2014

Examining Emotional Responses to Effective Versus Ineffective Virtual Buddies

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EXAMINING EMOTIONAL RESPONSES TO EFFECTIVE VERSUS INEFFECTIVE VIRTUAL BUDDIES

by

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A dissertation submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy
in the College of Education and Human Performance
at the University of Central Florida
Orlando, Florida

Summer Term
2014

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ABSTRACT

The purpose of this research study was to explore the impact of virtual character design on user emotional experience and user behavior in a simulated environment. With simulation training increasing in popularity as a tool for teaching social skills, it is essential that social interactions in virtual environments provide authentic opportunities for practice (Swartout et al., 2006). This study used Interactive Performance Theory (Wirth, 2012) to examine the effect of designing a virtual buddy character with ineffective traits instead of effective or expert traits. The sample population for this study (n = 145) consisted of first year university students enrolled in courses in the fall of 2013 at the University of Central Florida.

Data on participant emotional experience and behavior were collected through questionnaires, researcher observations, and physiological signal recording that included participant heart rate and galvanic skin response. Data were analyzed using multivariate analysis of variances (MANOVA), Kruskal-Wallis one-way analysis of variance, and qualitative thematic coding of participant verbal behavior and written responses. Results of the analysis revealed that participants who interacted with an ineffective virtual buddy character had statistically significant higher averages of verbal statements to the antagonist in the simulated environment and statistically significant lower perceptions of antagonist amiability than participants who interacted with an effective virtual buddy.

Additionally, participants who interacted with a virtual buddy of the opposite gender gave statistically significant higher ecological validity scores to the simulated environment than participants who interacted with a virtual buddy of the same gender. Qualitative analysis also revealed that participants tended to describe the female buddy character with more ineffective

traits than the male buddy character even though effective and ineffective design conditions were equally divided for both groups. Further research should be conducted on the effect of virtual buddy character design in different types of simulation environments and with different target audiences.

This dissertation is dedicated to my husband. Without his support and unwavering confidence this study would not have been possible.

ACKNOWLEDGMENTS

I would like to thank the many people who made this study possible. I could not have completed this study alone and I am very thankful for the help and guidance I have received along the way.

Dr. Gunter, without your guidance, I would not have known where to even begin in this process. Thank you for continuing to remind me that the process, more than the product, is where the important learning takes place.

To my committee members, Dr. Boote, Dr. Hughes, Dr. Proctor, and Dr. Taylor; thank you for your time and feedback that has helped me understand how to design and conduct a study with academic rigor.

To Kenneth Ingraham and Morgan Russell, the interactors in this study, thank you for lending your professional performance skills to this study and for helping me design compelling social interactions for the simulated environment.

Thank you to everyone that helped me at the Synthetic Reality Lab at the Institute of Simulation and Training. Myungho Lee and Kangsoo Kim, without your help and the generous use of your sensors, collecting physiological data would not have been possible. Thank you also to Dr. Nagendran who helped me organize and analyze the physiological data.

To Jeff Wirth, the experiences I had as an undergraduate and a masters student in the interactive performance lab were seminal in shaping my research interests and expanding my view of the possibilities for technology in human interaction. Thank you for sharing your vision.

To Terrie Sypolt, thank you for your patience and the many hours that you spent with me showing me how to navigate the sea of research databases and how to construct fruitful search terms.

To Claire Balgemann, my editor and dear friend, thank you for reading the whole thing and providing the honest feedback needed to make this document readable.

I would also like to thank the National Science Foundation which funded the development of the virtual simulation environment used in this study through grant IIS1116615. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author and do not necessarily reflect the views of the National Science Foundation.

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LIST OF ACRONYMS AND ABBREVIATIONS

GSR	Galvanic Skin Response
ITC	Independent Television Commission
SREAL	Synthetic Reality Lab
UCF	University of Central Florida

CHAPTER ONE: THE PROBLEM

Introduction

In the field of affective computing, understanding human emotion, and how we respond to virtual representations of human beings is a key component of creating believable and effective virtual characters for simulation training and other computer mediated learning experiences (Picard, 1997). This dissertation describes a research study that explored the intersection of computer science, psychology, and theatrical performance embodied in virtual characters. Specifically, this study examined the impact of virtual character social effectiveness on the emotional response of the participant.

Definition of Terms

Interactive Performance

Interactive Performance is an emerging field of study that combines traditional acting techniques, dramatic improvisational performance techniques, interpersonal persuasion techniques, storytelling skills, and principles for performing through technology into a new style of performance art that centers on a single user or "spect-actor" (Wirth, 1994; Zhu, Moshell, Ontañon, Erbinceanu, & Hughes, 2011). According to Interactive Performance Theory, the audience should be the central, driving force of the story or training experience. All actions taken by the actors should be driven by the choices and responses of the audience (Wirth, 1994).

Spect-actor

A spect-actor is an audience member, player, or computer program user who enters into an experience as the main actor or protagonist without rehearsal or training prior to the

experience (Wirth, 2012).The term spect-actor combines the terms “spectator” and “actor” to imply a duel role as both an audience member and co-creator of the experience.

Interactor

An interactor is an improvisational actor whose goal within a performance is to empower a spect-actor to experience and co-create a fictional narrative (Wirth, 2012).

Virtual Character

For this study, a virtual character refers to a human persona created for a simulated experience. Research into virtual characters often categorizes them as either a) virtual human agents, which are virtual characters controlled by a computer or b) avatars that are computer entities controlled by a live human being that represent that human being in a virtual space (Lim & Reeves, 2010) . Since this study focused on the design of character behavior regardless of whether that behavior is controlled by a computer or a human performer, the term virtual character is used to refer to both avatars and virtual human agents.

Social Actor

A social actor is a person or entity with motives and emotional responses who engages in an interpersonal interaction such as a conversation or negotiation with another person or entity. Reeves and Nass (1996) argue that human beings treat media and technology as social actors unconsciously, ascribing to them human qualities such as feelings and motivations (Reeves & Nass, 1996).

Galvanic Skin Response (GSR)

GSR readings are obtained by placing electrodes on the skin's surface and running a small electrical current to measure the conductivity of a person's skin (Slater et al., 2006). Research has shown that GSR readings are correlated to the arousal component of experiencing emotion (Broek van den, Janssen, Westerink, & Healey, 2009). Thus, by measuring GSR, one can obtain an indirect measurement of arousal that can inform the interpretation of other data (Broek van den, Janssen, Westerink, & Healey, 2009).

Ineffective Buddy

For the purposes of this study, an ineffective buddy character is a virtual companion character in the context of a simulated environment who supports the user or player but is unable to achieve the goal of the simulation. For example, if the goal of the simulation is to solve a problem, an ineffective buddy character would help the user, but be unable to solve the problem thus requiring the user to do it. This type of buddy is the opposite of the "effective buddy," which helps the user and would be able to solve the problem if the user could not. Often helping characters in learning simulations are "experts," a type of effective buddy who helps the user and knows how to solve the problems presented in the simulation. Interactive Performance theory predicts that replacing the expert or effective buddy with an ineffective buddy would influence the user to more actively engage in the problem presented by the simulation (Wirth, 2012).

History

Over the last 50 years, computerized simulation technology has advanced in representing human beings through improvements in three dimensional graphic representations of human characters, increased computer processing power, and advances in animation that have made

increasingly realistic looking human characters possible in simulated training contexts (Domagk, 2010; Garau, 2003; Rickel et al., 2002). With these advances, researchers began exploring to what extent we treat these characters like we would real people (Bailenson & Yee, 2005; Fabri, 2006; Garau, Slater, Pertaub, & Razzaque, 2005; Gratch et al., 2002; Hayes-Roth, 2004; Reeves & Nass, 1996; Rickel et al., 2002; Swartout et al., 2001; Veletsianos & Miller, 2008). For example, Lim and Reeves tested participant responses to playing a game against a computer versus playing the same game against a human component (2010). Bailenson and Yee tested the effect of nonverbal gestures of a virtual character compared to a human being (2005). Many additional researchers have conducted descriptive and phenomenological studies regarding the experience of interacting with a virtual character (Garau, Slater, Pertaub, & Razzaque, 2005; Gratch, Wang, Gerten, Fast, & Duffy, 2007; Hayes-Roth, 2004; Reeves & Nass, 1996; Slater et al., 2006; Veletsianos & Miller, 2008; Zanbaka, Ulinski, Goolkasian, & Hodges, 2007).

The Media Equation

In general, research has found that human beings treat even a minimally responsive simulated entity as a social actor, a being that has objectives and emotions when it communicates with a person (Bailenson & Yee, 2005; Garau, Slater, Pertaub, & Razzaque, 2005; Lim & Reeves, 2010; Reeves & Nass, 1996; Slater et al., 2006; Veletsianos & Miller, 2008). In the late 1990s, Reeves and Nass and colleagues conducted a series of experiments that reproduced classic psychological social experiments replacing one human being with a computer (1996). Through these experiments, they found that people tended to treat the computer as a social entity, a theory they call "the media equation" (Reeves & Nass, 1996). For example, Reeves and Nass found a "politeness" effect in that participants who evaluated a computer game on the same

computer on which they had previously played the game rated the game higher than when they played a game on one computer and then evaluated the game on a different computer (1996). Interestingly, all of the participants denied that they thought of computers as social actors (Reeves & Nass, 1996). From a series of similar experiments, Reeves and Nass (1996) conclude:

> People respond socially and naturally to media even though they believe it is not reasonable to do so, and even though they don't think that these responses characterize themselves…Social and natural responses to media are not conscious, and as a consequence, people are not able to confirm the media equation, even if they'd like to help. This means that our research story is also about how to observe what people cannot themselves describe. (p.7)

As the quotation implies, the unconscious nature of the media equation presents a significant challenge in measuring participant response since self-report can be unreliable. Extended to the study of emotion, which is also not directly observable, unreliable self-reporting compels researchers to look for instruments to augment self-report when studying complex responses to virtual characters.

After Reeves' and Nass' (1996) initial series of experiments, the media equation was supported by evidence from many other studies that explored interpersonal interaction with a virtual human character (Bailenson & Yee, 2005; Garau, Slater, Pertaub, & Razzaque, 2005; Hayes-Roth, van Gent, & Huber, 1997; Hayes-Roth, 2004; Pan, Gillies, & Slater, 2008; Slater et al., 2006; Umarov, Mozgovoy, & Rogers, 2012; Veletsianos & Miller, 2008). As researchers began to accept the strong evidence of a media equation effect, research began to focus on the extent and limitations of that effect in the context of an interaction with a virtual human character. Limitations of the media equation appeared in studies that compared participant

response to playing games against a computer controlled entity, to participant response to playing games against a real human controlling a visually identical entity. Studies found that participant response in terms of physiological arousal, aggression, engagement, and presence were significantly higher towards real human players compared to computer players (Eastin, 2006; Lim & Reeves, 2010; Mandryk, Inkpen, & Calvert, 2006; Weibel, Wissmath, Habegger, Steiner, & Groner, 2008). Given that these differences persist despite visually identical contexts, researchers have turned to exploring which specific behavioral differences may account for the changes in perception (Bailenson & Yee, 2005; Garau, Slater, Pertaub, & Razzaque, 2005; Goerger, McGinnis, & Darken, 2005; Gratch et al., 2002; Gratch, Wang, Gerten, Fast, & Duffy, 2007; Hayes-Roth, 2004; Pan, Gillies, & Slater, 2008; Rickel et al., 2002; Slater et al., 2006; Swartout et al., 2001; Umarov, Mozgovoy, & Rogers, 2012) .

Affective Computing

Concurrent to the development and testing of the media equation, in 1997 Picard published her theory of affective computing which also addresses the gap between how virtual characters and human beings behave. Picard (1997) called for the study of emotion to inform how to program virtual characters, arguing that without incorporating emotion virtual characters will be unable to make intelligent decisions. She stated:

> Computers are supposed to be paradigms of logic, rationality, and predictability. These paradigms, to many thinkers, are the very foundations of intelligence, and have been the focus of computer scientists working fervently to build an intelligent machine. After nearly a half century of research however, computer scientists have not succeeded in

> constructing a machine that can reason intelligently about difficult problems or that can interact intelligently with people. (Picard, 1997, p.1)

In concert with Picard's call for the further study of emotion, research into emotion has gained prominence in the fields of neuroscience and computer science over the last ten years. In neuroscience, new brain imaging technologies and continued research on the physiological components of the experience of emotion has led to new insights on how we process emotions and how emotions affect cognitive processes (Broek van den, Janssen, Westerink, & Healey, 2009; Grandjean & Sander, 2010). In computer science, computational models of emotion for virtual characters have emerged as an active area of study with continuing debate as to what theory of emotion these models should use for optimal gains in virtual character believability (de Melo, 2012; Gratch & Marsella, 2005; Gratch, Marsella, & Petta, 2009; Marsella, Gratch, & Petta, 2010; Picard, 1997; Scherer, 2010a; Sellers, 2013).

Emotion in the Performing Arts

One could argue that the study of emotion in the performing arts dates back to the advent of theater with classic philosophical works such as Aristotle's *Poetics,* which examines both the representation of character and the emotional response of the audience (Aristotle, Benardete, & Davis, 2002). Styles and methods for performance have changed over the years with varying degrees of realism and exaggeration, but for many modern methods of acting, emotion remains a key component of study (Richardson, 1988). In the realm of technology-mediated performance, entirely new techniques for acting, motion capture, and animation are being developed (Boulanger, Wu, & Kazakevich, 2013; Farman, 2006). Concurrent with techniques developed for technology-mediated performance, the field of audience interactive theater has embraced new

media as a means to extend range and extent of interactive experiences (Wirth, Norris, Mapes, Ingraham, & Moshell, 2011). In fact, over the last six years, actors trained in the discipline of Interactive Performance have performed as avatar characters in a variety of simulation training systems (Dieker, Hynes, Stapleton, & Hughes, 2007; Wirth, Norris, Mapes, Ingraham, & Moshell, 2011; Zhu, Moshell, Ontañon, Erbinceanu, & Hughes, 2011). An essential difference between the exploration of emotion in the performing arts versus other disciplines is that the study has been primarily artistic with very little empirical testing of the effectiveness of specific live performance techniques. Even in the field of animation which has examined in many studies the effect of visual expressions of emotion such as facial expressions and body posture there is little research on performance strategies for using these expressions (Fabri, 2006; Moreno & Flowerday, 2006; Vinayagamoorthy, Steed, & Slater, 2008).

Gender and Virtual Characters

One key factor identified by the literature as affecting the use of expressions is gender. Many studies have explored the role of gender in emotional expression in virtual environments with mixed results and conclusions (Felnhofer et al., 2014; Hess, Adams, & Kleck, 2005; Kim & Lim, 2013; Moreno & Flowerday, 2006). Generally, studies have found that people hold different expectations for male and female virtual characters in terms of expressing dominance as well as affiliative emotional expressions such as smiling (Hess et al., 2000; Hess, Adams, & Kleck, 2005; Kim & Lim, 2013). For example, Hess, Adams, and Kleck found that both male and female participants expected virtual characters to behave in accordance with gendered stereotypes with male virtual characters generally expected to display more dominate emotional states and female virtual characters generally expected to display more affiliative emotional

states (2005). Other studies such as Felnhofer et al. (2014) and Kim & Lim (2013) have found differences in how male and female participants perceive virtual characters with female participants tending to display a higher level of projecting interpersonal relationships and social context on virtual characters than male participants in the same studies. These finding suggest that participant and virtual character gender may significantly affect perceptions of virtual characters and participant emotional response. Thus, gender of the virtual buddy characters has been included in this study as a variable of study.

The Gap in the Research

As many researchers have pointed out, creating believable virtual characters is an interdisciplinary problem that draws upon research in many areas (Boyle, Connolly, Hainey, & Boyle, 2012; Gratch et al., 2002; Hayes-Roth, 2004; Prabhala & Gallimore, 2005; Rickel et al., 2002; Swartout et al., 2001; Umarov, Mozgovoy, & Rogers, 2012). Figure 1 represents essential areas of study that contribute to research on believable virtual characters.

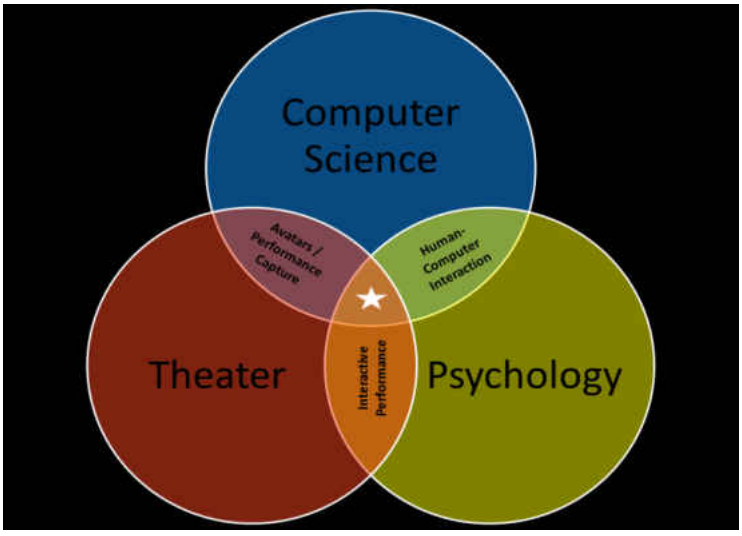


Figure 1 - Fields of Applicable Study

Although there is increasing research on performance capture and human-computer interaction that is contributing to the study and creation of virtual characters, researchers have yet to explore empirically what the field of interactive performance can contribute to the design of virtual characters in spite of its established use in avatar systems (Dieker, Hynes, Stapleton, & Hughes, 2007; Wirth, Norris, Mapes, Ingraham, & Moshell, 2011). This study provides an initial exploration into this gap in the research.

The Purpose of the Study

The purpose of this study was to build upon the literature of dramatic models of virtual character behavior by testing the interactive performance technique of the "ineffective buddy" character. This technique employs two key components. The first component, matching, describes how an interactor (the controller or performer) adopts a matching physicality, vocal characteristics, and emotional point of view as the spect-actor (participant or audience member) for the purpose of building an interpersonal connection with the spect-actor. The physicality aspect has been explored in previous research such as Bailenson and Yee's study on mimicry (2005). Their study found that the physical aspect of mimicry alone increased positive responses from participants when interacting with non-verbal, computer controlled characters (Bailenson & Yee, 2005). Bailenson & Yee's study and similar studies have not tested the effect of verbal and point of view matching.

The second component of virtual buddy effectiveness, defined in this study as character status and ability to achieve scenario goals compared to the participant, has not yet been empirically tested; however, related studies that consider virtual buddy status have suggested a potential effect (Hayes-Roth, van Gent, & Huber, 1997; Klesen, 2005; Umarov, Mozgovoy, &

Rogers, 2012). This component is especially important to test because in many instructional systems pedagogical agents are designed to be high status "experts" who are highly effective in order to provide the user with information on how to succeed at a given task (Swartout et al., 2001; Veletsianos & Miller, 2008). However, interactive performance theory suggests that the opposite design, an agent that is lower status and less knowledgeable than the user will encourage, activate, and empower the user to discover successful strategies for a given task (Wirth, 1994). Testing this variable for virtual character design in this study provided data that can inform future research on the effective design of pedagogical agents.

Research Questions

The following research questions guided this research study:

1. What is the difference in emotional experience of participants when they interact with an ineffective buddy character versus an effective buddy character in a social simulation?
2. What is the difference in emotional experience of participants when they interact with a same-gendered buddy character versus an opposite-gendered buddy character in a social simulation?

Design of the Study

The study was a 2x2 between subjects design that included time series analysis of physiological data exploring participant physiological responses to an effective or ineffective virtual buddy and potential interaction effects of participant gender. Additionally, physiological response data was triangulated with qualitative data exploring possible relationships between participant gender, participant self-reported emotional response to the virtual characters, and

observed participant behavior in the context of the simulation. Data sources used in this study included participant heart rate, galvanic skin response (GSR), questionnaire items adapted from the ITC sense of presence questionnaire, researcher observations, and open ended written responses from participants.

Participants consisted of freshmen at the University of Central Florida who volunteered to participate. Each participant interacted with two virtual characters in a virtual environment by talking to the characters. The first virtual character was a buddy who was either effective or ineffective and either of the same gender or the opposite gender of the participant based on the participant's randomly assigned research group. The second virtual character was an antagonist who remained constant throughout all research groups. During the interaction, participant heart rate and GSR were recorded. After the interaction, the participant completed a questionnaire that asked about his or her experiences in the simulation and emotional response towards the virtual characters.

Physiological data was graphed and analyzed for spikes using MATLAB software. Any recorded spikes were matched to the corresponding time point in the interaction video recording for analysis and analyzed for trends across research groups. Quantitative questionnaire data was analyzed for potential differences using a two-way ANOVA procedure. Qualitative questionnaire data was coded and analyzed for common themes across research groups.

Limitations of the Study

Although the researcher strived to provide a controlled experimental environment for all participants across all research groups, this study still had several limitations based upon research design, sampling, and the measurement instruments. Although multiple data sources were

collected to examine the impact of virtual buddy effectiveness and gender on participant engagement and emotional response, possible internal and external validity concerns for this study are described in the following sections.

Internal Validity Concerns

Intra-session history is one concern for internal validity for this research design (Campbell & Stanley, 1973). There is a risk that outside factors could create different intra-session histories between the groups. Randomization of research conditions on different days of the week and time of day was used to help minimize this risk. Additionally, procedures for introducing participants to the experiment, introducing the simulation, introducing the measurement equipment, applying measurement equipment, and monitoring the sessions was standardized and scripted to control the intra-session histories as much as possible.

Additionally, signal contamination is an internal validity concern for heart rate and galvanic skin response instruments. Although researcher observations and data removal of suspect signals based on accelerometer data was used to help minimize contamination from body movement and external influences, internal influences, time delay, and signal loss due to sampling rates remain a threat to internal validity and a limitation for interpreting the physiological data from this study.

External Validity Concerns

One risk to external validity in this research design is the interaction of testing and treatment (Campbell & Stanley, 1973). First, participants may have responded differently to the simulation scenario than they would normally due to being wired into a heart rate monitor and galvanic skin response equipment. The measurement equipment could have sensitized them to

their physiological response to the simulation experience and they could then possibly have adjusted their behavior due to the knowledge that their arousal was being measured. Additionally, applying this measurement equipment communicated to participants that the researcher was interested in emotional arousal, thus, that expectation may have changed their natural response to the simulation scenario. Furthermore, since the sample of participants was drawn only from university students, the results of this experiment are limited to this population of university students.

Significance of the Study

This study contributes to the literature on virtual character design in four ways. First, this study extends the research conducted by Bailenson and Yee (2005) and others on virtual character mimicry by going beyond physical mimicry to incorporating vocal and point-of-view mimicry as well. Second, this study helps inform the future design of pedagogical agents by providing a comparative study of effective versus ineffective virtual buddy characters that is currently lacking in the literature. Third, this study provides additional evidence regarding how gender influences participant emotional response and relationship with virtual characters, building on past virtual character research (Brown, Hall, & Holtzer, 1997; Burleson & Picard, 2007; Hess, Adams, & Kleck, 2005; Jenson & de Castell, 2010; Moreno & Flowerday, 2006; Pan, Gillies, & Slater, 2008). Lastly, this study provides data that could help determine whether or not interactive performance theory may warrant further research as a model for developing human controlled or automated virtual characters in certain simulated settings.

CHAPTER TWO: LITERATURE REVIEW

Introduction

Creating a believable virtual character is a goal towards which many areas of study including psychology, computer science, digital media, neuroscience, and theater can contribute valuable insights. This study focused on the component of emotional response to a virtual character. Towards that end, this review provides an overview of the study of emotion as it applies to the field of computer science and creating virtual characters. Additionally, this review describes some emerging work that has begun to incorporate artistic understandings of emotion from theatrical and improvised performance into the creation of virtual characters. Excluded from this review is research directly related to motion capture and literal translation of performance from a human being to an animated virtual character since this study focused on the theoretical modeling and generalized principles of emotional response rather than methods of capturing individual instances of performance. For a review of motion capture technologies, the reader may wish to consider the review from Moeslund, Hilton, and Volker (2006).

Affective Computing

Affective Computing is an area of research that explores how emotion intersects with computer science. Specifically, Picard's (1997) foundational theory of affective computing addresses "computing that relates to, arises from, or deliberately influences emotions" including computer recognition of human emotion, computer responses to human emotion, computers influencing human emotion, and computers having emotions of their own (p.3). Of particular interest for this study is the aspect of affective computing that relates to computers influencing human emotions.

Although Picard presents many problems to be solved towards the goal of an affective computing system, the scope of this study only focused on the aspect of how a computer or virtual character can use emotional expression to influence a human's emotion state. Tangential computing problems such as how computers will recognize human emotions or how computers can experience internal emotions were not considered in this study. Since this study centered around virtual characters used in simulated training contexts that include a human operator for the virtual character, both tangential problems were bypassed for this individual study, using the human operator to simulate those components by observing the participant's affect and using the operator's own internal constructions of emotion to inform the training scenario. Thus the central focus of this study was on the problem of how virtual characters can intentionally influence human emotions.

Yet, research into this aspect of emotional influence must be narrowed further for a single study due to the wide variety of human emotion and the different factors that contribute to experiencing specific emotions. These factors include: a) the type of emotion, b) the intensity of the emotion, c) the context for how the emotion began, and c) social conventions for how emotion is displayed (Picard, 1997). Considering the field of simulation, research suggests that emotion and these influencing factors also play a key role in learning, specifically in that higher states of arousal correlate with increased memory retention (Picard, 1997, p.99).

The Nature of Emotions

The scientific study of human emotion dates back over one hundred years, and yet there is still no consensus on a definition of emotion nor a comprehensive theory of emotion that is widely accepted in emotion research (Picard, 1997; Sellers, 2013). As Picard (1997) states, there

are still three questions that emotion research is attempting to answer: (1) What is an emotion?, (2) What causes emotions?, and (3) Why do we have emotions?(p.3). Each of these questions is explored in the context of current emotion research.

What is an Emotion?

The concept of an emotion is, at the same time, both familiar and complex, containing cognitive, physical, and social elements of experience. In the cognitive realm, research has shown how emotion influences perception and decision making (Blanchette & Richards, 2010; Damasio, 1994; Marsella, Gratch, & Petta, 2010; Picard, 1997). In the physical realm, research has explored indicators of emotional response such as heart rate, respiration rate, GSR, brain activity, and chemical indicators (Broek van den, Janssen, Westerink, & Healey, 2009; Matthews, McDonald, & Trejo, 2005). In the social realm, researchers have explored the communicative aspects of emotion and how these affect social interaction (de Melo, 2012; Gratch, 2008; Van Kleef, De Dreu, & Manstead, 2010). Additionally, there is an aspect of subjective experience of emotion that is often described as "a feeling". For example, a component of many training methods for acting includes processes to access and reflect on both cognitive and physical aspects of emotion for the purposes of reproducing emotional responses for an audience (Richardson, 1988). Historically, most research studies have considered only one of these aspects of emotion; however, with emerging focus on creating comprehensive computational models of emotion for artificial computer agents, current researchers advocate a more holistic approach including cognitive, physical, and social aspects of emotion. In order to examine how these aspects of emotion developed in the literature and began to overlap, each major approach is briefly reviewed.

Physiological Approach

While investigating the physical nature of emotions in the late nineteenth century, William James suggested that emotion is a physical experience characterized by physiological responses such as heart rate and perspiration (James, 1992). Research into emotion as a physical experience has continued to the present day (Cannon, 1927; Hudlicka, 2005; Matthews, McDonald, & Trejo, 2005; Picard, 1997; Sellers, 2013). As neuroscience research has utilized more advanced methods of brain imaging, neurochemical analysis, and physiological sensors, physical aspects of emotion have become more apparent and specific (Broek van den, Janssen, Westerink, & Healey, 2009; Hudlicka, 2005; Matthews, McDonald, & Trejo, 2005; Picard, 1997). These advanced methods have led to a view of emotions as complex physical "data channels" that manifest across the human system and have distinct physiological profiles for different types of emotional experiences (Hudlicka, 2005, p.864).

Cognitive Appraisal Approach

An alternative or supplemental approach, however, can also be found in a wide range of research that focuses primarily on the cognitive aspects and experience of emotion. In the realm of virtual characters, appraisal theories of emotion have been popular because they lend themselves to creating a system of rules for emotional expression (Picard, 1997; Scherer, 2010b). Ortiz, Oyarzun, & del Puy Carretero (2009) contend that appraisal theories of emotion describe emotion as a result of a "…dynamic assessment process of the needs, beliefs, objectives, worries, or environmental demands…" of a person or virtual character (p.296). Appraisal theories of emotion have been especially popular as a basis for emotional modeling for virtual characters in military simulation scenarios since they focus on the relationship between the virtual character's assessment of the environment and the resulting emotional state (Gratch et al., 2002). Unlike

most other cognitive theories of emotion, appraisal theories describe the link between the forming of emotion and emotional response (Scherer, 2010b). In fact, the emotional model most commonly used for virtual characters, the Ortony, Clore, and Collins (OCC) model (1988), uses an appraisal theory approach to emotional expression (Picard, 1997; Sellers, 2013). However as Sellers points out, the OCC model and other models based on appraisal theory fail to fully represent even the cognitive aspects of emotional experience as qualitatively described by human beings (2013, p.4). Another popular cognitive theory of emotion that is found in research in digital games is self-determination theory, which argues that emotions are the expression of human needs to feel capable, autonomous, and connected to others (Boyle, Connolly, Hainey, & Boyle, 2012, p.772). However, this model is often used to explain human player experience of games rather than used to provide emotional models for virtual characters (Boyle, Connolly, Hainey, & Boyle, 2012).

Social Constructivist Approach

On the other hand, theories of emotion that have been largely ignored in emotional modeling for virtual characters are social constructivist theories of emotion, which view emotion as a socially constructed phenomenon that lacks meaning outside of a sociocultural context (Scherer, 2010b). Social constructivist theories of emotion focus on the role that emotions play in communication (Scherer, 2010b). Similar to how some theories view emotion as a physiological "data channel," social constructivist theories view emotion as a communication channel that colors other expressions of meaning. These theories, however, present significant challenges for computer programming since according to social constructivist theories, emotion would vary radically between cultures and between individuals in unpredictable ways depending on how

those groups and individuals process their emotions and experiences over time (Scherer, 2010b). For this reason, some researchers have suggested discarding social constructivist theories entirely for the purposes of modeling emotions for virtual characters (Scherer, 2010b).

Social Interaction Approach

One variation on the social constructivist approach is social interaction theories of emotion that consider emotions to be, as Parkinson (2008) describes, "…intrinsically attuned to the actual anticipated, or imagined reaction of others" (p.1511). In other words, social interaction theories of emotion emphasize how the emotional expressions of others influence our own experience of emotion as well as how we use emotional expression, consciously or unconsciously, to influence the actions of other people around us (Parkinson, 2008). Support for the first point, the influence of others' emotions on us, can be found in research exploring the emotion contagion phenomenon which describes how, when interacting with another person, we tend to match their nonverbal communicative cues (Bailenson & Yee, 2005; Fabri, 2006; Vinayagamoorthy, Steed, & Slater, 2008). Support for the second point, our use of emotion as a means of conscious or unconscious social manipulation, is found in developmental research on the emotional displays of infants. Research has shown that infants learn very early how to use emotion, such as emotional displays of anger, to affect the responses of surrounding people and change the environment (Parkinson, 2008).

Combined Approach

As the field of affective computing has matured, however, most scholars agree that a comprehensive model of emotion must include both physiological and cognitive aspects of emotion and even some aspects of cultural differentiation in the expression of emotion (Sellers,

2013). Some of the first theories that considered cognitive, physical, and subjective aspects of emotion as applied to virtual characters were Picard's (1997) theories of affective computing. Picard described emotion as a changing state that is "…multi-variant – including aspects of both your mental state and physical state. It changes with time and with a variety of other activating and conditioning factors" (p.24). More recently, Sellers (2013) presented a combined model of emotion that defines emotions as "multi-faceted phenomena that include physiological reactions, internal subjective feeling, cognitive evaluation, and external expression and behavior" (p.3). Common elements of emotion definitions found across many current studies include the following aspects of emotion:

- the subjective experience of emotion,
- the physiological experience of emotion,
- sociocultural and environmental aspects of emotion, and
- cognitive or psychological appraisal aspects of emotion.

This study will follow Picard's (1997) general philosophy that, given the complex and varied nature of emotion, we can consider emotion as an overarching term that incorporates a variety of physical and cognitive processes that are not yet fully understood (p.225). Additionally, this study will explore a method of addressing the challenges of incorporating social constructivist theories of emotion in a programmatic approach to creating virtual characters.

What Causes Emotions?

Substantial research has been conducted that has attempted to ascertain the underlying causes of the experience of emotion. Many factors have been found to have significant effects across various studies. In the physical realm, factors such as neurochemical processes, posture, facial expressions, muscular tension, pain, and physical discomfort have been shown to influence

emotional states (Izard, 1993; Patrey & Kruse, 2005; Picard, 1997). In the cognitive or psychological realm, factors such as extroversion, social anxiety, social display rules of the culture, mood, and the mood of others around you have been found to influence emotional response (Clore, 1992; Garau, Slater, Pertaub, & Razzaque, 2005; Kahneman, 1973; Pan, Gillies, & Slater, 2008; Picard, 1997). To further complicate the potential causes of emotion, emotion is also influenced by memories, experiences, and associations specific to the individual such as the novelty of an experience, or past related experiences that carry with them an associated emotional state (Garau, Slater, Pertaub, & Razzaque, 2005; Picard, 1997; Sellers, 2013). The complexity of determining a cause for an emotional response and the lack of a truly comprehensive model in the literature suggest that when considering the causes of an emotional response, one must be exceedingly careful to collect rich data not only about the participant in the current moment, but also about the surrounding environment and potential past experiences of the participant that may influence current responses.

Why do we have emotions?

Although there is no definitive answer at this point as to why we have emotions, many theories of emotion include the idea that emotions serve as a mechanism for human adaptation to complex environments (Scherer, 2010b). Darwin (1872) described emotions as an evolved mechanism that provides an advantage to social organisms (Marsella, Gratch, & Petta, 2010; Sellers, 2013). The notion of emotion as an adaptation has continued in more modern research as well in the fields of neuroscience, psychology, and computer science (Marsella, Gratch, & Petta, 2010; Scherer, 2010a; Scherer, 2010b; Sellers, 2013). Three major areas in which these theories

postulate that emotions play an adaptive role are the interpretation of stimulus data, the management of cognitive resources, and the communication with other social organisms.

Interpretation of Stimuli

Initially, researchers believed that emotions evolved as a way to respond quickly to environmental threats without extended cognitive processing, however; current research suggests that instead, emotions actually developed as a replacement for fixed instinctual stimulus response (Scherer, 2010a). As Scherer (2010) describes: "Emotions have developed in the course of evolution to replace rigid instincts or stimulus response chains by a mechanism that allows flexible adaptation to environmental contingencies by decoupling stimulus and response, creating a latency time for response optimization" (p.48). Further neuroscience research on the amygdala in the brain supports this view, suggesting that the amygdala responds to the relevance of environmental stimuli and influences a corresponding emotional response (Grandjean & Sander, 2010). In the context of simulation training, influencing the attention and sense of relevance a participant attributes to elements of the training is an essential step towards creating effective training. Neuroscience research suggests that emotion may be one way to influence how a participant attends to training stimuli (Grandjean & Sander, 2010).

Management of Cognitive Processes

Another related theory on why we have emotions is that it helps us manage cognitive learning processes by essentially marking events to retain in memory with emotional markers to aid us in analysis of future situations (Picard, 1997). Damasio (1994), in his research with patients with frontal-lobe disorders, referred to these emotional markers as "somatic markers" that guide decision-making and avoid intractable analysis problems. His research suggests that

patients who are unable to process emotions are also unable to adequately manage cognitive analysis in order to reach rational decisions (Damasio, 1994). Damasio theorizes that this effect is caused by the patients' inability to create somatic markers (1994). Thus, emotion may play a critical role in problem solving.

Social Communication

A third perspective on why we have emotions in line with social interaction theories of emotion relates to adaptation for living in a social environment. This perspective views emotions as a communication tool to transmit intentions to other members of a social group, as well as to influence the actions of others (Banziger, With, & Kaiser, 2010; de Melo, 2012; Parkinson, 2008; Van Kleef, De Dreu, & Manstead, 2010). This perspective is supported by research conducted with human infants that shows that infants produce emotional events such as crying or smiling in order to affect the behavior of their caregiver (Banziger, With, & Kaiser, 2010; Parkinson, 2008).

Measuring Emotion

Emotional response in a simulated environment is often described in terms of arousal and participant engagement in simulation research. In some studies these factors are described as presence; however, this can often be a confusing term since presence is also used as a term to describe the experience of virtual space and even suspension of disbelief, which, while related, are not equivalent to emotional response. Lessiter, Freeman, Keogh, and Davidoff (2001) define three components of presence: a) a sensation of "being there" in a virtual environment, b) the illusion that the experience in the simulation is not mediated by technology, and c) a suspension of disbelief regarding the environment or events in the simulated context (p.282). In a more

general sense, Pan, Gillies, and Slater (2006) define presence as "the extent to which participants act and respond as if what they experience in the virtual reality were real" (p.90). Ultimately, the goal of simulation is for participants to act as if it were real, so, not surprisingly, measuring and achieving a sense of presence, which includes aspects of emotional experience, has become a key goal in simulation research (Bailenson & Yee, 2005; Garau, Slater, Pertaub, & Razzaque, 2005; Groenegress, Thomsen, & Slater, 2009; Lim & Reeves, 2010; Pan, Gillies, & Slater, 2008; Slater, Steed, & McCarthy, 1998; Slater et al., 2006; Vinayagamoorthy, Steed, & Slater, 2008).

Questionnaires for Measuring Presence

Interestingly, research studies in simulation have taken two different approaches to measuring presence that participants feel in a virtual environment. One approach is to ask participants how much presence they feel through questionnaires or interviews. Researchers have found several challenges in this approach. First, the concept or construct of presence is not a familiar term to most participants which can make it difficult for participants to rate how much presence they feel in a mediated situation (Freeman, Avons, Meddis, Pearson, & Ijsselsteijn, 2000; Lessiter, Freeman, Keogh, & Davidoff, 2001). Additionally, questionnaires that measure only one dimension of presence can be unstable and highly affected by prior experience with similar technologies (Lessiter, Freeman, Keogh, & Davidoff, 2001). Additionally, participants may not wish to admit the extent to which they felt present in the virtual environment (Reeves & Nass, 1996). Or, knowing that a researcher is trying to achieve feelings of presence, there could potentially be a reactive effect where participants may overstate the sense of presence that they felt in order to please the researcher (Campbell & Stanley, 1973).

ITC Sense of Presence Inventory

The ITC sense of presence inventory is a typical example of a validated presence questionnaire. This questionnaire embodies several aspects of the term "presence" that are represented in the literature, broken into four factors with strong internal validity coefficients. These four factors are: sense of physical space ($\alpha = .94$), engagement ($\alpha = .89$), ecological validity ($\alpha = .76$), and negative effects ($\alpha = .77$) (Lessiter, Freeman, Keogh, & Davidoff, 2001, p.292). This questionnaire has been used in numerous research studies and has been tested across a wide range of participants and media including film, video games, and virtual environments (Fabri, 2006; Grassi, Gaggioli, & Riva, 2009; Lessiter, Freeman, Keogh, & Davidoff, 2001). Research has found this questionnaire to be psychometrically sound and valid across many studies (Fabri, 2006). Since this study focused on the emotional response of the participant, the engagement items of the presence questionnaire were of particular interest and analyzed in conjunction with physiological measures of arousal.

Physiological Measures

Considering the potential limitations of presence questionnaires, many researchers began looking for more objective means to measure presence. Researchers found that physiological measures including participant heart rate and galvanic skin response correlated with the "engagement" factor of presence and could be used as data that indicated both physiological arousal and an increased probability of experiencing the engagement aspect of presence in the virtual environment (Garau, Slater, Pertaub, & Razzaque, 2005; Lim & Reeves, 2010; Pan, Gillies, & Slater, 2008; Slater et al., 2006; Vinayagamoorthy, Steed, & Slater, 2008). Although heart rate and galvanic skin response are not the only physiological measures that can be used, they are generally chosen over alternatives such as chemical testing of saliva and blood since

heart rate and galvanic skin response can be measured with non-invasive sensors (Broek van den, Janssen, Westerink, & Healey, 2009). Additionally, heart rate and galvanic skin response are less sensitive to social masking than are questionnaire data or interviews (Broek van den, Janssen, Westerink, & Healey, 2009). Some concerns when using heart rate and galvanic skin response that have been documented in research studies are that they can be sensitive to body movement, signal loss in sampling, individual differences in baseline rates, and time delays between the experience of an emotion and the resulting physiological effect (Broek van den, Janssen, Westerink, & Healey, 2009). Additionally, both heart rate and galvanic skin response are indirect measures and thus the research cannot determine with certainty the cause of signal changes. Signal changes can be influenced by internal thoughts, external factors, or even multiple factors that cannot be separated in the signal (Broek van den, Janssen, Westerink, & Healey, 2009). Thus, best practices in the literature demand that triangulation of data sources be used to increase confidence in interpreting results from physiological measures (Broek van den, Janssen, Westerink, & Healey, 2009). With data triangulation methodologies in place to measure the emotional response felt by participants in terms of arousal and engagement, the question then becomes what factors influence participant response.

