
SiEx0013	Pre	3	1	3	1	1	2	1	2	2	0.5183
SiEx0014	Post	2	2	3	1	1	3	3	2	2	0.8342
SiEx0014	Pre	2	2	3	1	1	3	3	2	2	0.7134
SiEx0015	Post	2	1	3	2	2	3	2	3	3	0.5121
SiEx0015	Pre	2	1	3	2	2	3	2	3	3	0.6711
SiEx0016	Post	2	2	2	1	1	2	2	3	3	0.7451
SiEx0016	Pre	2	2	2	1	1	2	2	3	3	0.7451
SiEx0017	Post	3	1	2	2	1	3	2	2	3	0.5592
SiEx0017	Pre	3	2	3	2	2	3	2	2	3	0.1858
SiEx0018	Post	1	2	3	1	1	2	2	1	3	0.6865
SiEx0018	Pre	2	2	1	1	1	1	2	2	3	0.4500
SiEx0021	Post	2	1	3	1	1	3	2	3	2	0.5914
SiEx0021	Pre	3	2	3	1	1	3	2	2	2	0.3764
SiEx0024	Post	3	2	3	1	1	3	2	2	3	0.6561
SiEx0024	Pre	3	2	2	1	1	3	3	2	2	0.3858
SiLo0001	Post	2	3	2	1	1	3	2	1	2	0.6190
SiLo0001	Pre	2	2	2	2	2	2	2	2	2	0.1372
SiLo0002	Post	3	2	3	2	2	3	3	2	2	0.6820
SiLo0002	Pre	3	2	2	2	2	3	3	2	3	0.6281
SiLo0003	Post	3	2	3	2	1	3	2	3	3	0.5158
SiLo0003	Pre	3	2	3	2	1	3	2	3	2	0.4291
SiLo0004	Post	3	1	3	2	3	3	2	2	3	0.5494
SiLo0004	Pre	2	1	2	1	1	3	3	1	2	0.5183
SiLo0005	Post	1	2	3	1	1	3	3	1	2	0.7101
SiLo0005	Pre	1	2	3	1	1	3	3	1	2	0.7101
SiLo0006	Post	2	1	3	1	1	1	2	2	3	0.6190
SiLo0006	Pre	2	3	2	1	2	3	1	3	2	0.6741
SiLo0007	Post	2	2	2	2	1	3	2	3	2	0.7665
SiLo0007	Pre	2	2	2	2	1	3	2	2	2	0.6873

USER_ID	PRE- / POST-	C_3Q1	C_3Q2	C_3Q3	C_3Q4	C_3Q5	C_3Q6	C_4Q2	C_4Q3	C_4Q4	CORRELATION
SiLo0008	Post	1	2	3	2	1	2	3	2	3	0.7298
SiLo0008	Pre	3	2	3	2	2	2	3	2	3	0.6281
SiLo0009	Post	3	1	3	2	1	2	1	3	3	0.6405
SiLo0009	Pre	3	2	3	3	1	2	1	2	3	0.2940
SiLo0010	Post	1	1	2	1	1	3	2	3	3	0.8519
SiLo0010	Pre	1	2	2	1	2	3	3	2	2	0.6029
SiLo0011	Post	1	1	3	1	1	3	1	2	3	0.8572
SiLo0011	Pre	1	1	2	2	1	3	2	2	1	0.5865
SiLo0012	Post	3	1	3	1	1	3	2	1	3	0.5494
SiLo0012	Pre	3	1	3	1	1	3	2	2	3	0.6277
SiLo0013	Post	2	1	3	2	2	3	1	2	3	0.6753
SiLo0013	Pre	3	3	3	3	3	3	2	2	3	0.3328
SiLo0014	Post	1	1	3	1	1	2	1	3	3	0.6746
SiLo0014	Pre	2	1	3	1	2	3	2	2	2	0.6621
SiLo0015	Post	3	2	3	2	3	3	2	3	3	0.5158
SiLo0015	Pre	2	1	3	2	2	3	2	3	2	0.7667
SiLo0016	Post	1	1	3	1	3	2	2	2	3	0.6983
SiLo0016	Pre	2	2	3	2	2	2	2	2	3	0.7665
SiLo0017	Post	3	1	3	2	2	3	2	2	3	0.6074
SiLo0017	Pre	2	2	3	2	2	3	2	1	2	0.4571
SiLo0018	Post	2	1	3	1	1	2	1	3	2	0.8382
SiLo0018	Pre	3	2	2	1	1	2	1	3	2	0.6507
SiLo0019	Post	3	1	3	1	1	2	3	2	3	0.7024
SiLo0019	Pre	2	1	3	1	1	1	1	3	2	0.5267
SiLo0020	Post	2	2	2	2	1	2	2	1	1	0.2581
SiLo0020	Pre	3	2	3	2	1	2	2	2	1	0.2659

Table 32: Participant Reaction – Virtual human acceptance.

@ParticipantID	Looked _Real	Showed_ Emotion	Lip_ Sync	Realistic_ Gestures	Sim_Live_ Roleplayer	Useful_Exp
SiLo0003	-1.00	-1.00	-2.00	0.00	-3.00	-1.00
SiLo0006	1.00	3.00	3.00	2.00	0.00	2.00
SiLo0007	-1.00	-3.00	3.00	-1.00	-1.00	2.00
SiLo0008	0.00	2.00	0.00	2.00	2.00	3.00
SiLo0009	1.00	0.00	1.00	1.00	1.00	2.00
SiLo0010	1.00	2.00	1.00	1.00	1.00	1.00
SiLo0011	0.00	0.00	1.00	0.00	-1.00	2.00
SiLo0019	1.00	-3.00	-3.00	-3.00	-3.00	1.00
SiEx0003	3.00	3.00	3.00	3.00	3.00	3.00
SiEx0004	-2.00	-3.00	-3.00	-3.00	-3.00	-1.00
SiEx0007	2.00	2.00	-1.00	-1.00	1.00	2.00
SiEx0008	1.00	2.00	2.00	0.00	1.00	1.00
SiEx0009	2.00	2.00	2.00	1.00	0.00	3.00
SiEx0010	3.00	2.00	3.00	3.00	3.00	3.00
SiEx0011	0.00	0.00	-1.00	1.00	-2.00	2.00
SiEx0024	1.00	3.00	2.00	2.00	1.00	3.00
NcLo0007	2.00	1.00	2.00	0.00	-1.00	1.00
NcLo0011	-1.00	1.00	-1.00	0.00	-1.00	2.00
NcLo0012	1.00	0.00	2.00	1.00	-1.00	1.00
NcLo0013	2.00	2.00	0.00	2.00	2.00	3.00
NcLo0020	2.00	3.00	2.00	2.00	3.00	2.00
NcLo0021	1.00	0.00	0.00	1.00	2.00	2.00
NcLo0022	2.00	0.00	1.00	0.00	0.00	1.00
NcLo0023	1.00	1.00	2.00	3.00	1.00	2.00
NcEx0011	2.00	2.00	2.00	3.00	2.00	3.00
NcEx0012	1.00	2.00	1.00	1.00	0.00	1.00
NcEx0013	2.00	2.00	2.00	2.00	1.00	2.00
NcEx0014	1.00	3.00	-1.00	1.00	2.00	3.00
NcEx0023	2.00	1.00	3.00	2.00	0.00	2.00

@ParticipantID	Looked _Real	Showed_ Emotion	Lip_ Sync	Realistic_ Gestures	Sim_Live_ Roleplayer	Useful_Exp
CcLo0007	2.00	1.00	0.00	0.00	1.00	2.00
CcLo0008	3.00	2.00	3.00	2.00	1.00	2.00
CcLo0017	-2.00	-1.00	1.00	2.00	0.00	2.00
CcLo0019	2.00	2.00	2.00	1.00	1.00	2.00
CcLo0023	1.00	1.00	1.00	1.00	1.00	2.00
CcEx0007	1.00	2.00	2.00	1.00	1.00	2.00
CcEx0008	-3.00	-3.00	-3.00	-3.00	-3.00	0.00
CcEx0009	2.00	3.00	2.00	2.00	3.00	3.00
CcEx0010	1.00	0.00	3.00	2.00	-1.00	1.00
CcEx0011	-1.00	-1.00	2.00	1.00	-3.00	0.00
CcEx0012	1.00	2.00	1.00	2.00	1.00	1.00
CcEx0013	2.00	2.00	3.00	3.00	2.00	1.00
CcEx0015	3.00	1.00	1.00	1.00	1.00	1.00
SiLo0014	1.00	2.00	-1.00	-1.00	1.00	2.00
SiEx0017	2.00	2.00	1.00	2.00	0.00	2.00
NcLo0018	1.00	0.00	0.00	0.00	1.00	2.00
NcLo0019	1.00	2.00	2.00	2.00	1.00	2.00
NcEx0015	1.00	1.00	0.00	0.00	0.00	2.00
CcLo0013	0.00	1.00	1.00	2.00	0.00	2.00
CcEx0001	2.00	3.00	3.00	3.00	2.00	3.00
CcEx0014	0.00	1.00	1.00	2.00	1.00	1.00
SiLo0016	2.00	0.00	1.00	1.00	0.00	2.00
SiEx0006	-3.00	-3.00	-3.00	-2.00	-3.00	1.00
NcEx0006	2.00	2.00	3.00	2.00	1.00	3.00
CcEx0022	0.00	1.00	--	1.00	1.00	1.00
SiLo0001	3.00	3.00	3.00	3.00	3.00	3.00
SiLo0002	-1.00	1.00	1.00	1.00	1.00	0.00
SiLo0004	-1.00	-2.00	1.00	0.00	-2.00	1.00
SiLo0005	3.00	2.00	2.00	2.00	0.00	-1.00
SiLo0012	3.00	2.00	3.00	3.00	2.00	3.00
SiLo0013	1.00	2.00	2.00	2.00	1.00	2.00