Social Factors of Emotion in a Virtual Environment

One component of emotion research that is more difficult to measure is social factors that influence emotional response. A weakness in many emotion studies that is often cited by researchers is that the experiments are conducted in a laboratory setting removed from authentic environments that may influence emotional response (Broek van den, Janssen, Westerink, & Healey, 2009; Picard, 1997). One of the elements of an authentic environment that is

underrepresented in computational models of emotion used for virtual characters is social factors that influence emotional response (Gratch, 2008); however, research in audience response to media and interactive theater provide a theoretical basis for exploring the application of social factors of emotional response to virtual characters (Bailenson, Beall, Loomis, Blascovich, & Turk, 2004; Bailenson & Yee, 2005; Magerko et al., 2009; Okita, Bailenson, & Schwartz, 2007; Reeves & Nass, 1996; Wirth, Norris, Mapes, Ingraham, & Moshell, 2011).

The Media Equation

As stated earlier, Reeves and Nass (1996) theorized that "all people automatically and unconsciously respond socially and naturally to media" (p.7). This theory is called the media equation and is supported by a series of experiments conducted by Reeves and Nass that replicated classic human interaction experiments, replacing one human with a computer (Reeves & Nass, 1996). For example, Reeves and Nass (1996) found that people displayed politeness towards computers that they had previously used, and furthermore, participants were not conscious of their behavior (p.5). Bailenson and Yee (2005) found that people rated virtual characters that employed social mimicry more favorably than virtual characters that did not employ social mimicry, thus displaying a social effect in spite of being aware that the virtual characters were not human (Bailenson & Yee, 2005, p.817). Vinayagamoorthy, Steed, and Slater (2008), while studying the impact of posture of virtual characters on participants, found that participants tended to interpret an entire social context beyond the affective states that they had programmed the virtual characters to display (p.965).

Although, despite our natural tendency to treat virtual characters as social agents as described in the media equation, research has also documented clear limitations to that effect.

For example, Garau, Slater, Pertaub, and Razzaque (2005) found that the more responsive and believable virtual characters were, the more participants treated them as if they were people (p.116). Furthermore, if something occurred during the interaction that was incongruous with human behavior, participants would then treat them less like a human social actor (Garau, Slater, Pertaub, & Razzaque, 2005). This effect was mediated by the participant's previous experience with games in that participants who frequently interacted with games needed more "consistently convincing" virtual character behavior to experience similar levels of presence and exhibit similar social behaviors as participants with less gaming experience (Garau, Slater, Pertaub, & Razzaque, 2005). These results were supported by Slater and colleagues (2006) with their study measuring the effect of these incongruous occurrences or "breaks in presence" (Slater et al., 2006).

Furthermore, Lim and Reeves' (2010) study which compared the effect of playing games against a computer versus playing games against a human player controlling a virtual character showed that even when interactions were identical, participants experienced higher levels of arousal and presence and evaluated the interaction differently when they believed they were interacting with a human instead of a computer (p.65). Neuroscience theory suggests that these effects are caused by "unique brain responses" that are activated when we interact with a human being (Lim & Reeves, 2010, p.57). In fact, several studies have documented that participants felt increased arousal and engagement when interacting with a human-controlled versus a computer-controlled character (Eastin, 2006; Mandryk, Inkpen, & Calvert, 2006; Weibel, Wissmath, Habegger, Steiner, & Groner, 2008). Considering simulation training, there are many situations where one would want to recreate the experience of interacting with a real human as accurately

as possible; therefore, learning what makes a virtual character socially believable as a human emerges as an important research goal.

Gender

Beyond the differences between human and computer agency in a simulated scenario, many studies have also explored how the gender of the participant and the gender of the virtual characters may affect how individuals respond to virtual characters in the scenario (Felnhofer et al., 2014; Hess, Adams, & Kleck, 2005; Kim & Lim, 2013; Moreno & Flowerday, 2006; Pan, Gillies, & Slater, 2008; Schrammel, Pannasch, Graupner, Mojzisch, & Velichkovsky, 2009; Wang & Yeh, 2013). However, results of studies have been mixed, often showing inconsistent effects of gender in differing simulated contexts. In general, expressive female virtual characters are perceived to be more affiliative and sociable than male virtual characters whereas male virtual characters are often perceived to be more dominant (Hess, Adams, & Kleck, 2005; Kim & Lim, 2013). One explanation for these findings is that male and female participants respond differently to virtual characters. Kim & Lim (2013) suggested that female participants tended to rely on interpersonal relationships more than males, and thus projected interpersonal expectations on virtual characters more so than male participants. In a similar vein, Felnhofer and colleagues (2014) found differences in how male and female participants experienced sense of presence in a virtual environment in that female participants tended to respond to the virtual characters with more "fantasy," or filling in context for virtual characters in the environment, than male participants, which could be compared to projecting interpersonal expectations (p.278). Yet, Hess, Adams, and Kleck (2005) found that both male and female participants

expected virtual characters to behave in accordance with gendered stereotypes regarding status relationships and emotional expression.

Another, more basic principle of gender that is likely to be significant in virtual environments is that research has shown that people are generally persuaded by people similar to them in gender (Bandura, 1986; Rosenberg-Kima, Baylor, Plant, & Doerr, 2008) and often, when given a choice, people will choose a virtual agent of the same gender (Kim, Baylor, & Shen, 2007; Kim & Lim, 2013; Moreno & Flowerday, 2006). However, some research into advertising with virtual characters suggests limits to same-gender attraction based upon the sexual expressiveness of the character (Wang & Yeh, 2013). For example, Wang's (2013) study found that both male and female participants responded more negatively to virtual characters of the same gender whose appearance was overtly sexual (p.420). These findings are supported by similar findings in advertising research using video recorded humans instead of virtual characters (Sengupta & Dahl, 2008). Thus, additional research is needed to fully understand how participant and virtual character gender interact and influence virtual interactions and emotional response to virtual characters. Since these relationships are often complex and highly contextual, some researchers have suggested looking towards artistic models of emotion and behavior for insight (Hayes-Roth, van Gent, & Huber, 1997).

Emotion and Interactive Theater

Although very rarely considered in scientific research on emotion and the expression of emotion, professional actors through the years have been developing theories, models, and techniques for creating believable characters and authentic expressions of emotions. Although one could argue whether or not these approaches seem successful in theatrical contexts, there is

little research that tests the believability or impact of these approaches when applied to virtual environments (Fuller & Magerko, 2010; Magerko et al., 2009; Medler & Magerko, 2010). Given the overarching goal of creating believable virtual characters, this area of expertise could provide fruitful approaches to achieving socially believable emotional virtual characters (Hayes-Roth, van Gent, & Huber, 1997).

Theatrical versus Psychological Approaches to Emotion Modeling

Thus far we have approached emotion from psychological, neuroscience, and computer science perspectives; however, one can argue that, for many simulation training applications, a theatrical approach to virtual character design may be more appropriate. For example, Hayes-Roth, Van Gent, and Huber (1997) stated:

> The goal of psychology is to explain human behavior. Therefore, psychological models of personality must satisfy objective requirements for generality, completeness, and explanatory power…. By contrast, the goal of drama is to produce a compelling experience for the audience. Therefore, artistic models of character must meet more subjective requirements for specificity, focus, and dramatic power…because our goal is to build synthetic actors, not synthetic individuals, we focus on artistic models of character rather than psychological models of personality. This focus allows us to limit severely the set of traits we model and to finesse entirely the deeper psychological questions of how complex configurations of personality traits work together to determine behavior. (p.111)

As the quotation implies, theatrical character models may be more appropriate than psychological character models when the goal is to create an evocative virtual character to

catalyze a specific training experience. Along these lines, Klesen (2005) supports the use of theatrical concepts for virtual character design on the grounds that believability is not adequate; virtual characters must also instigate the educational or training goals of the simulation (p.414).

Improvisation and the Study of Virtual Characters

Although still rare in research on virtual characters, some researchers are beginning to follow this call to explore theatrical models for creating virtual characters (Fuller & Magerko, 2010; Magerko et al., 2009; Riedl, 2010). Given the interactive nature of most simulation training and the difficulties of creating extensive scripts to cover all possible user choices, some researchers have begun exploring improvisational theater techniques as a source for insights and inspirations for new models of virtual character behavior (Fuller & Magerko, 2010; Magerko et al., 2009; Riedl, 2010). For example, Fuller and Magerko (2010) explored the concept of shared mental models using improvisational actors. In their study, they described the phenomenon of cognitive divergence and the strategies taken by improvisational actors to regain cognitive consensus on the scene after a divide, including the environment and relationships between characters (Fuller & Magerko, 2010). According to Fuller and Magerko (2010), professional improvisers function as experts in achieving cognitive convergence, thus, as they state: "If we can understand specifically how experts reach cognitive convergence, we can then incorporate those strategies into our computation model of improvisation" (p.5). Following this method, professional performers could be used to inform other aspects of virtual character modeling.

Although Fuller and Magerko (2010) describe working with improvisers as a useful way to observe expert strategies for creating shared mental models, one weakness of their study is that the improvisers that they observed were working with other trained improvisers. It is

unlikely that the majority of users of a virtual environment will have improvisational training; thus, whether these strategies will translate to individuals without improvisational training remains an open research question. To address this potential question of generalizability when using professional performers, one solution is to turn to more interactive theatrical forms such as interactive performance.

Interactive Performance

Interactive performance is an emerging field of study that combines traditional acting, dramatic improvisational performance, social psychology, narrative, and technology into a new style of performance art that centers around an untrained audience member or "spect-actor" (Wirth, 1994; Wirth, Norris, Mapes, Ingraham, & Moshell, 2011). Unlike other acting methods that focus primarily on the experience of the actor, interactive performance focuses on creating an empowering experience for the spect-actor (Wirth, 1994; Wirth, Norris, Mapes, Ingraham, & Moshell, 2011). In accordance with this philosophy, interactors trained in interactive performance learn many techniques and strategies to facilitate supporting the spect-actor in his or her narrative journey, which may be referred to as a scenario. In general terms, the theory of interactive performance states that the spect-actor needs at least one "buddy" character who will adopt the spect-actor's point of view and support him or her throughout the challenges of the experience (Wirth, 2012). This philosophy is similar to virtual systems that create pedagogical agents to support learners; however, interactive performance theory departs from most pedagogical agent design in that it suggests that the buddy character should adopt an interpersonal relationship where his or her behavior is ineffective compared to the spect-actor. In the context of the experience, interactive performance theory suggests that the buddy character

should be of slightly lower interpersonal status than the spect-actor and when confronting an antagonistic character, should fail (Wirth, 2012). By these means, interactive performance theory maintains that the spect-actor will be activated to defend his or her buddy and adopt an empowered, leading role in facing the challenge presented by the antagonistic character (Wirth, 2012). According to interactive performance theory, this effect is influenced by the extent to which the spect-actor feels emotionally connected to the buddy (Wirth, 2012).

Underlying this construct of the "ineffective buddy" are many additional techniques designed to build emotional connection between the interactor playing the buddy character and the spect-actor. One of these techniques is called "matching" and is defined as the interactor adopting the physicality, vocal qualities, and emotional perspective of the spect-actor (Wirth, 2012). Although these three aspects of matching have not yet been tested together in terms of effect on a participant, previous research has established a basis for matching (Bailenson & Yee, 2005; Kendon, 1970; LaFrance, 1982). Specifically, previous research has established that physical matching occurs within social groups and increases feelings of affiliation (Bailenson & Yee, 2005; Kendon, 1970; LaFrance, 1982). Furthermore, the effect is still present when a human being is replaced by a virtual character; human participants still view virtual characters that match their physicality more favorably than virtual characters that do not match them (Bailenson & Yee, 2005). This study tested the additional components of matching suggested by interactive performance theory, vocal quality and emotional perspective matching.

Summary

In summary, although there are many theories on what emotions are and how they affect our cognitive processes, decision making, social relationships, and body, the divisions between

these theories are artificial in the sense that a truly believable virtual character will require aspects from of all of these models of emotion (Gratch, 2008). Traditional computational models of emotion have predominantly explored cognitive appraisal aspects of emotion, historically neglecting to model physiological processes or complex social factors (Gratch, 2008; Marsella, Gratch, & Petta, 2010; Scherer, 2010a; Sellers, 2013). Current research advocates a holistic model of emotion for theoretical purposes that include cognitive, physical, and social factors (Gratch, 2008; Marsella, Gratch, & Petta, 2010; Scherer, 2010a; Sellers, 2013). Towards this end, a vital research question emerges of how to model interpersonal social influencers of emotion (Gratch, 2008). Interactive performance theory provides an established modeling strategy for social influencers of emotion that have been implemented in simulation training systems but has yet to be empirically tested to determine if they truly affect the emotional response of simulation participants. This study tested those strategies in hopes of contributing to the research towards a comprehensive computational model of emotion.

CHAPTER THREE: METHODOLOGY

Introduction

In order to test the interpersonal strategies suggested by Interactive Performance Theory, one must create a simulated setting where these strategies can be implemented. This study used the CollegeLive simulation system that had previously been developed for the purpose of encouraging college freshmen to develop protective behaviors related to alcohol consumption. This system was ideal because it had been designed to be operated by two interactors and was targeted towards an accessible study population.

Unlike research that is currently being conducted in the CollegeLive system on alcohol-related behaviors, this study focused on the emotional response of participants to a virtual buddy character. Some of the difficulties inherent in measuring emotion included the indirect nature of observing emotional response, confounding factors that can influence physiological data, and the potential unreliability of participants to be able to remember and communicate what their emotional response was in an accurate manner (Broek van den, Janssen, Westerink, & Healey, 2009; de Melo, 2012; Reeves & Nass, 1996; Slater, 2004). Thus, this study used a 2 x 2 factoral study design to collect multiple sources of both quantitative and qualitative data for comparison and analysis.

Research Questions

The following research questions were used for this research study:

1. What is the difference in emotional experience of participants when they interact with an ineffective buddy character versus an effective buddy character in a social simulation?

2. What is the difference in emotional experience of participants when they interact with a same-gendered buddy character versus an opposite-gendered buddy character in a social simulation?

Design of the Study

This study was a 2x2 between subjects' factorial design that included time series analysis of physiological data exploring participant physiological responses to an effective or ineffective virtual buddy and potential interaction effects of participant gender. Additionally, physiological response data was triangulated with qualitative data exploring possible relationships between participant gender, subjective emotional response to the virtual buddy, and participant behavior in the context of the simulation.

This study used multiple data sources to explore potential differences in participant emotional response in terms of arousal and valence to effective and ineffective virtual buddy characters. The quantitative methods in this study included the monitoring of participant heart rates and recording participant galvanic skin response (GSR) readings in order to analyze physiological levels of arousal. The qualitative methods in this study included researcher observation of participant action during the experience as well as post-experience open-ended written responses from the participant. Written responses explored the valence aspect of participant emotional response during the experience as well as provided evidence to examine researcher observation inferences for accuracy. Since previous research suggested a possible interaction effect of gender and perceptions of virtual buddy characters, MANOVA statistical procedures as well as qualitative theme analysis were used to explore potential relationships

between participant gender, effectiveness of the virtual buddy, and emotional response in terms of valence and participant arousal.

Rigor in the Research

Rigor in the research was warranted through triangulation of multiple data collection methods (Glesne, 2011). Both heart rate and galvanic skin response can measure the arousal component of experiencing emotion (Broek van den, Janssen, Westerink, & Healey, 2009). Combined with qualitative researcher observations as well as post-experience participant responses, these four data collection methods provide triangulated data on the factor of participant emotional response during the experience. This study was submitted to the University of Central Florida's Internal Review Board (Appendix J). Any documentation or data related to participants in this study was kept in a secure location and will be destroyed when the study has been completed.

Study Setting

The setting for this study included both a physical laboratory setting and a virtual environment. The participant interacted with researchers in the laboratory setting as well as virtual characters in a virtual environment. The virtual environment was accessed through a laptop computer and did not include wearable immersion devices such as a head mounted display. Both study settings are described in further detail below.

Virtual environment

The research was conducted in the CollegeLive simulator, which can be run from a laptop computer. CollegeLive is a simulation system developed by colleagues at SREAL, a collaboration of the College of Engineering and Computer Science and the Institute of

Simulation and Training at the University of Central Florida (UCF). CollegeLive was designed as a simulation game to accompany a UCF alcohol education program targeted to freshmen at UCF. CollegeLive uses peer-aged virtual characters and a virtual university environment to create an interactive narrative where a participant had the opportunity to practice protective behaviors regarding alcohol consumption.

This study used one simulated scene in the CollegeLive simulation that was rewritten for this study. That scene setting consisted of a virtual couch and coffee table where virtual characters could sit. The camera angle of the first-person participant's view of the scene was set to make it look like the participant is sitting across the coffee table from the virtual characters at a distance of approximately three feet. For this study, the participant conversed with two virtual characters, one of which was a buddy character and one of which was an antagonistic character, who pressured the participant to drink and insulted the participant. The buddy character supported the participant during this interaction. The full script for the scene is located in Appendix A.

Physical environment

To participate in this research, participants traveled to the main campus of the University of Central Florida. This study took place in an assessment room in the Teaching Academy building. The room contained a table, office chairs, a laptop computer, and a video camera. The room also had a one-way mirror on one wall that was not used for the study. Participants met with the researcher at the assessment room in the Teaching Academy and the researcher stayed within view of the participant throughout the session.

Participants experienced the CollegeLive simulation scene seated at a laptop computer. Participants wore a heart rate monitor attached to their wrist as well as a galvanic skin response monitor attached to the first two fingers on their non-dominant hand. Both devices sent data continuously to the data recording device.

Study Population

Since the main focus of this study was to isolate the effects of gender and effectiveness of a virtual buddy character, the population of this study was selected to minimize other potential effects that could arise from using a simulation system that was designed with a different population in mind. The CollegeLive simulator that was used for this study was designed specifically for freshmen at the University of Central Florida (UCF). Thus, the same population was used for this study.

The University of Central Florida

The population of this study was college freshmen enrolled in courses at UCF. For the Fall 2013 semester, UCF reported student enrollment at 59,770 students (University of Central Florida, 2014). Of those students, approximately 8,121 were graduate students, 351 were medical students, and 51,298 were undergraduates (University of Central Florida, 2014). Approximately 55% of undergraduate students were female. 95% of enrolled students held Florida residency status (University of Central Florida, 2014). Of the total student population, 57% described themselves as White, 20% as Hispanic / Latino, 10% as Black / African American, and 6% as Asian (University of Central Florida, 2014). In the Fall 2012 semester the largest colleges at UCF were the College of Sciences (20% of the student population), the College of Health and Public Affairs (15% of the student population), the College of Business Administration (15% of

the student population), and the College of Engineering and Computer Science (13% of the student population) (University of Central Florida, 2014). For the entering freshman class in the Fall of 2012, the average SAT score was 1248, the average ACT score was 27.1, and the average high school GPA was 3.89 (University of Central Florida, 2014).

Sample Selection

The sample for this study was 145 college freshmen who were 18 years of age or older in their first year of study at the University of Central Florida. This sample was chosen as a purposeful sample because they are the target audience of the CollegeLive simulation system that was used as the virtual environment. The target sample size was determined based on a power analysis for a four-group study using MANOVA statistical analysis. Assuming a moderate effect size, with α=.05, and 1-β = .8, a minimum of 128 participants was needed to achieve adequate power. Additional participants were recruited in order to account for the possibility of missing data or errors in recording physiological data for some participants. Due to the unique combination of variables in this study, no precedent could be found in existing literature for estimating an effect size to expect in this experiment, thus this study assumed a moderate effect size for the purposes of calculating a target sample size. Since the moderate effect size was assumed, post hoc statistical analysis was performed to determine the violation of the experimental assumptions.

Participants were recruited from the main campus of UCF using list serve emails, posted flyers on campus calling for participants, and instructor announcements of participation opportunities. Participants received no compensation for their time and participation.

Variables

Following the 2x2 between subjects design of the study, this study included two independent variables and multiple dependent variables. The independent variables for this study were the effectiveness of the virtual buddy character and the participant's gender. The dependent variables for this study included participant heart rate, participant GSR, participant questionnaire responses to the emotional engagement items of the ITC Sense of Presence questionnaire, participant free response regarding emotional response during the experience, and observations of participant actions within the simulation context.

Independent Variables

The independent variables of virtual buddy effectiveness and participant gender were selected based on the potential contributions of findings on these variables toward the creation of future virtual characters. The variable of virtual buddy effectiveness has potential applications to future learning systems that wish to include a virtual tutor or companion whose purpose is to empower or activate the user and could potentially provide information that is contradictory to how many pedagogical agents are designed (Swartout et al., 2001; Veletsianos & Miller, 2008). The variable of participant gender has been established in previous research to have a significant effect on how participants relate to a virtual character (Brown, Hall, & Holtzer, 1997; Burleson & Picard, 2007; Eastin, 2006; Hess, Adams, & Kleck, 2005; Jenson & de Castell, 2010; Moreno & Flowerday, 2006). Thus, participant gender is included in this study as well in order to explore potential interaction effects.

Effectiveness of the Virtual Buddy

According to Interactive Performance Theory, when the participant engages in a three-person interaction with a virtual buddy and an antagonistic character, the level of effectiveness of the virtual buddy in facing the challenge will influence the actions of the participant. If the virtual buddy is highly effective in defending the pair from the antagonist and facing the challenge then Interactive Performance Theory predicts that most participants will be less active in facing the challenge. On the other hand, if the virtual buddy is ineffective in defending the pair and facing the challenge, Interactive Performance theory predicts that the participant will take more action towards resolving the challenge. Thus, for this study the researcher manipulated the effectiveness of the virtual character using effective virtual buddy characters for participant groups one and three and ineffective virtual buddy characters for participant groups two and four as shown in Table 1.

Table 1 - Research Participant Groups

	Effective Virtual Buddy (High Status)	**Ineffective Virtual Buddy (Low Status)**
Same Gender Virtual Buddy	Group 1	Group 2
Opposite Gender Virtual Buddy	Group 3	Group 4

To achieve an effective virtual buddy the interactor portrays high status characteristics throughout the experience, then, after a three second wait time following an antagonist prompt, the effective virtual buddy provided a plausible solution to the challenge that the antagonist accepted. To achieve an ineffective virtual buddy, the interactor portrayed low status characteristics throughout the experience, then, after a three second wait time following the

antagonist prompt, the ineffective virtual buddy provided an unsuccessful solution to the challenge that the antagonist discredited.

Participant Gender

Based on previous research on gender and social interaction in virtual games (Brown, Hall, & Holtzer, 1997; Burleson & Picard, 2007; Hess, Adams, & Kleck, 2005; Moreno & Flowerday, 2006; Pan, Gillies, & Slater, 2008), participant gender could potentially affect the participant's emotional response to the virtual buddy character and behavior in the simulated scenario. In order to test potential interaction effects of participant gender, participants were matched based on gender and randomly assigned to one of four research groups. As seen in Table 1, participants in groups one and two interacted with a virtual buddy of the same gender and participants in groups three and four interacted with a virtual buddy of the opposite gender. For the purposes of this study, participants who identified as transgender male or transgender female were classified as male and female respectively for data analysis purposes. Also for this study, participants who identified as neither male, female, transgender male, or transgender female were randomly assigned to one of the four research groups and excluded from the analysis of gender effects. Although the interaction of participants with complex gender identities is a valuable topic of research, that area was outside of the scope of this study but hopefully will be a topic of future research.

Dependent Variables

As Picard (1997) stated: "One thing that is widely agreed upon is that no single signal is a trusted indicator of emotional response. Instead, patterns of signals are needed" (p. 166). Towards this end, many researchers advocate data triangulation and gathering multiple sources

of data in order to increase confidence in the interpretation of the emotional response of a participant (Broek van den, Janssen, Westerink, & Healey, 2009; Hudlicka, 2005; Picard, 1997). Thus, this study collected multiple sources of data that collectively can describe the emotional response of the participants.

Emotional Response of the Participant

Emotional response of a participant is difficult to measure for many reasons. First, emotion is not directly observable and thus must be inferred from other data (Parkinson, 2008; Picard, 1997). Additionally, participant self-report of emotion may be unreliable considering memory biases, social display rules, and variance in the ability to distinguish between similar emotional responses (Marsella, Gratch, & Petta, 2010; Picard, 1997; Scherer, 2010a). Thus, this study used the dimensional model of emotion that describes emotional response as a combination of valence and arousal, which has been frequently used in virtual character research and validated cross-culturally (Marsella, Gratch, & Petta, 2010; Picard, 1997; Sellers, 2013). To measure participant arousal, physiological measurements of heart rate and galvanic skin response were used. Valence was explored qualitatively using a post-experience questionnaire adapted from the ITC Sense of Presence Inventory as well as an additional three level virtual character perception questionnaire specific to the experience that included written open ended responses from participants that can be found in Appendix A.

Participant Action in the Virtual Environment

Participant action in the virtual environment was recorded from researcher observations of the session. Since the participant interacted in the virtual environment primarily through talking to virtual characters, action for this study was verbal in nature as described in Table 2.

Video recordings were made of every session so that researcher observations could be reviewed for accuracy.

Table 2 - Categories of Observation for Participant Action in the Virtual Environment

Categories of Observation	**Opportunity Provided by Interactor**
Interaction Initiation – Participant or virtual character	The interactor will provide wait time of three seconds before the virtual buddy responds to the antagonist prompt.
Interruption – Does the participant interrupt the virtual buddy character	Once the virtual buddy character responds, the virtual buddy will continue until the end of the verbal statement or until the participant interrupts without providing breath pause.
Statement to the antagonist – Does the participant speak to the antagonistic character	Before the antagonist exits the scene, the antagonist will wait three seconds for any participant response.
Participant Vocal Quality – High or low status	The virtual characters will prompt the participant to speak during the course of the experience.

Instrumentation

In using multiple sources of data to collectively describe participant emotional response to the simulation, one must consider both the advantages and the potential validity concerns of using each type of data measurement instrument. This section will describe each instrument and outline the strengths and weaknesses of each instrument that were considered in the data analysis for this study.

Demographic Questionnaire

After participants agreed to participate in the study, they were asked to fill out a brief demographic questionnaire. This questionnaire asked for the participant's gender, age, major area of study, and past experience with video games or simulations. Random participant codes

were used to match demographic questionnaires with other participant data so that the participant's name did not appear on this questionnaire or any other collected data.

Heart Rate and Galvanic Skin Response

To measure the participant's physiological arousal, the participant's heart rate and galvanic skin response were measured using heart rate and galvanic skin response monitors. This data was triangulated with researcher observations and accelerometer sensor data in order to detect potential signal contaminations. Using physiological measures such as heart rate and galvanic skin response provided certain advantages and potential concerns in terms of data collection and analysis.

Advantages

One advantage to using physiological measures is that they are free from social masking (Broek van den, Janssen, Westerink, & Healey, 2009). In other words, other measures that use self-report or observational measures of emotional impact are vulnerable to the participant masking his or her emotions. Physiological measures are not vulnerable to this masking. Another advantage that physiological measures have over speech analysis is that they are able to measure emotional impact when participants may be silent (Broek van den, Janssen, Westerink, & Healey, 2009). Furthermore, heart rate monitors and galvanic skin response are less invasive than other biological measures such as blood chemistry and brain activity pattern monitoring.

Concerns

First, both heart rate and galvanic skin response are indirect measures of emotional arousal and thus can be sensitive to contamination by other factors (Broek van den, Janssen, Westerink, & Healey, 2009). These factors include: body movement, internal influences, external

influences, measurement delay, and signal loss in sampling (Broek van den, Janssen, Westerink, & Healey, 2009). These potential factors of concern are detailed below.

Body Movement

Since increased physical activity and body movement can increase one's heart rate and galvanic skin response, and the goal of this study is to measure emotional response and not level of physical activity, the research setting had to limit body movement in order to collect valid heart rate and galvanic skin response data. Accordingly, for this study participants were seated throughout the simulation in a comfortable chair to limit excessive movement in the simulation space. Additionally, the researcher observing the sessions noted any large movements made by participants such as standing or emphatically gesturing so that data points that may be influenced by large movements could be isolated in data analysis. To support researcher observations, an accelerometer was included with the GSR sensor that recorded movement of the sensor base. Thus, any large movements made by participants, who were wired to the sensor base, were recorded by the accelerometer.

Internal Influences

Other factors that could influence heart rate and galvanic skin response readings are internal influences such as participant thoughts (Broek van den, Janssen, Westerink, & Healey, 2009). If the participant is thinking of something other than the simulation such as a memory or an unrelated thought, the emotional arousal that the heart rate and galvanic skin response monitors measure could be related to those thoughts instead of the simulation in which they are involved.

External Influences

Similar to internal influences, external influences such as loud noises, fire alarms, or other external factors that could startle the participant can also influence the heart rate and galvanic skin response readings. To minimize external contaminations of the readings, the researcher observing the session time coded any potential external influence on emotional impact such as a startling or unintended event during the session.

Measurement Delay and Signal Loss

One further limitation of heart rate and galvanic skin response meters as an instrument is that they are not a continuous measure. Instead, these instruments take readings at discrete, specific points in time. However, emotions have a range of expression that can last from milliseconds to minutes (Broek van den, Janssen, Westerink, & Healey, 2009). Thus, the rate of sampling could miss some information, or miss the specific point in time that marks the onset of the emotion. Another potential effect of a discrete sampling rate is that although it generally provides a good description of data that occurs over time, some parts of the signal can be lost. For example, Figure 2 illustrates how some trends in data could be lost between some signal points.

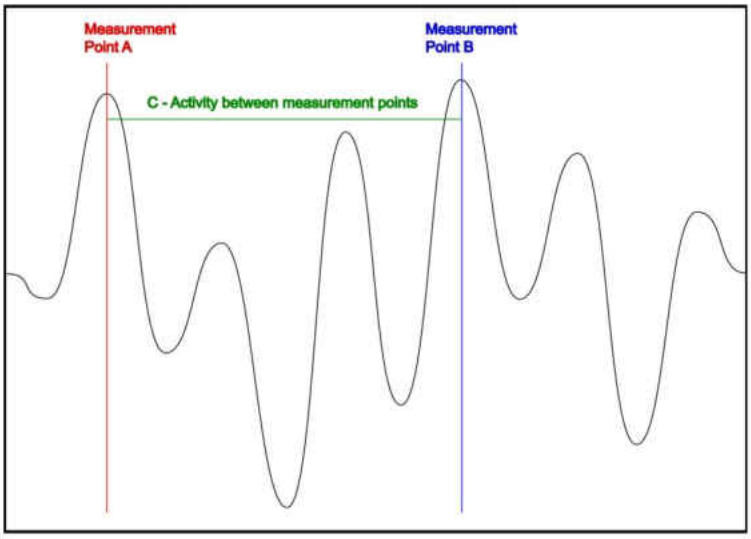


Figure 2 - Data Loss for Discrete Sampling

Researcher Observations

During the experiment, the researcher observed and coded instances where the participant spoke to a virtual character. These instances were coded as: a) conversational, b) confrontational, or c) interruptive. Verbal utterances were coded as conversational if they were friendly or affectively neutral in nature. Verbal utterances were coded as confrontational if the researcher observed hostility from the participant indicated by vocal pitch or tone. Finally, verbal utterances were coded as an interruption if the participant began speaking before a virtual character completed a phrase.

In addition to coding the verbal utterances of the participant, the researcher also coded any behavior that may have interfered with the recording of accurate physiological data, such as large or vigorous body movements made by the participant or a startling event such as a fire alarm that occurred outside the context of the study during the experiment.

Advantages:

One advantage to using researcher observations is that the researcher can focus on detailed aspects of participant expression that the participant may not be aware of or may not remember by the end of the experiment. Since the researcher can be trained to observe clearly defined verbal behaviors prior to the experiment, it is reasonable to presume that the researcher will be able to note instances of particular behavior. Additionally, since this experiment was recorded, outside researchers can review the data for accuracy.

Concerns:

One concern with using researcher observations is that researcher bias may influence what the researcher sees and codes during the experiment. Additionally, the researcher may misunderstand participant intentions and thus inaccurately represent the participant's actions. To address these concerns, for this study, firm definitions of coded behavior were established and revised as needed throughout the process. Additionally, each experimental session was recorded so that the session could be reviewed and the accuracy of researcher observations could be determined without time constraints.

ITC Sense of Presence Inventory & Written Responses

In order to collect additional quantitative data on the response of the participant to the virtual characters, this study used a portion of the ITC Sense of Presence Inventory. The ITC Sense of Presence Inventory measures the participant's spatial presence, engagement in the scenario, naturalness, and negative effects of being in the virtual environment (Fabri, 2006). Additionally, previous research has found this instrument to be psychometrically sound with validity confirmed by many research studies (Fabri, 2006). Since this study investigated

emotional response, only the engagement section of the ITC Sense of Presence Inventory was used because the engagement factor is defined as psychological involvement and enjoyment of the content (Lessiter, Freeman, Keogh, & Davidoff, 2001). In their study (n=600) of the ITC Sense of Presence Inventory, Lessiter and colleagues (2001) found that the engagement factor of the ITC Sense of Presence Inventory had an internal reliability coefficient of $\alpha = .89$, indicating that this factor is reliable (p.10). In addition to the ITC Sense of Presence Inventory, the participants in this study had the opportunity to provide written responses to open-ended questions addressing how they felt about the experience and each of the virtual characters.

Advantages:

One advantage of using the engagement items from the ITC Sense of Presence Inventory is that it is a well-established instrument. Given the history of research using this inventory, one can have more confidence in the validity and reliability of these items (Fabri, 2006; Grassi, Gaggioli, & Riva, 2009; Lessiter, Freeman, Keogh, & Davidoff, 2001). For example Grassi, Gaggioli, and Riva (2009) used the ITC Sense of Presence Inventory to measure the effect of mobile narratives in reducing stress through creating positive emotional responses (p.156). In a similar manner, this study used the same instrument to measure the effect of virtual buddy effectiveness in creating emotional responses; thus, by using the same instrument the research can compare findings to previous research.

Beyond the ITC Sense of Presence Inventory, an advantage to including open-ended questions is that it gave participants the opportunity to describe their subjective emotional experience in their own words without having to conform to artificial quantitative measures. The open-ended responses provided richer qualitative data that informed both the quantitative

questionnaire responses as well as the physiological data collected during the experience. Additionally, since the experience of emotion is a key topic under consideration, participant self-report is currently the only way to establish the subjective feeling of emotion, especially the valence aspect of emotion, during the experiment.

Concerns:

One concern with using the ITC Sense of Presence Questionnaire is that it was designed around a construct of virtual presence that participants may not fully understand (Slater, 2004). To address this concern, only the validated emotional engagement items were used. An additional concern with using the open written response from participants is that these responses may be subject to memory or social desirability effects that may prevent participants from providing accurate responses (Broek van den, Janssen, Westerink, & Healey, 2009; Picard, 1997; Reeves & Nass, 1996; Scherer, 2010b).

Therefore, self-reporting, especially of emotional experiences, has often been found to be unreliable (Scherer, 2010a). Participants may not wish to admit that they felt certain emotions during the experience due to embarrassment or social conventions about when certain emotions are appropriate (Broek van den, Janssen, Westerink, & Healey, 2009; Marsella, Gratch, & Petta, 2010; Picard, 1997). Even if the participant has every desire to be completely honest about his or her emotional response, he or she may not remember the feelings accurately or may lack the communicative ability to truly express the emotion that he or she felt (Scherer, 2010a). To address these concerns, this study combined open-ended response data with both researcher observations and physiological data about body response to glean a more accurate impression of participant emotional response.

Data Collection

In order to minimize the concerns related to the measurement instruments used in this study, a scripted procedure was followed to collect data. This procedure was informed by research methodology practices and was modeled after similar studies in the field of simulation and new media. This section will also discuss best practices for collecting quantitative physiological measures as well as qualitative measures of participant experience.

Study Procedures

The following steps describe the overall procedure that was followed for this study.

Step 1: Placing Participants into a Research Condition

Participants were assigned to matched groups based on their gender with each group consisting of participants of the same gender. From this group, participants were randomly assigned to one research condition. This corresponds to the blocking procedure suggested by Campbell and Stanley (1973). Using this blocking procedure helped ensure that each experimental condition was approximately equivalent in terms of gender while still allowing for random assignment to experimental conditions.

The four possible research conditions were as follows:

1. The participant interacts with an effective virtual buddy of the same gender.
2. The participant interacts with an ineffective virtual buddy of the same gender.
3. The participant interacts with an effective virtual buddy of the opposite gender.
4. The participant interacts with an ineffective virtual buddy of the opposite gender.

Step 2: Study Introduction

Each participant experience was conducted in a virtual environment presented on a laptop computer. Prior to the experience, participants spoke with the researcher about confidentiality procedures, the purpose of the research, and any risks and benefits associated with participating in the research. After the participant consented to participating in the research, he or she completed a demographic questionnaire. Next, the participant was seated at a laptop computer system with the virtual simulation already loaded on the screen. Heart rate monitors and galvanic skin response meters were attached the participant viewed a virtual environment empty of virtual characters for one minute to establish a baseline reading of heart rate and galvanic skin response.

Step 3: The Experiment

Once the baseline physiological readings were established, virtual buddy characters appropriate to the assigned research group walked into the virtual environment, sat on the virtual couch, and begin a conversation with the participant. Participants interacted with the simulation by speaking to the characters that appeared on screen. Participants did not need to use a mouse or keyboard to navigate the simulation in any way, nor did they need any type of head mounted display or special equipment for the simulation. The participant wore the heart rate monitor and the galvanic skin response meter throughout the experience to track physiological responses during the simulation.

The virtual buddy character initiated a conversation based on the participant's major area of study, and hobbies. The conversation continued for approximately two minutes based on the participant's responses. After approximately two minutes, a virtual male antagonist character entered the scene, offered the participant a beverage, and insulted the participant and the virtual buddy character. After a three second wait time for participant response, or after the participant

responded to the virtual antagonist, the virtual buddy responded based on the effectiveness assigned for the research group.

Step 4: Participant Response

Following the experience, the heart rate monitor and galvanic skin response meter were removed and the participant was asked to fill out the ITC questionnaire as well as the free response questionnaire about how he or she felt about the virtual characters. Demographic questionnaires, interview notes, as well as heart rate and galvanic skin response data were labeled with a participant number in order to protect the participant's identity. Documentation regarding study information about the purpose of the study and the consent process were given to the participant to keep for his or her records.

Quantitative Measures: Heart Rate and Galvanic Skin Response

In order to address some of the concerns regarding the use of physiological measures, Van Den Broek and colleagues (2009) suggest five best practices for properly using physiological measures: (a) triangulation, (b) using multiple data sets, (c) reporting signal frequencies, (d) reporting signal data filtering, and (e) stating measures in terms of the signal instead of the affective outcome (p. 3-6). This research study followed four of these five best practices.

Triangulation

In the context of physiological measures, triangulation refers to using multiple data sources as well as multiple researchers to collect and analyze data (Broek van den, Janssen, Westerink, & Healey, 2009). Van Den Broek and colleagues (2009) suggested not only using multiple physiological signals, but also some qualitative measure as an accompanying source of

data (Broek van den, Janssen, Westerink, & Healey, 2009). To meet this best practice of triangulation, this study incorporated more than one physiological measure as well as a qualitative measure by combining heart rate, galvanic skin response, researcher observations, questionnaire data, and participant free responses.

Reporting

The best practices of reporting signal frequencies, reporting signal data filtering, and stating measures in terms of the signal instead of the affective outcome all address the accurate representation of data obtained through physiological measures. Reporting signal frequencies and data filtering allows outside researchers to either replicate the study by using the same frequencies and data filtering or to test the effects of these settings in future studies. This replication and testing helps test the validity of measures obtained in the research. Thus, heart rate data was collected using a Mio Alpha® heart rate monitor, which transmits participant heart rate once per second. This heart rate monitor measures the heart rate on the wrist of the participant's non-dominant hand using an optical heart rate sensor. For GSR, the Shimmer® GSRsensor with integrated accelerometer was used. Signal collection was set to 10.1hz, which provided 10 GSR readings per second. Shimmer sensor software was used to calibrate the minimum and maximum range of GSR readings automatically for each participant.

Additionally, Van Den Broek and colleagues (2009) urge researchers to report measures in terms of the signal instead of the affective outcome in order to clarify researcher inferences about the meaning of signals as separate from the data itself (Broek van den, Janssen, Westerink, & Healey, 2009). Thus, although this research has defined one aspect of emotional response as the level of arousal as measured by heart rate and galvanic skin response, results will be reported

in the results section in terms of heart rate and galvanic skin response and not emotional response. The connection between the measures and the construct of emotional response will be explicitly made in the interpretation of results in the discussion section, separate from the reporting of data readings.

Multiple Data Sets

Although analyzing multiple data sets was not feasible for this study, a statistical post-hoc analysis was used to approximate multiple data sets and test for validity. After the initial analysis, the full data set was randomly split into two halves. Each half was then analyzed separately and compared with each other. Although this approximation is not as strong as using a second independent data set, it does provide some initial indications of validity for the analysis of the overall data set.

Qualitative Measures: Researcher Observations and Participant Response

In order to address some of the concerns surrounding both researcher biases and self-report biases that can potentially threaten the validity of qualitative research, Glesne (2011) suggests eight methods of promoting trustworthiness in qualitative research: a) prolonged engagement, b) triangulation, c) peer review, d) negative case analysis, e) clarification of researcher bias, f) member checking, g) rich description, and h) external audit (p. 49). This research study employed five of these eight methods.

Triangulation

In order to triangulate qualitative data, this study collected two different sources of qualitative data in researcher observations and participant open response and triangulated that data with two different sources of physiological quantitative data.

Negative Case Analysis

Throughout the research process, special attention and consideration was given to negative cases that seemed to contradict previous findings.

Clarification of Researcher Bias

Throughout the research process, the researcher kept a journal of thoughts, observations and analyses related to the research. This journal was examined throughout the research process for evidence of bias that could influence the research. Special care was taken to identify potential sources of bias and retain awareness of these sources throughout the research process.

Member Checking

Given the constraints of this study and limited exposure of participants to the system as well as the large sample size, extensive member checking was not possible for this study. Instead, multiple data sources including open responses, where participants could describe their experience in their own words, were used to provide an outlet for participants to share their views and interpretations of the experience.

Rich Description

Rich description was used in both the definition of coding for researcher observations and in the representation of participant perspectives. When possible, direct quotations of participant responses are used when describing results. Additionally, since the experiment sessions were recorded, written descriptions of results include rich detail that can be reviewed in the video recordings.

Prolonged Engagement and External Audit

Although prolonged engagement with participants and external audit of the research process are outside of the scope of this study, the research process was well documented so that future research can explore the effect of more prolonged engagement. Furthermore, although there is no external audit of this research, it is hoped that upon publication of this dissertation external researchers can examine and critique this study in order to improve research methodology for further exploration.

Data Analysis

Since this study used multiple data sources, both quantitative and qualitative data were analyzed for this study. First the quantitative and qualitative data were analyzed separately and then merged. The researcher then analyzed and described points at which the quantitative and qualitative data appeared to agree and where they appeared to differ. All areas of convergence and divergence are described in rich detail in future chapters so that future studies can replicate and explore findings in further detail. Next, this section will describe the analysis procedures that were used for quantitative and qualitative data respectively.

Quantitative Data

The heart rate and galvanic skin response data for the participant were analyzed using an interrupted time series analysis procedure and SPSS statistics software. Any spikes in heart rate or galvanic skin response were recorded and matched to the time period of the participant experience in which it occurred. These time periods were in turn matched with specific events that occurred during the scenario as described in Table 3. This matching process is necessary as there are likely to be slight variations between participants based on individual conversational

styles. The entire scenario lasted between 4 to 6 minutes. The physiological data, matched to common event points, were analyzed for reoccurring patterns across participants.

Table 3 - Approximate Time Points for Scenario Events

Scenario Event	**Approximate Time Point after baseline measures**
Entrance of the Virtual Buddy	≈ 10 seconds
First speech instance with the Virtual Buddy	≈ 15 seconds
Entrance of the Antagonist	≈ 2 minutes
First speech instance with the Antagonist	≈ 2 minutes 5 seconds
Initial drink offer	≈ 2 minutes 45 seconds
First Antagonist pressure point	≈ 2 minutes 55 seconds
Second Antagonist pressure point	≈ 3 minutes 10 seconds
Exit of the antagonist	≈ 3 minutes 45 seconds
First resolution speech instance	≈ 3 minutes 50 seconds
Virtual Buddy reaction point	≈ 4 minutes 5 seconds
End of scenario	≈ 5 minutes

Additionally, averaged heart rate and galvanic skin response readings corrected for individual baseline differences were calculated and compared across research conditions. Gender was also analyzed as a potential influencing factor for any statistically significant differences between research conditions using a multiple factor MANOVA procedure in SPSS.

Qualitative Data

Participant open responses and researcher observations were coded and analyzed for emerging themes and patterns using a grounded theory approach as suggested by Glesne (2011, p.187). For the coding process, the researcher reviewed open responses and video of simulated sessions. Spreadsheets were used to mark the frequency of participant verbal behavior and transcribe relevant participant statements.

Summary

In summary, this study addressed the difficulties of exploring participant emotional response by carefully controlling the simulated experience and by collecting multiple sources of data that are both quantitative and qualitative in nature. Even given the complexities of combining physiological and qualitative data, there are still areas of convergence and divergence between the data sources which will be described in detail in future chapters. Primary statistical analysis included MANOVAs to explore potential differences between participant groups as well as time series spike analysis of participant heart rate and GSR collected during the experience. Qualitative analysis included thematic analysis of participant written responses and coding of researcher observations.

CHAPTER FOUR: ANALYSIS AND RESULTS

Introduction

The purpose of this study was to explore how incorporating the interactive performance technique of an ineffective buddy in a social simulation influenced the emotional experiences of participants as well as to explore how gender differences in virtual characters may influence and interact with that experience. Toward that end, several sources of data were collected in order to examine the emotional experiences of participants including quantitative measures such as heart rate, GSR, and self-report questionnaire data as well as qualitative measures such as researcher observations and open-ended participant written responses. This chapter provides the analysis and results of this data in relation to the following research questions that guided this study:

1. What is the difference in emotional experience of a participant when they interact with an ineffective buddy character versus an effective buddy character in a social simulation?
2. What is the difference in emotional experience of a participant when they interact with a same-gendered buddy character versus an opposite-gendered buddy character in a social simulation?

Demographic Data

The sample for this study was drawn from first year university students attending classes during the Fall 2013 semester at the University of Central Florida, a large southeastern university in the United States of America. A sample size of 145 students participated. As seen in Figure 3, compared to the undergraduate population of the University of Central Florida, the study sample

had a slightly higher percentage of male participants than the general undergraduate population of the university (University of Central Florida, 2014).

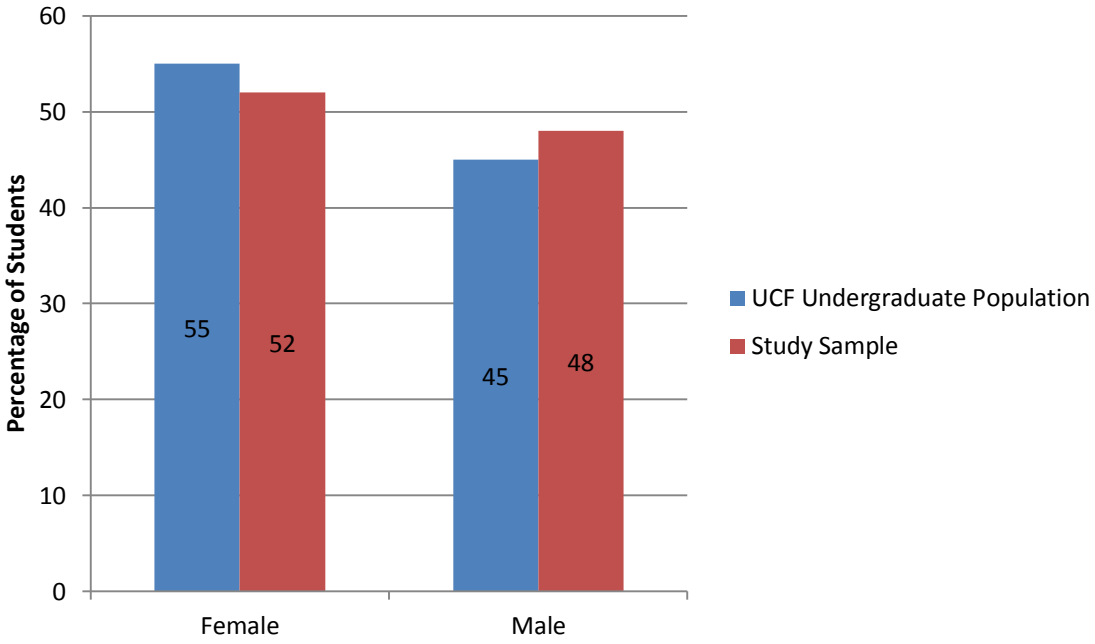


Figure 3 - Gender Demographics Comparison

Additionally, as seen in Table 4, the age breakdown of the sample for the study reflects the university average age of freshmen as 18.5 years of age (University of Central Florida, 2014).

Table 4 - Participant Sample Age Demographics

Participant Age	**Number of Participants**	**Percentage of Participants**
18 years of age	88	60.7%
19 years of age	38	26.2%
20 years of age	13	9.0%
21 years of age or older	6	4.1%

Given the nature of the simulation based around underage drinking behaviors, the six participants 21 years of age or older were excluded from analysis of underage drinking behavior in Table 5. For this study, underage drinking behavior included accepting the offer of an alcoholic drink, although no drink was provided as a part of this study.

Table 5 - Participant Underage Drinking Behavior

Participant Drinking Behavior	**Number of Participants**
Accepted an alcoholic beverage	
Male	21
Female	9
Total	30
Refused an alcoholic beverage	
Male	45
Female	63
Total	108

During the simulation, out of the sample of 138 underage participants, 21.7% of participants chose to accept an alcoholic beverage from the virtual character in spite of being under the legal drinking age. Of the participants who accepted the offer of an alcoholic beverage, 70% were male and 30%were female. Looking at the total sample, 31.8% of male participants chose to accept the alcoholic beverage and 12.5% of female participants chose to accept the alcoholic beverage.

Since research literature suggests that past computer and gaming experience may affect perceptions of virtual environments, demographic data on participant experience with computers and games was also collected and can be reviewed in Table 6.

Table 6 - Participant Computer and Gaming Experience

ITC Questionnaire Item	Number of Participants Who Selected Response
How often do you play computer games:	
Never	16
Occasionally (once or twice per month)	59
Often (less than 50% of days)	41
50% or more of days	15
Every day	14

Of the 145 study participants, when asked about how frequently they played video or computer games, 11% responded that they never play games, 40.7% responded that they occasionally play games once or twice per month, 28.3% responded that they often play games but less than 50% of days, 10.3% responded that they play games 50% or more of days, and 9.7% responded that they play games every day.

Because data for this study was collected from multiple sources, the following sections describe findings from each data source individually. Interpretations of results in relation to the research questions for this study can be found in chapter 5.

Physiological Data Analysis

During the simulation session, participant heart rate and GSR were recorded. The recordings began with a sixty second baseline reading before the simulation session began and continued until the end of the simulation. Matlab statistical processing software was then used to graph heart rate and GSR data. These graphs were visually analyzed for spikes in activity. When a spike was identified, the time point on the graph was matched to the video recording of the session and the event occurring in the simulation session was noted. These events were compared across participants and analyzed to determine if there were any patterns of physiological response across research groups. No patterns of response were found. In fact, very

few significant spikes in data were found that corresponded to events occurring in the simulation. When compared with the video recordings of the session, most spikes were determined to be likely the cause of signal interference or movement error rather than an emotional response to the simulation. This conclusion was supported by participant self-reports. On the ITC Sense of Presence questionnaire, when asked to rate the intensity of the experience, the overwhelming majority of participants rated the experience as not intense. Full graphs of participant heart rate and GSR data can be found in Appendix D.

ITC Sense of Presence Questionnaire

Immediately following the simulation session, each participant completed a modified version of the ITC sense of presence questionnaire. The questionnaire contained twenty-one items and a free response section where participants could add any additional comments. For analysis, the twenty-one items were combined using mean scores into three factors as per the scoring guidelines provide by the Independent Television Commission (ITC). These three factors included spatial presence, engagement, and ecological validity or naturalness of the system.

Differences Between Participants with Effective or Ineffective Buddies

Following research question 1 to determine if there were any differences between participants who had effective buddies and participants who had ineffective buddies, a MANOVA test was run using these two participant groups. A summary of assumption tests for the MANOVA analysis can be found in Table 7.

Table 7 - ITC SOPI MANOVA Assumption Tests Between Effective Buddy and Ineffective Buddy Research Groups

Test	**Results**	**Analysis**
Assumption of Independence	Met	Research Design
Assumption of Adequate sample size	Met	Sample size
Outliers	5 Univariate outliers 1 Multivariate outlier	Boxplot analysis Mahalanobis distance (p<.001)
Homogeneity of Variance-Covariance Matrices	Met	Box's test of equality of covariance matrices (p=.071)
Multicollinearity	No Multicollinearity Detected 1. Spatial presence and engagement 2. Spatial presence and ecological validity 3. Engagement and ecological validity	Pearson correlations 1. r = .348, p<.001 2. r = .303, p<.001 3. r = .578, p<.001
Normality	1. Engagement a. Effective Buddy Participant Group – Normally Distributed b. Ineffective Buddy Participant Group – Not Normally Distributed 2. Ecological validity – Normally distributed 3. Spatial presence score – Not Normally distributed	Shapiro-Wilk's test 1. a. *ns* b. p = .032 2. *ns* 3. p < .001

The assumption of independent observations was met by the study design and each group had adequate and comparable sample sizes: a) effective buddy group (n=73), ineffective buddy

group (n=72). Since univariate and multivariate outliers were found, MANOVA analysis was run twice, once with the outlying cases included and once with the outlying cases removed. Since removing the outlying cases did not significantly affect the test results, these outlying cases were left in the analysis. The assumption of normality as assessed by the Shapiro-Wilk's test was violated for the spatial presence score in both the effective and ineffective participant groups. The assumption of normality was also violated for the engagement score for the ineffective participant group. Thus, a Kruskal-Wallis non-parametric test was run and results were compared with individual ANOVA analyses. Since no statistically significant differences in results were found between the two tests, the MANOVA test was continued despite the violation of the assumption of normality. As seen in Table 8, the MANOVA test revealed no statistically significant differences between participants who had an effective buddy and participants who had an ineffective buddy in terms of spatial presence, engagement, or ecological validity scores.

Table 8 - ITC SOPI MANOVA Results for Between Effective Buddy and Ineffective Buddy Research Groups

Wilks' Lambda	**F**	**Hypothesis df**	**Error df**	**Sig.**	**Partial Eta Squared**
.953	2.173	3	141	.094	.044

Differences Between Participants with Same Gendered and Opposite Gendered Buddies

Continuing analysis to further explore research question 2 and see if there were any differences between participants who had a same gendered buddy versus participants who had an opposite gendered buddy, another MANOVA test was run. Assumption tests for the MANOVA analysis were similar to the previous tests run for the effective and ineffective buddy groups.

Differences in assumption tests for normality and the homogeneity of variance-covariance matrices can be found in Table 9.

Table 9 - ITC SOPI MANOVA Assumption Tests Between Same Gender Buddy and Opposite Gender Buddy Research Groups

Test	**Results**	**Analysis**
Homogeneity of Variance-Covariance Matrices	Met	Box's test of equality of covariance matrices (p=.696)
Normality	1. Engagement a. Same Gender Participant Group – Note Normally Distributed b. Opposite Gender Participant Group – Normally Distributed 2. Ecological validity – Normally distributed 3. Spatial presence score – Not Normally distributed	Shapiro-Wilk's test 1. a. p = .023 b. *ns* 2. *ns* 3. p < .001

Again the assumption of the independence of observations was met by the research design and both groups had adequate sample sizes for analysis: same gender buddy group (n=69), opposite gender buddy group (n=76). Since univariate and multivariate outliers were found, MANOVA analysis was run twice, once with the outlying cases included and once with the outlying cases removed. Since removing the outlying cases did not significantly affect the test results, these outlying cases were left in the analysis. In testing for normality, the ecological validity score was normally distributed across same gender buddy and opposite gender buddy groups. However, the spatial presence score violated the assumption of normality across both groups, exhibiting a negative skew. The engagement score also violated the assumption of

normality for the same gender group also exhibiting a negative skew. Thus, a Kruskal-Wallis non-parametric test was run and compared with individual ANOVA analyses. Since the results of both tests did not differ significantly, the MANOVA analysis was continued despite the violation of the assumption of normality. The MANOVA test revealed no statistically significant differences between participants who had same gendered buddies and participants who had opposite gendered buddies on ITC questionnaire responses.

Table 10 - ITC SOPI MANOVA Results for Between Same Gender Buddy and Opposite Gender Buddy Research Groups

Wilks' Lambda	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
.948	2.58	3	141	.056	.052

However, running separate ANOVA analysis, there was a statistically significant difference in the ecological validity score between participants with same gendered buddies versus opposite gendered buddies, $F(1, 143) = 4.23$, $p = .041$; partial $\eta^2 = .029$.

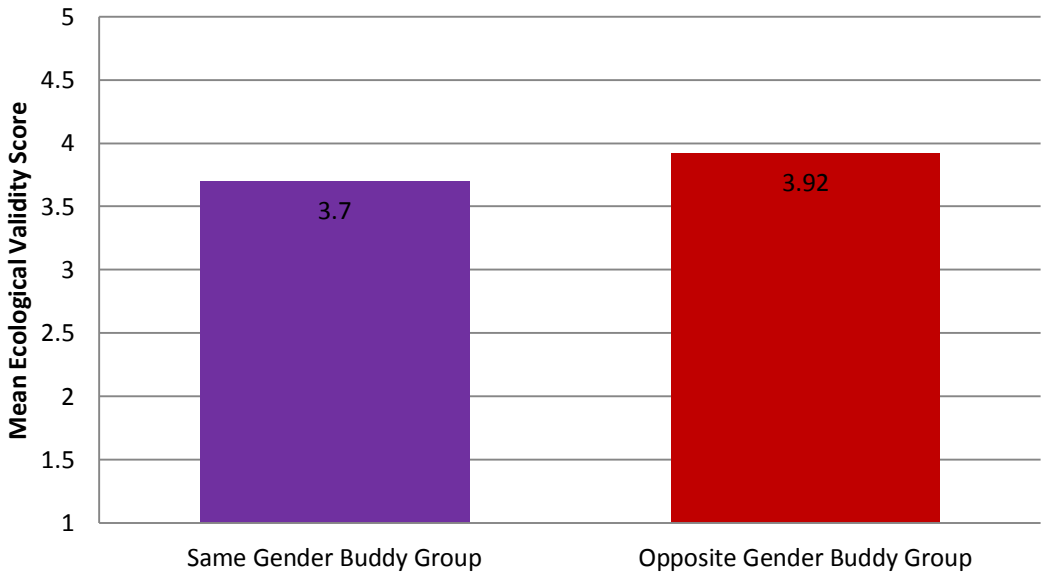


Figure 4 - ITC SOPI ANOVA Results for Ecological Validity Score

As seen in Figure 4, participants with opposite gender buddies tended to rate the ecological validity of the system higher than participants with same gender buddies, although this effect size was very small.

Qualitative Analysis of the Free Response Section

On the ITC sense of presence questionnaire, 68 participants, approximately 47%, chose to write additional comments about their simulation experience. These comments were not guided in any way since the prompt only asked if the participant wanted to add or share anything. From these comments, themes listed in Table 11 emerged regarding the responsiveness of the system, engagement in the simulation, the authenticity of the system, ways to improve the technology of the system, and agency of the virtual characters. The following section contains a summary of these themes from this item, full participant comments with coding can be found in Appendix E.

Table 11- Themes of ITC SOPI Free Response Section

Theme	**Number of Participants who Mentioned the Theme**
Responsiveness	30
Engagement	22
Authenticity of the system	17
Technology improvements	11
Source of virtual character agency	10

For the theme of responsiveness, approximately 44% of participants who wrote additional comments mentioned that they were surprised or impressed by how the simulation responded to what they said:

Participant 10: “I was really surprised when Tina called out my name, then I realized this was a bit more personal than past experiences.”

Participant 12: “The audio capture and recognition was amazing graphics were lacking but the ability to have dynamic conversations and responses that mostly felt unique was astounding.”

Participant 51: “It was really cool how the characters responded specifically to what I said and waited for some of my responses. For example, when Dylan asked what we wanted to drink, I hesitated and he said, ‘well [name of participant removed]. Do you want a drink?’ That was pretty interesting.”

In terms of speaking about engagement in the system, approximately 32% of respondents expressed that they enjoyed the experience:

Participant 8: “I really enjoyed participating.”

Participant 9: “A very good simulation. I felt that it was responsive to most of my vocalizations and to other sounds (like laughter) that indicated my response. Better graphics might increase the sense of realism, but overall I was drawn in and enjoyed the experience.”

Participant 139: “I really would have liked the experience to continue and have a chance to test a different scenario.”

Although there were also counter-examples of participants who felt that the simulated environment was not engaging:

Participant 91: “I was greatly impressed by the character’s ability to respond and interact to me. However, I didn’t like the situation and didn’t really get too absorbed.”

Approximately 25% of respondents commented on the authenticity of the system. Most of the comments about authenticity cited the verbal behavior of the characters or the environment of the simulation:

Participant 29: "Very cool. Felt like a real world experience."

Participant 34: "Playing was very interactive & felt natural, as if it were actual life."

Participant 54: "Conversations felt very natural like speaking to an actual person and not a virtual character. I enjoyed it and seeing each character's personality respond accurately to mine."

However, as a counter-example, approximately 9% mentioned aspects of the simulation that made it feel less realistic or authentic. Many of these comments suggested the unrealistic visual modeling of the characters contributed to a less realistic experience:

Participant 20: "The environment seemed realistic but the characters also seemed less realistic due to graphic illustration and some facial movements when talking."

Participant 80: "Overall this was an interesting experience. At first the characters seemed just like cartoons on a monitor but it was easy to interact with them as if in a real life situation."

Continuing to look at system technology, approximately 16% of respondents mentioned an aspect of the technology that could be improved to provide a better experience. The most common improvement cited was improving the graphics of the system:

Participant 63: "I felt immersed in a somewhat real world, only thing that held me back a little was the models for objects and characters, but besides that I was honestly amazed and I would honestly like to see this implemented in a game."

Participant 107: “The experience was really enjoyable. I know its a beta but I would like the graphic to be a little better. Overall, I loved the interaction. I had a pretty interesting conversation with the computer.”

Finally, approximately 15% of participants commented on the source of agency for the behavior of the virtual characters. Since it was not disclosed to participants prior to the study that the virtual characters were human-operated, some people expressed their suspicion that a human was controlling the system:

Participant 6: “My initial assumption was that this game may have been established with a set of algorithms and that the characters would speak based upon hearing or seeing specific command words. However, when Tina spoke about Volleyball and the Jazz Band, along with her timing with speech, I felt as if another person was simply participating from a neighboring computer. Reminds me of the game FACADE. It’s free for download.”

Participant 16: “I had trouble deciding whether or not the characters were AI or actual people.”

Participant 90: “Assuming that all audio was prerecorded, I was blown away when it responded to my Colorado statement, very impressive. For a video game, not the most entertaining but for some sort of A.I. it was quite unbelievable.”

On the other hand, there were counter-examples of participants who were convinced that the simulation was computer controlled:

Participant 14: “The girl was too obviously a response to my input (saying she did PR after I said I did PR). It was not another character I was interacting with, but a computer of course, but it didn’t feel ‘human.”

Character Perception Questionnaires

After completing the ITC sense of presence questionnaire, participants were asked to complete character perception questionnaires on their buddy character, named Tina or Adrian, as well as on the antagonist character in the simulation, named Dylan. This questionnaire had 9 items for each character for a total of 18 items as well as two free response sections asking the participant to explain their item choices. The nine items asked the participant to rate the character on nine personality characteristics:

- attractiveness,
- intelligence,
- friendliness,
- capableness,
- extroversion,
- kindness,
- strength,
- likeableness, and
- aggressiveness.

Statistical analysis of the questionnaire items using Pearson correlations revealed that the items for friendliness, kindness, and likeableness were highly correlated ($r > .5$) across all three characters and seemed to be measuring the same quality. Thus, these three items were combined using mean scores into a new amiableness item. Additionally, exploration of data distribution using histograms and Shapiro-Wilks tests revealed that responses across all three characters were not normally distributed, with certain items being strongly positively or negatively skewed. However, distributions were similarly shaped across research groups. Thus, Kruskal-Wallis non-parametric tests were used to analyze the questionnaire data since it does not require an assumption of normally distributed responses. The following section breaks the character perception questionnaires into three sections, analyzed separately per virtual character since

different subsets of the study population answered these sections based upon the research group that they were in.

Tina Character Perception Questionnaire

The Tina character perception questionnaire was given to approximately 46% of the study sample, the 66 participants who experienced Tina as a buddy character. The other 54% (79 participants) had Adrian as a buddy character. Each participant only experienced one of the two possible buddy characters; thus, this analysis applies only to the 66 participants who experienced Tina as a buddy character.

In further exploring questionnaire items for the character perception questionnaire for Tina, additional correlations emerged that were not present for the two male characters Adrian and Dylan. Analysis using Pearson correlations revealed additional strong correlations ($r > .5$) for the strength, extroversion, and aggressiveness items. Since it was unclear whether these items were measuring the same quality and since the same correlations did not appear in the questionnaires for Adrian or Dylan, these scores were not combined. Instead, the strength and extroversion items were removed from analysis for Tina and the aggressiveness item was kept.

Differences Between Participants with Effective or Ineffective Tina

To determine if there were any differences between participants who experienced the effective version of Tina versus participants who experienced the ineffective version of Tina, a Kruskal-Wallis test was run. There were no statistically significant differences in how participants rated Tina's attractiveness or amiability based on Tina's effectiveness condition; however, statistically significant differences were found in Tina's intelligence, capableness, and aggressiveness rating as can be seen in Figure 5.

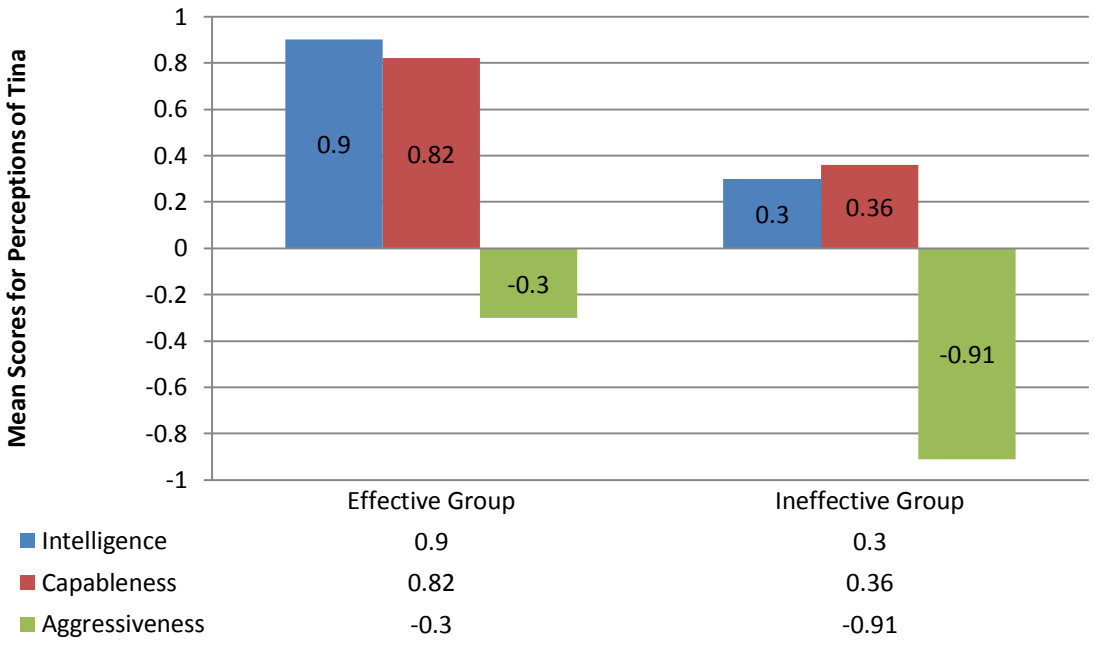


Figure 5 - Differences Between Effective Buddy and Ineffective Buddy Research Groups in Perceptions of Tina

The scores for Tina's intelligence rating were statistically significantly different between research groups $\chi^2(1) = 16.358$, $p < .001$. Participants who experienced effective Tina rated Tina as more intelligent than participants who experienced ineffective Tina. The scores for Tina's capableness rating were statistically significantly different between research groups $\chi^2(1) = 7.497$, $p = .006$. Participants who experienced effective Tina rated Tina as more capable than participants who experienced ineffective Tina. The scores for Tina's aggressiveness rating were statistically significantly different between research groups $\chi^2(1) = 20.984$, $p < .001$. Participants who experienced effective Tina rated Tina less passive than participants who experienced ineffective Tina.

Differences Between Male and Female Participants who had Tina as a Buddy

To further explore research question 2 and examine if there were any differences in character perception ratings between female participants who had Tina as a buddy (same gender) and male participants who had Tina as a buddy (opposite gender) an additional Kruskal-Wallis test was run. This test revealed no statistically significant differences between male and female participants in terms of rating Tina's attractiveness, intelligence, capableness, aggressiveness, or amiability.

Qualitative Analysis of Free Response to Tina

After the initial rating items for Tina, the character perception questionnaire had a free response section where participants were asked to describe why they felt the way they did about Tina. The following section summarizes characteristics associated with Tina in this item, which can be reviewed in Table 12. Full participant comments with coding notes can be found in Appendix F.

Table 12 - Most Common Characteristics Ascribed to Tina

Theme	**Number of Participants who Mentioned the Theme**	**Percentage of Participants who Mentioned the Theme**
Friendship	26	39%
Nice	13	20%
Passive	9	14%
Shy	8	12%
Outgoing	7	11%
Likeable	7	11%

The most common characteristics that were mentioned in this item by participants who had Tina as a buddy included: friend or friendship, nice, passive, shy, outgoing, and likeable. However, to further explore research question 1 and see how effective and ineffective character designs for Tina affected perceptions of Tina, two additional combined categories of effective characteristics and ineffective characteristics were created. For effective characteristics, the following codes were combined into one combined score:

- Capable,
- Competent,
- Confident,
- Direct,
- Independent,
- Mature,
- Outgoing,
- Smart,
- Stood up for me,
- Strong, and
- Supportive.

The combined score for these characteristics was 31 instances of these codes appearing in this item describing Tina. For ineffective characteristics, the following codes were combined into one combined score:

- Awkward,
- Depended on me,
- Didn't stand up for me,
- Introverted,
- Isolated,
- Passive,
- Quiet around Dylan,
- Shy,
- Low status speech,
- Stupid,
- Timid,
- Vulnerable,
- Let others control, and
- Went along.

The combined score for these characteristics was 51 instances of these codes appearing in this item describing Tina. Considering that half of the participants who had Tina as a buddy had effective Tina and half had ineffective Tina, one would expect effective and ineffective characteristics to be approximately equal; however, as seen in Figure 6 there were more instances of ineffective characteristics associated with Tina than effective characteristics.

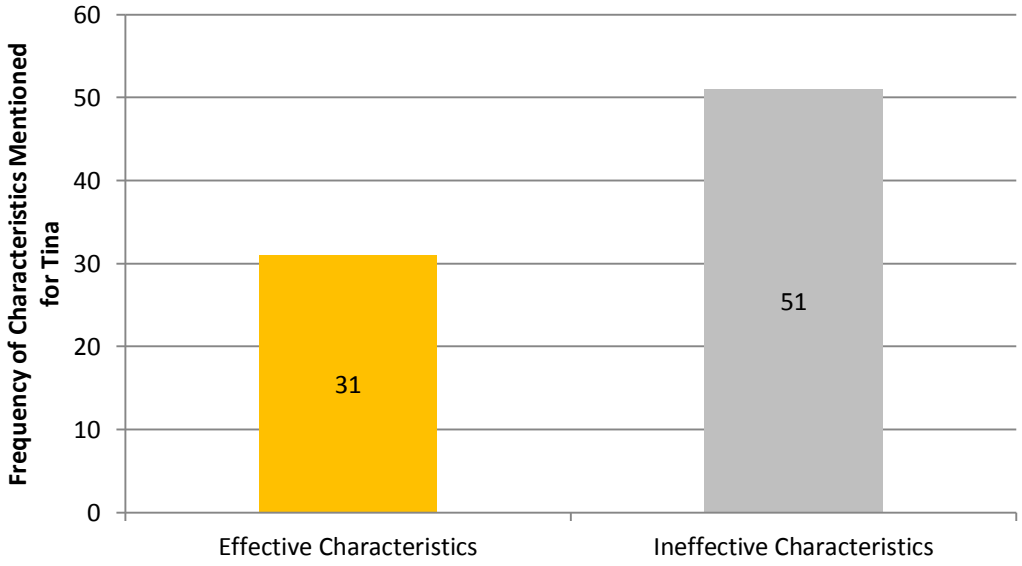


Figure 6- Effective and Ineffective Characteristic Frequencies for Tina

Adrian Character Perception Questionnaire

The Adrian character perception questionnaire was given to approximately 54% of the study sample, the 79 participants who experienced Adrian as a buddy character. The other 46% (66 participants) had Tina as a buddy character. Each participant only experienced one of the two possible buddy characters; thus, this analysis applies only to the 79 participants who experienced Adrian as a buddy character.

Differences Between Participants who Experienced Effective versus Ineffective Adrian

To explore research question 1 and determine if there were any differences in character perception between participants who had effective Adrian and a buddy and participants who had ineffective Adrian as a buddy, an additional Kruskal-Wallis test was run. No statistically significant differences were found in terms of ratings for Adrian's attractiveness, intelligence, capableness, or amiableness; however, statistically significant differences were found for Adrian's extroversion, strength, and aggressiveness scores as can be seen in Figure 7.

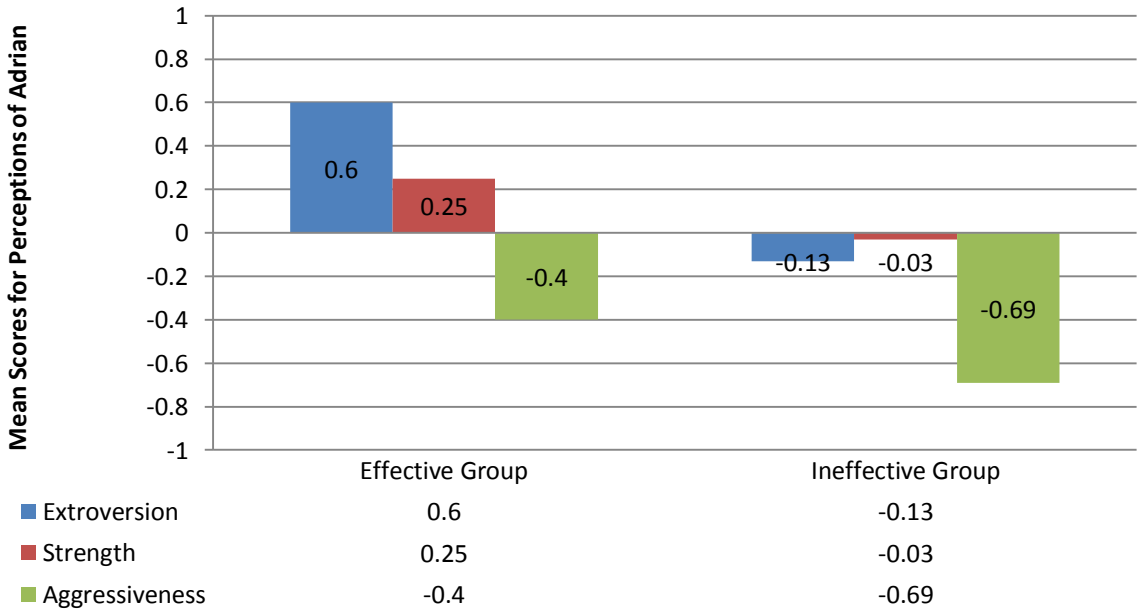


Figure 7- Differences Between Effective Buddy and Ineffective Buddy Research Groups in Perceptions of Adrian

The scores for Adrian's extroversion rating were statistically significantly different between research groups $\chi^2(1) = 15.145$, $p < .001$. Participants who experienced effective Adrian tended to rate Adrian as more outgoing than participants who experienced ineffective Adrian. The scores for Adrian's strength rating were statistically significantly different between research

groups $\chi^2(1) = 4.861$, $p = .027$. Participants who experienced effective Adrian tended to rate Adrian as stronger than participants who experienced ineffective Adrian. The scores for Adrian's aggressiveness rating were statistically significantly different between research groups $\chi^2(1) = 5.917$, $p = .015$. Participants who experienced ineffective Adrian tended to rate Adrian as more passive than participants who experienced effective Adrian.

Differences Between Male and Female Participants who had Adrian as a Buddy

To explore research question 2 and examine if there were any differences in character perception ratings between male participants who had Adrian as a buddy (same gender) and female participants who had Adrian as a buddy (opposite gender) an additional Kruskal-Wallis test was run. No statistically significant differences between male and female participants who had Adrian as a buddy were found in terms of ratings for Adrian's extroversion, intelligence, capableness, strength, aggressiveness, or amiableness; however, a statistically significant difference was found in Adrian's attractiveness rating.

The scores for Adrian's attractiveness rating were statistically significantly different between research groups $\chi^2(1) = 6.769$, $p = .009$. As seen in Figure 8, female participants who had Adrian as a buddy tended to rate Adrian as more attractive than male participants who had Adrian as a buddy.

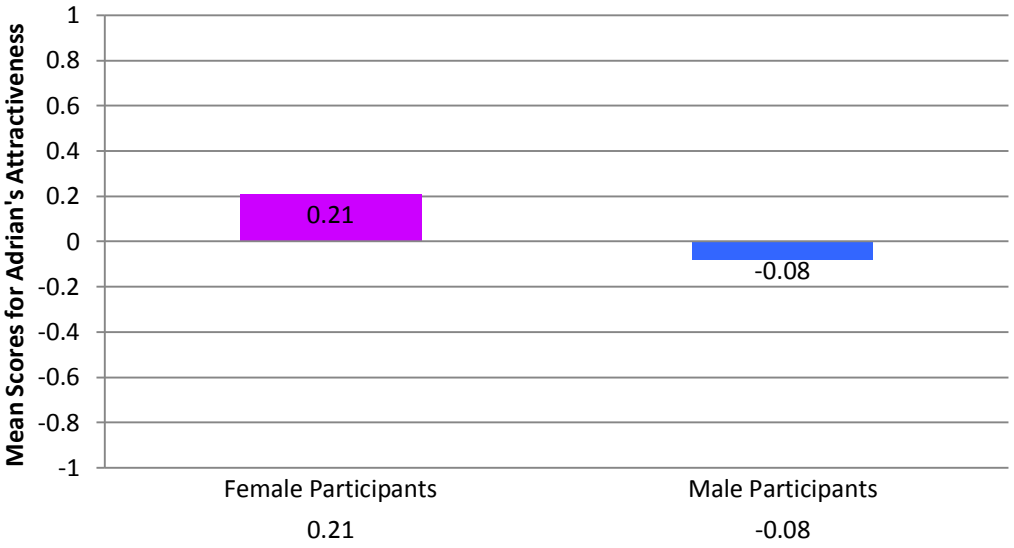


Figure 8 - Differences Between Female and Male Participants in Perceptions of Adrian's Attractiveness

Qualitative Analysis of Free Response to Adrian

After the initial rating items for Adrian, the character perception questionnaire had a free response section where participants were asked to describe why they felt the way they did about Adrian. The following section summarizes characteristics associated with Adrian in this item, the most common of which can be found in Table 13. Full participant comments with coding notes can be found in Appendix G.

Table 13 - Most Common Characteristics Ascribed to Adrian

Theme	Number of Participants who Mentioned the Theme	Percentage of Participants who Mentioned the Theme
Friendship	20	25%
Nice	20	25%
Conversational ability	19	24%
Relaxed / Laid Back	14	18%
Stood up for someone	10	13%
Passive	9	11%

The most common characteristics for Adrian that were mentioned in this item included: Friend or friendship, Niceness, Adrian's conversational ability, Relaxed or laid back, Stood up for someone, and Passive. Note that the percentages in Table 13 only apply to participants who had Adrian as a buddy in the scenario. In order to further explore research question 1 and see how effective and ineffective character designs for Adrian affected perceptions of Adrian, two additional combined categories of effective characteristics and ineffective characteristics were created. For effective characteristics, the following codes were combined into one combined score:

- Conversational ability,
- Outgoing,
- Relaxed or laid back,
- Smart,
- Social,
- Stood up for someone,
- Strong, and
- Supportive.

The combined score for these characteristics was 57 instances of these codes appearing in this item describing Adrian. For ineffective characteristics, the following codes were combined into one combined score:

- Awkward,
- Didn't stand up for himself,
- Non-responsive,
- Outsider,
- Passive,
- Quiet,
- Reserved,
- Sad,
- Shy,
- Timid,
- Unsure, and
- Weak.

The combined score for these characteristics was 33 instances of these codes appearing in this item describing Adrian. Considering that half of the participants who had Adrian as a buddy had effective Adrian and half had ineffective Adrian, one would expect effective and ineffective characteristics to be approximately equal; however, as seen in Figure 9, there were more instances of effective characteristics associated with Adrian than ineffective characteristics.