@ParticipantID	Looked _Real	Showed_ Emotion	Lip_ Sync	Realistic_ Gestures	Sim_Live_ Roleplayer	Useful_Exp
SiLo0015	1.00	0.00	0.00	1.00	-1.00	0.00
SiLo0020	3.00	0.00	0.00	2.00	1.00	3.00
SiEx0001	2.00	2.00	3.00	2.00	1.00	3.00
SiEx0002	0.00	0.00	-2.00	-2.00	-3.00	0.00
SiEx0005	0.00	0.00	0.00	0.00	0.00	0.00
SiEx0012	2.00	2.00	2.00	3.00	1.00	3.00
SiEx0013	1.00	1.00	0.00	0.00	2.00	2.00
SiEx0016	1.00	1.00	2.00	2.00	1.00	1.00
SiEx0021	1.00	1.00	2.00	1.00	0.00	2.00
NcLo0002	1.00	2.00	1.00	2.00	2.00	3.00
NcLo0005	0.00	2.00	2.00	2.00	0.00	1.00
NcLo0006	1.00	1.00	2.00	2.00	-1.00	2.00
NcLo0009	3.00	3.00	3.00	3.00	3.00	3.00
NcLo0016	2.00	0.00	2.00	2.00	0.00	1.00
NcLo0017	1.00	1.00	2.00	2.00	2.00	1.00
NcEx0004	2.00	2.00	-1.00	2.00	-1.00	-3.00
NcEx0005	2.00	3.00	3.00	3.00	3.00	3.00
NcEx0007	1.00	1.00	0.00	3.00	1.00	2.00
NcEx0008	-3.00	-3.00	-3.00	-3.00	-3.00	-3.00
NcEx0016	2.00	1.00	1.00	0.00	0.00	2.00
NcEx0017	1.00	2.00	2.00	2.00	-1.00	3.00
NcEx0019	3.00	2.00	3.00	2.00	1.00	2.00
NcEx0020	1.00	0.00	2.00	2.00	1.00	2.00
NcEx0021	1.00	2.00	2.00	3.00	1.00	3.00
NcEx0022	2.00	2.00	3.00	3.00	-1.00	2.00
NcEx0024	1.00	1.00	1.00	1.00	-1.00	-1.00
CcLo0001	1.00	1.00	1.00	1.00	1.00	1.00
CcLo0002	0.00	0.00	0.00	0.00	0.00	0.00
CcLo0003	3.00	3.00	3.00	3.00	0.00	2.00
CcLo0004	1.00	2.00	2.00	3.00	3.00	3.00
CcLo0005	-1.00	1.00	0.00	1.00	0.00	1.00

@ParticipantID	Looked _Real	Showed_ Emotion	Lip_ Sync	Realistic_ Gestures	Sim_Live_ Roleplayer	Useful_Exp
CcLo0006	2.00	2.00	2.00	2.00	2.00	2.00
CcLo0011	1.00	1.00	1.00	2.00	0.00	1.00
CcLo0012	1.00	1.00	0.00	0.00	-1.00	2.00
NcEx0001	1.00	1.00	0.00	1.00	1.00	0.00
NcEx0002	2.00	2.00	2.00	3.00	2.00	2.00
NcEx0003	-2.00	1.00	3.00	0.00	-3.00	1.00
CcEx0002	2.00	1.00	2.00	2.00	1.00	3.00
CcEx0003	0.00	0.00	1.00	-2.00	2.00	-2.00
CcEx0004	0.00	-1.00	-3.00	-2.00	0.00	1.00
CcEx0005	2.00	1.00	2.00	3.00	0.00	0.00
CcEx0006	-1.00	-1.00	0.00	0.00	-2.00	0.00
CcEx0017	0.00	1.00	1.00	1.00	0.00	-1.00
CcEx0020	1.00	2.00	2.00	1.00	-1.00	2.00
NcLo0004	1.00	1.00	2.00	2.00	1.00	3.00
SiLo0017	2.00	2.00	2.00	0.00	0.00	3.00
SiLo0018	2.00	2.00	1.00	2.00	1.00	2.00
SiEx0014	-1.00	-1.00	-1.00	-2.00	-2.00	1.00
SiEx0015	1.00	-3.00	-3.00	-3.00	-3.00	-2.00
SiEx0018	1.00	1.00	2.00	1.00	-1.00	1.00
NcLo0015	3.00	3.00	3.00	3.00	0.00	3.00
NcLo0024	2.00	2.00	2.00	2.00	2.00	2.00
NcLo0025	1.00	2.00	2.00	0.00	0.00	3.00
NcEx0009	2.00	2.00	1.00	3.00	3.00	3.00
NcEx0010	3.00	3.00	3.00	3.00	3.00	3.00
CcLo0014	-1.00	0.00	0.00	1.00	-3.00	2.00
CcLo0015	1.00	1.00	-1.00	1.00	-1.00	1.00
CcLo0016	-1.00	0.00	1.00	1.00	0.00	2.00
CcEx0018	1.00	2.00	2.00	1.00	2.00	3.00
CcEx0019	3.00	3.00	3.00	2.00	2.00	3.00

Table 33: Participant Reaction – Perceptions of interaction with virtual human.

@ParticipantID	See_VH	Hair_ Color	Similar_ Dialog	Done_ Different	Sim_F2F	Paided_ Attention	Zoom_ Artificial	Gestures_ Exaggerated	Expected_ Reaction	Assess_VH
SiLo0003	1	4	4	3	2	4	4	2	1	3
SiLo0006	1	2	4	2	1	1	--	--	2	1
SiLo0007	1	2	4	4	2	4	3	2	4	2
SiLo0008	1	4	4	2	4	3	3	3	4	4
SiLo0009	1	2	4	2	4	4	3	3	4	4
SiLo0010	1	2	3	4	4	4	3	3	4	3
SiLo0011	1	2	5	2	4	4	3	2	4	4
SiLo0019	1	2	2	3	2	4	3	1	3	4
SiEx0003	1	2	5	1	4	4	3	3	5	3
SiEx0004	1	2	4	3	1	3	3	1	3	1
SiEx0007	1	2	3	2	2	4	4	3	4	2
SiEx0008	1	2	4	2	4	5	3	1	4	4
SiEx0009	1	4	4	2	4	4	4	3	4	2
SiEx0010	1	2	4	2	4	5	2	2	5	4
SiEx0011	1	2	4	2	3	2	4	2	2	2
SiEx0024	1	4	4	2	2	4	4	2	4	2
NcLo0007	1	4	4	2	2	4	4	1	4	3
NcLo0011	1	2	4	3	2	3	4	3	3	4
NcLo0012	1	2	4	2	3	3	3	2	4	3
NcLo0013	1	2	4	1	4	5	3	3	4	5
NcLo0020	1	2	4	2	4	4	2	2	4	4
NcLo0021	1	4	4	3	4	4	3	2	5	4
NcLo0022	1	2	2	4	2	2	3	2	4	4
NcLo0023	1	2	3	3	4	4	2	2	4	3
NcEx0011	1	2	4	2	4	5	3	2	4	4
NcEx0012	1	2	3	3	4	4	3	3	3	4
NcEx0013	1	4	4	2	3	4	4	2	4	4
NcEx0014	1	4	4	2	3	4	3	4	3	4
NcEx0023	1	4	4	2	4	4	3	1	5	5

@ParticipantID	See_VH	Hair_ Color	Similar_ Dialog	Done_ Different	Sim_F2F	Paided_ Attention	Zoom_ Artificial	Gestures_ Exaggerated	Expected_ Reaction	Assess_VH
CcLo0007	1	2	4	3	3	4	3	2	4	2
CcLo0008	1	2	3	4	2	4	5	2	3	4
CcLo0017	1	2	4	2	3	4	3	2	4	4
CcLo0019	1	2	4	2	4	4	2	3	4	4
CcLo0023	1	4	4	2	4	4	2	2	4	4
CcEx0007	1	2	4	2	3	5	2	2	2	3
CcEx0008	1	2	4	1	2	4	5	4	3	4
CcEx0009	1	2	5	1	5	4	2	2	4	4
CcEx0010	1	2	3	4	3	4	4	2	4	4
CcEx0011	1	2	4	3	2	4	4	3	2	4
CcEx0012	1	4	3	4	4	5	3	3	4	5
CcEx0013	1	2	4	1	4	4	1	1	4	4
CcEx0015	1	2	4	2	4	4	4	3	4	2
SiLo0014	1	2	4	2	3	3	2	3	5	4
SiEx0017	1	4	4	4	2	4	4	2	4	4
NcLo0018	1	2	4	3	4	4	3	2	4	4
NcLo0019	1	2	3	2	3	4	3	3	4	4
NcEx0015	1	1	3	2	3	4	2	3	4	4
CcLo0013	1	1	4	3	3	4	3	3	4	4
CcEx0001	1	4	4	2	4	4	3	2	4	4
CcEx0014	1	4	3	2	4	4	3	2	3	3
SiLo0016	1	2	4	2	5	5	2	1	4	3
SiEx0006	1	2	4	4	2	5	3	2	3	3
NcEx0006	1	2	4	2	4	5	3	2	3	4
CcEx0022	1	2	4	2	2	3	4	3	3	3
SiLo0001	1	4	5	5	5	5	5	5	5	5
SiLo0002	1	2	4	5	3	4	3	2	4	4
SiLo0004	1	4	5	2	4	5	4	2	4	2
SiLo0005	1	2	5	1	4	4	2	4	4	3
SiLo0012	1	2	5	1	5	5	3	1	5	5
SiLo0013	1	1	4	3	4	4	2	2	4	3

@ParticipantID	See_VH	Hair_ Color	Similar_ Dialog	Done_ Different	Sim_F2F	Paided_ Attention	Zoom_ Artificial	Gestures_ Exaggerated	Expected_ Reaction	Assess_VH
SiLo0015	1	4	4	3	3	4	3	3	4	3
SiLo0020	1	2	5	3	4	5	3	2	4	4
SiEx0001	1	2	4	3	3	4	3	2	4	5
SiEx0002	1	2	5	1	5	1	5	5	1	1
SiEx0005	1	4	3	3	3	3	3	3	3	3
SiEx0012	1	2	5	2	4	4	3	3	4	4
SiEx0013	1	4	4	2	4	4	3	3	4	4
SiEx0016	1	2	4	1	3	4	2	2	2	2
SiEx0021	1	4	4	4	3	4	3	3	2	3
NcLo0002	1	4	3	2	4	4	3	3	4	4
NcLo0005	1	2	4	1	3	4	3	1	5	3
NcLo0006	1	2	4	2	2	4	3	3	4	2
NcLo0009	1	2	5	3	5	5	3	1	5	5
NcLo0016	1	2	3	3	4	4	3	4	4	4
NcLo0017	1	4	4	2	3	4	3	3	4	3
NcEx0004	1	2	4	2	3	4	3	2	4	3
NcEx0005	1	2	5	2	5	5	2	1	5	5
NcEx0007	1	4	4	2	3	4	3	2	4	3
NcEx0008	0	2	4	4	1	1	3	3	3	3
NcEx0016	1	2	4	3	3	3	3	2	5	3
NcEx0017	1	4	4	2	1	3	3	3	4	2
NcEx0019	1	2	4	3	--	4	3	4	3	4
NcEx0020	1	2	5	2	4	4	3	3	4	4
NcEx0021	--	--	5	2	3	5	3	2	4	4
NcEx0022	1	2	4	4	4	4	4	3	2	4
NcEx0024	1	2	3	4	2	3	3	3	4	3
CcLo0001	1	2	3	3	3	3	3	3	3	3
CcLo0002	1	2	3	2	3	4	3	3	3	3
CcLo0003	1	2	4	3	4	4	3	2	4	--
CcLo0004	1	2	5	3	5	5	3	3	2	5
CcLo0005	1	4	5	2	3	5	4	2	4	3

@ParticipantID	See_VH	Hair_ Color	Similar_ Dialog	Done_ Different	Sim_F2F	Paided_ Attention	Zoom_ Artificial	Gestures_ Exaggerated	Expected_ Reaction	Assess_VH
CcLo0006	1	2	5	3	4	5	4	3	5	5
CcLo0011	1	4	4	2	3	4	3	3	4	4
CcLo0012	1	4	5	2	3	5	3	2	4	4
NcEx0001	1	2	3	3	3	3	3	3	3	3
NcEx0002	1	4	4	2	3	4	3	2	4	4
NcEx0003	1	4	5	2	2	5	3	2	5	5
CcEx0002	1	2	4	2	3	4	3	2	4	4
CcEx0003	--	--	3	3	2	--	3	4	5	1
CcEx0004	1	2	4	2	5	4	3	2	4	4
CcEx0005	1	2	4	2	3	4	3	2	4	4
CcEx0006	1	2	3	3	4	5	3	3	4	3
CcEx0017	1	2	4	2	3	1	4	2	4	4
CcEx0020	1	2	4	2	4	4	4	2	4	4
NcLo0004	1	4	4	--	4	4	3	3	4	4
SiLo0017	1	2	5	2	4	5	2	2	4	4
SiLo0018	1	2	5	2	3	3	4	2	4	2
SiEx0014	1	2	5	1	2	4	2	1	4	2
SiEx0015	1	2	3	5	2	1	4	1	3	1
SiEx0018	1	4	4	3	3	2	4	3	4	4
NcLo0015	1	2	4	3	4	3	3	3	4	3
NcLo0024	1	4	4	2	3	4	2	2	3	3
NcLo0025	1	2	4	2	3	5	3	2	4	4
NcEx0009	1	2	5	1	4	4	4	2	4	4
NcEx0010	1	4	4	3	4	4	4	3	4	4
CcLo0014	1	4	4	2	1	4	5	2	4	4
CcLo0015	1	2	5	1	3	5	3	2	4	4
CcLo0016	1	2	5	2	4	5	3	2	4	4
CcEx0018	1	2	4	3	4	4	3	3	4	4
CcEx0019	1	2	4	2	4	5	2	2	4	4

Table 34: Participant Reaction – Virtual human appearance.

@ParticipantID	D3_Bored	D3_Frustrated	D3_Defensive	D3_OpenHonest	D3_Friendly	D3_Interested	D3_Anxious
SiLo0003	4	4	3	5	3	3	4
SiLo0006	1	4	1	4	3	2	1
SiLo0007	2	4	4	4	3	4	4
SiLo0008	2	4	4	4	3	3	4
SiLo0009	1	4	2	4	3	3	2
SiLo0010	4	3	5	4	2	2	4
SiLo0011	4	5	5	4	3	2	4
SiLo0019	4	4	4	4	3	3	3
SiEx0003	4	5	5	1	1	3	4
SiEx0004	3	3	4	4	3	3	4
SiEx0007	2	4	4	4	2	3	4
SiEx0008	2	5	5	4	2	3	4
SiEx0009	1	5	3	5	2	3	3
SiEx0010	2	4	5	4	4	3	4
SiEx0011	4	5	5	4	2	2	4
SiEx0024	4	4	4	3	2	3	4
NcLo0007	5	4	4	4	3	2	4
NcLo0011	2	4	4	2	2	2	4
NcLo0012	3	3	2	--	4	3	4
NcLo0013	2	5	5	4	3	4	4
NcLo0020	2	4	4	4	3	3	4
NcLo0021	3	2	1	5	4	4	2
NcLo0022	2	4	4	4	3	4	4
NcLo0023	3	4	5	4	3	2	3
NcEx0011	4	4	4	4	2	2	3
NcEx0012	3	4	4	2	2	2	3
NcEx0013	2	2	4	--	4	3	3
NcEx0014	4	4	5	5	1	3	4
NcEx0023	1	4	4	5	4	3	4
CcLo0007	2	2	4	4	4	3	2

@ParticipantID	D3_Bored	D3_Frustrated	D3_Defensive	D3_OpenHonest	D3_Friendly	D3_Interested	D3_Anxious
CcLo0008	2	2	2	4	4	4	2
CcLo0017	3	4	4	4	3	4	4
CcLo0019	2	3	4	4	3	3	4
CcLo0023	3	4	4	4	4	3	3
CcEx0007	3	4	5	4	2	2	4
CcEx0008	4	4	4	3	2	2	4
CcEx0009	2	4	4	4	4	3	4
CcEx0010	2	2	4	3	3	4	4
CcEx0011	1	3	4	4	3	3	4
CcEx0012	2	4	4	5	3	2	2
CcEx0013	2	4	4	4	3	4	3
CcEx0015	2	4	4	4	4	4	4
SiLo0014	4	5	5	2	3	1	4
SiEx0017	3	4	4	4	3	2	4
NcLo0018	2	4	4	5	3	4	4
NcLo0019	4	4	4	3	3	4	4
NcEx0015	3	4	4	4	4	4	3
CcLo0013	4	4	4	3	3	2	4
CcEx0001	2	4	4	4	3	4	2
CcEx0014	3	2	3	4	4	4	4
SiLo0016	2	2	4	4	4	3	3
SiEx0006	3	3	4	4	4	4	3
NcEx0006	4	4	4	5	4	4	3
CcEx0022	2	4	4	4	3	3	4
SiLo0001	5	3	3	4	3	3	3
SiLo0002	4	2	4	5	4	4	2
SiLo0004	3	2	1	5	4	3	3
SiLo0005	1	1	1	1	1	1	1
SiLo0012	1	1	4	4	5	3	4
SiLo0013	3	4	4	4	3	4	4
SiLo0015	5	5	5	4	3	3	3
SiLo0020	3	4	4	4	4	4	3

@ParticipantID	D3_Bored	D3_Frustrated	D3_Defensive	D3_OpenHonest	D3_Friendly	D3_Interested	D3_Anxious
SiEx0001	1	4	4	5	3	2	5
SiEx0002	1	5	4	4	3	1	5
SiEx0005	3	3	3	3	3	3	3
SiEx0012	2	4	4	4	3	2	4
SiEx0013	2	2	4	4	3	4	4
SiEx0016	3	4	4	3	3	2	3
SiEx0021	2	4	5	--	4	2	4
NcLo0002	4	4	4	4	3	3	4
NcLo0005	2	2	2	4	4	4	3
NcLo0006	2	4	4	4	2	2	2
NcLo0009	1	4	4	4	4	2	5
NcLo0016	3	3	3	4	4	4	3
NcLo0017	3	4	4	4	3	3	4
NcEx0004	3	4	4	4	3	3	4
NcEx0005	4	4	4	4	3	2	4
NcEx0007	2	2	2	4	4	3	2
NcEx0008	3	3	3	3	3	3	3
NcEx0016	2	4	4	4	4	4	4
NcEx0017	4	4	2	4	4	3	4
NcEx0019	2	4	5	4	2	2	4
NcEx0020	4	3	4	5	3	4	3
NcEx0021	2	4	4	5	4	3	3
NcEx0022	2	4	4	4	2	4	4
NcEx0024	2	4	4	4	3	4	4
CcLo0001	3	3	3	3	3	3	3
CcLo0002	4	3	3	4	2	2	3
CcLo0003	2	2	2	4	4	4	2
CcLo0004	1	2	3	5	5	5	3
CcLo0005	1	4	5	3	3	4	4
CcLo0006	2	2	2	5	4	4	4
CcLo0011	3	4	4	3	3	3	4
CcLo0012	4	3	5	4	3	3	5

@ParticipantID	D3_Bored	D3_Frustrated	D3_Defensive	D3_OpenHonest	D3_Friendly	D3_Interested	D3_Anxious
NcEx0001	3	3	3	3	3	3	3
NcEx0002	3	4	5	5	3	3	4
NcEx0003	1	4	4	4	4	4	4
CcEx0002	2	3	4	4	4	4	4
CcEx0003	1	2	3	4	5	4	3
CcEx0004	1	1	1	4	1	1	3
CcEx0005	2	2	4	4	3	3	4
CcEx0006	--	1	1	1	--	--	--
CcEx0017	3	4	4	4	2	3	4
CcEx0020	2	2	2	4	4	4	2
NcLo0004	1	3	2	4	4	4	2
SiLo0017	2	4	4	4	3	4	4
SiLo0018	4	2	3	3	2	1	2
SiEx0014	1	4	5	4	2	3	4
SiEx0015	2	3	4	3	2	3	4
SiEx0018	2	4	4	5	3	2	4
NcLo0015	2	1	4	4	4	4	3
NcLo0024	2	2	2	4	4	--	3
NcLo0025	2	4	3	4	3	3	2
NcEx0009	4	4	4	5	4	4	2
NcEx0010	2	2	2	4	4	4	3
CcLo0014	2	5	5	3	3	2	4
CcLo0015	4	2	2	4	4	4	2
CcLo0016	1	4	4	4	2	4	2
CcEx0018	3	4	4	4	3	3	4
CcEx0019	2	4	4	4	2	4	4

Table 35: Bi-Polar adjective scores

Participant ID	D4_Q1	D4_Q2	D4_Q3	D4_Q4	D4_Q5	D4_Q6	D4_Q7	D4_Q8	D4_Q9	D4_Q10	Bi-Polar Integer
CcEx0001	1	1	1	1	1	1	1	1	1	1	10
CcEx0002	5	5	5	4	5	5	5	4	5	5	48
CcEx0003	4	4	5	3	4	3	3	5	5	5	41
CcEx0004	4	4	4	4	4	4	3	3	4	4	38
CcEx0005	4	4	4	3	4	4	4	4	4	4	39
CcEx0006	2	4	4	3	4	3	3	3	4	4	34
CcEx0007	3	4	4	3	4	4	4	3	5	4	38
CcEx0008	3	4	4	1	4	4	3	1	4	2	30
CcEx0009	5	5	5	5	5	5	4	4	5	5	48
CcEx0010	4	4	5	3	4	4	4	3	4	3	38
CcEx0011	3	3	4	2	3	2	3	1	2	1	24
CcEx0012	4	4	4	4	4	4	4	4	3	4	39
CcEx0013	4	4	5	5	4	5	4	5	4	4	44
CcEx0014	3	5	4	4	4	4	3	3	4	4	38
CcEx0015	4	4	4	4	4	4	4	3	4	4	39
CcEx0017	4	4	4	2	3	4	4	2	4	3	34
CcEx0018	4	5	4	4	5	4	4	4	5	4	43
CcEx0019	5	5	5	5	5	5	5	4	5	5	49
CcEx0020	4	5	5	4	5	5	4	4	5	4	45
CcEx0022	3	4	4	4	4	4	4	3	3	3	36
CcLo0001	3	3	3	3	3	3	3	3	3	3	30
CcLo0002	3	4	4	2	3	4	2	3	3	4	32
CcLo0003	3	3	3	3	3	3	3	3	3	3	30
CcLo0004	4	5	3	3	3	4	2	5	5	5	39
CcLo0005	3	5	5	5	5	5	5	5	5	5	48
CcLo0006	5	5	5	4	4	4	4	5	5	5	46