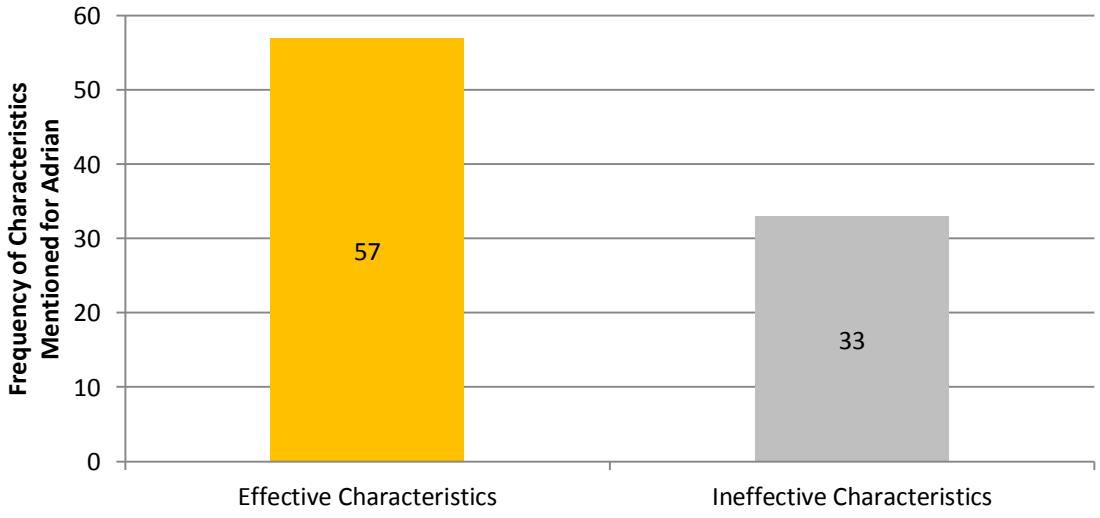


Figure 9 – Effective and Ineffective Characteristic Frequencies for Adrian

Dylan Character Perception Questionnaire

Unlike Tina and Adrian, all participants experienced Dylan since he was the antagonistic character in the simulation. Thus, all 145 participants in the study were given the Dylan character perception questionnaire and this analysis includes the full study sample.

Differences Between Participants who has an Effective versus an Ineffective Buddy

To explore research question 1 and determine if there were any differences in character perception of Dylan between participants who had an effective buddy versus an ineffective buddy, an additional Kruskal-Wallis test was run. No statistically significant differences were found between participants who had an effective versus ineffective buddy in terms of ratings for Dylan's attractiveness, intelligence, capableness, extroversion, strength, or aggressiveness; however, as seen in Figure 10, a statistically significant difference was found in Dylan's amiability score.

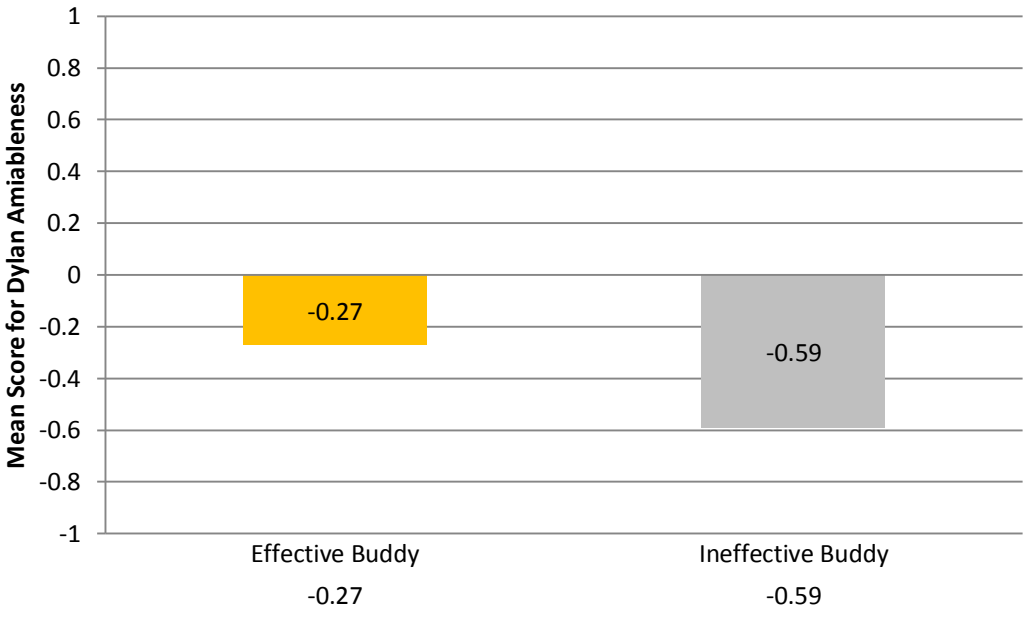


Figure 10 - Differences Between Effective Buddy and Ineffective Buddy Research Groups in Perceptions of Dylan's Amiableness

The scores for Dylan's amiableness rating were statistically significantly different participants who had an effective versus an ineffective buddy character, $\chi^2(1) = 10.89$, $p = .001$ Participants with effective buddies tended to rate Dylan's amiability higher than participants with ineffective buddies.

Differences Between Participants who had a Same Gender Buddy versus an Opposite Gender Buddy

To explore research question 2 and determine if there were any differences in character perception of Dylan among participants who had a same gender buddy versus participants who had an opposite gender buddy, another Kruskal-Wallis test was run. No statistically significant differences were found in any of Dylan's character perception rating between participants who had a same gender buddy versus participants who had an opposite gender buddy.

Differences Between Male and Female Participants in Dylan Character Perceptions

Since the Dylan character perception questionnaire was given to all participants whether they had Tina or Adrian as a buddy, and since the research groups were divided based on buddy character gender, there is not a natural split between participants of different genders as is seen with the Tina and Adrian character questionnaires. Thus, to explore participant gender differences in the Dylan character perception questionnaire, an additional Kruskal-Wallis test was run to see if male and female participants rated Dylan differently. No statistically significant differences were found between male and female participants in terms of rating Dylan's intelligence, capableness, extroversion, strength, aggressiveness, or amiability; however, a statistically significant difference was found in Dylan's attractiveness rating as can be seen in Figure 11.

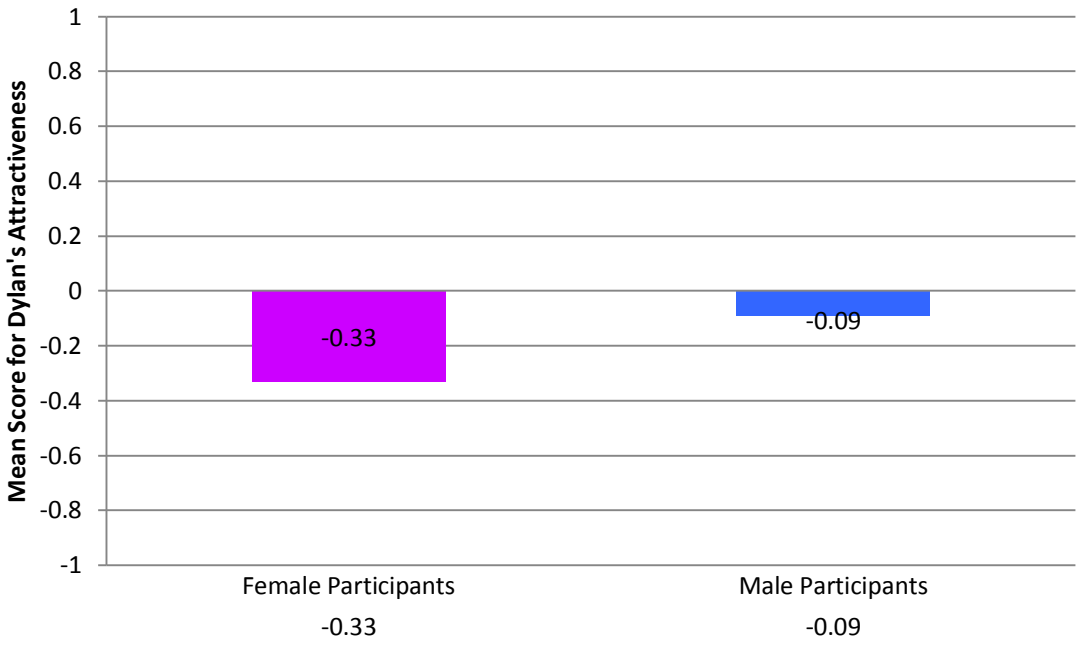


Figure 11 - Differences Between Female and Male Participants in Perceptions of Dylan's Attractiveness.

The scores for Dylan's attractiveness rating were statistically significantly different between research groups $\chi^2(1) = 7.046$, $p = .008$. Female participants tended to rate Dylan as less attractive than male participants.

Qualitative Analysis of Free Response to Dylan

After the initial rating items for Dylan, the character perception questionnaire had a free response section where participants were asked to describe why they felt the way they did about Dylan. The following section summarizes characteristics associated with Dylan in this item the most common of which can be found in Table 14. Full participant comments with coding notes can be found in Appendix H.

Table 14 - Most Common Characteristics Ascribed to Dylan

Theme	Number of Participants who Mentioned the Theme	Participants who Mentioned the Theme
Pressuring participants to drink	58	40%
Aggressive	33	23%
Insulting	29	20%
Rude	26	18%
Dislike for Dylan	22	15%
Mean	22	15%
Drunk	18	12%
Outgoing	17	12%
Friendly	14	10%

The most common characteristics mentioned for Dylan in this item included: pressuring participants to drink, aggressive, insulting, rude, dislike for Dylan, mean, drunk, outgoing, and friendly. Additionally, 42 participants (29%) mentioned their buddy (Tina or Adrian) as part of their reasoning for how they felt about Dylan. Considering that Dylan was a consistent character across all research groups and designed to be the antagonist, it is interesting that both positive and negative descriptors emerged in this item as seen in Figure 12.

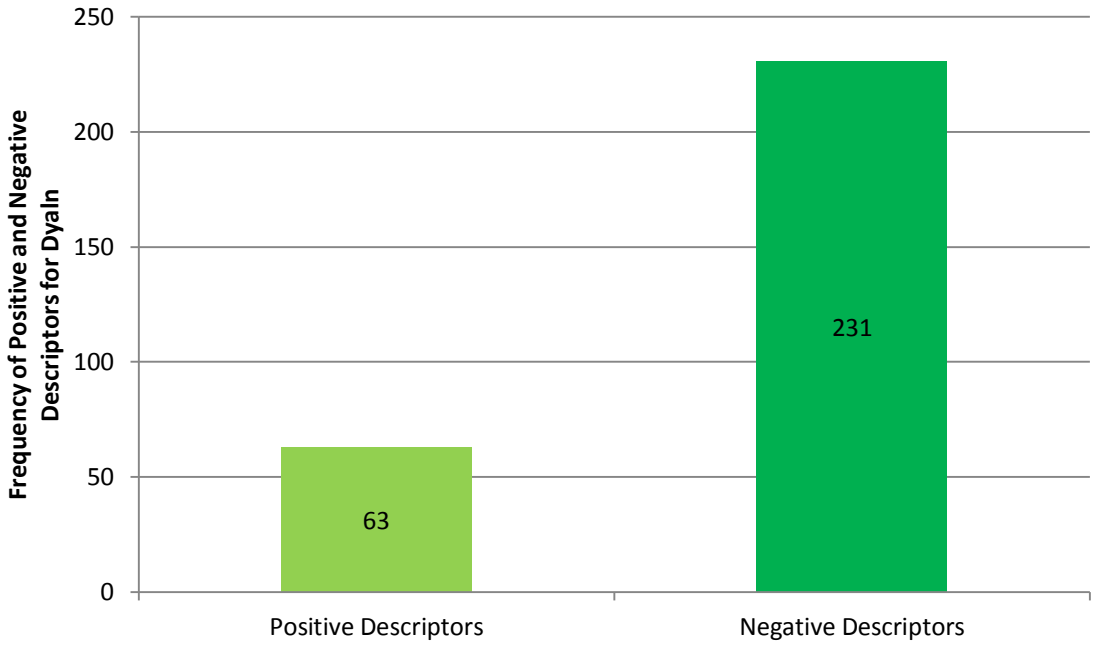


Figure 12 - Frequency of Positive and Negative Descriptors for Dylan

Generally positive and generally negative characteristic descriptions were combined to compare the frequency of positive versus negative descriptors for Dylan. Negative descriptors including:

- Aggressive,
- Angry,
- Arrogant,
- Bad host,
- Blows you off,
- Bossy,
- Braggart,
- Confrontational,
- Defensive,
- Dislike,
- Disapproval,
- Douche,
- Hostile,
- Immature,
- Incapable,
- Inconsiderate,

- Insulting,
- Jerk,
- Judgmental,
- Mean,
- Misogynistic,
- Obnoxious,
- Rude,
- Stupid,
- Tool,
- Unattractive,
- Uncaring,
- Unfriendly,
- Weak, and
- Weird

were combined into one score of 231 instances of negative character descriptors. Positive descriptors including:

- Capable,
- Decent,
- Friendly,
- Fun,
- Funny,
- Good host,
- Likeable,
- Nice,
- Outgoing,
- Smart, and
- Strong

were also combined into one score of 63 instances of positive character descriptors.

Researcher Observation Analysis

In order to measure whether buddy character design affected participant behavior in the simulation, simulation sessions were video recorded and coded for frequencies of verbal behavior that may indicate active engagement with the antagonist. The measures used were: a) the frequency of times the participant interrupted one of the virtual characters, b) how many statements the participant made to the antagonist character, and c) during the two scripted

pressure points, whether the participant responded first or waited for the buddy character to respond to the antagonist. Additionally, statements that participants made about their buddy character, about the antagonist, or that implied a defensive or protective statement towards the buddy character were transcribed for qualitative analysis.

Quantitative Analysis of Participant Verbal Behavior Frequency

Examining the distribution of participant responses, A Shapiro-Wilk test revealed a significant violation of the assumption of normality for all research groups on the interruption frequency score and the first responses to scripted pressure points score ($p<.001$). The statements to the antagonist score was also non-normally distributed in the opposite gender effective ($p=.007$) and the opposite gender ineffective ($p=.040$) groups. When examining different groupings of participant responses including effective buddy versus ineffective buddy groups and same gender buddy versus opposite gender buddy groups, non-normality remained an issue. A Shapiro-Wilk test revealed a significant violation of the assumption of normality for both effective buddy and ineffective buddy research groups on the interruption frequency score and the first responses to scripted pressure points score ($p<.001$). The statements to the antagonist score was also non-normally distributed in the effective buddy group ($p=.003$). Furthermore, a Shapiro-Wilk test revealed a significant violation of the assumption of normality for both same gender buddy and opposite gender buddy research groups on the interruption frequency score and the first responses to scripted pressure points score ($p<.001$). The statements to the antagonist score was also non-normally distributed in both the same gender buddy group ($p=.044$) and in the opposite gender buddy group ($p=.012$). Thus, a Kruskal-Wallis test was chosen to examine differences in verbal behavior between different research groups.

Differences in Observed Verbal Behavior Between Participants who had an Effective versus Ineffective Buddy Character

To explore research question 1 and determine if there were any differences between participants who had an effective buddy character versus participants who had an ineffective buddy character, another Kruskal-Wallis test was run. No statistically significant differences were found in interruption frequency between effective buddy and ineffective buddy research groups; however, statistically significant differences were found in frequency of statements to the antagonist and first response to scripted pressure points as can be seen in Figure 13.

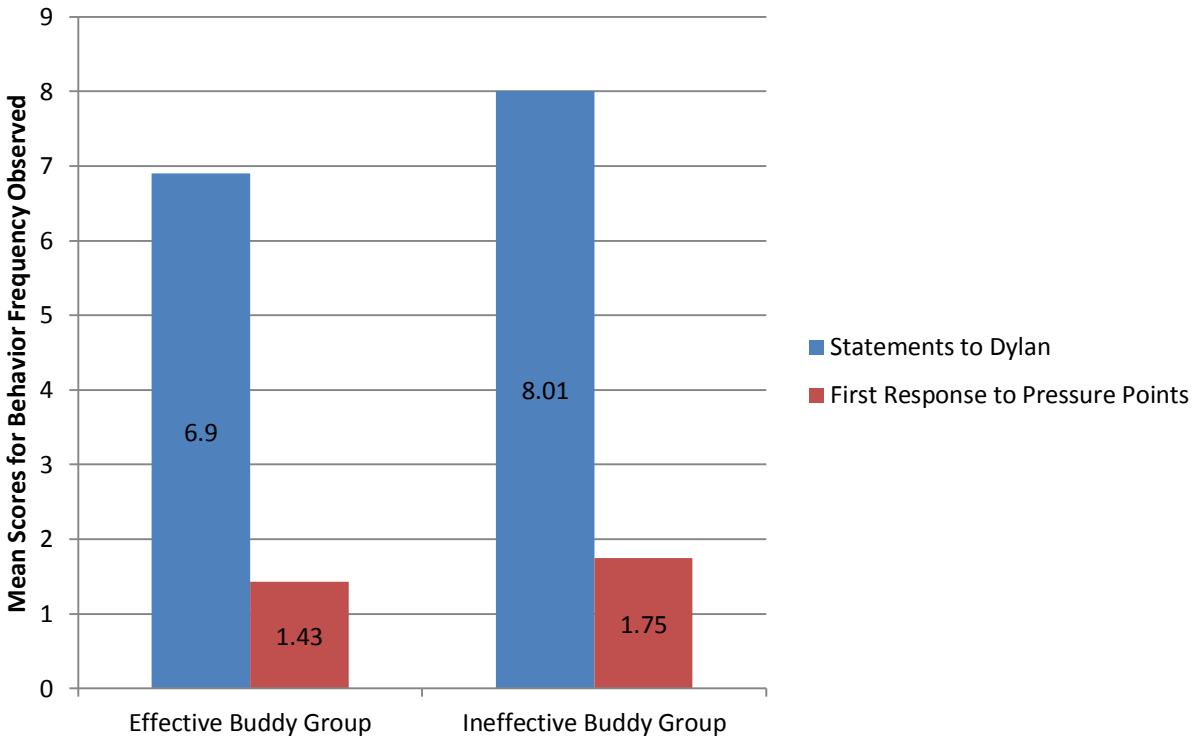


Figure 13 - Differences Between Effective Buddy and Ineffective Buddy Groups in Observed Verbal Behavior

The score for the frequency of statements to the antagonist was statistically significantly different between research groups $\chi^2(1) = 12.619$, $p < .001$. Participants who had an ineffective

buddy tended to make more statements to the antagonist than participants who had an effective buddy character. The score for the first response to scripted pressure points was statistically significantly different between research groups $\chi^2(1) = 9.434$, $p = .002$. Participants who had an ineffective buddy tended to respond first to pressure points more frequently than participants who had an effective buddy.

Differences in Observed Verbal Behavior Between Participants who had a Same Gender Buddy versus an Opposite Gender Buddy

To determine if there were any differences between participants who had a same gender buddy versus participants who had an opposite gender buddy, an additional Kruskal-Wallis test was run. No statistically significant differences were found in interruption frequency, frequency of statements to the antagonist, or first response to scripted pressure points between participants who had a same gender buddy and participants who had an opposite gender buddy.

Qualitative Analysis of Participant Verbal Behavior

After the completion of simulation sessions, video recordings of the sessions were reviewed and any verbal statements the participant made about: a) his or her buddy character, b) Dylan, the antagonist, or c) implying a protective behavior towards the buddy were transcribed and then analyzed for themes using coding procedures (Glesne, 2011). The thematic analysis is summarized in the section below. Full transcripts of these participant statements with associated coding can be found in Appendix I.

Thematic Analysis of statements about the Buddy

Out of 145 participants, 16 participants, 11% made statements that indicated how they felt about the buddy character, either Tina or Adrian, during the session. As seen in Table 15, the

most common theme for these statements was an affirmation of the buddy character's choice not to drink with statements such as:

Participant 101: "I think it's smart not to drink at parties…"

Participant 110: "That was responsible of you."

Participant 117: "I think you're cool for not drinking."

There was also a theme of affirming partnership in the situation evidenced by statements such as:

Participant 61: "Glad you didn't have to deal with him by yourself."

Participant 139: "I'm not [cool] either, so it's OK."

Table 15 - Themes of Statements about the Buddy Character

Theme	**Number of Participants who Mentioned the Theme**	**Percentage of Responding Participants who Mentioned the Theme**
Affirmation of the buddy character's choice not to drink	5	31%
Affirmation of partnership	4	25%

Thematic Analysis of statements about the Antagonist Dylan

Out of 145 participants, 66 (46%) made statements that indicated how they felt about the antagonist character, Dylan. Common themes that appeared in these statements are listed in Table 16.

Table 16 - Themes of Statements about Dylan

Theme	Number of Participants who Mentioned the Theme	Percentage of Responding Participants who Mentioned the Theme
Negative characterization of Dylan	27	41%
Dylan being drunk	9	14%
Sarcastic attribution of a positive characteristic	8	12%
Defense of Dylan's behavior	5	8%

Even though in the simulation Dylan was not shown with a drink or said he had had anything to drink, some explained Dylan's behavior as a result of being drunk:

Participant 15: "I think he's had a few too many drinks."

Participant 45: "Some people change when they're a little drunk. Maybe he's trying to have fun."

Participant 79: "He IS throwing a party, and I'm pretty sure he's drunk. You have to expect stupidity."

Another common theme was to express negative opinions of Dylan such as calling him rude, a jerk, mean, a tool, or a douche. Additionally, some participants associated Dylan with a positive characteristic, but in a sarcastic tone that implied they meant the opposite of what they said:

Participant 41: "What a charmer."

Participant 61: "Nice guy."

Participant 103: "So he's so friendly."

As a counter example, some participants did try to defend Dylan. For example, some participants implied that perhaps Dylan usually behaves differently:

Participant 14: "He's probably just a nervous host."

Participant 48: "Maybe he's not like that all the time."

Participant 60: "Maybe he's different in his outside element."

Of the five participants who defended Dylan, three were 21 years of age or older, four of them were men, and all had Tina as their buddy character.

Thematic Analysis of Protective Behaviors toward the Buddy

Of 145 participants, 50 (34%) exhibited a verbal protective behavior toward the buddy character. As seen in Table 17, five themes emerged in these verbal protective behaviors which included: stating the unacceptable behavior, aggression, asserting personal choice, sending the antagonist away, and avoiding drinking and driving.

Table 17 - Protective Behavior Themes

Theme	**Number of Participants who Mentioned the Theme**	**Percentage of Responding Participants who Mentioned the Theme**
Telling Dylan his behavior is inappropriate	12	24%
Aggression towards Dylan	7	14%
Asserting the personal choice of the buddy character	7	14%
Avoidance of further confrontation	7	14%
Drinking and Driving	5	10%

Most commonly, participants responded to the antagonist's insult of the buddy character by telling Dylan how his behavior was inappropriate. Descriptors for how his behavior was inappropriate included: mean, rude, harsh and hostile. Some participants responded to the antagonist with aggression:

Participant 11: "Hey don't talk to my friend like that. How 'bout YOU shut up?"

Participant 18: "Why you gotta be such a jerk?...Screw you. You wanna fight?"

Participant 119: "Douche! Totally just called you a douche. Bye, douche!"

Other participants responded to the antagonist's insult of the buddy by asserting the personal choice of the buddy:

Participant 3: "She can just drink what she wants, I mean is it that big a deal."

Participant 45: "Hey man, you gotta respect people's opinions, y'know if she don't wanna beer that's alright."

Some participants attempted to avoid further confrontation between the antagonist and the buddy by trying to get the antagonist to leave:

Participant 16: "Guess you should go be a good host somewhere else."

Participant 19: "C'mon man, get the diet coke!...My friend's waiting, man, hurry up."

Participant 99: "Just go get my Yuengling."

Additionally, participants appealed to the logic of avoiding drinking and driving to diffuse the conflict between the antagonist and the buddy:

Participant 110: "He shouldn't drink if he's going to drive."

Participant 125: "He has to drive, it's the smarter option not to drink anything."

Summary

To review, in order to explore how incorporating the interactive performance technique of an ineffective buddy in a social simulation influenced the emotional experiences of participants, as well as to explore how gender differences in virtual characters may influence and interact with that experience, multiple forms of questionnaire and observational data were gathered during a virtual simulation. The simulation represented a college house party and the social challenges related to negotiating alcohol consumption and protective behaviors with peers. For a sample of 145 university freshmen participants, some differences in emotional experience and verbal behavior during the simulation were found between participants who had an effective or ineffective virtual buddy as well as participants who had a same gendered versus opposite gendered buddy.

For research question 1 that explored the difference in emotional experience of a participant when he or she interacted with an ineffective buddy character versus an effective buddy character in a social simulation, the character perception questionnaires revealed differences between participants who interacted with effective versus ineffective buddies in terms of aggressiveness ratings, extroversion ratings, and intelligence ratings. For Dylan, the antagonist, participants who had an effective buddy (Tina or Adrian) rated Dylan as more amiable than participants who had an ineffective buddy. Additionally, researcher observations of participant verbal behavior revealed that participants who had an effective buddy were less verbally active during the simulation than participants who had an ineffective buddy.

For research question 2 that explored the difference in emotional experience of a participant when he or she interacted with a same-gendered buddy character versus an opposite-gendered buddy character in a social simulation, the ITC sense of presence questionnaire

revealed that participants who had an opposite gender buddy rated the ecological validity of the system higher than participants who had a same gender buddy. Additionally, the character perception questionnaire revealed that for the male characters, there was a difference in attractiveness ratings for the character based on participant gender. Also, in the open ended participant response items, participants tended to describe the female buddy character (Tina) as more ineffective than the male buddy character (Adrian) even though the effective and ineffective conditions were equally divided for both groups.

CHAPTER FIVE: DISCUSSION AND CONCLUSION

The purpose of this study was to explore how incorporating the interactive performance technique of an ineffective buddy in a social simulation influenced the emotional experiences of participants as well as to explore how gender differences in virtual characters may influence and interact with that experience. Thus, the following research questions guided this study:

1. What is the difference in emotional experience of participants when they interact with an ineffective buddy character versus an effective buddy character in a social simulation?
2. What is the difference in emotional experience of participants when they interact with a same-gendered buddy character versus an opposite-gendered buddy character in a social simulation?

Findings from this study can inform future efforts to design and explore the effects of virtual buddy characters on users of interactive learning systems. This study provides a comparative analysis of effective versus ineffective virtual buddy characters that is currently lacking in the literature. Yet, it builds on past virtual character research such as the virtual character mimicry studied by Bailenson and Yee (2005) as well past research on emotional response to virtual characters (Burleson & Picard, 2007; Gillies, Pan, & Slater, 2010; Moreno & Flowerday, 2006; Pan, Gillies, & Slater, 2008; Pan, Gillies, Barker, Clark, & Slater, 2012). Furthermore, this study helps inform practitioners and researchers whether elements of interactive performance theory may warrant further investigation as components of a model for developing virtual characters.

For this study the sample size was 145 first year university students at the University of Central Florida. The sample was composed of approximately even groups based on gender with 75 students identifying themselves as female (51.7%) and 70 students identifying themselves as male (48.3%). The majority of participants were also between the ages of 18 and 20 (95.9%) with only 6 participants (4.1%) aged 21 or older.

Each participant experienced a simulated scenario where they conversed with a virtual buddy character and then were offered an alcoholic drink by a different antagonistic virtual character. The scenarios lasted approximately five minutes. Heart rate and GSR data were collected throughout the experience. Following the experience, the participant was asked to fill out the ITC sense of presence inventory questionnaire as well as a questionnaire regarding their perceptions of and emotional response to the virtual characters. The physiological data as well as responses from the questionnaires were analyzed across research participant groups to see if there were any differences between participants who had an effective versus an ineffective buddy and between participants who had a same gender versus an opposite gender buddy. Video recordings of the sessions were also analyzed for differences in terms of verbal behavior such as frequency of verbal statements made to the antagonist character and responses to scripted pressure points. Qualitatively, open ended written responses on the questionnaires as well as transcribed participant statements regarding the buddy and antagonist characters were analyzed for themes.

Overall, no clear differences in emotional response or engagement emerged between the groups in physiological or questionnaire data; however, some differences were found between the groups of participants in terms of perceptions of the virtual characters as well as verbal activity during the simulation. Compared to participants who had ineffective buddies,

participants who had an effective buddy tended to: a) rate Tina higher in intelligence, capableness, and aggressiveness, b) rate Adrian higher in extroversion, strength, and aggressiveness, c) rate Dylan as more amiable, d) make fewer statements to Dylan during the session, and e) respond first to pressure points less frequently. In terms of buddy gender, compared to participants who had a same gender buddy, participants with an opposite gender buddy tended to rate the ecological validity of the simulation higher. Additionally, female participants tended to rate Adrian as more attractive and Dylan as less attractive than male participants rated Adrian and Dylan.

Discussion of Research Question 1

1. What is the difference in emotional experience of participants when they interact with an ineffective buddy character versus an effective buddy character in a social simulation?

Character Perceptions

As supported by the research design of this study, differences in character perceptions emerged between participants who had an effective buddy and participants who had an ineffective buddy. Effective buddies were perceived as more aggressive, extroverted, and strong than ineffective buddies. Perceptions of the friendliness and attractiveness of the virtual characters were not affected by having an effective or ineffective buddy. This finding suggests that the performance goals of the study design were met in that the human beings controlling the virtual buddy characters were able to accurately portray different levels of character effectiveness between groups while maintaining the affiliative goals of the buddy character.

There was an interesting finding in differences in character perceptions between participants who had an effective versus an ineffective buddy character when participants rated their perceptions of Dylan, the antagonist. Participants who had an effective buddy character rated Dylan as statistically significantly more likable than participants who had an ineffective buddy character. Since the goal of the antagonist was to be unlikeable, the ineffective buddy character was more effective in supporting this goal. This finding supports the hypothesis of Interactive Performance Theory that having an ineffective buddy character strengthens the role of the antagonist (Wirth, 2012). Applied to future virtual character simulation projects, this finding suggests that in simulations where an antagonist is designed to oppose the player, using an ineffective buddy character for the player rather than an effective buddy character may be a means of influencing the player to perceive the antagonist as more unlikeable and thus strengthening the player's position opposing the antagonist.

Researcher Observations

Interactive Performance Theory was further supported by the observational data of participant verbal behavior during the simulation. Interactive Performance Theory predicts that participants with an ineffective buddy will be more active in engaging simulated challenges than participants with an effective buddy (Wirth, 2012). In this study, participant activity engaging simulated challenges was measured through frequency of statements to the antagonist, initial responses to antagonist challenges, and instances of verbal interruption of a virtual character. No statistically significant differences were found in terms of instances of verbal interruption; however, statistically significant differences were found for both frequency of statements to the antagonist and initial responses to antagonist challenges. Participants who had an ineffective

buddy tended to make more statements to the antagonist character and tended to more frequently respond first to antagonist challenges rather than waiting for the buddy character to respond than did participants who had an effective buddy.

Discussion of Research Question 2

2. What is the difference in emotional experience of participants when they interact with a same-gendered buddy character versus an opposite-gendered buddy character in a social simulation?

ITC Sense of Presence Questionnaire

Participant ratings on the ITC sense of presence inventory contributed to findings of previous studies that examined gender differences in presence while interacting with virtual systems. Bracken's study found that women rated realism of a virtual environment higher than men (2005). Although similar to findings found, in Felnhofer and colleagues' study (2014), this study did not find a statistically significant difference in ecological validity scores, which incorporates a sense of realism, between male and female participants; there was a statistically significant difference between participants who had a virtual buddy character of the opposite gender versus participants who had a virtual buddy character of the same gender. Participants who interacted with an opposite gender virtual buddy character tended to rate the ecological validity of the system higher than participants who interacted with a same gender virtual buddy character, although the effect size was small, $F(1, 143) = 4.23$, $p = .041$; partial $\eta^2 = .029$. This finding may suggest that gender effects on sense of realism may be influenced not only by the gender of the participant, but also by the gender of surrounding characters in the virtual environment.

In terms of spatial presence, Felnhofer and colleagues found that male participants feel a higher level of spatial presence in virtual environments (Felnhofer, Kothgassner, Beutl, Hlavacs, & Kryspin-Exner, 2012; Felnhofer et al., 2014). This study, like Bracken's study (2005), failed to find any statistically significant differences in terms of ratings of spatial presence between male and female participants. Similarly, although past studies such as Bailenson et al. (2003) and Felnhofer et al. (2014) found statistically significant differences in engagement with female participants exhibiting more engagement than male participants in the virtual environment, this study, like Bracken's study (2005), did not find any statistically significant differences between male and female participants in terms of engagement.

As Felnhofer et al. note, the contradictory findings in many studies on the effects of gender on sense of presence is likely a result of the variety of measures used, the differences in virtual contexts, and the different stimuli for participant responses (2014, p. 273). Compared to the virtual environments used in many research studies, the CollegeLive system exhibits a very high level of verbal responsiveness to the participant, but a relatively low level of physical immersion in the environment compared to the virtual environments described in other research studies that use head mounted displays or cave systems. Additionally, the high level of interaction with the virtual buddy character may explain why buddy gender differences were found in this particular study. In short, although a direct comparison to previous studies may not be warranted given the differences in the virtual environment tested here, this study does highlight how the aspect of interaction with a virtual buddy character may interact with participant gender and affect participant sense of presence in the virtual environment.

Character Perceptions

Past research on the effect of character gender on perceptions of a virtual character has found that male characters are generally rated as more dominant than female characters (Hess, Adams, & Kleck, 2005). This effect was found to be more pronounced in highly affiliative characters with high association to characters perceived as "more likely to behave in a stereotype congruent manner" (Hess, Adams, & Kleck, 2005, p.532). One explanation for this effect put forth by Wagner & Berger is the status characteristics theory that states that it takes higher levels of 'proof' to attribute a non-stereotypical characteristic to a person than it would a stereotypical characteristic (1993). Findings from this study supported previous research on gender and dominance as well as status characteristics theory (Hess, Adams, & Kleck, 2005; Wagner & Berger, 1993).

First, it is interesting to compare the two virtual buddy characters in this study, Tina and Adrian seen in Figure 14.

Figure 14 - Virtual Buddy Characters Tina and Adrian

Tina and Adrian were designed to have similar features in terms of dominance cues with very similar jaw shapes, eye sizes, and hair lines in order to minimize visual cuing of dominance traits. Additionally, performance scripting for both characters was identical so that behavioral responses were based on the character designation of effective or ineffective and not on character gender. In short, every attempt was made to make both virtual buddy characters equivalent in all respects with the exception of gender. Yet, perception differences still emerged between the two characters. Thus, it is reasonable to attribute differences in perceptions to gender rather than visual or behavioral cuing in the scenario.

In the study, research participants were divided into four groups, approximately half had Adrian as a buddy and half had Tina as a buddy. These two groups were divided once more with

approximately half of each group experiencing an effective version of the buddy character and half experiencing an ineffective version of the buddy character. As supported by the research design, participants experiencing the effective version of the buddy tended to rate Adrian as more aggressive, strong, and extroverted and rate Tina as more aggressive, capable and intelligent than participants who experienced the ineffective versions of the buddies; however, gender differences between perceptions of Tina and Adrian emerged in the open response portions of the questionnaire.

Thematic analysis was conducted on participant open responses and words describing the virtual buddy characters were marked and categorized as either an effective or ineffective characteristic. Examples of effective characteristics included words such as: "smart," "outgoing," "strong," "supportive," "capable", "confident", and "independent." Examples of ineffective characteristics included words such as: "awkward," "passive," "shy," "stupid," "timid," "vulnerable," "unsure," and "weak."

Given the approximately equal distribution between effective and ineffective versions of both Tina and Adrian for participant groups, one would expect the frequency of effective and ineffective characteristic words included in the open response questions to also be approximately equal. Yet, in contradiction to this expectation, thematic analysis reveals that participants tended to describe Adrian with more effective characteristics (63%) than ineffective characteristics (37%). Additionally, participants tended to describe Tina with fewer effective characteristics (39%) than ineffective characteristics (62%). Thus, when describing perceptions of the buddy character in their own words, participants tended to describe Adrian as more effective than Tina in spite of equivalent behavioral responses and distribution between effective and ineffective conditions. This finding supports Wagner & Berger's status characteristics theory which suggests

that it would take higher levels of evidence for participants to rate Adrian as ineffective or Tina as effective based on assumed gender stereotypes of women being less effective than men in resisting a pressured social situation (1993). The finding in this study supports previous research results that have found that people generally tend to rate male characters as more dominant than female characters as well as the findings that highly affiliative characters, like buddy characters, are expected to behave in a more stereotypical manner (Hess, Adams, & Kleck, 2005).

Another interesting finding in the character perceptions questionnaire was the difference in attractiveness ratings for the two male virtual characters Adrian and Dylan as seen in Figure 15.

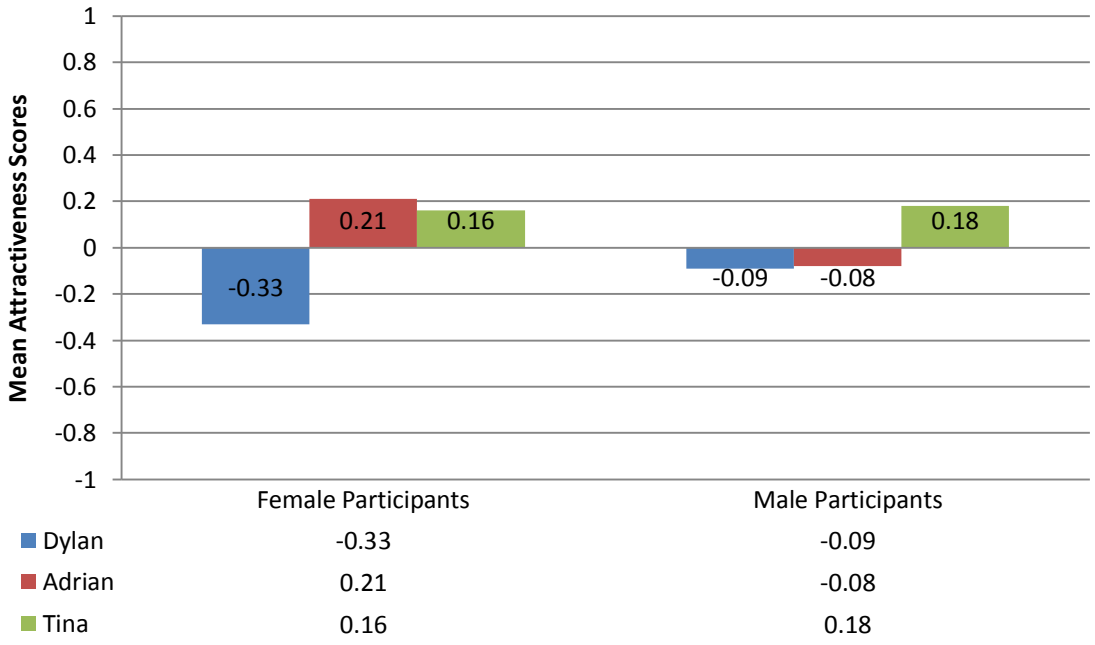


Figure 15 - Mean Attractiveness Scores for the Virtual Characters

Female participants rated Adrian, the buddy character, as statistically significantly more attractive than male participants did. On the other hand, for Dylan, the antagonist, female

participants rated Dylan as statistically significantly less attractive than male participants rated Dylan. Attractiveness ratings for the female buddy character showed no statistically significant differences between female participants and male participants. One explanation for this finding is a negative same-gender effect for male participants in terms of rating attractiveness, regardless of the behavior of the virtual character. This explanation is supported by marketing research with virtual characters that found similar negative same-gender effects for male participants when rating the attractiveness of virtual characters (Wang & Yeh, 2013).

Yet, negative same-gender effects for male participants do not fully explain why attractiveness ratings from male participants for Dylan were not as negative as ratings from female participants. One possible explanation for this phenomenon is because Dylan's behavior of pressuring the participant to accept an alcoholic drink may have been perceived as more socially acceptable when directed towards a male participant than a female participant. This may have negatively affected attractiveness ratings for female participants while producing little effect on male participants. This explanation is supported by some research on the alcohol expectancies of undergraduate students. For example, Dodd et al.'s study on alcohol expectancies found that while most college-aged males felt it was normal to match the drinking habits of others, most college-aged females felt that matching the drinking habits of others was not important (2010, p.97). In fact, several studies on the drinking behavior of college students note that men tend to be expected to drink more and conform to social drinking expectations more than women (Dodd, Glassman, Arthur, Webb, & Miller, 2010; Orcutt & Schwabe, 2012; Shippee & Owens, 2011). More research is needed to further explore this explanation for the difference in attractiveness ratings for Dylan between male and female participants.

Other Findings

ITC Sense of Presence Questionnaire

In the qualitative analysis of the ITC sense of presence questionnaire, responsiveness of the simulation system emerged as a major theme. Approximately 44% of participants who answered in the free response section mentioned that they were surprised or impressed by the responsiveness or conversational abilities of the avatars in the system. According to past research such as Garau et al., (2005) responsive characters in a simulation system create a higher sense of personal contact and increased social behavior towards the virtual character. Additional studies that have compared human conversational partners to computer controlled characters with varying levels of responsiveness such as Gratch et al. have also found that more responsive virtual characters tend to be more successful in creating rapport with a participant and promoting social behavior (2007). Thus, given the qualitative reports of high responsiveness of the CollegeLive system as well as observed social behavior towards the virtual characters, this study supports past research findings that indicate that people tend to respond socially to responsive virtual characters (Garau, Slater, Pertaub, & Razzaque, 2005; Gratch, Wang, Gerten, Fast, & Duffy, 2007; Traum, Rickel, Gratch, & Marsella, 2003).