Participant ID	D4_Q1	D4_Q2	D4_Q3	D4_Q4	D4_Q5	D4_Q6	D4_Q7	D4_Q8	D4_Q9	D4_Q10	Bi-Polar Integer
CcLo0007	4	4	4	3	4	4	4	3	4	4	38
CcLo0008	4	4	5	3	4	4	5	3	4	4	40
CcLo0011	4	4	4	4	4	4	4	3	4	3	38
CcLo0012	4	5	5	4	5	4	5	4	4	4	44
CcLo0013	3	4	4	3	4	3	4	3	4	4	36
CcLo0014	3	5	4	3	5	4	5	2	5	3	39
CcLo0015	5	5	5	4	5	4	5	4	5	4	46
CcLo0016	4	4	4	3	5	4	4	4	4	4	40
CcLo0017	4	4	4	3	4	4	4	4	4	4	39
CcLo0019	4	4	5	4	4	4	4	3	4	4	40
CcLo0023	4	4	4	4	4	4	4	4	4	4	40
NcEx0001	3	3	3	3	3	3	3	3	3	3	30
NcEx0002	4	4	4	3	2	2	2	3	1	1	26
NcEx0003	4	5	5	5	5	5	5	3	5	5	47
NcEx0004	3	5	5	3	3	3	4	2	4	3	35
NcEx0005	5	5	5	5	5	5	5	5	5	5	50
NcEx0006	3	5	4	4	5	5	5	4	5	5	45
NcEx0007	3	4	4	3	5	4	4	4	5	5	41
NcEx0008	1	2	1	1	1	1	2	1	1	1	12
NcEx0009	5	5	5	2	2	1	5	4	5	5	39
NcEx0010	5	5	5	5	5	5	5	5	5	5	50
NcEx0011	4	5	5	4	4	4	4	4	5	4	43
NcEx0012	3	4	4	4	4	4	4	4	4	4	39
NcEx0013	4	4	4	4	4	3	4	4	4	3	38
NcEx0014	4	4	5	5	4	5	5	4	4	3	43
NcEx0015	3	3	4	3	4	4	3	3	4	3	34
NcEx0016	4	4	3	3	4	4	3	3	4	4	36

Participant ID	D4_Q1	D4_Q2	D4_Q3	D4_Q4	D4_Q5	D4_Q6	D4_Q7	D4_Q8	D4_Q9	D4_Q10	Bi-Polar Integer
NcEx0017	3	5	4	4	5	4	4	2	4	3	38
NcEx0019	4	4	4	4	4	4	4	4	4	4	40
NcEx0020	4	5	4	4	4	4	4	3	4	4	40
NcEx0021	5	5	5	5	5	5	5	4	5	5	49
NcEx0022	4	4	4	3	4	4	4	3	4	4	38
NcEx0023	4	5	5	4	4	5	5	4	5	4	45
NcEx0024	3	3	3	3	3	3	3	3	3	3	30
NcLo0002	5	5	5	5	5	5	5	5	5	5	50
NcLo0004	4	4	4	4	4	4	4	4	5	5	42
NcLo0005	3	3	1	1	1	1	1	3	4	4	22
NcLo0006	4	4	1	3	1	1	1	1	1	1	18
NcLo0007	4	4	3	3	2	4	3	3	4	3	33
NcLo0009	5	5	5	5	5	5	5	5	5	5	50
NcLo0011	3	4	4	3	4	3	3	2	4	3	33
NcLo0012	3	5	4	4	3	4	4	4	5	3	39
NcLo0013	4	5	4	5	5	5	3	4	5	4	44
NcLo0015	4	4	4	4	4	4	5	4	4	4	41
NcLo0016	3		4	3	4	3	4	4	4	4	33
NcLo0017	4	4	1	2	3	4	4	3	4	4	33
NcLo0018	4	4	4	4	4	5	4	5	4	4	42
NcLo0019	5	5	5	5	5	5	5	4	5	4	48
NcLo0020	4	4	4	4	4	4	5	4	4	5	42
NcLo0021	4	4	4	4	5	5	5	3	4	4	42
NcLo0022	4	4	4	3	4	4	4	3	4	4	38
NcLo0023	4	4	4	4	4	4	4	3	4	4	39
NcLo0024	4	5	4	4	4	4	4	4	4	5	42
NcLo0025	4	3	4	4	4	4	4	4	4	3	38

Participant ID	D4_Q1	D4_Q2	D4_Q3	D4_Q4	D4_Q5	D4_Q6	D4_Q7	D4_Q8	D4_Q9	D4_Q10	Bi-Polar Integer
SiEx0001	5	5	5	5	4	5	5	4	5	4	47
SiEx0002	3	2	3	3	2	3	3	3	2	3	27
SiEx0003	4	4	5	5	5	5	5	4	4	4	45
SiEx0004	1	5	2	1	2	2	2	1	3	1	20
SiEx0005	3	3	3	3	3	3	3	3	3	3	30
SiEx0006	3	3	4	2	3	3	2	1	3	2	26
SiEx0007	5	4	5	3	5	4	5	3	4	3	41
SiEx0008	4	4	4	3	3	4	4	4	4	4	38
SiEx0009	5	5	5	4	5	5	5	4	5	4	47
SiEx0010	5	5	5	5	5	5	5	4	5	4	48
SiEx0011	4	2	2	3	2	2	2	3	2	2	24
SiEx0012	5	5	4	4	5	5	4	4	5	5	46
SiEx0013	3	4	4	4	4	4	4	4	4	4	39
SiEx0014	3	3	3	3	3	4	4	3	4	4	34
SiEx0015	1	1	1	1	2	2	1	1	1	1	12
SiEx0016	3	4	2	2	2	2	2	2	2	2	23
SiEx0017	4	4	2	2	3	2	2	3	2	2	26
SiEx0018	4	5	4	3	4	4	4	3	4	4	39
SiEx0021	4	4	4	3	4	3	4	3	4	3	36
SiEx0024	3	4	3	4	4	4	4	3	4	4	37
SiLo0001	5	5	5	5	5	5	5	5	5	5	50
SiLo0002	3	3	4	3	4	3	4	3	3	3	33
SiLo0003	2	2	2	1	2	4	3	1	2	1	20
SiLo0004	3	4	5	3	5	5	4	4	5	4	42
SiLo0005	5	5	5	4	4	4	4	4	4	4	43
SiLo0006	4	3	3	4	4	3	3	1	3	2	30
SiLo0007	3	4	2	2	1	1	1	1	1	1	17

Participant ID	D4_Q1	D4_Q2	D4_Q3	D4_Q4	D4_Q5	D4_Q6	D4_Q7	D4_Q8	D4_Q9	D4_Q10	Bi-Polar Integer
SiLo0008	4	4	4	2	4	4	3	3	4	4	36
SiLo0009	4	4	4	3	4	4	4	3	4	3	37
SiLo0010	4	4	4	3	4	4	4	3	3	4	37
SiLo0011	4	4	4	3	4	4	4	4	5	4	40
SiLo0012	4	5	5	4	5	5	5	4	5	5	47
SiLo0013	4	4	4	4	4	4	4	4	4	4	40
SiLo0014	4	3	4	5	4	5	5	4	4	4	42
SiLo0015	4	4	4	3	3	3	4	3	4	4	36
SiLo0016	4	5	4	4	4	4	4	4	4	4	41
SiLo0017	3	5	5	5	4	4	5	4	5	5	45
SiLo0018	3	4	3	2	3	3	4	4	4	2	32
SiLo0019	3	5	4	3	4	3	4	3	5	3	37
SiLo0020	4	5	5	5	5	5	5	5	5	5	49

Table 36: Percentage of time on windows during speaking and not speaking phases.

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VH	VH_Choice	VH_Chat	VH_Off	USER_VH	USER_Choice	USER_Chat	USER_Off
SiLo0003	38.90%	34.70%	16.20%	10.10%	10.20%	81.10%	6.20%	2.50%
SiLo0006	59.20%	27.10%	2.30%	11.40%	8.60%	86.00%	3.50%	1.90%
SiLo0007	38.50%	44.90%	2.90%	13.70%	2.80%	87.30%	0.00%	9.90%
SiLo0008	19.90%	57.50%	20.20%	2.50%	1.40%	84.40%	13.40%	0.80%
SiLo0009	36.90%	44.30%	11.00%	7.70%	1.90%	96.20%	1.10%	0.80%
SiLo0010	3.30%	6.60%	11.90%	78.20%	0.20%	62.70%	11.20%	25.90%
SiLo0011	28.80%	39.60%	22.50%	9.10%	0.80%	85.30%	12.90%	1.00%
SiLo0019	30.50%	22.90%	45.40%	1.20%	2.60%	86.50%	9.80%	1.10%
SiEx0003	22.80%	38.50%	26.00%	12.70%	3.60%	84.60%	7.50%	4.30%
SiEx0004	66.30%	18.40%	8.80%	6.50%	13.10%	79.70%	6.20%	1.10%
SiEx0007	41.00%	25.30%	31.30%	2.50%	1.20%	84.50%	13.50%	0.80%
SiEx0008	75.60%	4.20%	1.10%	19.20%	10.00%	84.00%	1.30%	4.70%
SiEx0009	45.90%	15.70%	29.20%	9.10%	6.80%	79.50%	7.30%	6.30%
SiEx0010	70.90%	8.40%	17.10%	3.60%	4.60%	87.20%	7.20%	1.00%
SiEx0011	30.70%	26.90%	19.90%	22.40%	3.10%	86.20%	7.20%	3.40%
SiEx0024	39.60%	24.20%	24.20%	12.00%	3.20%	81.70%	13.90%	1.20%
NcLo0007	37.40%	22.10%	36.50%	4.00%	3.90%	82.90%	10.00%	3.10%
NcLo0011	49.30%	33.30%	13.10%	4.30%	1.30%	88.50%	9.00%	1.20%
NcLo0012	48.60%	28.10%	16.60%	6.70%	4.30%	87.10%	7.10%	1.60%
NcLo0013	63.20%	14.00%	15.70%	7.10%	8.40%	80.50%	10.40%	0.80%
NcLo0020	73.90%	8.30%	12.20%	5.70%	7.50%	70.00%	16.20%	6.30%
NcLo0021	28.80%	45.60%	1.60%	24.00%	0.90%	73.70%	0.80%	24.60%
NcLo0022	58.40%	9.40%	22.90%	9.20%	2.10%	80.60%	11.20%	6.10%
NcLo0023	35.90%	49.30%	10.70%	4.10%	2.70%	94.70%	1.30%	1.30%
NcEx0011	58.70%	28.20%	9.10%	4.00%	6.00%	84.60%	8.30%	1.20%
NcEx0012	75.20%	12.60%	8.80%	3.40%	5.60%	88.20%	4.70%	1.50%
NcEx0013	54.50%	19.10%	18.30%	8.20%	2.30%	86.10%	10.80%	0.90%
NcEx0014	60.60%	21.40%	16.10%	2.00%	6.80%	87.20%	5.80%	0.20%
NcEx0023	57.20%	33.90%	4.50%	4.50%	2.30%	92.60%	0.70%	4.40%

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VH	VH_Choice	VH_Chat	VH_Off	USER_VH	USER_Choice	USER_Chat	USER_Off
CcLo0007	68.50%	17.20%	13.00%	1.30%	2.80%	85.70%	10.80%	0.70%
CcLo0008	32.30%	57.90%	3.90%	6.00%	1.30%	96.70%	1.20%	0.90%
CcLo0017	44.00%	41.80%	6.10%	8.10%	0.80%	76.70%	1.00%	21.50%
CcLo0019	71.10%	15.90%	7.20%	5.80%	13.50%	72.40%	10.80%	3.30%
CcLo0023	52.40%	30.70%	11.80%	5.20%	3.10%	87.20%	9.50%	0.20%
CcEx0007	65.40%	20.00%	11.10%	3.50%	3.50%	87.10%	8.40%	1.00%
CcEx0008	30.30%	16.10%	4.00%	49.50%	2.50%	74.60%	11.10%	11.90%
CcEx0009	69.80%	10.40%	12.90%	7.00%	8.10%	76.40%	13.90%	1.70%
CcEx0010	72.10%	22.60%	3.00%	2.30%	10.60%	80.70%	6.80%	2.00%
CcEx0011	47.10%	32.90%	9.30%	10.80%	5.50%	86.00%	3.10%	5.40%
CcEx0012	60.10%	26.90%	9.80%	3.20%	3.60%	86.00%	9.80%	0.60%
CcEx0013	31.70%	39.80%	24.20%	4.20%	2.20%	80.40%	6.80%	10.50%
CcEx0015	16.50%	4.90%	14.30%	64.30%	3.60%	34.90%	11.40%	50.10%
SiLo0014	33.10%	19.90%	44.10%	2.90%	7.20%	80.00%	12.10%	0.70%
SiEx0017	35.70%	38.00%	14.60%	11.70%	3.60%	88.60%	4.70%	3.00%
NcLo0018	89.50%	4.80%	1.10%	4.60%	12.60%	50.30%	0.20%	36.90%
NcLo0019	23.70%	54.70%	1.10%	20.50%	0.70%	67.50%	0.00%	31.80%
NcEx0015	49.70%	29.90%	8.40%	12.00%	6.20%	88.70%	2.40%	2.70%
CcLo0013	80.30%	10.30%	5.20%	4.20%	5.70%	92.30%	1.40%	0.50%
CcEx0001	29.90%	53.30%	13.30%	3.50%	2.30%	84.40%	11.80%	1.60%
CcEx0014	31.00%	54.50%	7.20%	7.30%	3.60%	90.10%	1.90%	4.30%
SiLo0016	9.20%	41.90%	37.30%	11.60%	2.30%	78.30%	9.70%	9.70%
SiEx0006	51.00%	38.80%	2.40%	7.80%	14.10%	75.10%	0.30%	10.50%
NcEx0006	39.00%	26.40%	3.40%	31.10%	2.70%	62.80%	1.60%	32.90%
CcEx0022	48.50%	15.40%	25.00%	11.10%	8.00%	71.50%	15.00%	5.60%
SiLo0001	69.70%	4.90%	15.40%	10.00%	7.10%	51.50%	34.90%	6.50%
SiLo0002	7.40%	36.20%	6.70%	49.60%	0.00%	92.40%	3.00%	4.60%
SiLo0004	62.10%	17.90%	8.20%	11.90%	3.30%	74.50%	3.70%	18.40%
SiLo0005	14.50%	63.40%	16.00%	6.20%	1.40%	89.90%	6.60%	2.10%
SiLo0012	10.50%	24.10%	59.90%	5.50%	3.00%	78.90%	16.80%	1.30%
SiLo0013	21.80%	32.80%	38.30%	7.10%	2.00%	77.90%	17.40%	2.70%

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VH	VH_Choice	VH_Chat	VH_Off	USER_VH	USER_Choice	USER_Chat	USER_Off
SiLo0015	48.70%	47.20%	0.70%	3.40%	5.00%	91.40%	0.80%	2.80%
SiLo0020	9.20%	28.90%	20.90%	41.00%	1.20%	77.50%	10.80%	10.50%
SiEx0001	26.60%	30.70%	39.40%	3.20%	1.30%	77.70%	18.50%	2.60%
SiEx0002	35.60%	27.00%	29.90%	7.50%	4.00%	85.80%	6.50%	3.80%
SiEx0005	31.30%	42.60%	8.70%	17.50%	2.90%	87.90%	1.90%	7.30%
SiEx0012	55.10%	33.50%	3.20%	8.20%	7.70%	87.20%	0.80%	4.30%
SiEx0013	17.80%	51.80%	19.80%	10.50%	3.80%	88.00%	5.30%	3.00%
SiEx0016	14.10%	21.80%	44.80%	19.30%	4.30%	73.40%	12.20%	10.00%
SiEx0021	36.30%	21.60%	39.50%	2.70%	7.40%	75.50%	16.80%	0.40%
NcLo0002	36.30%	26.80%	28.00%	8.80%	2.40%	81.60%	11.80%	4.30%
NcLo0005	48.10%	16.00%	25.30%	10.50%	4.20%	68.00%	14.80%	13.00%
NcLo0006	40.70%	26.00%	11.50%	21.80%	2.10%	67.10%	14.00%	16.80%
NcLo0009	80.10%	6.00%	12.20%	1.70%	15.70%	68.20%	4.50%	11.60%
NcLo0016	54.20%	12.20%	27.20%	6.40%	7.20%	73.30%	17.40%	2.10%
NcLo0017	42.40%	31.20%	22.10%	4.30%	3.00%	85.40%	10.60%	1.00%
NcEx0004	35.70%	6.50%	38.50%	19.30%	8.60%	35.60%	43.70%	12.10%
NcEx0005	51.80%	33.30%	9.30%	5.60%	3.50%	87.40%	7.30%	1.80%
NcEx0007	77.70%	4.90%	12.10%	5.40%	8.80%	75.40%	10.20%	5.60%
NcEx0008	14.70%	44.70%	5.30%	35.40%	7.20%	53.20%	2.80%	36.80%
NcEx0016	50.60%	9.40%	20.50%	19.60%	2.90%	78.90%	16.60%	1.60%
NcEx0017	48.20%	27.10%	22.30%	2.40%	4.60%	80.90%	13.90%	0.70%
NcEx0019	54.80%	20.50%	16.00%	8.80%	1.70%	88.20%	9.70%	0.40%
NcEx0020	44.20%	33.40%	14.20%	8.10%	1.70%	88.00%	4.50%	5.80%
NcEx0021	83.50%	3.60%	3.10%	9.90%	10.50%	69.80%	11.30%	8.40%
NcEx0022	13.80%	63.30%	18.70%	4.10%	1.40%	90.20%	7.80%	0.70%
NcEx0024	46.10%	44.50%	7.80%	1.60%	5.10%	92.70%	1.60%	0.60%
CcLo0001	38.40%	28.60%	26.50%	6.50%	4.30%	84.80%	8.50%	2.30%
CcLo0002	35.70%	38.40%	18.00%	8.00%	4.00%	80.10%	13.70%	2.20%
CcLo0003	61.10%	28.30%	1.60%	9.00%	5.30%	72.60%	1.30%	20.80%
CcLo0004	39.20%	38.00%	5.40%	17.30%	4.10%	91.50%	1.70%	2.70%
CcLo0005	23.90%	31.30%	28.60%	16.20%	0.40%	84.60%	11.50%	3.60%

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VH	VH_Choice	VH_Chat	VH_Off	USER_VH	USER_Choice	USER_Chat	USER_Off
CcLo0006	31.50%	45.60%	5.10%	17.80%	0.60%	86.50%	3.90%	9.10%
CcLo0011	57.80%	29.90%	2.90%	9.30%	2.70%	84.50%	1.80%	11.00%
CcLo0012	87.90%	2.00%	7.30%	2.90%	9.70%	81.60%	6.00%	2.80%
NcEx0001	23.80%	36.90%	32.20%	7.10%	0.80%	90.10%	8.50%	0.60%
NcEx0002	37.70%	26.30%	31.20%	4.80%	4.00%	85.00%	8.70%	2.20%
NcEx0003	56.00%	11.30%	14.50%	18.30%	2.90%	81.80%	11.60%	3.70%
CcEx0002	56.60%	32.80%	2.90%	7.80%	2.70%	88.40%	1.40%	7.50%
CcEx0003	43.70%	29.40%	10.60%	16.40%	2.40%	91.10%	2.80%	3.70%
CcEx0004	18.80%	34.60%	31.40%	15.20%	1.90%	69.10%	22.60%	6.40%
CcEx0005	29.10%	36.70%	28.90%	5.40%	1.40%	79.60%	8.10%	10.90%
CcEx0006	41.90%	22.90%	26.80%	8.40%	4.90%	64.30%	17.20%	13.60%
CcEx0017	69.50%	17.10%	2.20%	11.20%	10.50%	81.20%	1.40%	6.90%
CcEx0020	24.70%	33.30%	35.60%	6.40%	0.80%	81.90%	7.00%	10.30%
NcLo0004	29.80%	53.00%	6.50%	10.60%	6.20%	83.80%	2.40%	7.70%
SiLo0017	30.50%	21.20%	44.90%	3.40%	4.30%	75.60%	20.00%	0.10%
SiLo0018	58.60%	35.30%	3.20%	2.80%	10.10%	87.80%	1.30%	0.90%
SiEx0014	29.50%	41.70%	25.30%	3.50%	1.00%	79.00%	19.20%	0.70%
SiEx0015	23.40%	32.10%	41.30%	3.20%	4.00%	74.70%	19.60%	1.80%
SiEx0018	26.40%	45.20%	19.20%	9.20%	0.90%	88.70%	9.30%	1.10%
NcLo0015	7.10%	59.20%	25.70%	8.00%	2.40%	65.90%	20.20%	11.50%
NcLo0024	24.40%	51.10%	1.40%	23.10%	1.40%	90.40%	1.00%	7.30%
NcLo0025	60.20%	30.00%	3.70%	6.10%	4.70%	87.40%	4.80%	3.10%
NcEx0009	50.40%	11.90%	34.10%	3.50%	7.10%	71.30%	20.70%	0.90%
NcEx0010	57.40%	9.30%	20.40%	12.90%	4.70%	79.50%	11.80%	4.00%
CcLo0014	43.10%	44.90%	10.30%	1.70%	1.20%	90.90%	7.50%	0.40%
CcLo0015	10.20%	80.10%	5.90%	3.90%	0.20%	96.90%	2.00%	0.90%
CcLo0016	20.20%	43.20%	34.60%	2.00%	1.80%	90.30%	7.00%	0.90%
CcEx0018	33.20%	31.70%	4.40%	30.70%	11.20%	38.40%	4.80%	45.70%
CcEx0019	13.80%	50.50%	30.50%	5.20%	0.20%	84.30%	9.10%	6.40%

Table 37: Adjusted fixation ratios for speaking and not speaking phases.