Character Perceptions

In the qualitative analysis of the written responses about perceptions of Dylan as well as in participant comments about Dylan, one interesting finding was that many participants described Dylan as being drunk in spite of the fact that during the simulation Dylan did not take a drink or verbally express that he had been drinking. During the simulation, 6% of participants made a verbal statement about Dylan being drunk such as:

Participant 36: “He looks really drunk.”

Participant 79: “He IS throwing a party, and I’m pretty sure he’s drunk. You have to expect stupidity.”

Participant 93: “This guy’s crazy. He had a few drinks, his brain is swimming.” Additionally, 12% of participants described Dylan as drunk in written free response on the character perceptions questionnaire. This finding supports previous research on student perceptions of alcohol consumption in video advertising. For example Proctor et al. found that students tended to perceive characters in filmed advertisements as heavy drinkers even when the advertisement did not depict the physical act of drinking (2005, p.648). Proctor et al.’s study also found that female participants and participants with more alcohol dependence tended to perceive increased drinking for male characters (2005, p. 648). Although the current study did not find a similar gender bias among participants who described Dylan as drunk (11 male participants, 9 female participants), this study did not measure alcohol dependency characteristics for participants. Future research may benefit from adding measures of alcohol dependency to see how those characteristics may influence virtual character perceptions in simulated contexts involving alcohol.

Physiological Data

Previous research such as Slater and colleagues’ study: *Analysis of Physiological Responses to a Social Situation in an Immersive Virtual Environment* (2006) has found that ECG parameters such as heart rate as well as GSR analysis can be used to measure physiological changes during events such as speaking to a virtual avatar or a break in presence (p.566). Garau and colleagues’ research on response to virtual humans (2005) supports this finding in that it found that electrodermal activity reflected “significant events” such as a virtual human coming

into the participant's field of view or the virtual human speaking (p.112). Thus, for this study, the researcher expected to find indications in the heart rate and GSR data that would indicate similar events such as speaking to the virtual character or responding to a personal insult from a virtual character; however, no such indicators were found consistently across participants. In fact, the physiological data showed no clear patterns of arousal corresponding with any scripted event in the simulated scenario.

Comparing these findings to past virtual character research that used heart rate and GSR, the design of the experience as well as the measurement equipment may account for the difference in findings. Previous studies that have found event markers in heart rate or GSR readings have used more immersive virtual reality systems where the participant can stand or walk around the environment (Garau, Slater, Pertaub, & Razzaque, 2005; Slater et al., 2006; Vinayagamoorthy, Steed, & Slater, 2008) whereas this study used a 2D desktop system where the participant remained seated throughout the experience. Additionally, this study used a heart rate monitor that was worn on the wrist rather than a heart rate monitor using chest electrodes or a chest strap. Although researcher testing of the heart rate monitor prior to the experience showed the monitor to vary only slightly from chest electrodes, the variation in measurement may have been more pronounced on other individuals and may not be as reliable as the heart rate monitors used in other studies.

Suggestions for Improving the Study

Overall, this study was unable to measure the arousal aspect of emotional experience to the extent desired by the researcher. Physiological data showed no significant patterns of emotional arousal during the simulated experience and participant response to questionnaire

items supports the view that participants did not find the simulated social scene to be very emotionally intense. Creating a more provocative scenario may create a better testing environment to measure the effect of buddy effectiveness and gender on participant emotional response.

Considering the design of the scenario used in this study, one way to improve the intensity of the experience would be to change the offer from an alcoholic beverage to a substance seen as less socially acceptable such as a hard drug. Participant responses indicated that even though participants in this study were predominantly under the legal drinking age, the offer of an alcoholic beverage, even with high pressure, was not seen as uncommon or particularly stressful. Additionally, the insults provided by the antagonist character in this scenario were very general in nature and contained no profanity or elements that would target an individual participant. Increasing the intensity of the insults by using profanity or customizing insults to individual participants may also increase the intensity of the simulated scenario.

Additionally, this simulated environment did not allow the participant to move freely in the virtual space. The sedentary nature of the scenario may have contributed to the perceived lack of intensity of the situation. Incorporating the ability to allow the participant to navigate the virtual space and increase physical involvement in the environment may also increase engagement in the scenario and perceived intensity of the situation. As a result, stronger trends in emotional response to the scenario may be observed.

Additional Applications

Given the flexibility of the CollegeLive virtual environment, additional applications are possible in the same environment. Since there are humans in the loop controlling the virtual

characters, re-scripting the scenario to explore other types of social interaction would be possible. Given the current characters and environment assets, new scripts could easily explore other behaviors and responses related to a college social setting. For example, this system could be used to explore how college students respond to sexual advances from a virtual character or how college students can employ protective strategies to promote personal safety while maintaining high social esteem. As another example, this environment could be used to explore other character archetypes beyond the buddy and antagonist character that may be used in virtual simulation. For example, with the addition of virtual characters of different ages and backgrounds, archetypal roles such as the mentor or the love interest could be explored with virtual entities. Results from such exploration could inform the design of future narrative training simulations.

Significance of Findings

This study contributes to the literature on virtual character design in several ways. First, this study extends past research such as Bailenson and Yee's study on virtual character mimicry (2005) to incorporate vocal and point of view mimicry. Qualitative comments on the responsiveness of the system as well as likeability ratings for the buddy characters suggest that vocal and point of view mimicry in addition to physical mimicry are effective in establishing rapport between a virtual buddy character and a participant. Next, this study provides preliminary evidence that suggests that making a virtual buddy character ineffective versus effective at a particular task, in this case navigating a pressured social situation, may influence participants to be more active in the simulated setting, supporting the prediction made by Interactive Performance Theory (Wirth, 2012). This evidence suggests that further research into

possible benefits of an ineffective buddy is warranted. Additionally, in exploring the impact of virtual character gender on participant experiences, this study contributes to past research in providing evidence that supports Wagner & Berger's status characteristics theory (1993) as well as previous marketing research that suggests a negative same gender effect when male participants rate the attractiveness of male characters (Dodd, Glassman, Arthur, Webb, & Miller, 2010). This study also inspires new questions regarding gender and virtual character perceptions related to alcohol expectancies that will require additional research.

Conclusion

In terms of measuring emotional experience of participants in this study, physiological data and the ITC sense of presence inventory showed no statistically significant difference between participants who had an effective versus an ineffective buddy character or between participants who had a same gender versus an opposite gender buddy character. Yet, when measuring emotional experience through perceptions of the virtual characters and verbal behavior within the simulation, statistically significant differences were found between participants in different research groups. Predictions made in Interactive Performance Theory that participants with an ineffective buddy would be more active in the simulation and feel more negatively towards the antagonist character were supported by study data (Wirth, 2012). In terms of examining the differences between participants who had a same gender buddy versus participants who had an opposite gender buddy, this study found that participants with an opposite gender buddy tended to rate the ecological validity of the simulation higher which expands upon gender differences found in previous research rating ecological validity of systems and suggests that virtual character gender in addition to participant gender may be a useful factor

for further study. Additionally, in participant character perceptions statistically significant differences emerged. Qualitative analysis of free response about character perceptions supported Wagner & Berger's status characteristics theory which suggests that it takes higher levels of evidence in order for participants to rate female characters as effective in a situation and male characters as ineffective in a situation (1993). In the current study, qualitative description of Tina, the female buddy character, tended to use more ineffective terms than effective terms. Similarly, the qualitative description of Adrian, the male buddy, tended to use more effective terms than ineffective terms. Furthermore, differences in attractiveness ratings for the male virtual characters emerged between female and male participants in the study. For Adrian, the male buddy character, male participants tended to rate him as less attractive than did female participants, a result that supports previous findings in marketing research of negative same-gender attractiveness rating effects for male participants (Wang & Yeh, 2013). On the other hand, attractiveness ratings for Dylan, the antagonist character, did not exhibit the same negative trend for male participants as it did for female participants. In fact, attractiveness ratings from male participants for Adrian and Dylan differed very little, perhaps suggesting differences in social drinking expectancies between male and female participants (Dodd, Glassman, Arthur, Webb, & Miller, 2010).

Limitations of the Study

Although every attempt was made to provide a controlled experimental environment for all participants, this study is still limited by the research design, sampling, and measurement instruments used. First, although the simulated scenario was scripted, the interactive nature of the scenario meant that dialogue between virtual characters and participants was different in each

run of the simulation, creating different intra-session histories for participants who may have affected emotional experience and perceptions of characters. Additionally, the use of a wrist worn heart rate monitor to collect physiological data as well as a 2D desktop simulation system does not allow the comparison of findings from the physiological data to previous research using chest electrodes, chest strap systems, or simulated environments where the participant can move around the virtual space. As wrist worn systems become more commercially available and more research is conducted with these potentially less accurate measurement systems, this study may provide a comparison point for other studies using wrist worn systems with stationary 2D virtual environments. A further limitation of the study regarding the collection of physiological data is that merely attaching the GSR and heart rate monitoring sensors to the participants in the study may have changed their behavior and made them more aware that the study was measuring their emotional response to the simulated situation. Finally, the sample for this study was drawn only from freshmen at one American university. Additional research is needed to see if the findings from this study are generalizable to other populations in different environments.

Recommendations for Future Research

Based on the findings from this study, two major areas present themselves as possible fruitful areas of future research. First, further exploration of the potential benefits and drawbacks of using an ineffective virtual buddy character design would contribute to the design of future simulation and pedagogical agent systems. There may be certain virtual contexts in which an ineffective buddy character would produce better participant learning outcomes than an effective or "expert" buddy character. Future research measuring the impact of buddy character design on learning outcomes would help answer this question. Additionally, this study raises questions

specific to the context of social expectancies regarding alcohol as it relates to the perceptions of virtual characters. As virtual environments are used more frequently to teach positive social behaviors regarding alcohol consumption, further research is needed to determine how virtual character design influences participant behavior. Thus, based on the results of this research study and the review of current literature on these topics, the following suggestions are made for future research:

1. Further research should be conducted on the influence of ineffective buddy characters on participant behavior in a simulated environment.
2. Further research should be conducted on the influence of ineffective buddy characters on the learning outcomes of participants in a virtual learning environment.
3. Additional research on participant gender differences in perception of experienced presence should include level of interaction and gender of the virtual characters as potential factors that influence sense of presence.
4. Further research should be conducted on how social expectancies surrounding alcohol consumption are translated into virtual environments.
5. Further research should be conducted on the effects of interactions with virtual characters on the construction of personal norms regarding alcohol consumption behaviors.
6. Further research should be conducted on how archetypal roles for virtual characters can affect participant experience in virtual training environments.

In conclusion, given the flexibility of virtual environments that allow for humans to control the virtual characters, further research on how performance techniques can be translated into the

compelling portrayal of virtual characters that fulfill specific narrative goals has the potential to help build a blueprint for the design of virtual characters that support simulated training goals.

APPENDIX A: SCENARIO SCRIPTING

Unlike traditional scripts, this interactive scenario was scripted using a branching structure that supports participant choices and includes instructions for the interactors that are puppeteering the avatars in the scenarios. Figure 16 represents the branching structure of the scenario. Instructions for the interactor are in italics.

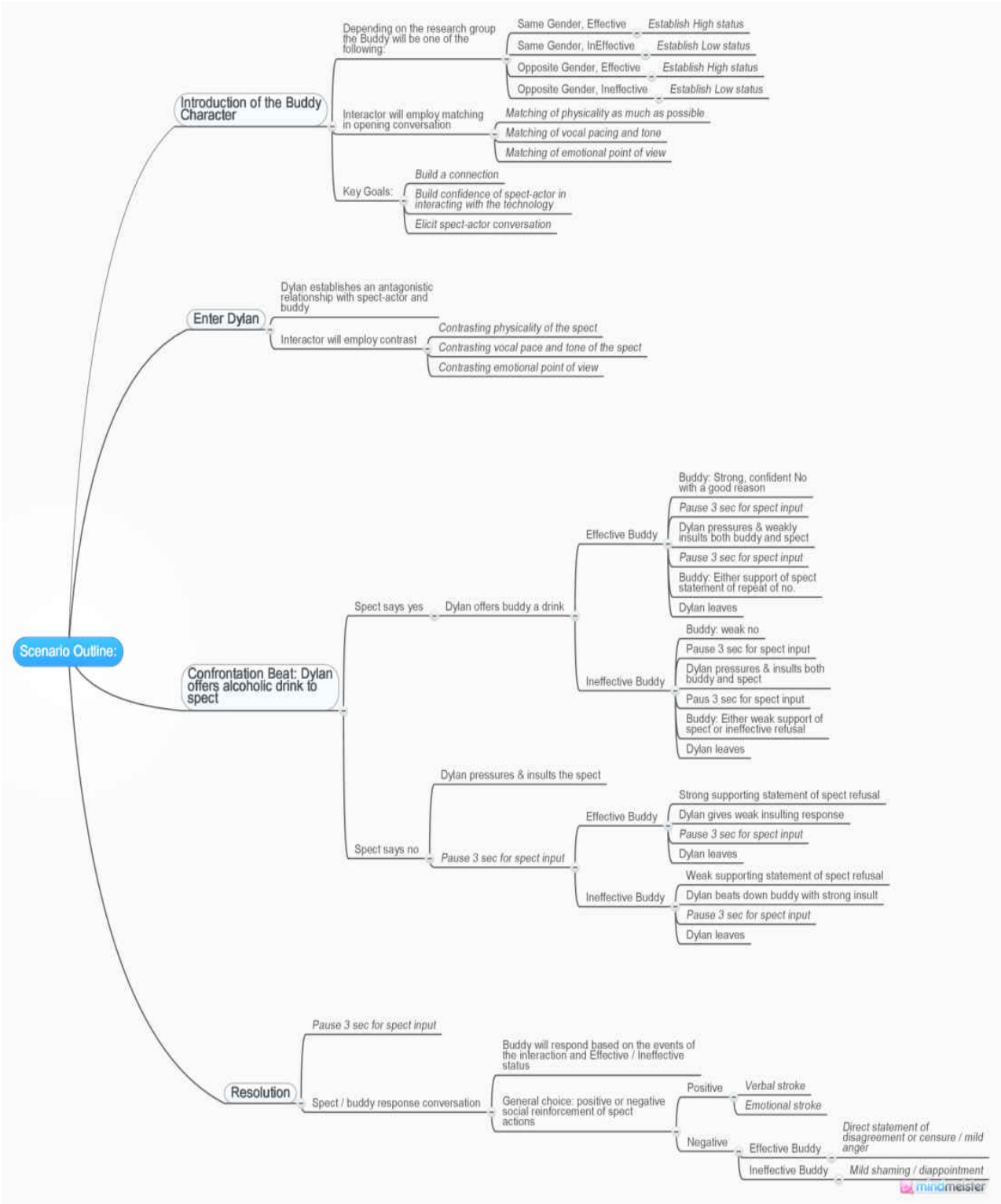


Figure 16 - Scenario Script

In summary, the scenario had four main beats, each with specific intearctive goals. In beat one, the virtual buddy character was introduced. Depending on the research group, the buddy was either the same gender or the opposite gender of the participant and was either effective or ineffective in resisting peer pressure with social competence. The goal for the interactor in this beat was to employ matching technique to build a friendly connection between the virtual buddy character and the participant. In beat two, the antagonist, Dylan, was introduced as a character. The main goal for the interactor in this beat was to employ the contrast technique in order to build an antagonistic relationship with the participant. In beat three, Dylan offered an alcholic drink (virtually, no real drink was provided) and then based on the participant's response either pressured the participant to drink, or pressured the buddy character to drink if the participant initially accepted the offer. Participant actions in beat three were resolved in beat four after Dylan had left the scene and the participant had the opportunity to discuss the interaction with the virtual buddy character.

APPENDIX B: ITC SOPI

Since the ITC-SOPI is a copyrighted instrument used with permission for this study it cannot be reproduced here. Please see the official copyright statement for the instrument below and contact the instrument author for a copy of the instrument.

Independent Television Commission – Sense of Presence Inventory

ITC-SOPI

APPENDIX C: SUPPLEMENTAL VIRTUAL CHARACTER QUESTIONNAIRE

Character Questionnaire

Please indicate which adjective is CLOSEST to how you feel towards the character that you met in the scenario by circling just ONE of the adjectives following each question.

DURING THE SCENARIO, I FELT THAT <u>TINA</u> WAS….

1.	Unattractive	Neither attractive nor unattractive	Attractive
2.	Stupid	Neither smart nor stupid	Smart
3.	Unfriendly	Neither friendly nor unfriendly	Friendly
4.	Incapable	Neither capable nor incapable	Capable
5.	Shy	Neither outgoing nor shy	Outgoing
6.	Mean	Neither nice nor mean	Nice
7.	Weak	Neither strong nor weak	Strong
8.	Unlikeable	Neither likeable nor unlikeable	Likeable
9.	Passive	Neither aggressive nor passive	Aggressive

Why did you feel this way about Tina?

Please indicate which adjective is CLOSEST to how you feel towards the character that you met in the scenario by circling just ONE of the adjectives following each question.

DURING THE SCENARIO, I FELT THAT <u>DYLAN</u> WAS….

1.	Unattractive	Neither attractive nor unattractive	Attractive
2.	Stupid	Neither smart nor stupid	Smart
3.	Unfriendly	Neither friendly nor unfriendly	Friendly
4.	Incapable	Neither capable nor incapable	Capable
5.	Shy	Neither outgoing nor shy	Outgoing
6.	Mean	Neither nice nor mean	Nice
7.	Weak	Neither strong nor weak	Strong
8.	Unlikeable	Neither likeable nor unlikeable	Likeable
9.	Passive	Neither aggressive nor passive	Aggressive

Why did you feel this way about Dylan?

Character Questionnaire

Please indicate which adjective is CLOSEST to how you feel towards the character that you met in the scenario by circling just ONE of the adjectives following each question.

DURING THE SCENARIO, I FELT THAT <u>ADRIAN</u> WAS….

1.	Unattractive	Neither attractive nor unattractive	Attractive
2.	Stupid	Neither smart nor stupid	Smart
3.	Unfriendly	Neither friendly nor unfriendly	Friendly
4.	Incapable	Neither capable nor incapable	Capable
5.	Shy	Neither outgoing nor shy	Outgoing
6.	Mean	Neither nice nor mean	Nice
7.	Weak	Neither strong nor weak	Strong
8.	Unlikeable	Neither likeable nor unlikeable	Likeable
9.	Passive	Neither aggressive nor passive	Aggressive

Why did you feel this way about Adrian?

_____

_____

_____

_____

_____

_____

Please indicate which adjective is CLOSEST to how you feel towards the character that you met in the scenario by circling just ONE of the adjectives following each question.

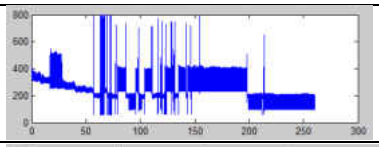
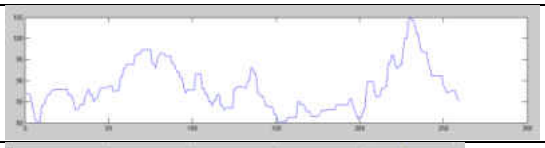
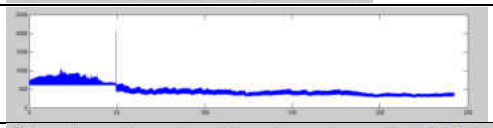
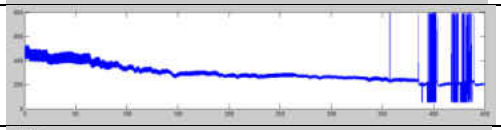
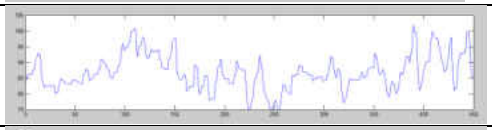
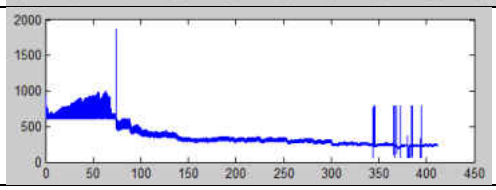
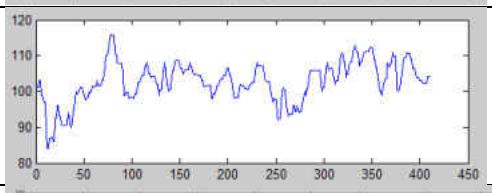
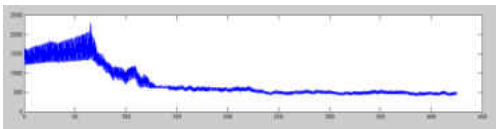
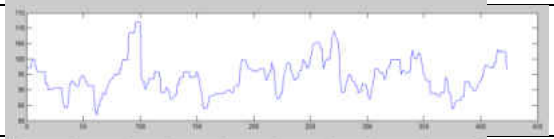
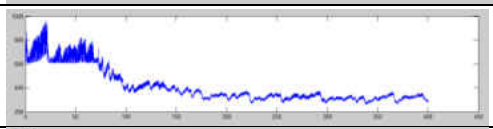
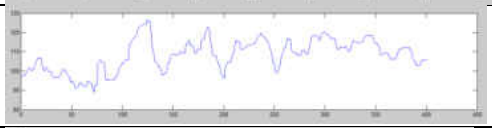
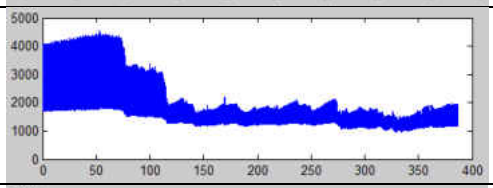
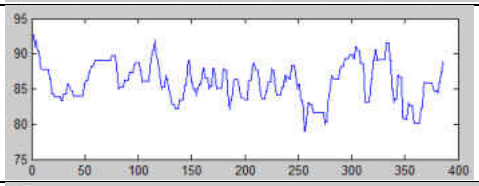
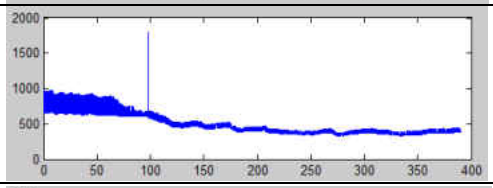
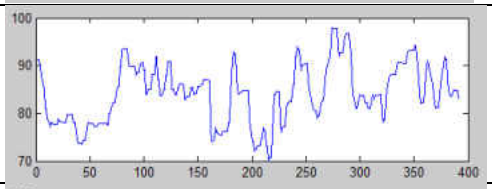
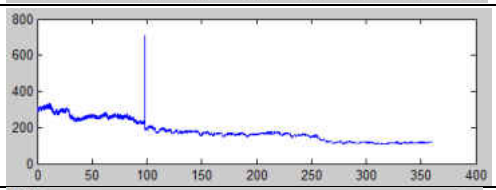
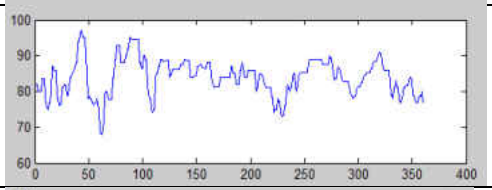
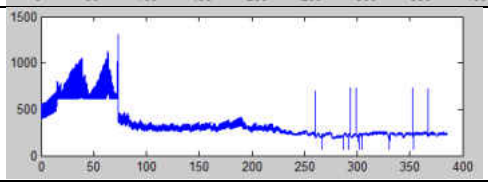
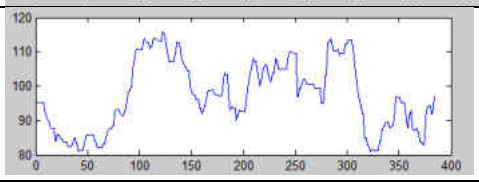
DURING THE SCENARIO, I FELT THAT <u>DYLAN</u> WAS….

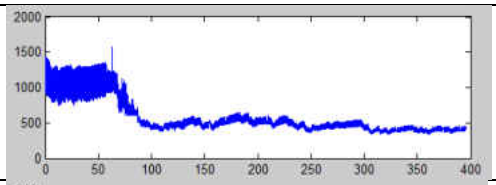
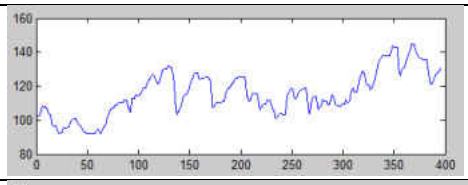
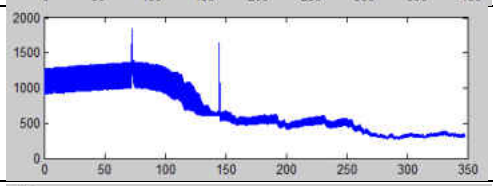
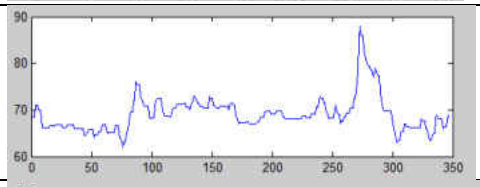
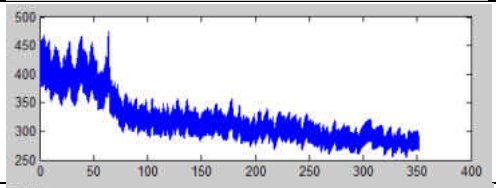
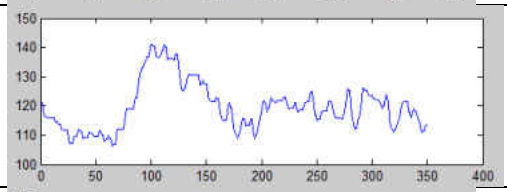
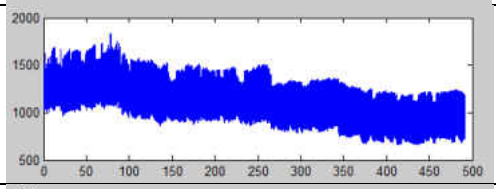
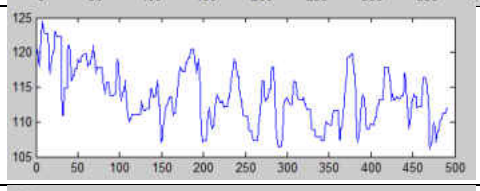
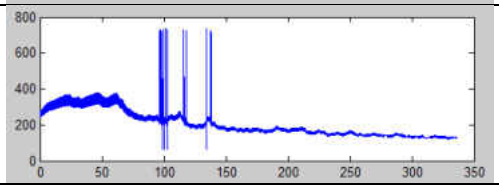
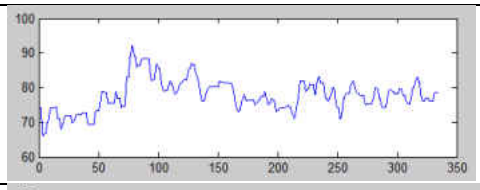
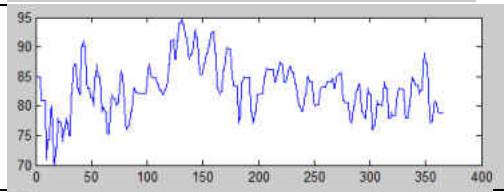
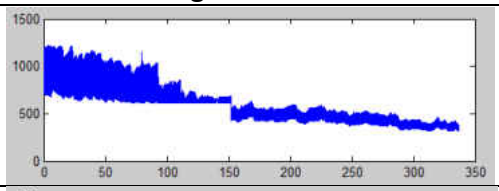
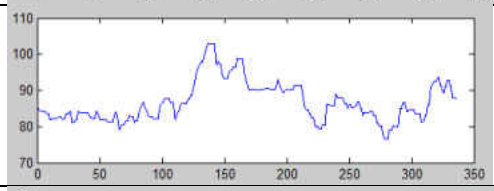
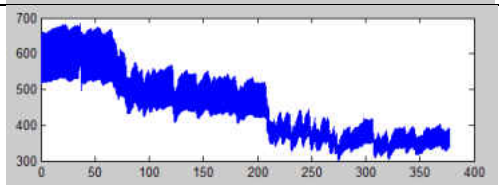
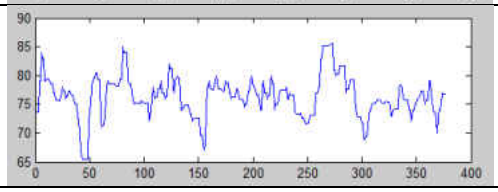
1.	Unattractive	Neither attractive nor unattractive	Attractive
2.	Stupid	Neither smart nor stupid	Smart
3.	Unfriendly	Neither friendly nor unfriendly	Friendly
4.	Incapable	Neither capable nor incapable	Capable
5.	Shy	Neither outgoing nor shy	Outgoing
6.	Mean	Neither nice nor mean	Nice
7.	Weak	Neither strong nor weak	Strong
8.	Unlikeable	Neither likeable nor unlikeable	Likeable
9.	Passive	Neither aggressive nor passive	Aggressive

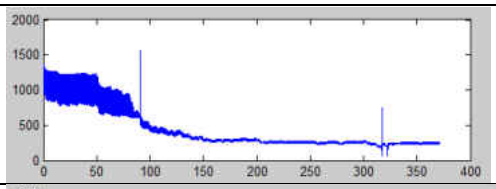
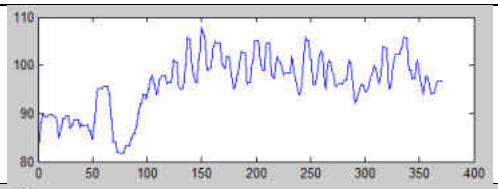
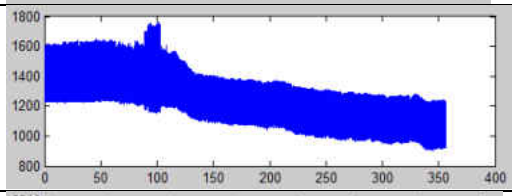
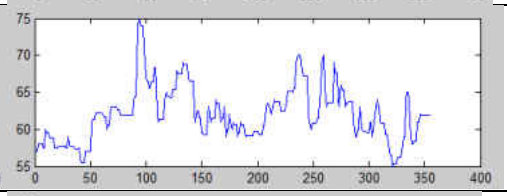
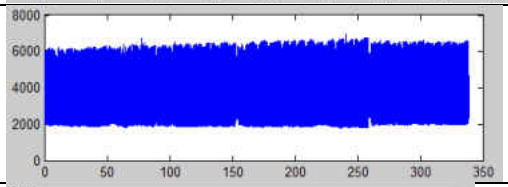
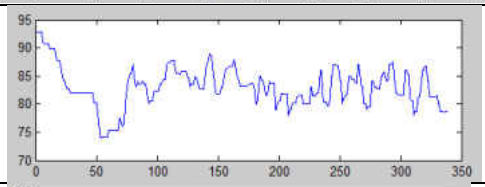
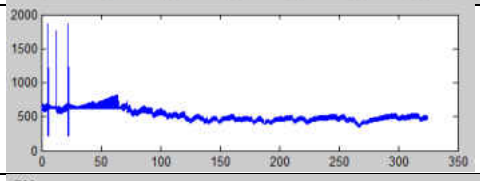
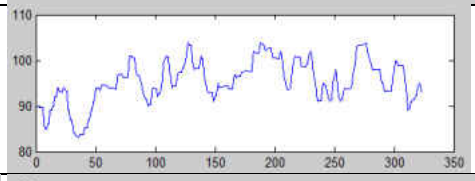
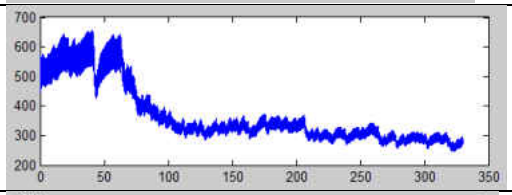
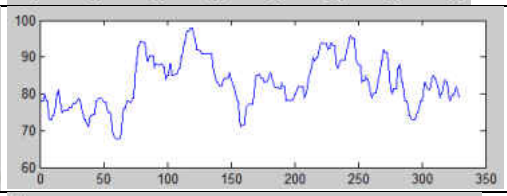
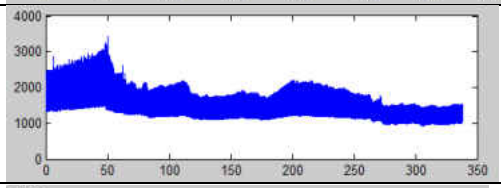
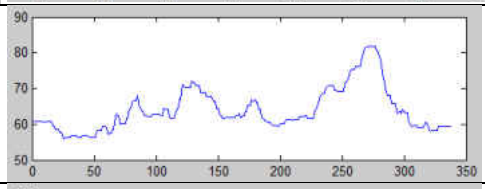
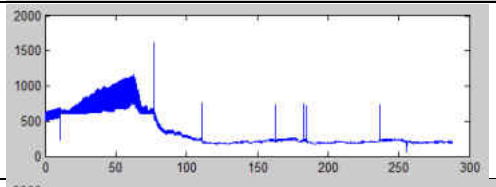
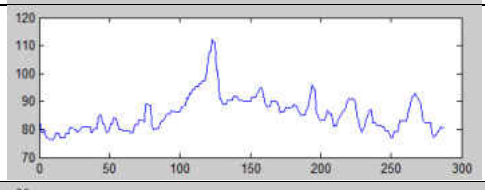
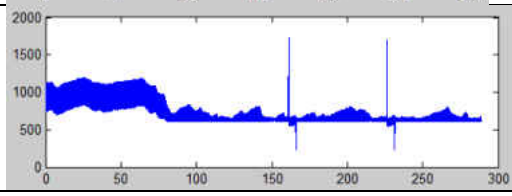
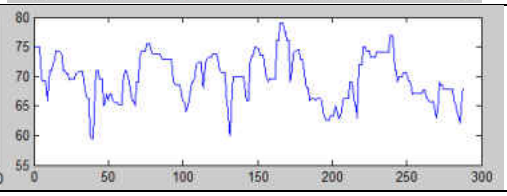
Why did you feel this way about Dylan?

APPENDIX D: HEART RATE AND GSR DATA

Table 18 - Participant Physiological Data

Participant Number	GSR	Heart Rate
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		

Participant Number	GSR	Heart Rate
11		
12		
13		
14		
15		
16	Data Recording Error	
17		
18		

Participant Number	GSR	Heart Rate
19		
20		
21		
22		
23		
24		
25		
26		

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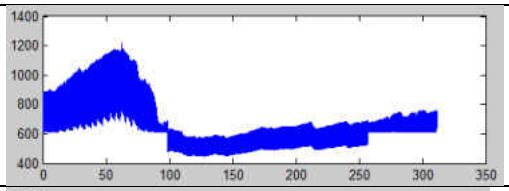
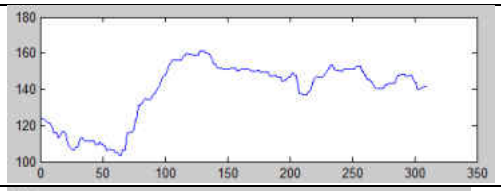
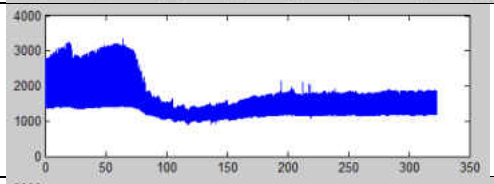
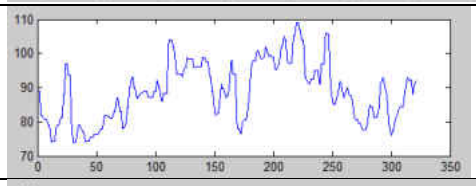
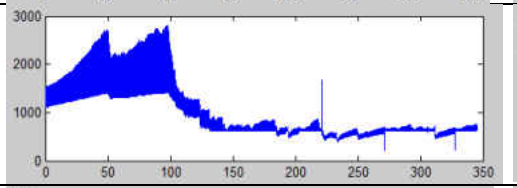
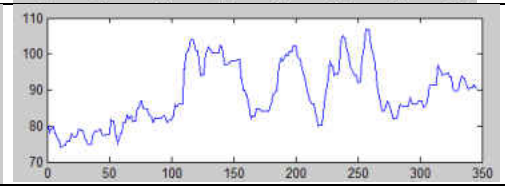
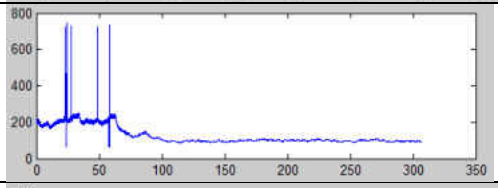
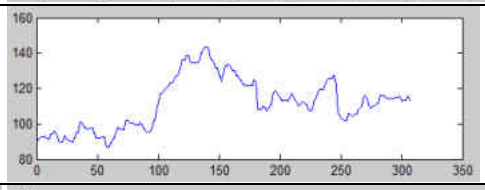
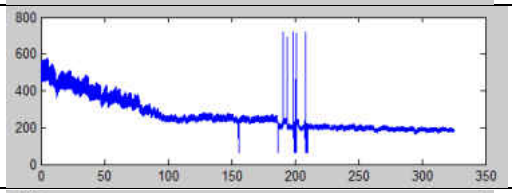
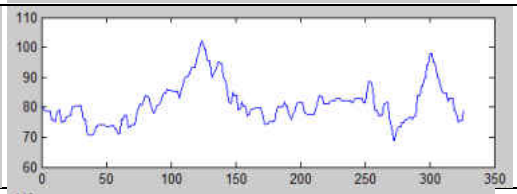
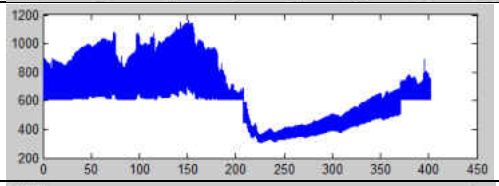
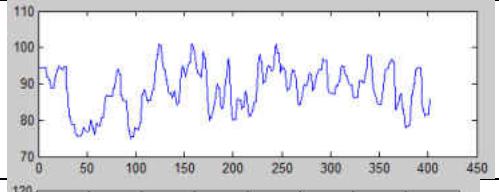
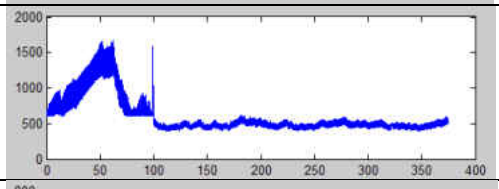
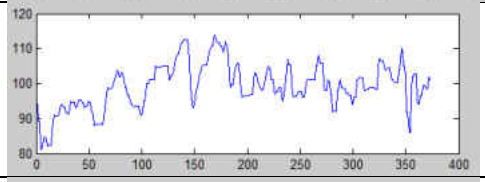
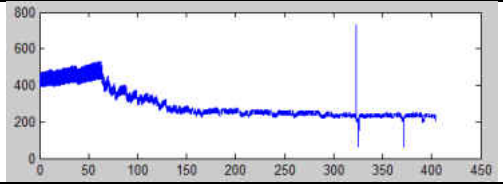
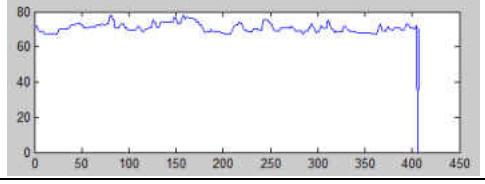
27		
28		
29		
30		
31		
32		
33		
34		

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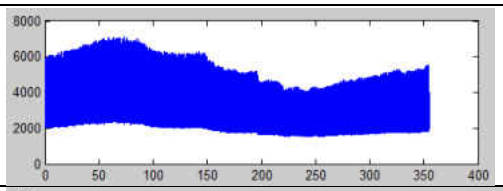
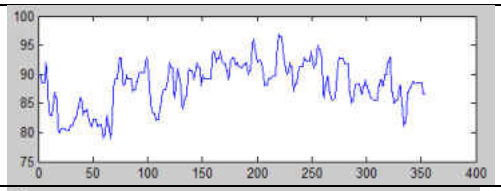
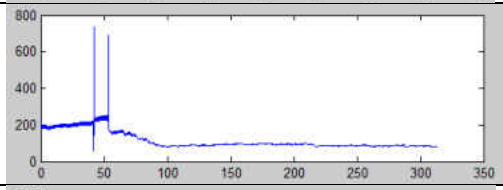
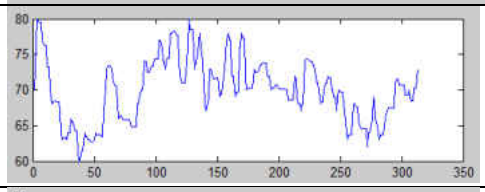
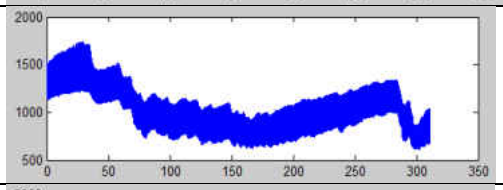
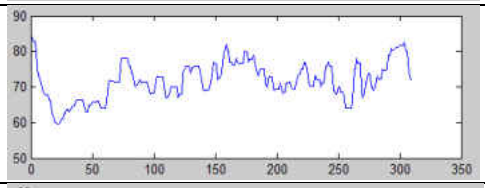
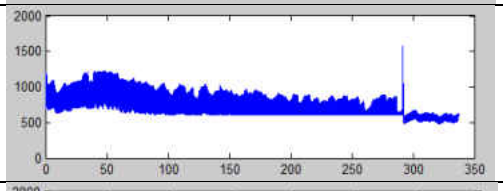
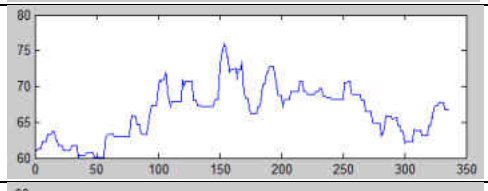
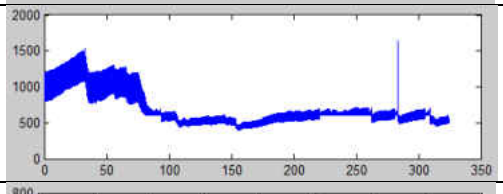
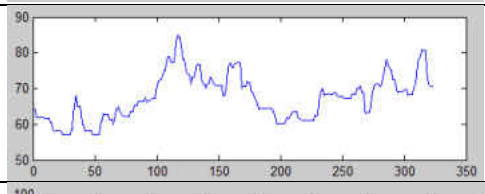
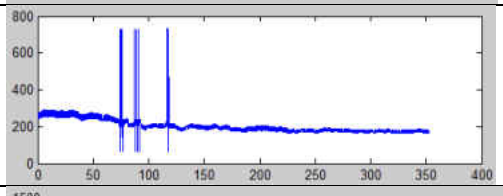
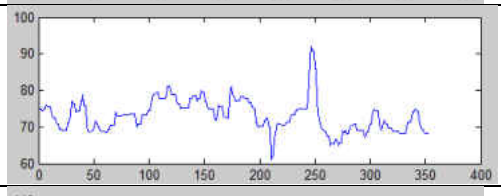
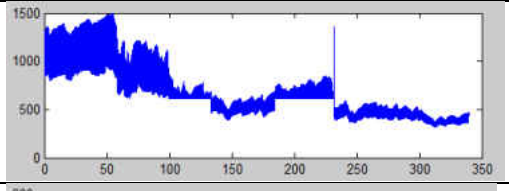
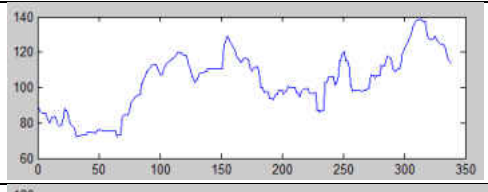
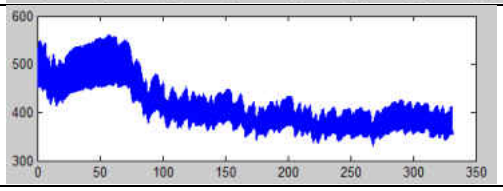
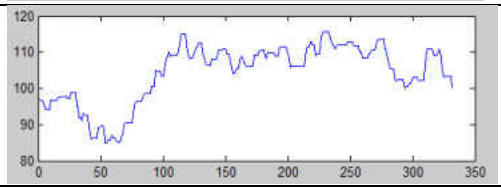
35		
36		
37		
38		
39		
40		
41		
42		

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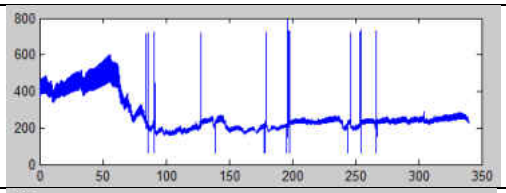
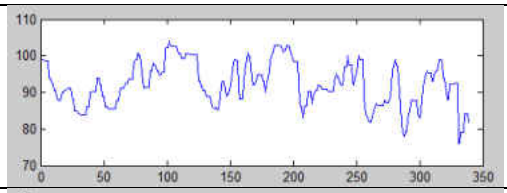
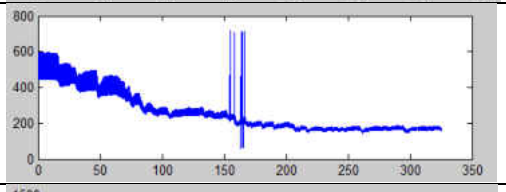
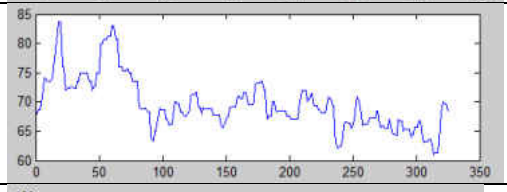
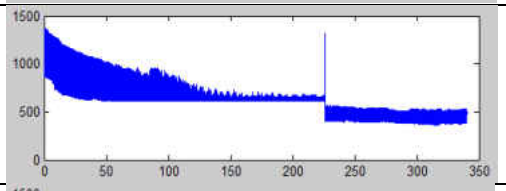
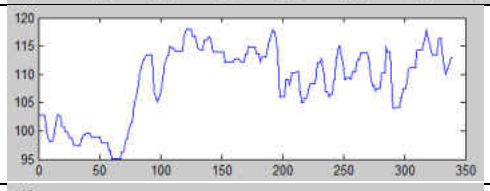
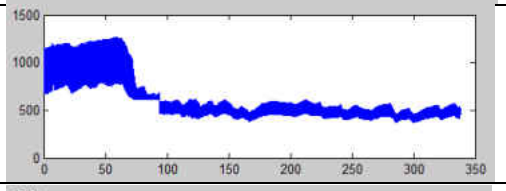
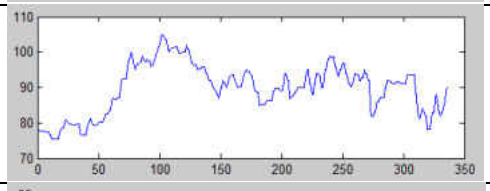
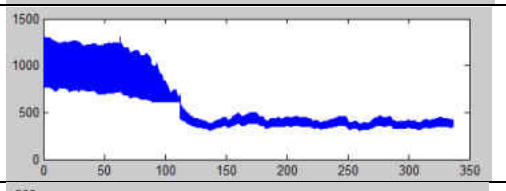
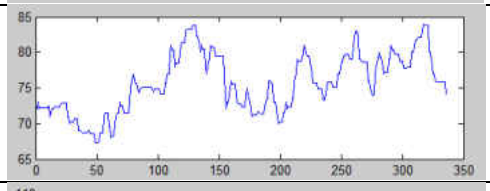
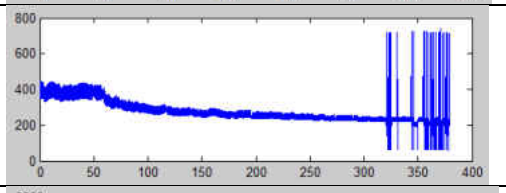
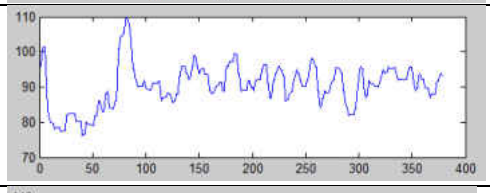
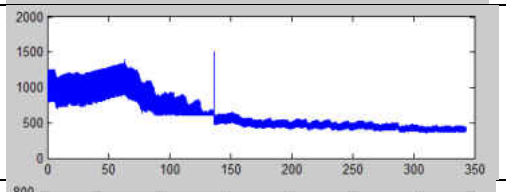
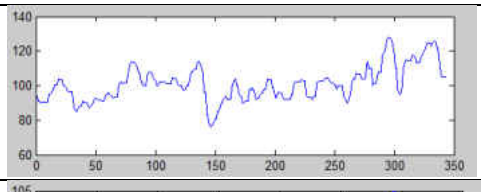
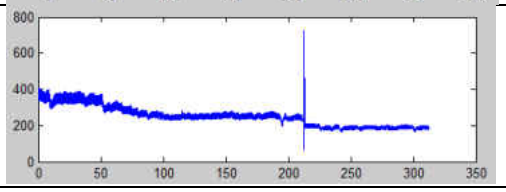
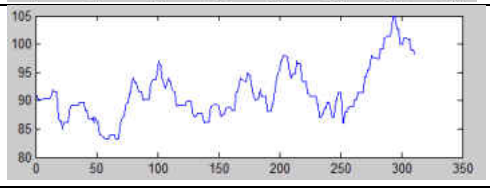
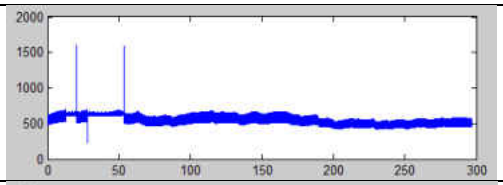
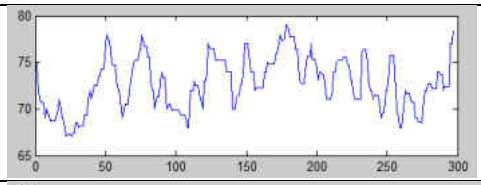
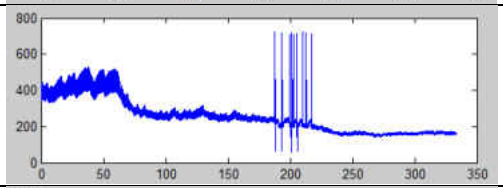
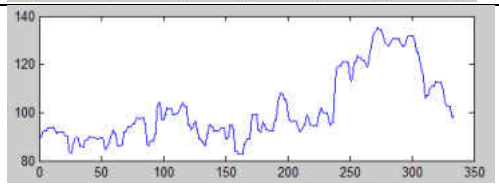
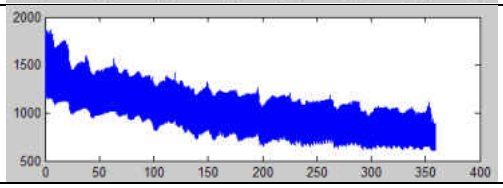
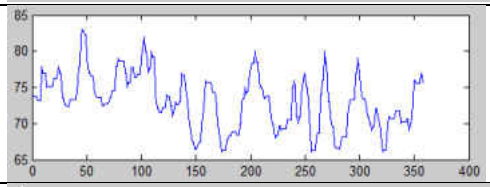
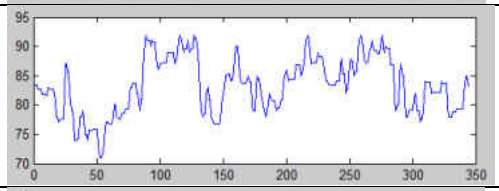
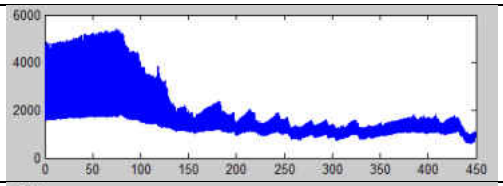
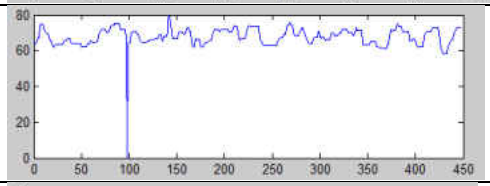
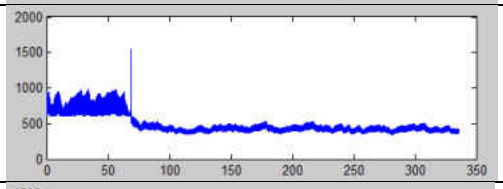
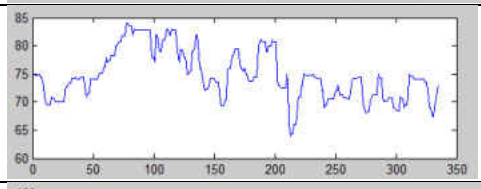
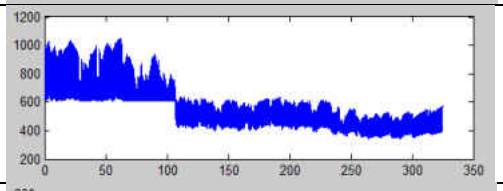
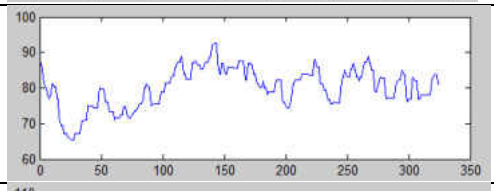
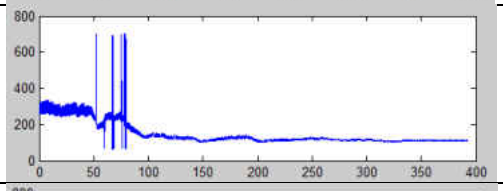
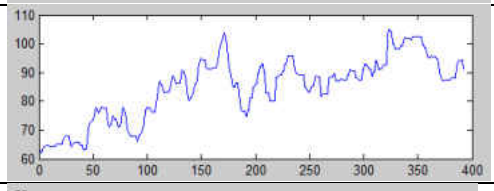
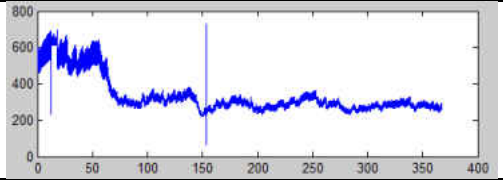
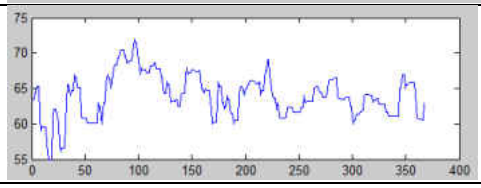
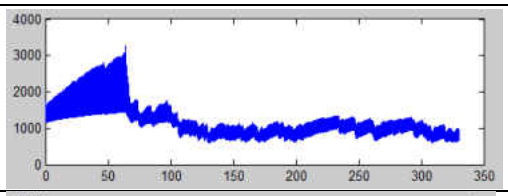
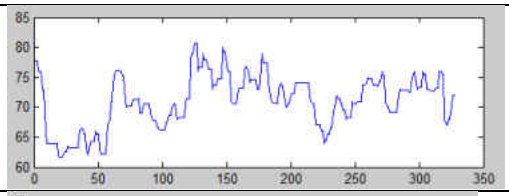
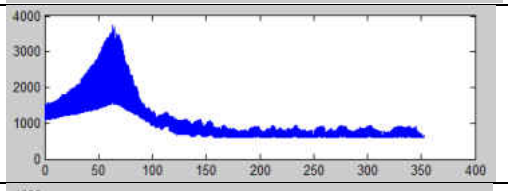
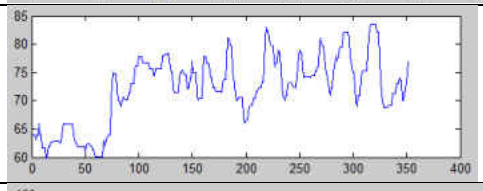
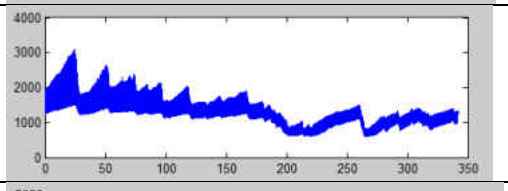
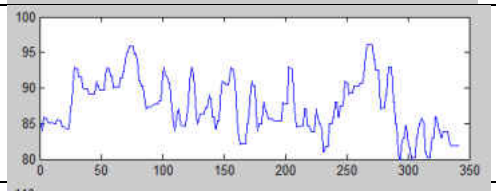
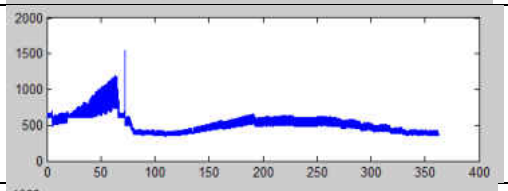
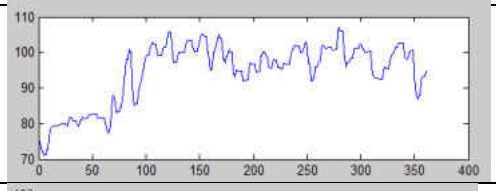
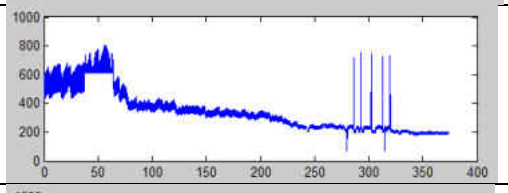
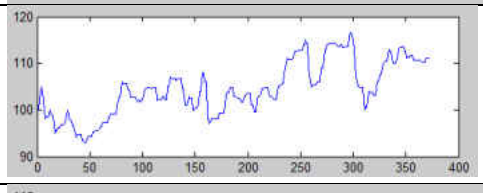
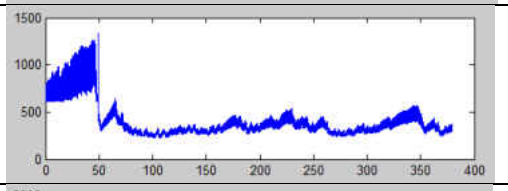
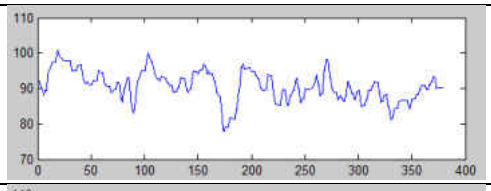
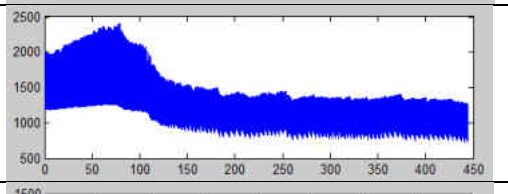
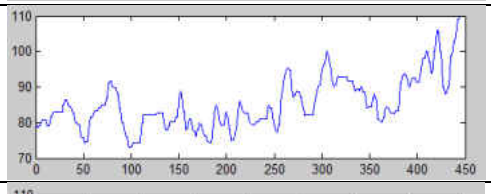
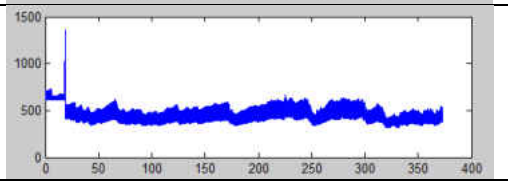
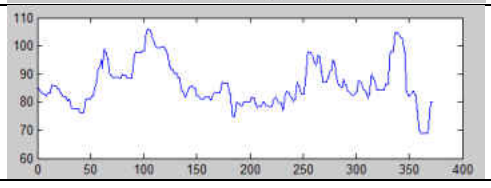
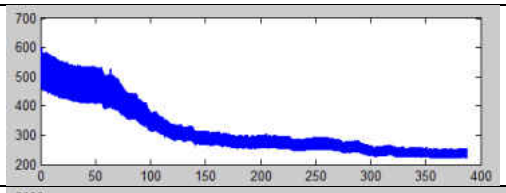
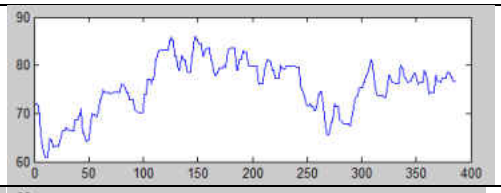
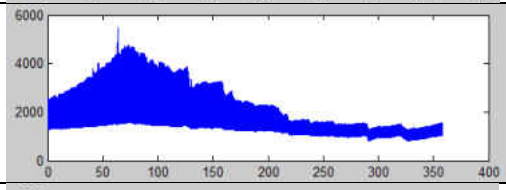
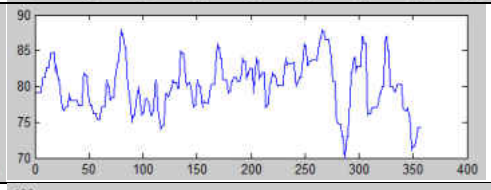
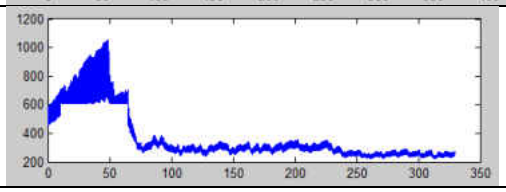
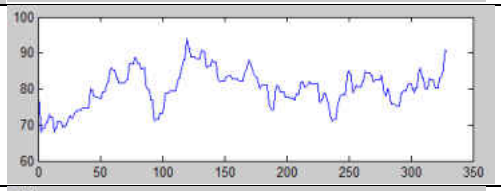
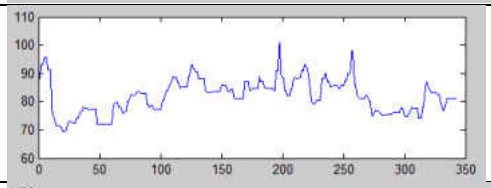
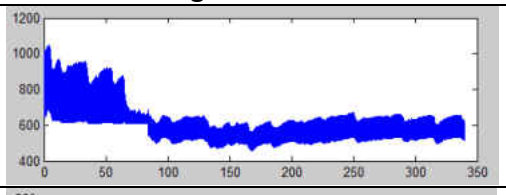
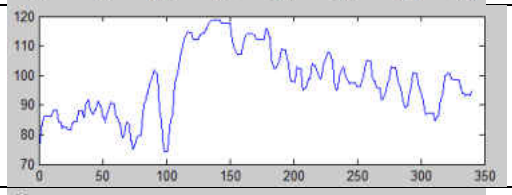
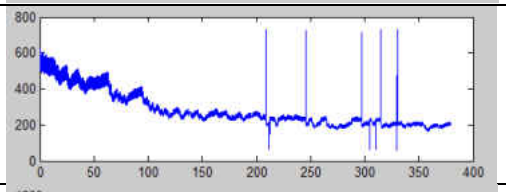
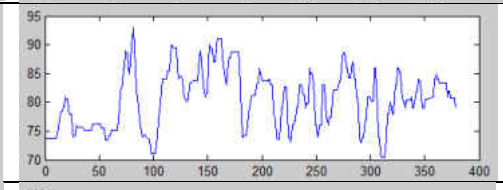
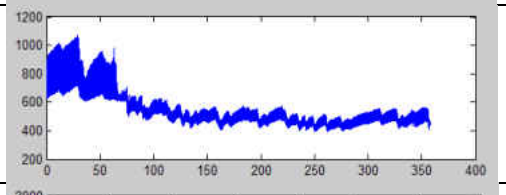
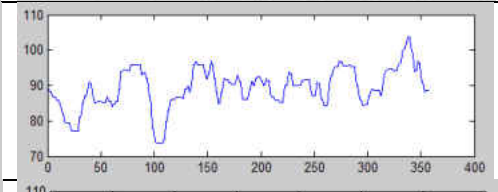
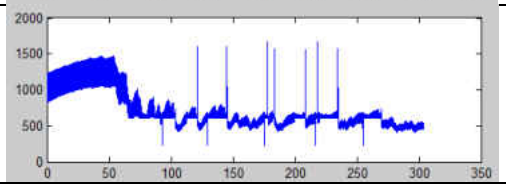
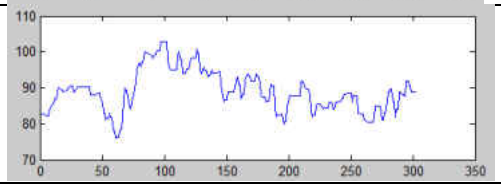
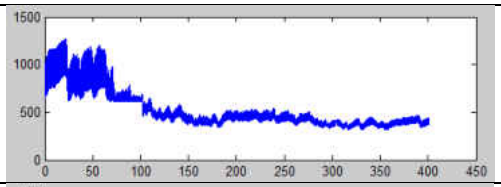
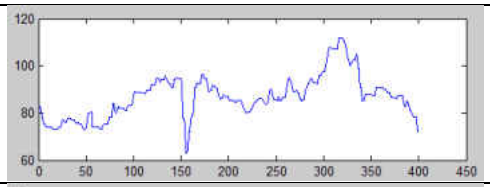
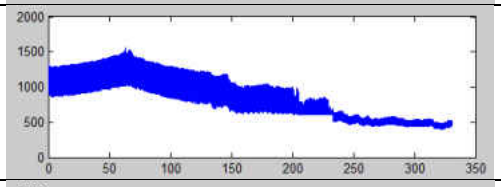
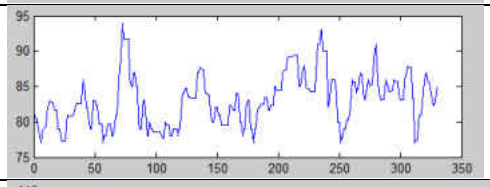
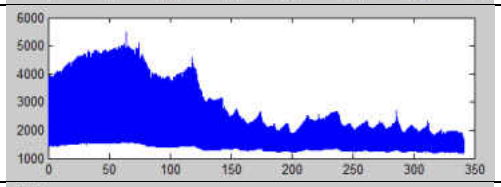
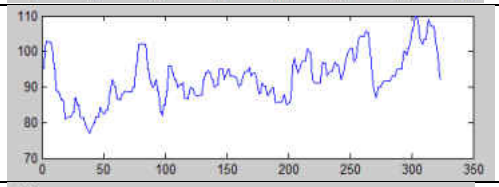
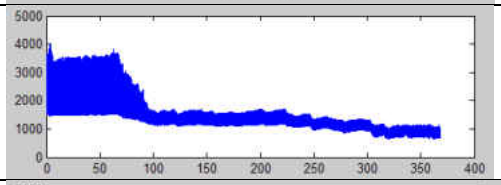
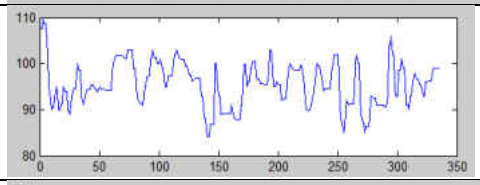
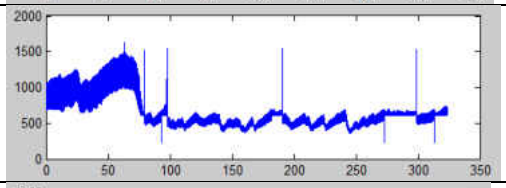
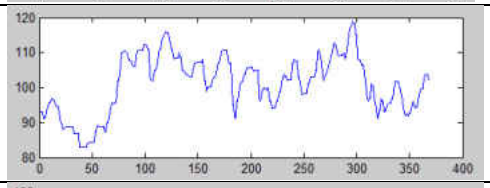
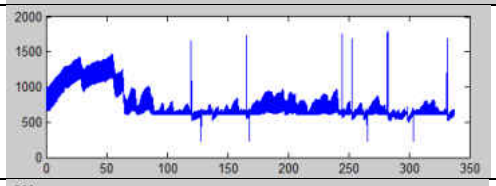
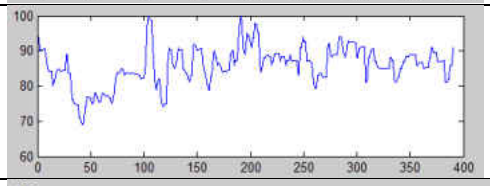
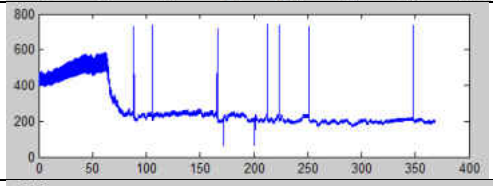
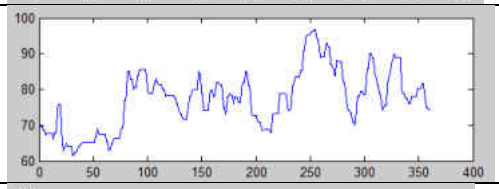
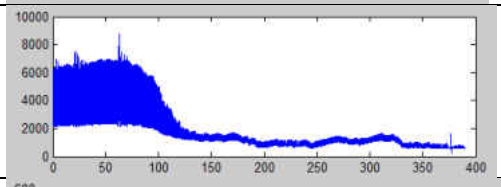
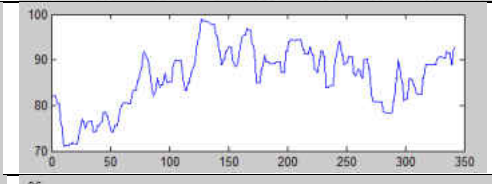
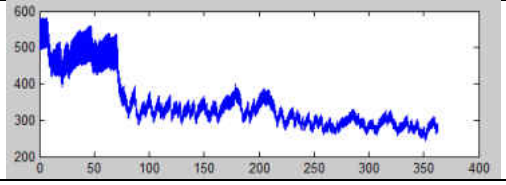
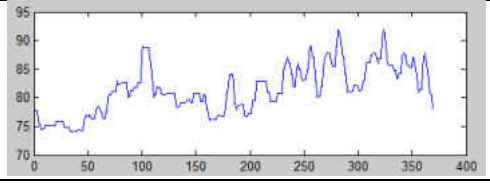
43		
44		
45		
46		
47		
48		
49		
50		

Participant Number	GSR	Heart Rate
51		
52		
53		
54	Data Recording Error	
55		
56		
57		
58		
59		

Participant Number	GSR	Heart Rate
60		
61		
62		
63		
64		
65		
66		
67		

Participant Number	GSR	Heart Rate
68		
69		
70		
71	Data Recording Error	
72		
73		
74		
75		

Participant Number	GSR	Heart Rate
76		
77		
78		
79		
80		
81		
82		
83		
84		

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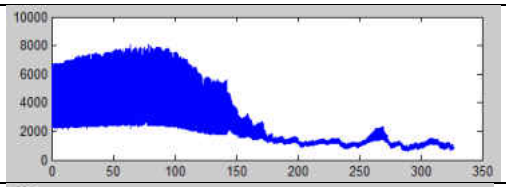
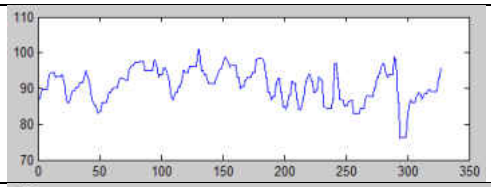
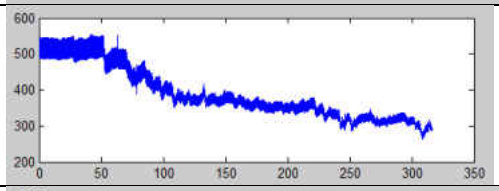
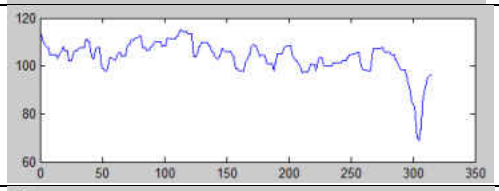
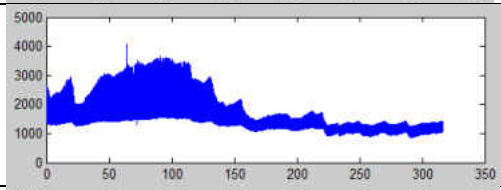
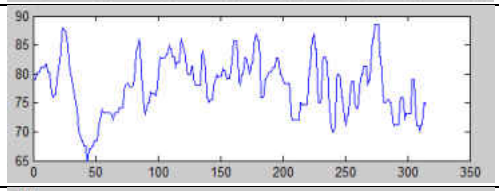
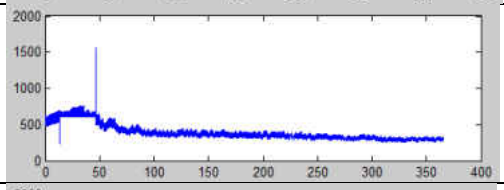
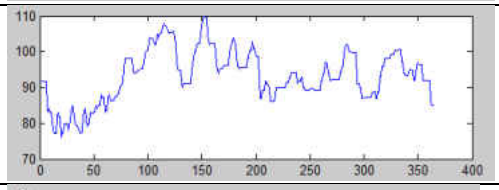
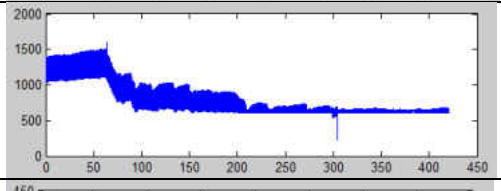
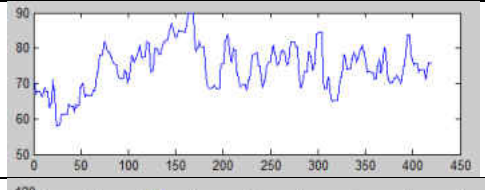
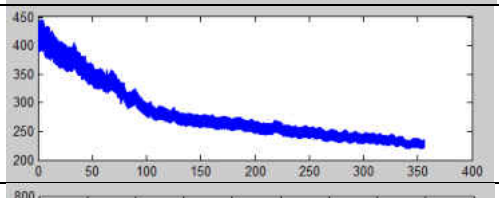
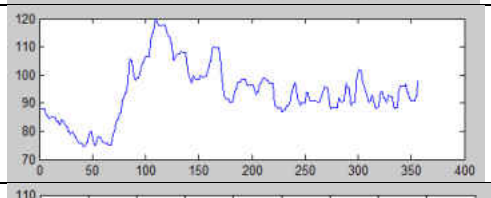
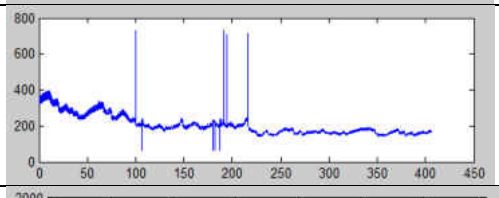
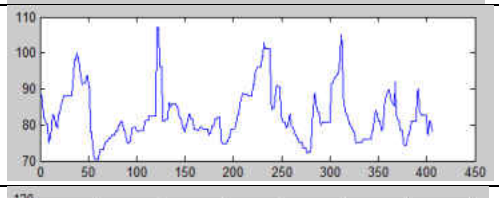
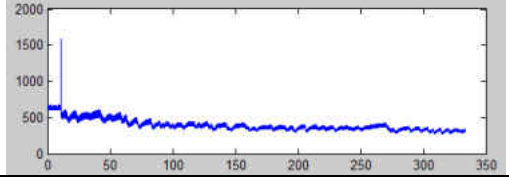
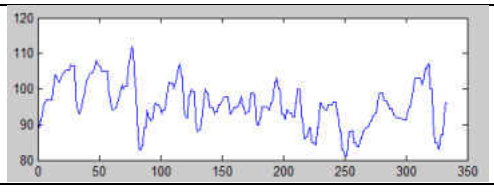
85		
86		
87		
88		
89		
90		
91		
92		