	SPEAKING			NOT SPEAKING		
@ParticipantID	AFR_VH_VH	AFR_VH_Choice	AFR_VH_Chat	AFR_User_VH	AFR_User_Choice	AFR_User_Chat
SiLo0003	0.67	1.65	0.77	0.18	3.86	0.30
SiLo0006	1.02	1.29	0.11	0.15	4.10	0.17
SiLo0007	0.66	2.14	0.14	0.05	4.16	0.00
SiLo0008	0.34	2.74	0.96	0.02	4.02	0.64
SiLo0009	0.64	2.11	0.52	0.03	4.58	0.05
SiLo0010	0.06	0.31	0.57	0.00	2.99	0.53
SiLo0011	0.50	1.89	1.07	0.01	4.06	0.61
SiLo0019	0.53	1.09	2.16	0.04	4.12	0.47
SiEx0003	0.39	1.83	1.24	0.06	4.03	0.36
SiEx0004	1.14	0.88	0.42	0.23	3.80	0.30
SiEx0007	0.71	1.20	1.49	0.02	4.02	0.64
SiEx0008	1.30	0.20	0.05	0.17	4.00	0.06
SiEx0009	0.79	0.75	1.39	0.12	3.79	0.35
SiEx0010	1.22	0.40	0.81	0.08	4.15	0.34
SiEx0011	0.53	1.28	0.95	0.05	4.10	0.34
SiEx0024	0.68	1.15	1.15	0.06	3.89	0.66
NcLo0007	0.64	1.05	1.74	0.07	3.95	0.48
NcLo0011	0.85	1.59	0.62	0.02	4.21	0.43
NcLo0012	0.84	1.34	0.79	0.07	4.15	0.34
NcLo0013	1.09	0.67	0.75	0.14	3.83	0.50
NcLo0020	1.27	0.40	0.58	0.13	3.33	0.77
NcLo0021	0.50	2.17	0.08	0.02	3.51	0.04
NcLo0022	1.01	0.45	1.09	0.04	3.84	0.53
NcLo0023	0.62	2.35	0.51	0.05	4.51	0.06
NcEx0011	1.01	1.34	0.43	0.10	4.03	0.40
NcEx0012	1.30	0.60	0.42	0.10	4.20	0.22
NcEx0013	0.94	0.91	0.87	0.04	4.10	0.51
NcEx0014	1.04	1.02	0.77	0.12	4.15	0.28
NcEx0023	0.99	1.61	0.21	0.04	4.41	0.03

	SPEAKING			NOT SPEAKING		
@ParticipantID	AFR_VH_VH	AFR_VH_Choice	AFR_VH_Chat	AFR_User_VH	AFR_User_Choice	AFR_User_Chat
CcLo0007	1.18	0.82	0.62	0.05	4.08	0.51
CcLo0008	0.56	2.76	0.19	0.02	4.60	0.06
CcLo0017	0.76	1.99	0.29	0.01	3.65	0.05
CcLo0019	1.23	0.76	0.34	0.23	3.45	0.51
CcLo0023	0.90	1.46	0.56	0.05	4.15	0.45
CcEx0007	1.13	0.95	0.53	0.06	4.15	0.40
CcEx0008	0.52	0.77	0.19	0.04	3.55	0.53
CcEx0009	1.20	0.50	0.61	0.14	3.64	0.66
CcEx0010	1.24	1.08	0.14	0.18	3.84	0.32
CcEx0011	0.81	1.57	0.44	0.09	4.10	0.15
CcEx0012	1.04	1.28	0.47	0.06	4.10	0.47
CcEx0013	0.55	1.90	1.15	0.04	3.83	0.32
CcEx0015	0.28	0.23	0.68	0.06	1.66	0.54
SiLo0014	0.57	0.95	2.10	0.12	3.81	0.58
SiEx0017	0.62	1.81	0.70	0.06	4.22	0.22
NcLo0018	1.54	0.23	0.05	0.22	2.40	0.01
NcLo0019	0.41	2.60	0.05	0.01	3.21	0.00
NcEx0015	0.86	1.42	0.40	0.11	4.22	0.11
CcLo0013	1.38	0.49	0.25	0.10	4.40	0.07
CcEx0001	0.52	2.54	0.63	0.04	4.02	0.56
CcEx0014	0.53	2.60	0.34	0.06	4.29	0.09
SiLo0016	0.16	2.00	1.78	0.04	3.73	0.46
SiEx0006	0.88	1.85	0.11	0.24	3.58	0.01
NcEx0006	0.67	1.26	0.16	0.05	2.99	0.08
CcEx0022	0.84	0.73	1.19	0.14	3.40	0.71
SiLo0001	1.20	0.23	0.73	0.12	2.45	1.66
SiLo0002	0.13	1.72	0.32	0.00	4.40	0.14
SiLo0004	1.07	0.85	0.39	0.06	3.55	0.18
SiLo0005	0.25	3.02	0.76	0.02	4.28	0.31
SiLo0012	0.18	1.15	2.85	0.05	3.76	0.80
SiLo0013	0.38	1.56	1.82	0.03	3.71	0.83

	SPEAKING			NOT SPEAKING		
@ParticipantID	AFR_VH_VH	AFR_VH_Choice	AFR_VH_Chat	AFR_User_VH	AFR_User_Choice	AFR_User_Chat
SiLo0015	0.84	2.25	0.03	0.09	4.35	0.04
SiLo0020	0.16	1.38	1.00	0.02	3.69	0.51
SiEx0001	0.46	1.46	1.88	0.02	3.70	0.88
SiEx0002	0.61	1.29	1.42	0.07	4.09	0.31
SiEx0005	0.54	2.03	0.41	0.05	4.19	0.09
SiEx0012	0.95	1.60	0.15	0.13	4.15	0.04
SiEx0013	0.31	2.47	0.94	0.07	4.19	0.25
SiEx0016	0.24	1.04	2.13	0.07	3.50	0.58
SiEx0021	0.63	1.03	1.88	0.13	3.60	0.80
NcLo0002	0.63	1.28	1.33	0.04	3.89	0.56
NcLo0005	0.83	0.76	1.20	0.07	3.24	0.70
NcLo0006	0.70	1.24	0.55	0.04	3.20	0.67
NcLo0009	1.38	0.29	0.58	0.27	3.25	0.21
NcLo0016	0.93	0.58	1.30	0.12	3.49	0.83
NcLo0017	0.73	1.49	1.05	0.05	4.07	0.50
NcEx0004	0.62	0.31	1.83	0.15	1.70	2.08
NcEx0005	0.89	1.59	0.44	0.06	4.16	0.35
NcEx0007	1.34	0.23	0.58	0.15	3.59	0.49
NcEx0008	0.25	2.13	0.25	0.12	2.53	0.13
NcEx0016	0.87	0.45	0.98	0.05	3.76	0.79
NcEx0017	0.83	1.29	1.06	0.08	3.85	0.66
NcEx0019	0.94	0.98	0.76	0.03	4.20	0.46
NcEx0020	0.76	1.59	0.68	0.03	4.19	0.21
NcEx0021	1.44	0.17	0.15	0.18	3.32	0.54
NcEx0022	0.24	3.01	0.89	0.02	4.30	0.37
NcEx0024	0.79	2.12	0.37	0.09	4.41	0.08
CcLo0001	0.66	1.36	1.26	0.07	4.04	0.40
CcLo0002	0.62	1.83	0.86	0.07	3.81	0.65
CcLo0003	1.05	1.35	0.08	0.09	3.46	0.06
CcLo0004	0.68	1.81	0.26	0.07	4.36	0.08
CcLo0005	0.41	1.49	1.36	0.01	4.03	0.55

	SPEAKING			NOT SPEAKING		
@ParticipantID	AFR_VH_VH	AFR_VH_Choice	AFR_VH_Chat	AFR_User_VH	AFR_User_Choice	AFR_User_Chat
CcLo0006	0.54	2.17	0.24	0.01	4.12	0.19
CcLo0011	1.00	1.42	0.14	0.05	4.02	0.09
CcLo0012	1.52	0.10	0.35	0.17	3.89	0.29
NcEx0001	0.41	1.76	1.53	0.01	4.29	0.40
NcEx0002	0.65	1.25	1.49	0.07	4.05	0.41
NcEx0003	0.97	0.54	0.69	0.05	3.90	0.55
CcEx0002	0.98	1.56	0.14	0.05	4.21	0.07
CcEx0003	0.75	1.40	0.50	0.04	4.34	0.13
CcEx0004	0.32	1.65	1.50	0.03	3.29	1.08
CcEx0005	0.50	1.75	1.38	0.02	3.79	0.39
CcEx0006	0.72	1.09	1.28	0.08	3.06	0.82
CcEx0017	1.20	0.81	0.10	0.18	3.87	0.07
CcEx0020	0.43	1.59	1.70	0.01	3.90	0.33
NcLo0004	0.51	2.52	0.31	0.11	3.99	0.11
SiLo0017	0.53	1.01	2.14	0.07	3.60	0.95
SiLo0018	1.01	1.68	0.15	0.17	4.18	0.06
SiEx0014	0.51	1.99	1.20	0.02	3.76	0.91
SiEx0015	0.40	1.53	1.97	0.07	3.56	0.93
SiEx0018	0.46	2.15	0.91	0.02	4.22	0.44
NcLo0015	0.12	2.82	1.22	0.04	3.14	0.96
NcLo0024	0.42	2.43	0.07	0.02	4.30	0.05
NcLo0025	1.04	1.43	0.18	0.08	4.16	0.23
NcEx0009	0.87	0.57	1.62	0.12	3.40	0.99
NcEx0010	0.99	0.44	0.97	0.08	3.79	0.56
CcLo0014	0.74	2.14	0.49	0.02	4.33	0.36
CcLo0015	0.18	3.81	0.28	0.00	4.61	0.10
CcLo0016	0.35	2.06	1.65	0.03	4.30	0.33
CcEx0018	0.57	1.51	0.21	0.19	1.83	0.23
CcEx0019	0.24	2.40	1.45	0.00	4.01	0.43

Table 38: Average duration of visual fixations on windows for speaking and not speaking phases.

		SPEAKING				NOT SPEAKING			
@ParticipantID	TOTAL TIME	GL_VH	GL_Choice	GL_Chat	GL_Off	GL_VH_NS	GL_Choice_NS	GL_Chat_NS	GL_Off_NS
SiLo0003	116992	27.00	35.00	17.00	26.00	41.00	59.00	10.00	17.00
SiLo0006	140631	18.00	21.00	4.00	18.00	12.00	20.00	7.00	18.00
SiLo0007	139537	16.00	27.00	7.00	24.00	5.00	34.00	1.00	28.00
SiLo0008	117104	24.00	35.00	16.00	15.00	14.00	35.00	24.00	18.00
SiLo0009	132764	20.00	28.00	10.00	28.00	3.00	19.00	6.00	9.00
SiLo0010	127792	6.00	9.00	18.00	24.00	1.00	18.00	15.00	12.00
SiLo0011	135945	18.00	27.00	20.00	29.00	2.00	17.00	14.00	12.00
SiLo0019	154587	11.00	21.00	24.00	7.00	5.00	24.00	16.00	10.00
SiEx0003	145360	9.00	24.00	21.00	27.00	6.00	30.00	16.00	22.00
SiEx0004	135778	29.00	26.00	15.00	23.00	19.00	20.00	14.00	14.00
SiEx0007	160321	21.00	19.00	25.00	27.00	5.00	28.00	25.00	18.00
SiEx0008	170044	14.00	5.00	4.00	8.00	16.00	14.00	5.00	6.00
SiEx0009	145701	29.00	32.00	21.00	37.00	16.00	46.00	16.00	40.00
SiEx0010	191716	19.00	10.00	13.00	22.00	8.00	32.00	19.00	18.00
SiEx0011	120273	31.00	34.00	24.00	34.00	5.00	24.00	14.00	15.00
SiEx0024	151756	20.00	32.00	33.00	27.00	8.00	50.00	45.00	17.00
NcLo0007	142684	12.00	23.00	29.00	19.00	7.00	31.00	17.00	24.00
NcLo0011	146831	16.00	23.00	20.00	14.00	9.00	30.00	17.00	20.00
NcLo0012	120477	19.00	23.00	19.00	6.00	16.00	34.00	17.00	8.00
NcLo0013	142801	28.00	18.00	16.00	20.00	26.00	37.00	21.00	10.00
NcLo0020	140899	30.00	10.00	12.00	28.00	16.00	57.00	42.00	55.00
NcLo0021	160455	11.00	28.00	2.00	23.00	3.00	74.00	2.00	74.00
NcLo0022	151006	19.00	19.00	25.00	24.00	7.00	34.00	22.00	18.00
NcLo0023	129301	16.00	36.00	15.00	14.00	8.00	20.00	6.00	6.00
NcEx0011	141891	17.00	20.00	20.00	26.00	5.00	29.00	14.00	19.00
NcEx0012	131368	23.00	11.00	8.00	18.00	8.00	16.00	9.00	10.00
NcEx0013	115391	13.00	21.00	22.00	26.00	4.00	22.00	20.00	11.00
NcEx0014	140038	17.00	15.00	8.00	8.00	12.00	16.00	9.00	1.00

		SPEAKING				NOT SPEAKING			
@ParticipantID	TOTAL TIME	GL_VH	GL_Choice	GL_Chat	GL_Off	GL_VH_NS	GL_Choice_NS	GL_Chat_NS	GL_Off_NS
NcEx0023	126701	21.00	31.00	8.00	18.00	2.00	26.00	1.00	24.00
CcLo0007	128452	13.00	12.00	12.00	6.00	4.00	25.00	21.00	7.00
CcLo0008	131533	22.00	28.00	6.00	14.00	8.00	23.00	9.00	8.00
CcLo0017	126648	19.00	25.00	6.00	19.00	2.00	29.00	7.00	20.00
CcLo0019	118356	17.00	16.00	15.00	20.00	15.00	44.00	35.00	30.00
CcLo0023	133890	13.00	18.00	10.00	21.00	5.00	22.00	21.00	5.00
CcEx0007	150556	27.00	21.00	11.00	22.00	8.00	21.00	17.00	14.00
CcEx0008	124956	26.00	20.00	8.00	44.00	5.00	37.00	10.00	35.00
CcEx0009	141282	18.00	12.00	19.00	20.00	16.00	27.00	24.00	25.00
CcEx0010	120354	20.00	21.00	6.00	7.00	20.00	25.00	6.00	7.00
CcEx0011	132917	30.00	37.00	24.00	45.00	13.00	42.00	15.00	35.00
CcEx0012	119518	24.00	22.00	11.00	22.00	4.00	20.00	15.00	8.00
CcEx0013	120372	14.00	25.00	21.00	23.00	9.00	36.00	17.00	28.00
CcEx0015	177339	5.00	5.00	5.00	10.00	9.00	28.00	14.00	31.00
SiLo0014	158584	17.00	21.00	22.00	11.00	20.00	48.00	35.00	8.00
SiEx0017	149574	23.00	29.00	18.00	22.00	11.00	26.00	15.00	13.00
NcLo0018	170730	13.00	4.00	1.00	9.00	20.00	40.00	1.00	36.00
NcLo0019	164016	13.00	34.00	3.00	30.00	2.00	55.00	0.00	53.00
NcEx0015	154059	26.00	23.00	14.00	18.00	19.00	39.00	12.00	17.00
CcLo0013	137138	13.00	14.00	8.00	3.00	7.00	13.00	6.00	2.00
CcEx0001	134007	23.00	41.00	16.00	21.00	3.00	25.00	18.00	12.00
CcEx0014	168198	19.00	33.00	14.00	17.00	9.00	29.00	7.00	26.00
SiLo0016	168075	14.00	34.00	35.00	37.00	9.00	43.00	26.00	40.00
SiEx0006	238290	29.00	34.00	3.00	21.00	93.00	140.00	1.00	81.00
NcEx0006	134395	25.00	30.00	7.00	36.00	3.00	22.00	3.00	18.00
CcEx0022	161307	34.00	20.00	20.00	49.00	12.00	27.00	24.00	26.00
SiLo0001	179177	31.00	9.00	23.00	35.00	14.00	94.00	83.00	80.00
SiLo0002	171324	6.00	27.00	10.00	20.00	0.00	31.00	4.00	25.00
SiLo0004	177830	14.00	20.00	14.00	16.00	5.00	47.00	24.00	30.00
SiLo0005	141404	8.00	43.00	27.00	18.00	7.00	42.00	17.00	18.00

		SPEAKING				NOT SPEAKING			
@ParticipantID	TOTAL TIME	GL_VH	GL_Choice	GL_Chat	GL_Off	GL_VH_NS	GL_Choice_NS	GL_Chat_NS	GL_Off_NS
SiLo0012	207678	7.00	23.00	23.00	14.00	9.00	43.00	34.00	13.00
SiLo0013	128276	9.00	32.00	35.00	29.00	6.00	44.00	42.00	26.00
SiLo0015	136017	19.00	23.00	1.00	8.00	12.00	20.00	2.00	8.00
SiLo0020	165932	12.00	34.00	21.00	35.00	4.00	47.00	20.00	43.00
SiEx0001	192714	17.00	30.00	20.00	15.00	7.00	35.00	35.00	23.00
SiEx0002	160982	24.00	41.00	35.00	25.00	14.00	36.00	18.00	24.00
SiEx0005	169426	16.00	30.00	15.00	22.00	6.00	34.00	10.00	26.00
SiEx0012	159168	40.00	33.00	7.00	26.00	21.00	34.00	3.00	26.00
SiEx0013	173180	13.00	32.00	24.00	14.00	12.00	51.00	27.00	20.00
SiEx0016	190344	8.00	35.00	33.00	48.00	15.00	61.00	24.00	66.00
SiEx0021	175752	18.00	21.00	22.00	5.00	12.00	24.00	22.00	2.00
NcLo0002	128738	21.00	25.00	26.00	28.00	3.00	40.00	28.00	25.00
NcLo0005	150445	18.00	20.00	26.00	24.00	7.00	36.00	30.00	34.00
NcLo0006	124515	17.00	28.00	13.00	32.00	8.00	39.00	31.00	27.00
NcLo0009	183551	19.00	7.00	9.00	16.00	25.00	50.00	21.00	54.00
NcLo0016	153812	21.00	17.00	32.00	30.00	13.00	47.00	52.00	35.00
NcLo0017	124307	14.00	20.00	18.00	19.00	4.00	18.00	14.00	12.00
NcEx0004	186956	24.00	6.00	34.00	36.00	20.00	56.00	75.00	49.00
NcEx0005	199397	13.00	20.00	10.00	16.00	7.00	32.00	15.00	25.00
NcEx0007	168881	26.00	10.00	11.00	21.00	18.00	53.00	25.00	39.00
NcEx0008	129287	9.00	12.00	4.00	13.00	40.00	55.00	11.00	30.00
NcEx0016	152633	22.00	14.00	22.00	34.00	8.00	20.00	19.00	17.00
NcEx0017	166983	19.00	16.00	13.00	13.00	9.00	28.00	29.00	8.00
NcEx0019	132848	16.00	15.00	17.00	23.00	3.00	18.00	21.00	11.00
NcEx0020	178113	25.00	27.00	11.00	17.00	13.00	50.00	14.00	36.00
NcEx0021	149990	21.00	5.00	5.00	22.00	18.00	37.00	19.00	33.00
NcEx0022	149641	11.00	26.00	15.00	10.00	3.00	15.00	7.00	6.00
NcEx0024	169104	14.00	26.00	15.00	9.00	9.00	18.00	8.00	9.00
CcLo0001	155572	16.00	18.00	18.00	9.00	17.00	33.00	14.00	10.00
CcLo0002	133890	12.00	24.00	17.00	18.00	9.00	27.00	21.00	16.00

		SPEAKING				NOT SPEAKING			
@ParticipantID	TOTAL TIME	GL_VH	GL_Choice	GL_Chat	GL_Off	GL_VH_NS	GL_Choice_NS	GL_Chat_NS	GL_Off_NS
CcLo0003	178263	14.00	17.00	2.00	15.00	13.00	42.00	4.00	42.00
CcLo0004	142689	20.00	30.00	11.00	31.00	7.00	29.00	6.00	21.00
CcLo0005	130634	19.00	19.00	23.00	29.00	1.00	29.00	21.00	24.00
CcLo0006	161128	11.00	22.00	7.00	22.00	2.00	43.00	9.00	37.00
CcLo0011	137488	20.00	23.00	8.00	23.00	4.00	42.00	8.00	29.00
CcLo0012	156935	17.00	4.00	6.00	8.00	15.00	18.00	15.00	16.00
NcEx0001	189008	10.00	26.00	24.00	7.00	4.00	29.00	30.00	5.00
NcEx0002	170520	16.00	26.00	29.00	15.00	15.00	35.00	23.00	22.00
NcEx0003	137147	21.00	16.00	22.00	31.00	5.00	39.00	25.00	32.00
CcEx0002	187083	20.00	20.00	5.00	14.00	13.00	32.00	6.00	22.00
CcEx0003	155550	24.00	28.00	15.00	33.00	5.00	24.00	8.00	19.00
CcEx0004	242402	19.00	39.00	43.00	30.00	16.00	123.00	93.00	85.00
CcEx0005	168174	18.00	42.00	27.00	20.00	10.00	50.00	20.00	30.00
CcEx0006	253223	20.00	28.00	25.00	31.00	31.00	186.00	67.00	176.00
CcEx0017	159144	20.00	16.00	6.00	19.00	13.00	28.00	9.00	23.00
CcEx0020	192468	12.00	26.00	23.00	32.00	3.00	96.00	21.00	89.00
NcLo0004	180139	19.00	23.00	10.00	15.00	14.00	27.00	10.00	13.00
SiLo0017	138665	8.00	11.00	22.00	3.00	6.00	28.00	35.00	3.00
SiLo0018	123027	14.00	21.00	4.00	10.00	14.00	19.00	4.00	7.00
SiEx0014	143020	10.00	36.00	24.00	33.00	2.00	58.00	55.00	28.00
SiEx0015	209137	10.00	30.00	30.00	10.00	10.00	89.00	78.00	37.00
SiEx0018	161352	21.00	15.00	15.00	24.00	5.00	25.00	17.00	17.00
NcLo0015	165825	3.00	34.00	25.00	24.00	18.00	116.00	69.00	86.00
NcLo0024	188175	21.00	32.00	4.00	40.00	9.00	73.00	3.00	70.00
NcLo0025	156849	25.00	22.00	4.00	21.00	13.00	38.00	16.00	26.00
NcEx0009	154026	14.00	12.00	17.00	5.00	8.00	31.00	34.00	7.00
NcEx0010	221325	23.00	11.00	26.00	40.00	10.00	71.00	33.00	74.00
CcLo0014	135290	13.00	16.00	10.00	8.00	5.00	17.00	12.00	6.00
CcLo0015	177671	12.00	25.00	8.00	13.00	2.00	15.00	6.00	3.00
CcLo0016	175840	16.00	18.00	16.00	9.00	11.00	26.00	19.00	9.00

		SPEAKING				NOT SPEAKING			
@ParticipantID	TOTAL TIME	GL_VH	GL_Choice	GL_Chat	GL_Off	GL_VH_NS	GL_Choice_NS	GL_Chat_NS	GL_Off_NS
CcEx0018	204270	54.00	56.00	12.00	52.00	73.00	110.00	14.00	99.00
CcEx0019	218823	6.00	24.00	19.00	20.00	2.00	56.00	27.00	37.00

Table 39: Number of visual fixations to windows for speaking and not speaking phases.