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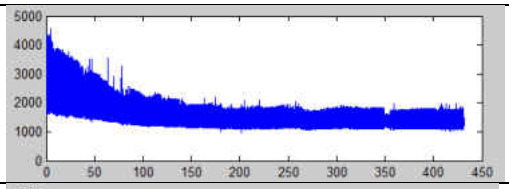
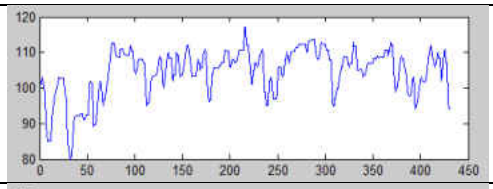
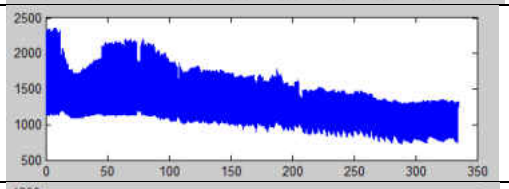
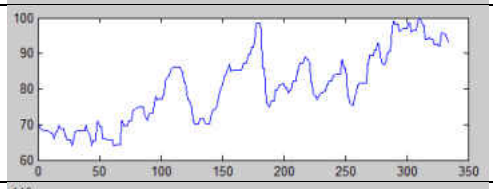
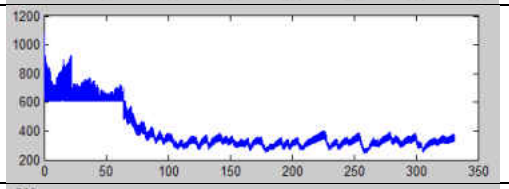
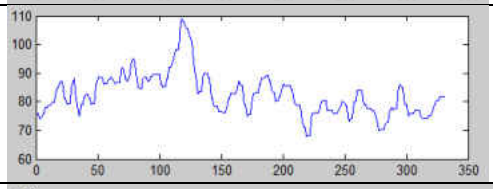
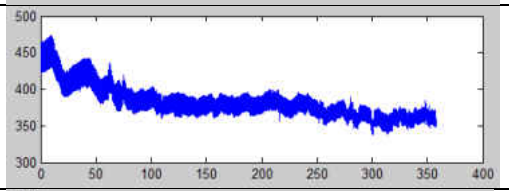
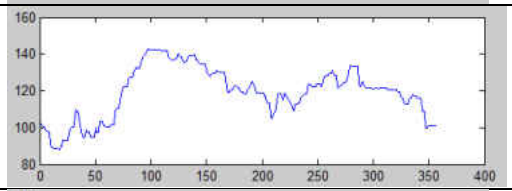
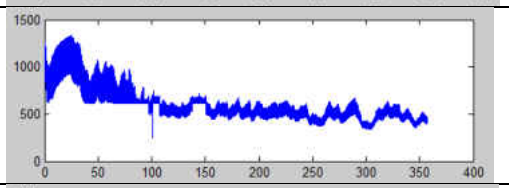
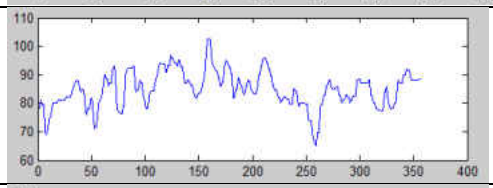
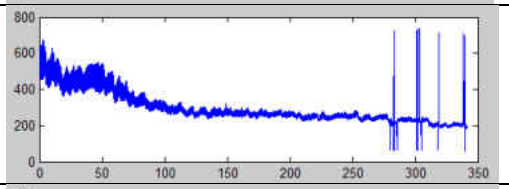
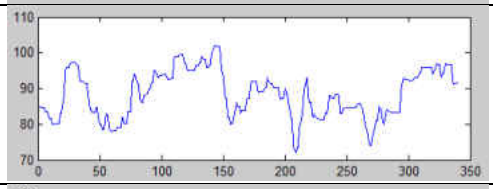
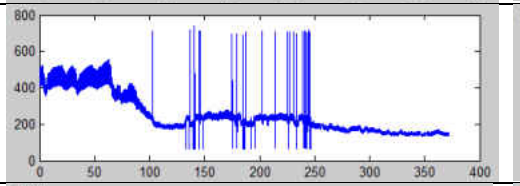
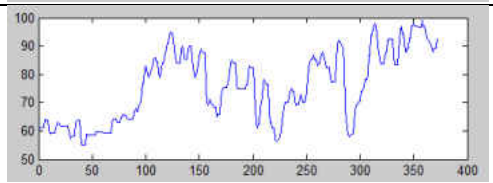
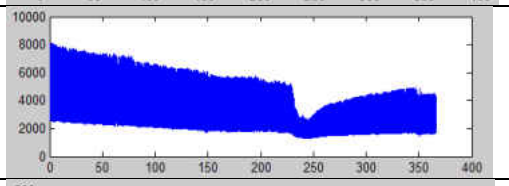
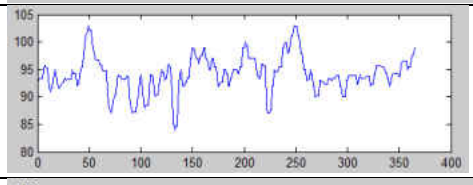
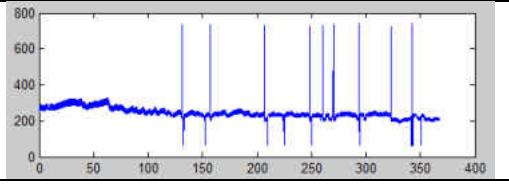
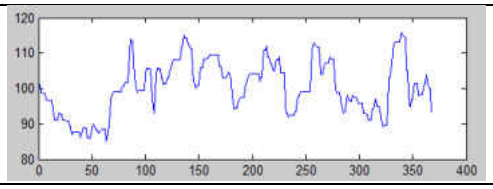
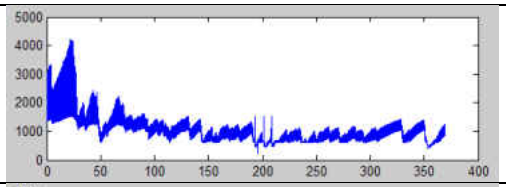
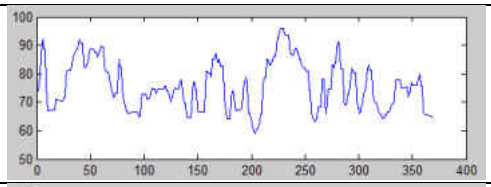
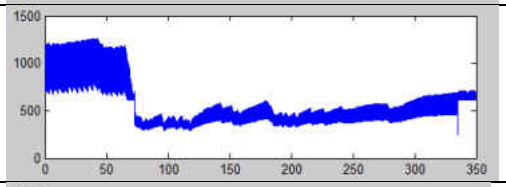
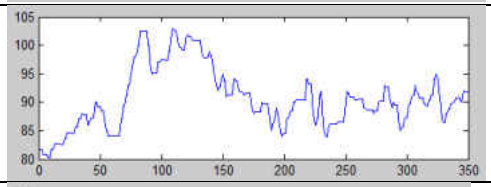
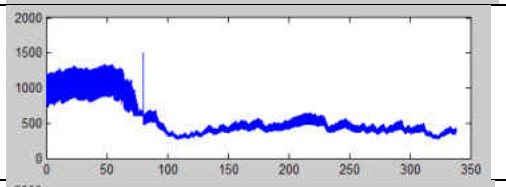
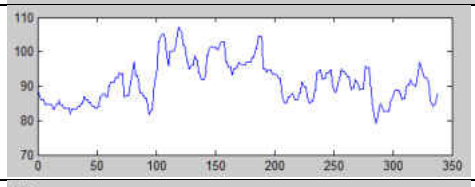
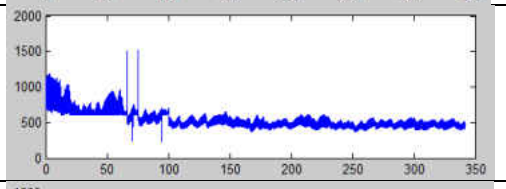
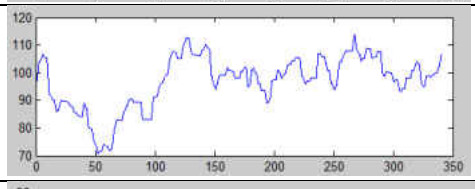
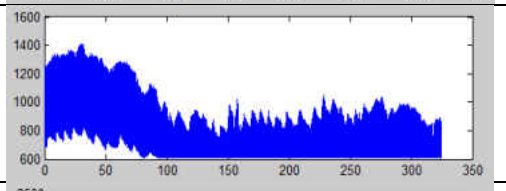
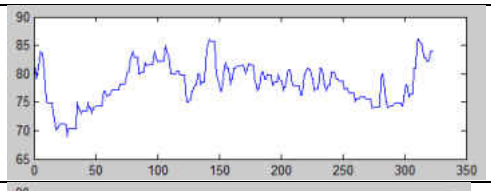
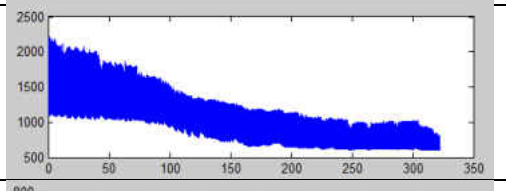
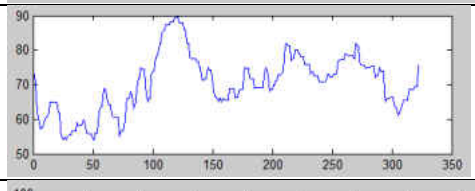
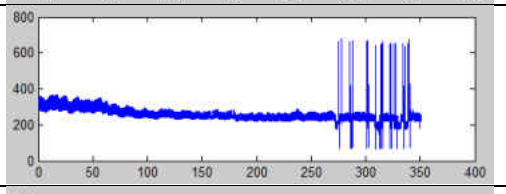
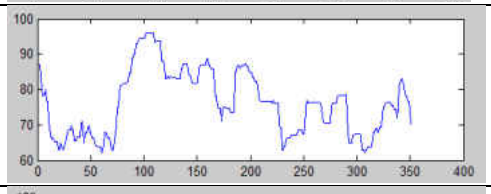
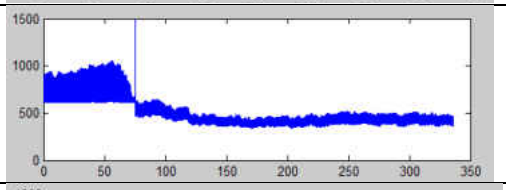
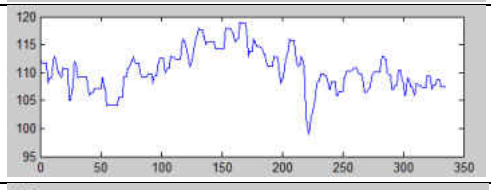
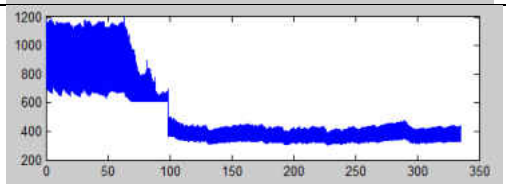
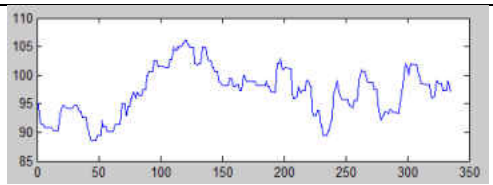
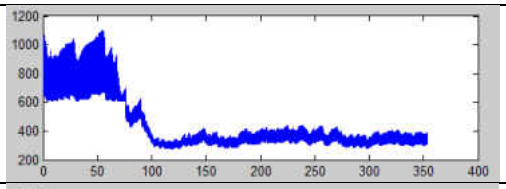
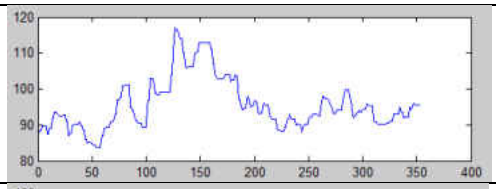
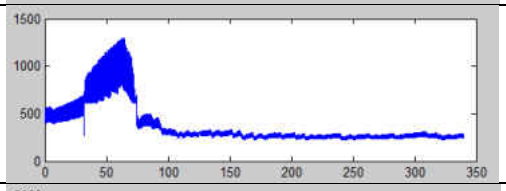
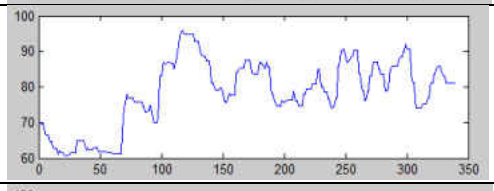
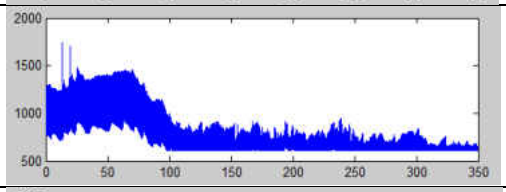
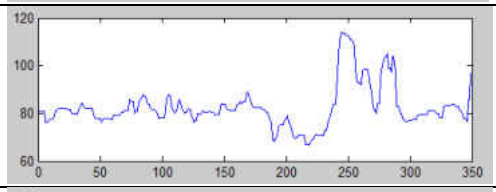
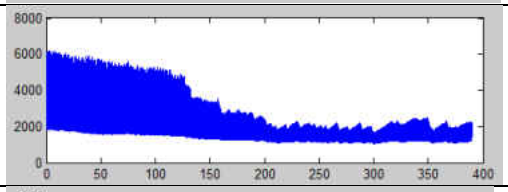
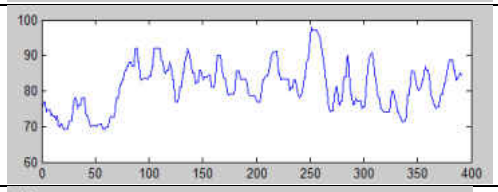
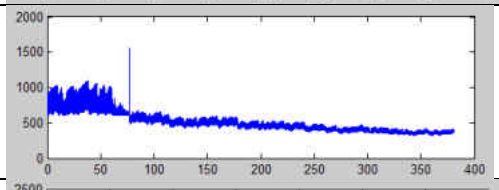
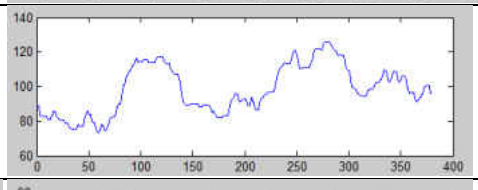
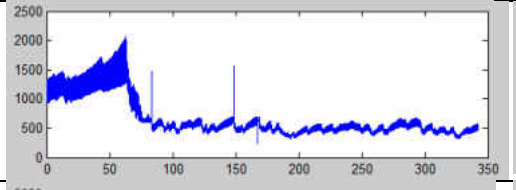
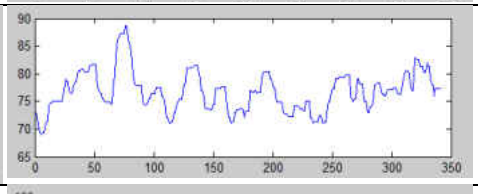
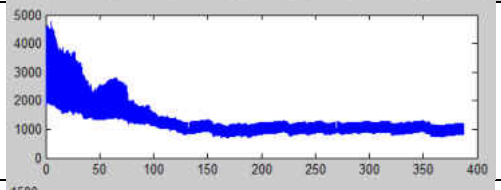
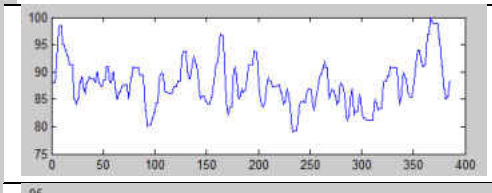
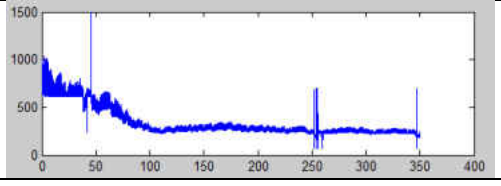
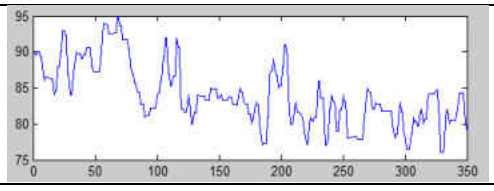
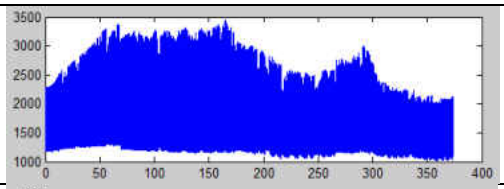
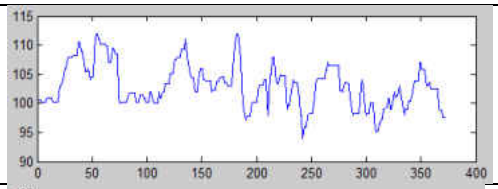
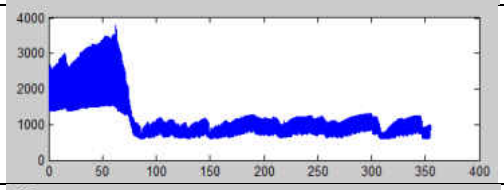
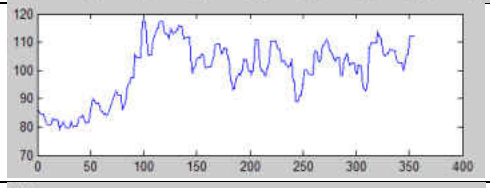
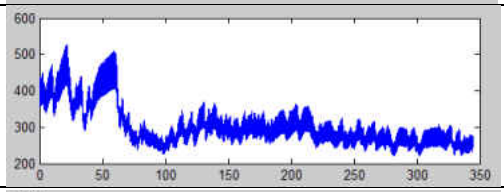
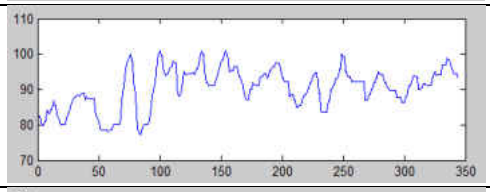
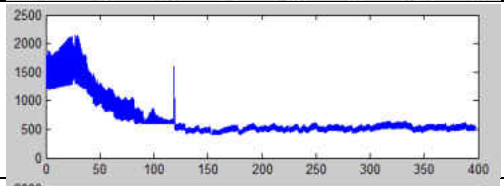
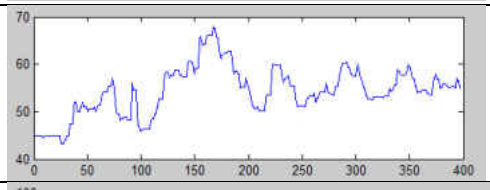
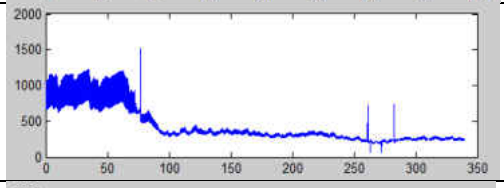
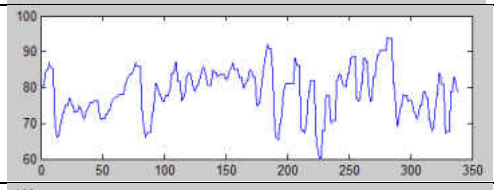
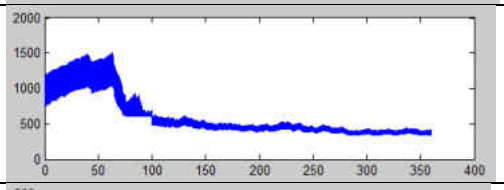
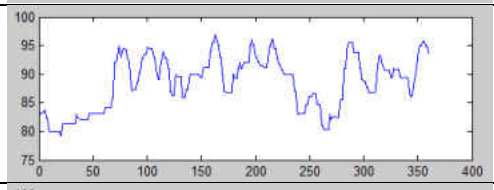
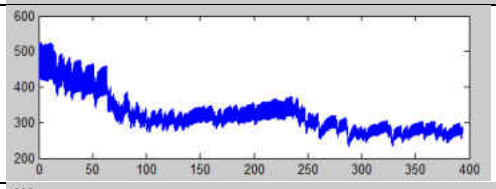
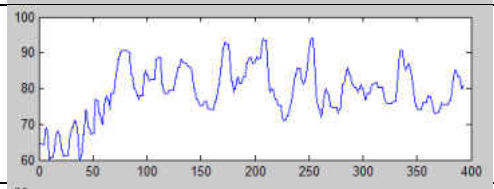
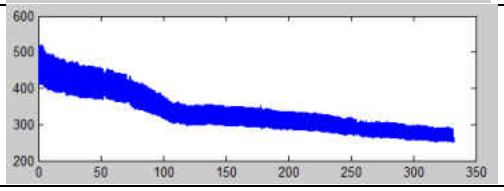
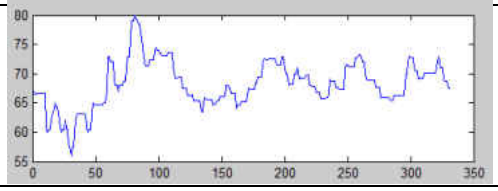
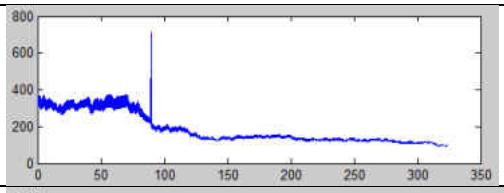
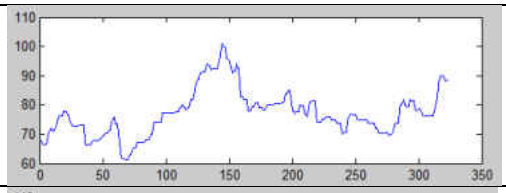
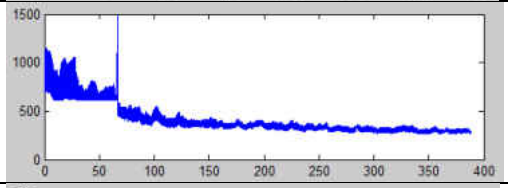
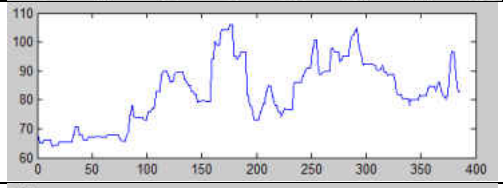
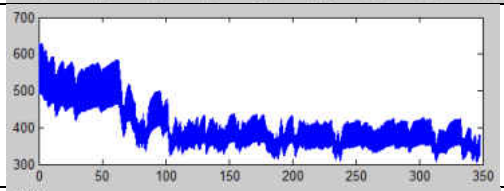
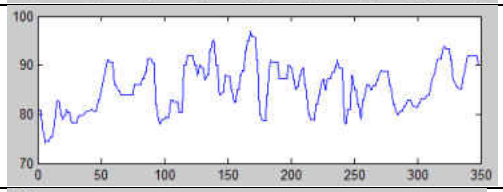
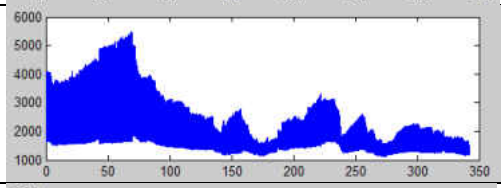
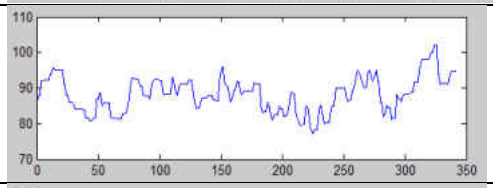
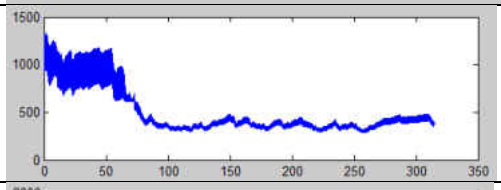
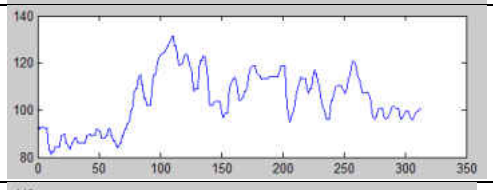
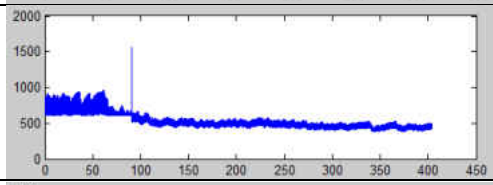
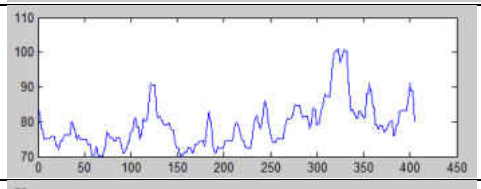
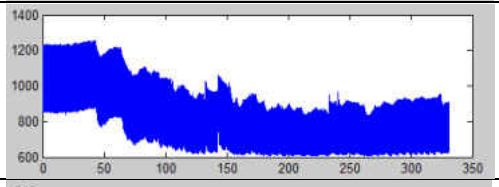
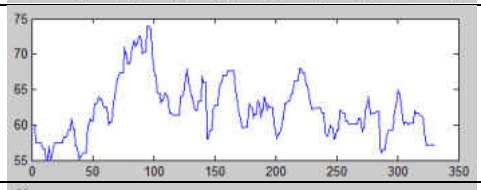
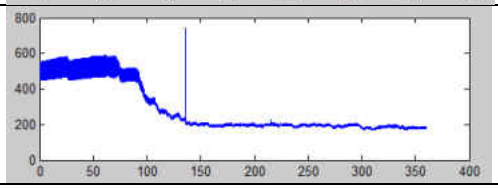
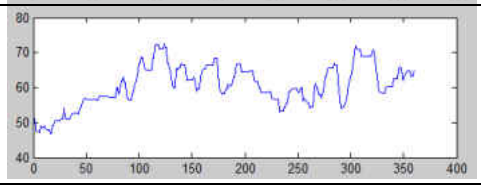
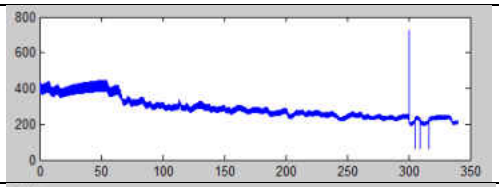
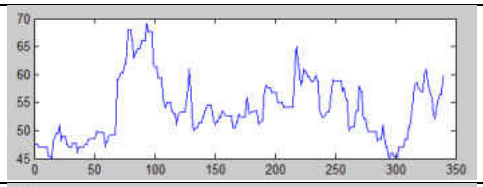
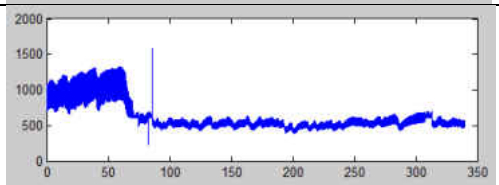
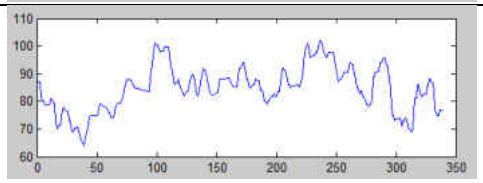
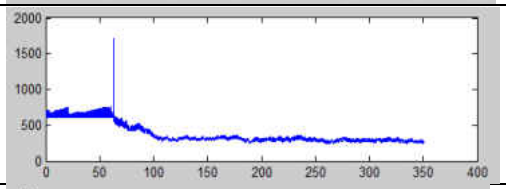
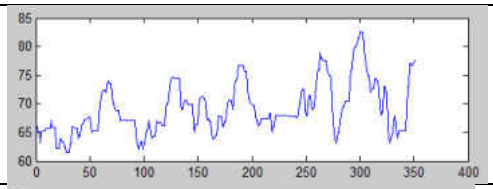
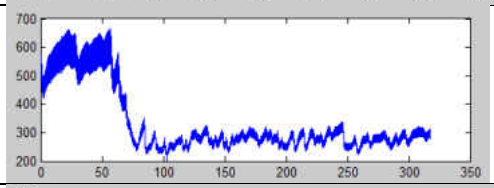
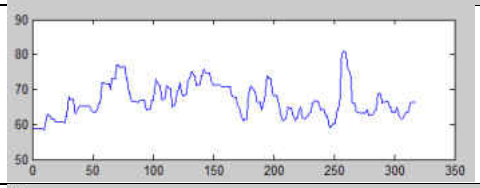
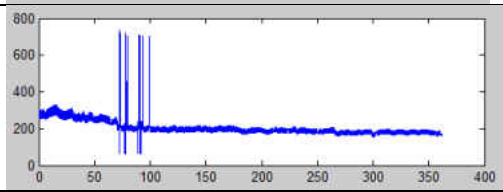
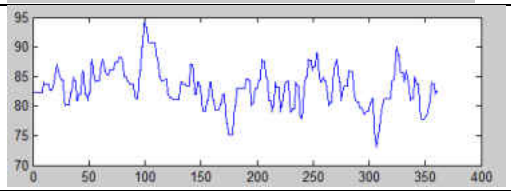
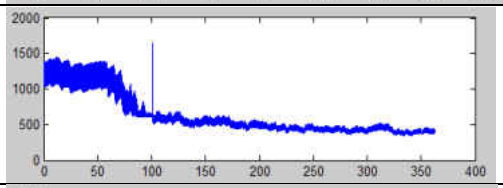
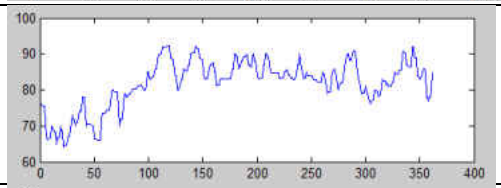
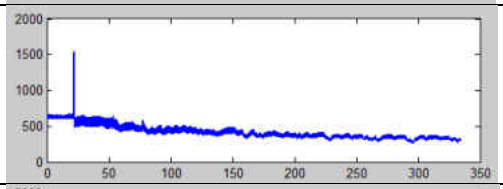
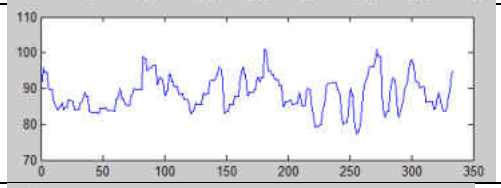
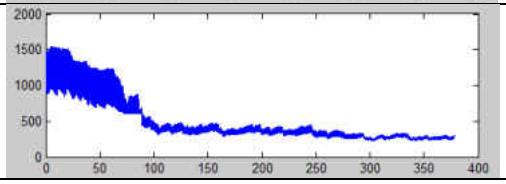
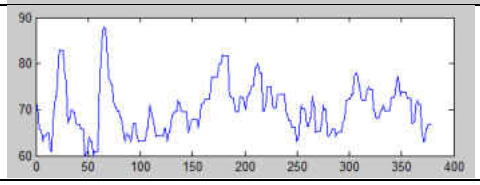
93		
94		
95		
96		
97		
98		
99		
100		
101		

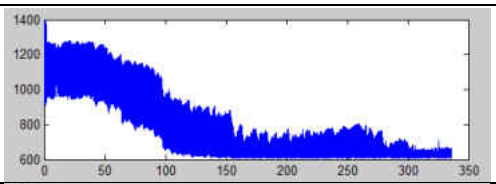
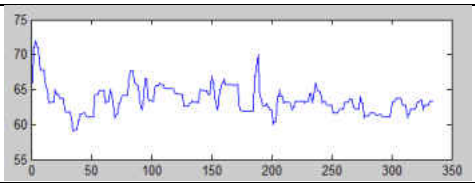
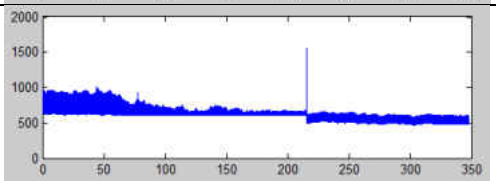
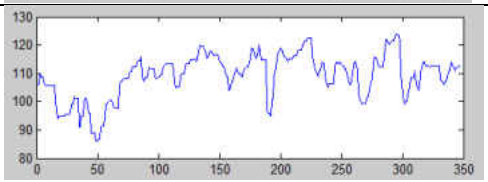
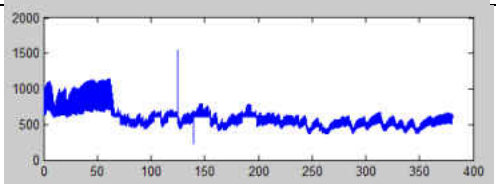
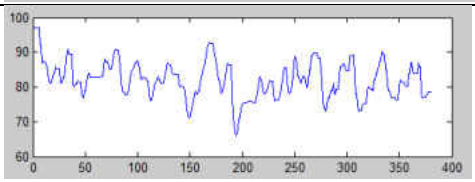
Participant Number	GSR	Heart Rate
102		
103		
104		
105		
106		
107		
108		
109		
110		

Participant Number	GSR	Heart Rate
111		
112		
113		
114		
115		
116		
117		
118		

Participant Number	GSR	Heart Rate
119		
120		
121		
122		
123		
124		
125		
126		

Participant Number	GSR	Heart Rate
127		
128		
129		
130		
131		
132		
133		
134		

Participant Number	GSR	Heart Rate
135		
136		
137		
138		
139		
140		
141		
142		

Participant Number	GSR	Heart Rate
143		
144		
145		

APPENDIX E: QUALITATIVE CODING OF ITC SOPI FREE RESPONSE

Table 19 - Qualitative Coding of ITC SOPI Free Response Item

Participant Number	Written Response	Coding
1	Very believable responses from the simulation characters. This was a very memorable and engaging experience. Thank you!	Authenticity Memorability Engagement
2		
3		
4	Technologically, the product is facinating. As an avid gamer and computer-geek, however, I found myself more engrossed with the technology than the on-goings of the storyline. I do not believe that fault lies in the development. More so with myself and my own geekiness.	Technology Engagement
5	Good adaptive response base, didn't expect it to keep up with all of the curve balls.	Responsiveness
6	My initial assumption was that this game may have been established with a set of algorithms and that the characters would speak based upon hearing or seeing specific command words. However, when Tina spoke about Volleyball and the Jazz Band, along with her timing with speech, I felt as if another person was simply participating from a neighboring computer. Reminds me of the game FACADE. It's free for download.	Agency
7	I am glad I was able to volunteer and experience this virtual world!	Volunteer
8	I really enjoyed participating.	Engagement
9	A very good simulation. I felt that it was responsive to most of my vocalizations and to other sounds (like laughter) that indicated my response. Better graphics might increase the sense of realism, but overall I was drawn in and enjoyed the experience.	Responsiveness Technology Graphics Authenticity (neg) Engagement
10	I really enjoyed participating, it felt as if I ws there at the party, but in reality I wasn't and if the simulation was more realistic, I would have been able to fully immurse myself into the simulation. Thank you. P.S. I was really surprised when Tina called out my name, the I realized this was a bit more personal than past experiences.	Engagement Presence Authenticity (neg) Responsiveness
11		
12	The audio capture and recognition was amazing graphics were lacking but the ability to have dynamic conversations and responses that mostly felt unique was astounding.	Technology Audio Graphics

Participant Number	Written Response	Coding
		Responsiveness
13		
14	The girl was too obviously a response to my input (saying she did PR after I said I did PR). It was not another character I was interacting with, but a computer of course, but it didn't fell "human."	Agency (comp)
15		
16	The environment itself reacted to me in a way that astounded me. I had trouble deciding whether or not the characters were AI or actual people. The only thing that drew me back was the unreal graphics.	Responsiveness Agency Technology Graphics Authenticity (neg)
17		
18		
19	Conversation was very realistic; it drew me away from my usual thoughts except when I mentioned seeing my friends for Thanksgiving.	Authenticity Engagement
20	The environment seemed realistic but the characters also seemed less realistic due to graphic illustration and some facial movements when talking	Authenticity Authenticity (neg) Technology Graphics Face
21		
22		
23		
24	It was fun and cool. I wish I could've participated a bit longer.	Engagement
25	I was extremely amazed with how the game responded to what I said. It made me feel like it was all real.	Responsiveness Authenticity
26		
27		
28		
29	Very cool. Felt like a real world experience.	Authenticity
30		
31		
32		
33		
34	Playing was very interactive & felt natural, as if it were actual life.	Responsiveness Authenticity
35		

Participant Number	Written Response	Coding
36		
37		
38		
39		
40		
41	A really interesting experience that seemed to draw content from the videos we had to watch before attending (unless there's consent). It was interesting to be put in a virtual situation like that.	Interesting
42	It seemed as if I were talking to real people.	Authenticity
43	I thought it was very cool that I could change the topic of the conversation and Tina would know immediately what to say.	Responsiveness
44	I did not like Dylan.	Dylan (neg)
45	Dylan need to learn some manners.	Dylan (neg)
46		
47	I thought is was cool how the characters took what I said into account and started conversations from my responses.	Responsiveness
48	I was really surprised at how realistically the characters seemed to respond.	Authenticity Responsiveness
49		
50	There was a pause between me and Dylan when Dylan first came in. I don't know if that's me being socially awkward or I didn't read social cues well or whatever. I also had a socially awkward start when initializing the conversation with my friend.	Awkward
51	It was really cool how the characters responded specifically to what I said and waited for some of my responses. For example, when Dylan asked what we wanted to drink, I hesitated and he said, "well Amber. do you want a drink?" That was pretty interesting.	Responsiveness
52		
53	If it is a game, I feel as if to be more entertaining the game should have more things to do, the player should be visible and be able to move around more, and your real life friend should be able to play this game with you. Personally, by playing with my friends I would be more comfortable instead of talking to strangers. Thank you! Overall it wasn't a bad experience. :)	Boring Cooperative play
54	Conversations felt very natural like speaking to an actual person and not a virtual character. I enjoyed it and seeing	Authenticity Agency

Participant Number	Written Response	Coding
	each character's personality respond accurately to mine.	Responsiveness
55		
56	I'm not usually very social.	Awkward
57		
58		
59	Really cool experience!	Engagement
60		
61		
62	The experience was somewhat confusing.	Confusing
63	I felt immersed in a somewhat real world, only thing that held me back a little was the models for objects and characters, but besides that I was honestly amazed and I would honestly like to see this implemented in a game.	Presence Technology Models
64		
65		
66		
67		
68	I really liked the experience. It was very interactive and fun. Very realistic.	Engagement Responsiveness Authenticity
69		
70		
71		
72	Really impressed by the smoothness of the A.I.	Responsiveness Agency
73	Though it was an animated character I still felt as if our conversation meant something to it. For example, when I "had his back" with the beer.	Agency
74		
75		
76	The one time that Dylan directly was talking to Adrian and I was talking to him he didn't seem to respond. The conversations were very realistic. One thing is that Adrain said "that's cool" often. Other than that the characters were well made. Graphics could be improved significantly, though and a change of scene or a moving scene would make it much more impressive. What you have so far though is incredible and I have never played anything that had characters treat me like part of them would before! Absolutely brilliant.	Authenticity Technology Graphics Responsiveness Responsiveness (neg)
77	This seems like a fun game.	Engagement

Participant Number	Written Response	Coding
78	The experiment was quite entertaining and was something I truly would love to see in the future. the only thing I'd like more of is the ability of the characters to interact more in-depth with you. I regarded Tina as a minor acquaintance who didn't want to engage too deeply with our conversation.	Engagement Responsiveness (neg)
79		
80	Overall this was an interesting experience. At first the characters seemed like just cartoons on a monitor but it was easy to interact with them as if in a real life situation.	Authenticity Authenticity (neg) Interesting
81		
82		
83	Really cool experiment and simulation! Would recommend to anyone!	Engagement
84		
85	Felt super awkward speaking to the screen especially since I was unaware of what my objective was, but it was really cool to do the entire thing. I enjoyed the "douchebag" voice given to Dylan and the fact that when I spoke the words were recognized.	Awkward Engagment Technology Audio Dylan (neg) Responsiveness
86	The characters could do better with changes in responding to my tone of voice and using sarcasm and such	Responsiveness (neg)
87		
88		
89		
90	Assuming that all audio was prerecorded, I was blown away when it responded to my Colorado statement, very impressive. For a video game, not the most entertaining but for some sort of A.I. it was quite unbelievable.	Responsiveness Boring Agency
91	I was greatly impressed by the character's ability to respond and interact to me. However, I didn't like the situation and didn't really get to absorbed.	Responsiveness Engagement (neg)
92		
93	High level of accuracy related to speech recognition, response time, and dialog. Surprised at "reality" effect, creating a bridge between the "displayed environment" and my own physical existence, experience and reaction to a real world situation. Best of luck on the study and great work on the simulation.	Responsiveness Authenticity Presence
94		

Participant Number	Written Response	Coding
95		
96		
97		
98	I'm very interested to see what this research accomplishes! As an animation major, I love seeing technology utilized to its full potential & I enjoyed seeing the characters react to my words & choices in a believable way!	Technology Engagement Responsiveness Authenticity
99	So cool! I've never done anything like that before: it was cool that the game play pertained to my answers and how I responded.	Engagement Responsiveness
100		
101		
102	I thought it was pretty interesting the simulation pretty much knew exactly what to say & how to respond to my answers. It was effective that the character led the conversations.	Interesting Responsiveness
103		
104		
105	A job well done.	
106	It is a new experience to me and it was a little awkward to get used to.	Awkward
107	The experience was really enjoyable. I know its a beta but I would like the graphic to be a little better. Overall, I loved the interaction. I had a pretty interesting conversation with the computer.	Engagement Technology Graphics Responsiveness Interesting Agency
108		
109		
110		
111		
112		
113		
114	Responses were very realistic and so was the environment.	Authenticity
115		
116		
117		
118	It was a cool experience and was surprised how the simulation reacted when we both talked at the time and we both would stop and ask what each other were going to say.	Engagement Responsiveness
119	The characters remembered the things I told them about	Agency

Participant Number	Written Response	Coding
	myself seemed like I was talking to an actual person.	
120		
121	I enjoyed the experience and thought that it was great that it took everything I said into account for future conversations during the simulation.	Engagement Responsiveness
122	Wow really interesting	Interesting
123	The virtual environment was great to experience hands on	Engagement
124		
125		
126	Very surprised at how interactive it was	Responsiveness
127	Made me feel like I was making awkward chit-chat!	Awkward
128	It was definitely an awesome new experience. It was cool how the characters responded to everything I said, or didn't and then conversation progressed from there.	Engagement Responsiveness
129		
130	I felt that Adrienne was more believable as a person and friend, while Dylan was too animated and reminded me of a stereotypical movie character.	Adrian Authenticity Dylan Stereotype
131		
132		
133		
134	I found it interesting how well the characters responded to my input and seemed to have their own views on what I was saying.	Responsiveness
135	fun to be conversating with the characters	Engagement
136		
137	There is a strong likelyhood that the characters were voiced by a real person with a microphone. This is because they were unusually responsive and believable and there was a one way mirror to my left and I'm certain these was another person watching behind it.	Agency Responsiveness Authenticity Real Environment
138	If the graphics were a little better it would seem even more real.	Technology Graphics Authenticity (neg)
139	I really would have liked the experience to continue and have a chance to test a different scenario.	Engagement
140		
141		

Participant Number	Written Response	Coding
142	The voice recognition & conversation was phenomenal.	Responsiveness
143		
144		
145	The experience was very surreal, I was impressed.	Surreal

APPENDIX F: QUALITATIVE CODING OF TINA CHARACTER PERCEPTION FREE RESPONSE

Table 20 - Qualitative Coding of Tina Character Perception Free Response Item

Participant Number	Written Response	Coding
1	Her responses and vocal inflections were very realistic and reminded me of friends who are like that. Although her movements didn't seem to natural, the way she spoke to me was very friendly.	Authenticity Motion Friend
2	She seemed like she really was a friend, which I found surprising. I would compare her easily to friends I have in my life.	Friend
3	She seemed like she would be a good friend to just about anyone but she is independent and stands up for herself.	Friend Independent
4	I am not sure whether or not Tina was developed to allow for player reaction and in-world control, but tha tis what she seemd to do. That, as a result, is why I perceived Tina as selected above.	Agency (comp)
5	Tina used dialect and speech pattern that irritates me, but her attitude and personality were not over all bad. I cannot judge the attractiveness of a simulated character.	Speech Irritating Can't judge
6	Pretty firendly. Seemed as if she was like any friend I have.	Friend
7	Tina was pretty cool the whole time. She stood up for me when I just wanted a Sprite! She felt like a real friend !!	Cool Stood up for me
8	I felt Tina was nice in the way she responded to me; I thought she was smart for making the decision not to drink. I thought she was shy in that she was just with me on the couch. She just seemed vulnerable, she mumbled when the other guy came in.	Nice Smart Shy Vulnerable Speech (low status)
9	I felt no real personal connection with Tina. If I had some prior experience, or knew how I knew her, I would feel like we had a connection. Or if I had met her with no prior interaction and no indtroduction I would feel a stronger connection, Better graphics would also add to the realism of Tina.	No connection Lack of knowledge / experience Graphics Authenticity (neg)
10	Tina is smart, friendly, capable,...beacuse this is what I gathered from our encounter. The first question is more of my opinion, I'm just indifferent. Tina wasn't aggressive towards me but aggressive when Dhillon tried to get me to drink when I didn't want to.	Smart Friend Capable Indifferent (part) Stood up for me
11	Tina did not fear conversation and responded. I viewed her as a sweet, caring person due to her sympathy for my situation,	Nice Caring

Participant Number	Written Response	Coding
	compliments, and her gratitude. She didn't confront Dylan but let me handle the situation, but she supported me like I believe a friend would in the situation. Her responses indciated that she was like any other girl and she seemed capable of handling herself. I responded to her like I would anyone and viewed her mentally as a person.	Sympathy Compliments Gratitude Let others control Supportive Friend Capable Agency (person)
12	She was forward and direct about things but let Dylan control conversation. She was friendly with class and helping me study. the unattractive was the graphics of game itself, and the nose	Direct Let others control Friend Graphics
13	Tina was very outgoing. She did try to draw me in. She was not exactly a person I would call a friend based on my personality.	Outgoing Not friend
14	Passive + Likeable + Friendly because agreeable. She because her statements depended on my input.	Passive Likeable Friend Agreeable Depended on me
15	Tina was able to kindly respond to everything I said and seemed like a nice person. She was able to carry the conversation whenever I was unsure what to say. When Dylan came around, she kept her cool and wasn't over-the-top when pushing him away.	Caring Nice Stood up for me
16	She was pretty laid back and spoke nicely. Chatted about her day and mine. She was pretty passive when Dylan mistreated her. She didn't stand up for herself. But she thanked me and wanted to hang out more. So she seemed nice.	Laid back Passive Let others control Nice
17	Tina approached me as if she was a friend of mine for a while. Making comments on things that enjoy such as my shirt and Tom Hanks.	Friend
18	She seemed like a person who wouldn't stand up for herself when I started calling the other guy a jerk	Let others control
19	Because of her responses; she failed her stats midterm (stupid), complimented me on my looks (nice), didn't react negatively when the host called her lame (passive/weak), and	Stupid Nice Passive