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VHGL	VH_ChoiceGL	VH_ChatGL	VH_OffGL	USER_VHGL	USER_ChoiceGL	USER_ChatGL	USER_OffGL
SiLo0003	657	452	433	177	162	896	403	97
SiLo0006	1527	599	270	292	627	3776	444	90
SiLo0007	1132	781	193	268	487	2220	2	306
SiLo0008	333	662	509	66	65	1559	360	28
SiLo0009	748	642	448	112	518	4062	143	71
SiLo0010	461	607	545	2693	103	2328	500	1443
SiLo0011	646	591	454	127	339	4147	759	67
SiLo0019	1263	495	861	80	526	3683	627	111
SiEx0003	1365	862	664	253	514	2428	403	168
SiEx0004	1209	374	310	149	524	3038	338	58
SiEx0007	1026	699	658	48	249	3044	546	42
SiEx0008	3130	484	155	1391	682	6585	283	860
SiEx0009	836	260	735	130	368	1488	395	135
SiEx0010	1963	440	694	85	761	3605	500	76
SiEx0011	537	428	449	356	369	2127	306	135
SiEx0024	1041	398	385	233	370	1508	284	65
NcLo0007	1252	386	505	85	509	2420	534	115
NcLo0011	1396	654	297	138	138	2796	503	55
NcLo0012	1160	554	397	506	181	1746	283	137
NcLo0013	1025	353	446	161	291	1967	447	70
NcLo0020	991	332	407	81	416	1087	341	101
NcLo0021	1060	660	326	422	322	1080	420	361
NcLo0022	1390	224	414	173	295	2343	502	336
NcLo0023	1023	624	325	132	263	3639	161	168
NcEx0011	1822	744	240	80	983	2395	485	50
NcEx0012	1714	602	573	98	501	3968	374	108
NcEx0013	2166	468	429	162	318	2164	297	44
NcEx0014	1896	759	1068	131	452	4369	516	170
NcEx0023	1438	576	297	131	760	2391	501	121

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VHGL	VH_ChoiceGL	VH_ChatGL	VH_OffGL	USER_VHGL	USER_ChoiceGL	USER_ChatGL	USER_OffGL
CcLo0007	2395	651	493	101	532	2607	390	74
CcLo0008	667	941	296	193	125	3330	106	85
CcLo0017	1048	758	458	194	301	1973	104	801
CcLo0019	1886	447	215	130	594	1090	204	73
CcLo0023	1845	781	540	112	499	3235	369	35
CcEx0007	1151	452	480	76	392	3767	450	66
CcEx0008	725	500	313	699	221	906	496	152
CcEx0009	2075	462	362	186	411	2308	472	54
CcEx0010	1902	568	262	170	321	1963	685	171
CcEx0011	830	470	204	126	311	1502	150	112
CcEx0012	1318	643	469	76	533	2580	393	47
CcEx0013	768	540	390	62	149	1355	243	228
CcEx0015	2003	601	1744	3913	460	1452	947	1884
SiLo0014	886	432	913	119	380	1773	367	98
SiEx0017	836	707	436	287	292	3049	282	209
NcLo0018	3184	556	504	236	745	1486	242	1209
NcLo0019	862	762	169	324	413	1374	0	672
NcEx0015	1018	692	321	355	308	2147	190	148
CcLo0013	2807	333	295	644	694	6022	201	212
CcEx0001	619	619	397	78	557	2500	484	97
CcEx0014	860	870	271	225	434	3392	303	182
SiLo0016	306	572	494	146	289	2106	432	279
SiEx0006	917	594	416	194	269	957	585	231
NcEx0006	871	491	271	482	688	2185	420	1398
CcEx0022	749	405	656	118	681	2697	634	218
SiLo0001	1027	248	305	130	640	694	532	103
SiLo0002	563	610	307	1130	0	2796	697	172
SiLo0004	2071	417	273	346	832	1985	195	769
SiLo0005	825	673	270	157	179	1900	344	105
SiLo0012	682	474	1181	177	522	2858	767	157
SiLo0013	1100	464	496	111	260	1354	316	78

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VHGL	VH_ChoiceGL	VH_ChatGL	VH_OffGL	USER_VHGL	USER_ChoiceGL	USER_ChatGL	USER_OffGL
SiLo0015	1167	933	330	192	348	3823	342	296
SiLo0020	401	444	521	614	340	1839	605	272
SiEx0001	828	540	1042	113	239	2952	702	147
SiEx0002	782	347	450	159	286	2414	364	160
SiEx0005	1027	746	305	417	530	2847	210	307
SiEx0012	724	534	240	166	364	2560	257	165
SiEx0013	730	864	440	401	358	1960	221	170
SiEx0016	977	346	754	223	377	1572	663	198
SiEx0021	1064	542	947	282	713	3638	880	215
NcLo0002	791	492	494	144	612	1557	320	130
NcLo0005	1098	329	400	173	586	1858	484	356
NcLo0006	1129	438	415	321	185	1225	322	441
NcLo0009	1908	384	611	49	825	1794	283	282
NcLo0016	1168	325	383	96	567	1585	340	59
NcLo0017	1370	704	555	102	541	3429	545	59
NcEx0004	722	529	549	261	545	804	736	311
NcEx0005	1895	791	440	167	706	3817	675	100
NcEx0007	1574	257	578	134	532	1555	444	157
NcEx0008	401	915	323	669	153	829	220	1051
NcEx0016	1214	354	491	303	337	3677	814	89
NcEx0017	1338	895	905	96	549	3099	512	90
NcEx0019	1627	648	446	182	405	3592	338	26
NcEx0020	930	650	680	250	153	2089	381	191
NcEx0021	2128	385	327	240	530	1707	536	230
NcEx0022	661	1283	658	215	409	5416	997	98
NcEx0024	1569	816	249	84	615	5611	224	74
CcLo0001	1080	715	661	323	264	2668	632	243
CcLo0002	1298	698	462	193	362	2422	532	110
CcLo0003	1989	757	353	273	510	2178	396	625
CcLo0004	917	593	231	261	526	2836	256	117
CcLo0005	569	745	562	253	295	2296	430	117

	SPEAKING				NOT SPEAKING			
@ParticipantID	VH_VHGL	VH_ChoiceGL	VH_ChatGL	VH_OffGL	USER_VHGL	USER_ChoiceGL	USER_ChatGL	USER_OffGL
CcLo0006	1356	982	344	382	300	2185	469	265
CcLo0011	1351	608	169	189	576	1702	187	321
CcLo0012	2337	223	549	162	675	4740	417	180
NcEx0001	1123	668	633	475	276	4231	384	156
NcEx0002	1071	459	489	146	316	2868	448	119
NcEx0003	1285	340	317	284	482	1747	386	97
CcEx0002	1466	849	301	287	265	3563	311	438
CcEx0003	958	551	371	261	464	3633	332	184
CcEx0004	580	519	428	296	212	999	432	133
CcEx0005	853	461	564	142	149	1727	440	393
CcEx0006	1102	430	565	142	307	669	498	149
CcEx0017	1825	563	193	309	805	2886	152	296
CcEx0020	999	620	750	97	358	1132	441	153
NcLo0004	725	1063	300	327	558	3943	302	754
SiLo0017	1729	872	925	512	622	2338	495	29
SiLo0018	1687	677	325	114	506	3252	220	85
SiEx0014	1406	553	502	51	436	1142	292	21
SiEx0015	1244	568	731	168	597	1251	373	71
SiEx0018	674	1613	685	205	180	3600	555	66
NcLo0015	959	703	414	134	152	643	332	151
NcLo0024	491	674	146	243	206	1668	432	139
NcLo0025	1088	615	415	131	376	2413	316	124
NcEx0009	1900	522	1059	374	836	2170	573	123
NcEx0010	1340	453	422	173	753	1808	578	87
CcLo0014	1336	1132	415	85	194	4417	513	58
CcLo0015	344	1295	296	120	132	7901	406	359
CcLo0016	509	967	871	87	203	4280	450	120
CcEx0018	328	302	196	298	225	512	501	664
CcEx0019	1098	1002	763	122	127	2393	536	276

APPENDIX I: ADDITIONAL ANALYSIS OF VIRTUAL HUMAN ACCEPTANCE INDIVIDUAL QUESTIONS BY RANK

APPENDIX I: ADDITIONAL ANALYSIS OF VIRTUAL HUMAN ACCEPTANCE INDIVIDUAL QUESTIONS BY RANK

The following tables provide analysis data of the six questions on virtual human acceptance that participants responded to after completing the simulated counseling session. The analysis shows the median responses of the individual questions by rank separating the responses for the static image (SI) and animated character (1V/2V).

Table 40: Sample sizes by rank for the static image (SI) and animated character (1V/2V) conditions

	Rank				
	Cadet	Enlisted	NCO	Officer	Total
Static Image (SI)	16	4	15	5	40
Animated Character (1V/2V)	26	8	36	10	80
Total	42	12	51	15	120

Table 41: Kruskal-Wallis test showing significance for virtual human acceptance individual questions for the static image and animated character conditions.

Question	Static Image	Animated Character
	Kruskal-Wallis test significance (p)	
Looked real	.79	.45
Showed human-like emotion	.89	.44
Voice synched with lips/face	.36	.93
Had realistic gestures	.22	.75
Felt like talking to live human	.34	.61
Useful experience	.81	.04*

* indicates statistical significance of $p < .05$.

The only statistical difference found was for the question regarding the simulation being a useful experience for the animated character. A post hoc pairwise analysis indicates that the statistic difference that question is between the NCO and Commissioned Officer responses with the officers providing the greatest observed median response.

Similar Kruskal-Wallis test for the three counselor views, the two virtual human behaviors, and the six test conditions did not result in significant differences for either the static image or the animated character.

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