Participant Number	Written Response	Coding
	made sure it was fine with me if we left the party (likeable).	Likeable
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36	Her responses & conversation were kind, she kept the conversation going. When the boy, Dylan walked up she was quiet & didn't really talk much.	Caring Quiet around Dylan
37	She acted confident.	Confident
38	It was hard to gauge attractiveness as she was not very realistic, I could tell she was an image created by someone. She seemed smart because she felt good about her midterm. She seemed friendly, nice, and likeable because she engaged me in conversation and asked additional questions about me. In the interaction with Dylan she seemed to show that she was outgoing, but also capable and willing to speak her mind, which made her seem strong rather than weak.	Authenticity (neg) Smart Friend Nice Likeable Speech Outgoing Direct Strong
39	Tina went along with whatever I said & never had her own thoughts or choice. She took criticism form the guy even though he was a jerk.	Went along Let others control
40	She seemed friendly since she asked about my day and very nice but she had a hard time defending herself. Had she said something or I interrupted, her character could appear differently. I feel that Tina is different for everyone.	Friend Nice Vulnerable
41	Tina was portrayed as a very likeable character, we're "friends" after all. She was rather sure of herself when it was	Likeable Confident Passive

Participant Number	Written Response	Coding
	"just the two of us" but when Dylan arrived she became very timid and passive, therefore I had to "intervene." She's neither smart nor stupid, just a "regular person."	Timid
42	Tina seemed to care about what I said and always had an appropriate response. She seemed very competent in conversation and acted as a real woman.	Caring Competent
43	I feel this way about Tina because this is the way she made herself appear to me. She was friendly and outgoing and at one point I kind of felt we were actually friends. She was passive because she was also quick to agree with many things I did/say.	Friend Outgoing Passive Went along
44	Tina was extremely nice and very talkative. Dylan being a jerk caused Tina to become more shy and unsure of herself.	Nice Outgoing Shy Timid
45	She's a nice girl just looking for conversation. The level of maturity displayed far surpasses most of the girls I see on-campus.	Nice Mature
46	Tina was friendly but I didn't know her well enough. I couldn't exactly judge her within the few minutes I met with her.	Friend Can't judge
47	She reminded me of a close friend I had in high school.	Friend
48	She was nice, polite. With Dylan, she seemed a bit passive. I felt like she and I connected, like we were actual friends.	Nice Polite Passive Friend
49	During my experience, she didn't respond too much to my situation with Dylan where he got upset to my non-drinking. Displayed her as rather passive where as a friend she could have stuck up for me more. :)	Passive Friend Didn't stick up for me
50	She looked hot when I imagined her looks and design to be more human like in my mind. Mostly, the conversation w/ her was very fluid and life-like, making me suspect that another real human was actually talking to me on the other side of the game. the conversation w/ her led me to those feelings.	Attractive Authenticity Agency (person)
51	I feel this way about Tina because she sounded kind of sad and apparently I agreed to come to the party with her so I get the feeling she's too shy to go alone. Also, when we talked to Dylan, she waited to see my responses to him before reacting.	Sad Shy Went along
52	I think that Tina might have been unattractive from the way that Dylan responded to her, calling us the "lame couch." She	Unattractive Stupid

Participant Number	Written Response	Coding
	might have been stupid as she said she failed her exam. But she seemed pretty nice & likeable.	Nice Likeable
53	In real life I am shy so some parts were awkward but Tina was a friendly likeable character.	Awkward Friend Likeable
54	She complemented me where appropriate and asked me questions but was not 100% engaging. Plus, in the situation where the host came over and offered me a beer, she remained silent until he has left.	Complements Boring Quiet around Dylan
55		
56		
57		
58	I see Tina this way mainly because of the responses I got out of her. She was extremely friendly to me, yet seemed kind of depressed. She acted very passive and shy around Dillon, but at the same time she held her ground and did not get talked into drinking. Finally, I did not really ask her anything to gauge how smart she was so I will never know.	Friend Sad Passive Shy Independent
59	Because she made an effort to be my friend in the game, and wasn't rude in any way.	Friend Polite
60	She was very engaging with at the party and to herself. When the male character came around she seemed to freeze up. We had a great conversation about a wide variety of subjects.	Engaging Quiet around Dylan
61	She carried most of the conversation. She wasn't too intimidating and vey talkative.	Outgoing
62	She didn't say anything to Dylan but always tried to make friendly conversation.	Quiet around Dylan
63	Mainly due to her responses, since she maintained eye contact with me and she was very kind with how she gave compliments and wouldn't tease me or pester me with anything.	Caring Complements
64	She seemed to be a fairly nice person and made a good effort at maintaining a conversation. She seemed like a real enough, though not very remarkable person.	Nice Authenticity
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Participant Number	Written Response	Coding
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78	By the way she seemed isolated and withdrawn at the party. Her shell seemed not to disappear at all and showed her as someone who liked staying to herself.	Isolated Introverted
79	She was like any other female friend, just introverted and pixelated. Intelligence was not tested, too virtual reality to think about attractiveness.	Friend Introverted Authenticity (neg.)
80	As I got more into the simulation Tina seemed more like a real person because of her interacting with me. She seemed to be interested in what I thought just as a real friend would be.	Authenticity Friend
81	Apparently Tina and I went to the party together and she agreed with me with the no drinking alcohol.	Agreeable
82	She seemed interested in what i had to say and open to talking to people and interacting at the party, but it was clear that I was in control of making decisions (accepting a drink from Dylan or not, when we left the party...)	Outgoing Let others control
83	She was really nice, in a weird, flirty, video game character way. She was awkward but trying to open up to me even after I shut her down.	Nice Flirty Awkward
84	Because of her responses, i.e. (98 on psych test) "DD showed responsibility	Responsible
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86		
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94	I felt this way by the tone of her voice and her hand gestures. I felt that Tina did not express excessive amount of trait where she should be labeled positively or negatively	Speech Motion Can't judge

Participant Number	Written Response	Coding
95	I think she was very friendly and acted like she was really interested in my life. She asked questions, which made me feel more comfortable.	Friend Caring
96	She seemed very shy and reserved. She said she didn't have much experience with parties and asked for me to get her an interview, rather than attempting to secure one herself. She also seemed to simply "go along" with my responses.	Shy Went along
97	The way she responded to my questions and responses were like the responses of actual people I've met. She seemed friendly enough.	Authenticity Friend
98	She seemed to want to stick up for herself, but probably would have chosen to drink if I had.	Went along
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115	She did not give into peer pressure from Dylan, and she kept calm while he was antagonizing us. She also followed most of her dialogue with questions about me instead of focusing on herself.	Strong
116	I felt that I could relate to Tina and that she was easy to talk to. It was a little awkward at first but the more we talked, the more I felt comfortable.	Awkward Engaging
117	She is sorta like me. Calm, shy, but really nice and friendly.	Shy Nice Friend
118	Well first Tina and I were secluded on the couch away from everyone else why she was shy. She was smart and capable	Isolated Shy

Participant Number	Written Response	Coding
	because she aced her test and she was passive when Dylan had sat between, she got quiet.	Smart Capable Passive Quiet around Dylan
119	She was friendly and remember things I told her but would stand up for herself.	Strong
120	Tina was friendly and held a conversation with me. When Dylan came over and offered us drinks, she was strong willed when I said no and did not let him persuade her into drinking. I found Tina likeable and outgoing because of the conversation we had. She even felt comfortable enough to tell me about her brother. She was physically attractive and had a great personality.	Friend Strong Likeable Outgoing Attractive
121		
122		
123		
124		
125		
126		
127		
128	Tina was very shy when the house owner came over and appeared to not want him there. She wasn't open to meeting new people or even defending herself from this very rude stranger.	Shy Introverted Vulnerable
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Participant Number	Written Response	Coding
144	I felt this way as she was pretty normal in character and felt like someone who would act the way she did in an environment not comfortable to her.	Authenticity
145	She was a very friendly individual that stood up for what she wanted and wasn't pressured.	Friend Strong

APPENDIX G: QUALITATIVE CODING OF ADRIAN CHARACTER PERCEPTION FREE RESPONSE

Table 21 - Qualitative Coding of Adrian Character Perception Free Response Item

Participant Number	Written Comment	Code
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20	I had a good amount of time to interact with him. He seemed to be made of good friend material. The interaction felt friendly and sociable.	Friend Social
21	He is more laid back and go with the flow person. He is shy based on the way he reacted to Dylan by lowering his head.	Relaxed Shy Gesture
22	He was a nice, easy going person and kept conversation going even when there were moments of silence.	Nice Relaxed Conversation
23	His actions and the way he was responding to what I was saying.	
24	He seemed chill and down to earth. Like a friend I've known for a while.	Relaxed Friend
25	He kept the conversation going and never let there be a dull moment. When Dillon was being rude to me he stepped in like a real gentleman. He stuck up for someone he didn't know that well over one of his friends.	Conversation Gentleman Stood up for someone
26	Throughout our conversation he seemed very calm and collected. He seemed to care about what I had to say and how	Relaxed Care Drunk (Dylan)

Participant Number	Written Comment	Code
	I responded to him. He also handled the situation with the drunk friend very well too. Overall, Adrian was very likeable and this led to how I feel about him.	Likeable
27	Adrian supported my decision to not drink and stood up for me. It seemed as if we knew each other pretty well and I found myself interacting with him as I normally would with friends.	Supportive Stood up for someone Friend
28	I felt this way because of my interaction with him and how he responded to different things.	
29	he seemed easy going and capable of carrying on a conversation with new people. He was a nice guy.	Relaxed Conversation Nice
30	He asked questions about me and cared about what I had to say and how I felt.	Questions Care
31	He was good at keeping the conversation going and could tell when his friend was getting pushy. He was trying to keep everybody happy.	Conversation Peacemaker
32	The way he asked questions, also how he answered. Then when Dylan showed up he also showed his character and how it was.	Questions
33	Adrian seemed like a relaxed character who's nice because of his attitude.	Relaxed Nice
34	He felt like an actual person; not perfect in every way.	Authenticity
35	b/c Adrian insisted Dylan back off pressuring me to have a beer.	Stood up for someone
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Participant Number	Written Comment	Code
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55	The whole time I interacted with Adrian, he was interested in who I was and what things I like to do. He kept a comfortable environment for me when it kind of got hostile with Dylan.	Interested Stood up for someone
56	Given his responses to my responses, he seemed to convey characteristics of a friendly guy.	Friend
57	I felt this way about Adrian because I don't know him and we got along well for the first time meeting someone.	Didn't know him
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65	He just seemed like a nice person who would stick up for you even if it was uncomfortable to him.	Nice Stood up for someone
66	Adrian was incapable of defending his position on alcohol consumption. He appeared timid when challenged by Dylan and expected others to stand up for him.	Didn't stand up for himself Timid
67	Based upon Adrian's comments about classes and going to parties the impression I got was that the character was generally likeable and outgoing.	Likeable Outgoing
68	Kinda just sat there and didn't move or even try to carry on a meaningful conversation.	Non-responsive
69	The way we interacted and communicated, help me make my decision about Adrian.	
70	Because of how he reacted when the other guy forced the issue on the beer.	
71	He was a very believable character with clearly defined thoughts and opinions.	Authenticity
72	The interaction made me feel like I was talking to an actual person and was thus able to pick up on certain, general, behaviors.	Authenticity
73	He would continue to hold conversation with me, which allowed me to think he is outgoing and nice. The graphics were	Conversation Outgoing

Participant Number	Written Comment	Code
	minimal so attractive/unattractive is hard to pin point. Adrian was not aggressive in his conversation , but passive when he talk about pressure of drink. For example when I said you don't have to drink he made the comment "yeah I guess" (or something along those lines.).	Nice Graphics Passive
74	I believe that because Adrian was the 1st person I saw at the "party" it was easier to communicate with him. He had an easy going personality and seemed nice.	Relaxed Nice
75	Because the character was lacking visual detail with today's technology in the gaming world, it is very easy to see how less "real" older games look and feel. If everything in the virtual living room had more detail, the whole experience, along with Adrian, would have felt more real.	Graphics Authenticity (neg)
76	I felt that Adrian was not very outgoing, but at the same time friendly. He said "that's cool" a lot just to have something to say, yet he was friendly and even a bit funny. He paid attention when I was telling Dylan about his alcohol. then he said "You sure know your alcohol." I thought this was pretty funny. I think he is a passive character because he didn't stand up for himself when Dylan was making fun of him. overall Adrian is a likeable character.	Friend Funny Passive Didn't stand up for himself Likeable
77	Adrian seems to be an ordinary relaxed guy. He was smart not to drive drunk but he also seemed shy because he was only sitting at a party.	Average Relaxed Smart Shy
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85	First of all, his voice was like the "nice guy" voice so I could tell he was supposed to be friendly. He's the type of person that makes me feel awkward and uncomfortable, though, because he makes a lot of small talk and he doesn't have a lot of wit or hubris. I see a lot of character development potential if this were a real video game.	Voice Friend Awkward
86	He defended and supported me when Dylan got angry about me not taking a drink. And throughout the whole conversation	Stood up for someone Supportive

Participant Number	Written Comment	Code
	he was very friendly.	Friend
87	Adrian was a friendly person but there wasn't enough happening in the displayed environment for me to get to know his character better.	Friend Didn't know him
88	He seemed nice and was able to carry a simple conversation without becoming aggressive (like Dylan did). The fact that he didn't say anything to Dylan gave the impression he was slightly on the shy side, or at least somewhat passive.	Nice Conversation Shy Passive
89	He was very social, if the conversation got quiet he had something to say. he managed to stand up for himself without being over the top.	Social Conversation Stood up for someone
90	He was very conversational and responded appropriately as if he were interested in what I had said.	Conversation Interested
91	He didn't stand up to Dylan, so I believe he is passive. Otherwise he was friendly and interesting to converse with.	Didn't stand up for himself Passive Friend
92	Because of the way he talked to me and also the way that he told the other guy to back up when I rejected his offer for an alcoholic beverage.	Stood up for someone
93	Terms used. Conversationality and attempts at small talk. Helpfulness when asked for assistance. Claim that he had "aced" his math test when asked, and his stated major. Also, related to strength; his general appearance and reaction to other character.	Conversation Helpful
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99	He was so nice! And we had good conversations! I felt that he was attractive because of all his other personality traits, smart b/c he didn't want to drink and drive, friendly because he was talking nicely to me, nice- because he is likeable because he's nice. I feel he was shy because he was all the way on the left side of the couch, not close, weak/passive because I felt he was getting attacked by the other guy.	Nice Conversation Attractive Smart Friend Likeable Shy Weak Passive
100	Just the way he talked casually and told Dylan to chill it was	Relaxed

Participant Number	Written Comment	Code
	not aggressive just calm and relaxed.	
101	I felt like that it was just a normal sit down conversation from what I was able to pick up, he seemed like a kind, sort of laid back person. All we really did was sit and talk.	Nice Relaxed
102	He seemed like a nice average guy. The way his character was designed made him so normal. It wasn't like there was this major quality about him to stand out or anything. Just average nice-guy. Especially when his kindness showed when I didn't want alcohol.	Nice Average
103	Easy to talk to, kept conversation going.	Conversation
104	He was a neutral character who responded to my feelings and communication in a similar way that resembled me.	Neutral
105	Beyond the lack of character development (seeing as how the topic of conversation was on me), his personality seemed very agreeable to whoever would speak to him. His build was average and to me his values seemed to fit well with my own.	Lack of development Agreeable Average
106	He was fairly talkative and friendly. But didn't seem like he was too outgoing. He made a smart decision by not taking a drink before driving.	Fiend
107	He seemed like one of those cool kids in college and he loves pizza! You can't go wrong there.	Cool
108	Adrian was very friendly and he acted as if it was a real life situation. His personality was very humble and enjoyable to hangout with.	Friend Authenticity Humble
109	He reminded me of someone who liked to keep to himself and focus on school rather than his social life.	Reserved
110	He wasn't too in my face but he wasn't just part of the background. He was friendly and natural like a real person.	Friend Authenticity
111	He was really nice and seemed really different from Dylan. Also his comment "I don't know how to talk to guys like that" made him seem shy and passive.	Nice Shy Passive
112	I felt this way about Adrian because he was talkative and friendly. He also kept the conversation going and called me by my first name. He seems like a very personable character.	Friend Conversation Social
113	Adrian seemed very depressed and as if he needed some serious help in is day-to-day life. His problems seemed exaggerated (My boss won't let me see my family for Thanksgiving) to highlight his sad demeanor.	Sad
114	Adrian was friendly and kept the conversation going. however it seemed that he felt like an outsider at the party and did not	Friend Conversation

Participant Number	Written Comment	Code
	stand up for himself when Dylan kept pestering him.	Outsider Did not stand up for himself
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121	I felt this way about Adrian because of the way he introduced himself and spoke to me. The character seemed genuinely nice and interested in my responses.	Nice Interested
122	I thought that overall Adrian was a cool character; really nice and definitely likeable.	Cool Nice Likeable
123	because he said bad things to Dylan	Insult
124	He was quiet but made conversation. He was friendly & stood up for me. He's passive because he was very calm but could stand up for himself & others which makes him strong.	Quiet Friend Stood up for someone Passive Relaxed Strong
125	His responses were relatively rote but believable and indicated a person who wasn't entirely comfortable in the situation; it was a social situation and therefore he was probably really shy. Dylan kind of walked onto him hence the passivity. Other than that he had likeable and nice qualities but was neither here nor there.	Authenticity Shy Didn't stand up for himself Passive Likeable Nice
126	He was nice by trying to be a good guest and offer me a drink but he ended up leaving me alone once I said I was sure I did not want a drink.	Nice
127	He approached me and kept the conversation going even when I really had nothing to say. He also politely declined the beer.	Conversation Polite

Participant Number	Written Comment	Code
128		
129	I felt he was friendly because he was starting most of the conversation, smart because he talked about classes & school and nice and likeable because he was talking to me.	Friend Conversation Smart Nice Likeable
130	He was at a "party" yet not talking to many people, making him seem shy. He was passive because of his response to Dylan. But he was smart, friendly, & nice in conversation.	Shy Passive Smart Friend Nice
131	He just seemed like a chill guy. If he were actually real he would probably be a great friend to have around.	Relaxed Friend
132	Adrian was friendly. He did not succumb to peer pressure. He was very wise to suggest getting out of the party.	Friend Smart
133	We didn't have an in-depth conversation. Didn't get much information about him but he seemed like a pretty nice guy.	Nice
134	He was a nice guy but he didn't stick up for himself.	Nice Didn't stand up for himself
135	Because he was friendly, relaxed to me, and kept a good conversation with me and asked about my life.	Friend Relax Conversation
136	He seemed really chill and easy to talk to . he wasn't awkward and he always knew how to start conversations and to keep conversations going. He was nice and he seemed to watch over me and cared what I have to say.	Relaxed Conversation Nice Stood up for people Care
137	He was, based on the usual measurements of a real person's character, a generally tolerable and likeable person. If he were real, he would likely be a pleasant person to be around.	Likeable
138	I felt this way because he was responding well to everything I was saying, and even asked what kind of dog a multipoo was. It was a little awkward talking to a computer at some points but besides that , he responded well.	Awkward
139	He was a very sad person. Was not very exciting. If I had more time and knowledge of the game I would have asked him to stay at the party.	Sad
140	I didn't find him attractive because he looked like a virtual character; I found him smart/likeable because he was so open	Unattractive Smart

Participant Number	Written Comment	Code
	to conversing with me.	Likeable Conversation
141	I felt as if Adrian was a real person I was having a casual conversation with. It seemed as if he had real emotion.	Authenticity
142	He seemed unsure and doubtful of himself at times, but when comfortable, he display positive cognitive feedback indicating he was at ease with the subject matter.	Unsure
143	I felt this way about Adrian because of his tonality and how much he wanted to converse with me.	Voice Conversation
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APPENDIX H: QUALITATIVE CODING OF DYLAN CHARACTER PERCEPTION FREE RESPONSE

Table 22 - Qualitative Coding of Dylan Character Perception Free Response Item

Participant Number	Written Responses	Code
1	I felt this way because of the way he kept trying to put his arm around Tina, and because of the way he kept pushing her to drink even though she didn't want to.	Tina Pressure
2	He just reminded me of the kinds of people I don't really like. He seemed like he was trying to induce peer pressure and found little importance in how Tina and I felt.	Pressure Tina Uncaring
3	He was nice at first but once you didn't do what he wanted then he would blow you off. So, it's just kinda like whatever; you do your thing and I'll do mine.	Nice Blow you off
4	The proof is in the pudding for that guy. Dialogue mostly.	
5	He seemed like he would have been more amiable if he had not felt insulted by my comment on his lacking drink selection. Beyond that, holding a party with underage drinking is stupid in and of itself, but directly offering a drink to a freshman is ridiculous.	Offended Stupid Underage drinking
6	Spoke his mind and had a hint of attitude. Likes to go to parties. Fits the stereotype for a college student.	Spoke his mind Partyer Stereotype
7	Dylan got upset with me, because I only wanted a Sprite at his party. He even left our conversation, just because I didn't want an alcoholic drink!	Upset
8	Dylan tried to pressure into drinking, saying we were lame, insinuating we were not cool. I was actually worried he was going to bring one of his friends or a weapon to attack us or threaten us. He seems outgoing for hosting the party. I'm not sure what capability refers to. He may be of age, but I still think he's dumb.	Insult Pressure Outgoing Category confusion Stupid
9	I felt a stronger connection with Dylan because I felt like I got to know him over the course of the simulation. I felt like it was an accurate portrayal and I enjoyed how he reacted to my responses. I felt like he was mostly neutral because I didn't interact with him for an extended period of time.	Connection Authenticity Responsiveness Couldn't judge
10		
11	I thought he was a jerk. He came and hang out with us to be social and I viewed him like any other person, however he became hostile over the fact that I didn't like wine and become judgmental and verbally abusive, thus I responded in an aggressive manner right back. I especially did not like how he snapped at Tina, my friend, and I snapped back, and he	Jerk Outgoing Hostile Judgmental Insult Tina

Participant Number	Written Responses	Code
	walked off. His speed to hostility displayed to me his immaturity and secured my disapproval.	Immature Disapproval
12	Unattractive for the graphics, stupid for continuing to party after getting clicked out, Unfriendly as starts conversation w/ insult Incapable to enjoy himself soberly and incapable to have good relationship Outgoing to have party and invite friends over. Mean as he insults you immediately Weak to need alcohol to have fun. unlikable w/ attitude arrogance and hostility Aggressive as he pushes alcohol onto you and insults you	Unattractive Graphics Stupid Unfriendly Insulting Incapable Outgoing Mean Weak Arrogant Hostile Aggressive Pressure
13	Dylan had a "tool" mentality and seemed like many "typical" college guys. I think he seemed realistic.	Tool Stereotype Authenticity
14	He was anxious and therefore not cool, calm, and collected.	Anxious
15	The Dylan character did its job well. I believe he was meant to portray the "frat boy" stereotype and he succeeded. He seemed like a decent guy, but was also drunk and therefore more pushy. However, when offering alcohol, he didn't try to force me to drink anything.	Stereotype Decent Drunk Pressure
16	Dylan came across as a stereotypical mean jock. He didn't seem to think about much except partying and treated Tina in a bad way. He speaks aggressively but is quick to leave when people are against him.	Stereotype Mean Partier Tina Aggressive
17	At first Dylan approached me as a friend but then when he offered me a beer and when I refused he slightly insulted me. Also he kinda insulted Tina before leaving. Dylan was a bit to pushy when offering a beer.	Friend Insulting Pressure
18	He was being mean to us and kept checking his phone. he also kept making seemingly aggressive gestures.	Mean Aggressive Motion
19	Based on his responses, Dylan was stupid and incapable at the time he offered two underage people alcohol. Then he proceeded to be unfriendly and mean once Tina denied his offer. After, Dylan became aggressive once I ordered him to hurry up with the diet Coke yet showed weakness once I saw through his empty threats as he left with a "whatever"	Stupid Incapable Underage drinking Unfriendly Mean

Participant Number	Written Responses	Code
	remark. Lastly, he seemed outgoing as he hosted a party and by the way he spoke like a stereotypical "bro"	Tina Aggressive Weak Outgoing Stereotype
20	Dylan tried to persuade Adrian and I to drink when we didn't want to, which makes him seem unfriendly. He also seemed to get unhappy when we didn't want to drink. He appeared to have an obnoxious attitude.	Pressure Adrian Unfriendly Upset Obnoxious
21	He came off as a very aggressive person trying to be mean to Adrian. He was inconsiderate of others around him and didn't really care about Adrian's feeling. The way he acted like he was the boss and you should do what he said.	Aggressive Mean Adrian Inconsiderate Uncaring Bossy
22	Dylan seemed to be drunk and was upset that Adrian and I were just talking and not drinking.	Drunk Upset Adrian
23	He was rude and douchy.	Rude Douche
24	I don't know too much as to who he personally is because of him being inebriated at the time. But, who he was as a drunk showed some key qualities of his character.	Can't judge Drunk
25	Dillion was extremely rude to me after I turned down him getting me a drink. he should've taken my response and been okay with it, instead he said I was embarrassing him which made me not like him and find his personality unattractive.	Rude Pressure Dislike Unattractive
26	I felt this way about Dylan because he had the stereotypical drunk look to him. What I mean is he seemed very forward. Somewhat demanding, and angry when I declined beer. If he wasn't drunk, it could've been much different.	Stereotype Drunk Forward Pressure Angry
27	Dylan was very confrontational. He bragged about his own place instead of allowing me to make judgments and basically stormed off after I refused a drink. He is not the type of person I like to associate with.	Confrontational Brag Dislike
28	Because he seemed offended when I said I didn't want a beer and was just sitting talking to Adrian.	Offended Adrian
29	I felt like you didn't really get to know Dylan super well. He seemed outgoing and friendly, but kind of jerkish like pushing the alcohol.	Can't judge Outgoing Friend

Participant Number	Written Responses	Code
		Jerk Pressure
30	He was very pushy about drinking even though I am not a big drinker. He made me feel bad for not wanting to drink.	Pressure
31	He was drunk so it may have been intensified, but his questions were kind of rude and more backhanded than Adrian's.	Drunk Rude Adrian
32	What he asked, and how he was on the pushy side. Also, he just seemed a bit too sure of himself. He just didn't seem friendly.	Pressure Arrogant Unfriendly
33	Dylan's drunk behavior made me feel this way.	Drunk
34	He seemed to act like some people do in college, "party & have fun", but also didn't care for others who did not "party & have fun."	Partier Uncaring
35	He teased Adrian and I about not being fun and drinking, but he seems likeable.	Insult Adrian Likeable
36	His responses to the things I said were a bit snappy & emphasized his attitude towards me. He also jumped to conclusions quickly.	Judgmental
37	He was weird.	Weird
38	In terms of personality Dylan seemed unattractive. He was not shy about voicing his opinion on things in the conversation, but the way that he did it made it seem more rude and unlikeable. Because he really only regarded his own opinion it made him more aggressive and unfriendly. He also seemed kind of stupid because of the way he spoke and because he didn't really have a plan for entertainment at the party aside from beer pong.	Unattractive Spoke his mind Rude Dislike Arrogant Aggressive Unfriendly Stupid Voice
39	He did not treat his guest well & all he did was brag about his own place. He said very mean things to defend himself because I didn't agree with what he said.	Bad host Brag
40	The responses that he gave to me and the questions he had made me feel like he was mean.	Mean
41	Dylan was much like the SAM from "Unless there's Consent" videos and therefore thoroughly unappealing. It was comical to watch him fumble in the scenarios, but overall he was a completely horrid guy. He was very rude and made very nasty comments and was incapable of functioning as a pleasant 'human being' !	Unattractive Rude Insult

Participant Number	Written Responses	Code
42	Dylan seemed like a relaxed guy who just wanted to have fun at the party. He didn't portray himself as a brainiac but he get get through a conversation well enough.	Relaxed Fun
43	I feel this way about Dylan because he was unfriendly and mean to Tina and I , which made him unlikeable. I feel that he was also a weak person because I think he felt he had to drink alcohol to have fun, and blew Tina and I off when we wouldn't drink with him. He was also aggressive in wanting Tina and I to drink his beer.	Unfriendly Mean Tina Dislike Weak Aggressive Pressure
44	I did not like Dylan because I felt as if he thought he was better than me. Dylan just was not a good guy.	Arrogant
45	I could not be sure if Dylan was drunk or not. If he was then I can't readily judge him on his characteristics. He was very rude in the sense that I wasn't sure if I had known him long enough to allow him to say my place was a dump. That insult was weak though and easy to brush aside by distracting communication techniques. I do actually have a cheap rent payment.	Drunk Can't judge Rude Insult
46	He was not the type of person I would hang out with, but he wasn't exactly mean or anything.	Avoid
47	He seemed like somebody I knew a long time ago. I really didn't talk much with him but he was still a friend.	Friend
48	The way he spoke, it seed he was rather egotistic. How he gave Tina trouble about not drinking was insensitive.	Arrogant Tina Pressure Inconsiderate
49	He was so mean! He should expect when throwing a party with alcohol present that some people should need to drive sober. However he became very defensive about it which come off very unpleasant.	Mean Bad host Defensive Dislike
50	He acted like the textbook douche-bro in college, almost too much so. The conversation w/ Dylan led me to this feeling, and the conversation went pretty much how I imagined it would in my head.	Stereotype Douche
51	Dylan came up to us and immediately asked if we were at the nerd couch, which wasn't nice. he came up to us making him outgoing but called us lame when we didn't want "adult" drinks. He wasn't too aggressive on getting us to drink.	Insult Mean Outgoing
52	Dylan immediately came over and began insulting Tina & I. He might have thought he was attractive by the way he acted. He	Insult Tina

Participant Number	Written Responses	Code
	didn't seem very nice to Tina. When he asked if I wanted a beer he was a little aggressive when I declined.	Mean Aggressive Pressure
53	I don't really like drunk people so he was pretty annoying. I was glad he left. He reminded me of a real life "player" who flirts a lot.	Drunk Obnoxious Partier
54	He seemed alright at first but upon offering me a beer and hearing my response, he turned rude. He was a little unkind in how he talked to me afterwards.	Rude Mean
55	When I first was greeted by Dylan, he seemed nice and inviting. He wanted me to join the party and drink. I didn't mind playing just without the drinking, he didn't like that and true colors displayed being rude.	Nice Pressure Rude
56	He was very hard to judge given the short circumstances, and I wouldn't necessarily judge someone so quickly. he may have been harder to judge because he was just a character, in a real situation I might have stronger responses. He also didn't do anything too extreme, his reaction was kind of normal, so again difficult to judge him.	Can't judge
57	I felt this way about Dylan because he wasn't accepting of the fact that Adrian and I didn't want to drink. I also didn't really get to know him so I'm not sure what kind of guy he is.	Pressure Adrian Can't judge
58	I fell very split about Dylan. He came off at first as a very friendly individual who cared about his guests. However, he seemed to change in a negative way when Tina mentioned she did not want a drink. Overall, it'll be unfair to call him stupid because of my negative bias towards him.	Friendly Good host Tina Dislike
59	Because he was loud and aggressive towards me, and didn't think before he talked. He was very forceful and upfront.	Aggressive Inconsiderate Pressure Forward
60	Dylan was very aggressive when it came to his party. He wanted to make sure everyone was having a good time and interacting with one another. Although he was aggressive, his friendliness and outgoing charisma made him very hospitable for his party.	Aggressive Good host Friend Outgoing
61	The first things he said were about his "awesome crib" and then he offered us beer. He kept insisting even though we both refused. he was very pushy.	Pressure
62	I felt like Dylan was trying to sound like Matthew Machonahey. He was rude to Tina.	Voice Rude

Participant Number	Written Responses	Code
		Tina
63	I usually don't like to say whether or not someone is smart or stupid, but he was persistent, ignorant of others choices, seems to comment negatively on my ideas, and implies he is the only person who I have to listen to in order to have fun. he was annoying, to say the least.	Pressure Stupid Arrogant Obnoxious
64	He seemed to be trying a bit too hard to be seen as cool and came off as a bit rude and air-headed, though not entirely unlikeable. He did seem to genuinely want the people at his party to have fun.	Rude Stupid Good host
65	Because he tried to force me to drink when I was uncomfortable and then was mean about it when I said no.	Pressure Mean
66	Dylan has to be a fairly friendly character in order to throw his own party however besides being somewhat friendly he does not show any overt characteristics. Increased likeability and an outgoing demeanor are likely the results of being a host as opposed to being genuinely friendly.	Friend Likeable Outgoing Good host
67	This character started to speak pleasantly though it soon became mean spirited. Dylan also showed aggression through a harsher tone and raised arms once told no.	Mean Aggressive
68	He was drunk and pushy very mean and unlikeable.	Drunk Pressure Mean Dislike
69	How Dylan approached us help me decide what type of person he is.	
70	He tried to impose his ways onto others and wasn't very accepting when that was denied.	Pressure
71	He came off as rude, (thinking the 2 of us were 'lame' for having a private conversation) as well as almost not accepting the fact that Adrian didn't want to drink.	Rude Pressure Adrian
72	Dylan was...rather rude and abrasive but also interactive I guess? He came over and started talking. Anyway he didn't seem particularly nice in certain situations although he seems like in the right instance he would be an okay guy.	Rude Confrontational Decent
73	To me people that try to pressure people to do things they don’t want to (drink) and they make fun of a person when they want to do something else are: stupid, unattractive, mean, and unlikeable. Dylan is weak in making Adrian feel pressure because he doesn't know Adrian’s reasons for not	Pressure Insult Stupid Unattractive Mean Dislike

Participant Number	Written Responses	Code
	drinking. Dylan's mannerisms seem outgoing however aggressive.	Weak Adrian Outgoing Aggressive
74	Dylan seemed intoxicated and that may have altered his personality and how he acted. When he mildly insulted Adrian, it seemed that he was more concerned about the appearance of looking cool. However, I didn't talk to Dylan enough to make a solid conclusion pertaining to his actions.	Drunk Insult Adrian Couldn't judge
75	I feel this way about Dylan because he was pretty aggressive when it came to his talking. He is one of those people that think you are uncool if you don't do what he does or do it along with him.	Aggressive Pressure
76	I feel this way towards Dylan because he was being stupid and unfriendly by making fun of his party guests. He didn't really seem like he was capable of much. He sure was mean. I believe only weak men need to belittle others so that's why I considered him weak. I did not like him at all. He came at Dylan and I in an aggressive way like he didn't like us.	Stupid Unfriendly Insult Incapable Mean Weak Dislike Aggressive
77	He came off as a jerk. He started off by insulting my apartment and then he made fun of Adrian and me for sitting and not drinking.	Jerk Insult Adrian
78	He was a bit pushy and acted a bit aggressively. He sounded rude when I answered something to him in a polite rejecting way that he didn't like. His attitude towards Tina was also a bit harsh that I didn't like too much that portrayed him as an absolute jerk.	Pressure Aggressive Rude Tina
79	He seemed stupid and unfriendly yet still came over to check on his guests. He was nice to me, but not to Tina. I chalked that up to being drunk. Strong personality, but not a personality that I like.	Stupid Unfriendly Good host Nice Tina Drunk Dislike
80	I feel like Dylan was friendly and could be nice but from what I saw and interacted with him he was a bit unlikeable and aggressive towards Tina and I refusing to drink.	Friend Nice Unlikeable Aggressive Tina Pressure

Participant Number	Written Responses	Code
81	Dylan tried offering drinks to Tina and i, but after we said no, he started calling us names and then left. He also, did not try to do anything too aggressive towards Tina, who he was sitting by.	Pressure Tina Insult
82	He tried harder than Tina to convince me of what he thought through calling us losers, but he ultimately left us alone. Since he is hosting the party and interacting with people, I would think he is outgoing, but his attitude makes him unattractive and unlikeable.	Tina Pressure Insult Outgoing Unattractive Dislike
83	He was funny but rude. He was a little too pushy and didn't respect someone's opinions. He was trying to be a friend but definitely a bad influence.	Funny Rude Pressure Friend
84	He was just trying to be nice and make conversation.	Nice
85	Dylan was whatever. If I ever saw him again (even though he's my "boyfriend") I would literally never say hi to him. He was pretty much a jerk which I knew he would be the minute he spoke. Defiantly a static character. 0/10 would not friend.	Avoid Jerk Voice Dislike
86	The way he got offended when I said no to a drink and then started to get slightly angry about it.	Offended Angry
87	Dylan came over very energetic and was willing to get me to have more fun. He didn't seem to like my answer to his questions, but he seemed like an okay guy.	Decent
88	He came off very critical and close-minded, unwilling to accept people with personalities of preferences different from his own.	Judgmental
89	He was rude even upon approach. He had nothing nice to say and actually tried to pressure us into drinking with him. he just had a bad attitude and doesn't know how to take "no" for an answer.	Rude Pressure
90	He was willing to throw a party at his house but very closed minded about people not wanting to drink.	Judgmental Pressure
91	Dylan's attitude and disregard of driving safety makes him stupid. he was friendly towards us but was mean when we weren't feeling his party. He was aggressive trying to get us to join, because of these things he is unlikeable to me.	Stupid Friend Mean Aggressive Pressure Dislike
92	I feel like Dylan was more towards the mem side because he was under the influence of alcohol, but I also think that	Drunk Likeable

Participant Number	Written Responses	Code
	maybe he could be a likeable guy when he's sober and acts naturally.	
93	His character used terms, body language, and social setting that reduced his standing, academically and socially. Position as possibly impaired (by alcohol) may have contributed to his lack of apparent conversationality, friendliness, and temper. Cannot judge intelligence on an impaired individual. Tried to make friendly overtures, however conversation time and opportunity was limited in contrast to Adrian. No stand out features physically or behaviorally.	Drunk Angry Can't judge Adrian
94	For the same reasons with Tina, Dylan did not overly express traits that classify him as negative or positive trait. His choice of diction gave him a negative impression for the majority of the simulation and his choice to ignore Tina gave a negative impression.	Tina Voice Dislike Blow you off
95	I felt this way about Dylan because he kept insisting I should drink even when I'm underage. Then when he didn't hear a satisfactory answer, he got mad and walked away/	Pressure Underage drinking Angry
96	He was friendly and engaging (if a bit rude) but his attitude clearly took a more aggressive and judgmental turn as soon as I declined his offers.	Friendly Outgoing Rude Aggressive Judgmental
97	The way he spoke had aggressive and unattractive tone. Also the scenario where he kind of insulted me kind of put me off.	Voice Aggressive Unattractive Insult
98	He was aggressive in that he really tried to push us to drink however he was being outgoing & friendly in his own way & wanted people to "enjoy" his party, however he was offended when Tina & I refused his offer to "loosen up."	Aggressive Pressure Outgoing Friend Good host Offended Tina
99	Dylan was mean. Unattractive because of the way he spoke. Stupid because of how he talked to me and how he talked down to Adrian Unfriendly because he couldn't keep any kind of conversation. Mean and unlikeable aggressive because since he got turned down (Adrian wanted no drink) he freaked out, got defensive and started insulting people. Then	Mean Unattractive Voice Stupid Adrian Unfriendly Dislike

Participant Number	Written Responses	Code
	told me to get my own drink - thats not how you treat a party guest! Capable outgoing strong cause even though he was mean he could hold his own in the argument.	Aggressive Defensive Insult Bad host Capable Outgoing strong
100	He was more aggressive, but had good intentions of just trying to have us be more social, but couldn't take the hint that well.	Aggressive Good host
101	Dylan popped right in the middle of our conversation. Once again, he seemed a little laid back, but he was quick at offering us something to drink. he wanted us to engage a bit more in the party and he was a bit aggressive about it.	Relaxed Aggressive
102	I would say character was definitely pushy. He obviously put himself on a higher pedestal as if he were better than us "nerds." He became pretty unlikeable which is when he put labels on us. Other than that I took in account it was a drunk mood or her personality. Couldn't fully tell.	Pressure Arrogant Dislike Insult Drunk Can't judge
103	pressured more to drink, using name calling.	Pressure Insult
104	He came on very strong and did his own thing in opposition to the Adrian character who acted similar to me.	Spoke his mind Strong Adrian
105	Dylan displayed an intoxicated quality in his attitude. I would have to assume that his overall personality is skewed. His conversation went into a negative area if the respondent (me) disagreed with him. Build was also average so no physical intimidation exhibited. His only redeeming quality would have to be shirt, just because it seemed funny to me.	Drunk Funny
106	He was very aggressive on wanting to make the other guy drink when he didn't want to. Also, he was harsh on us for sitting on the couch and didn't seem too happy we weren't into the party.	Aggressive Pressure Upset
107	Dylan was a little drunk when he met us. Even though he was drunk he still interact with us in a "college" manner. he played a good host by "offering" us a beer and trying to get us to join the party.	Drunk Good host
108	Dylan was very judgmental. He acted like someone normally would act at a party in a real life situation.	Judgmental Authenticity

Participant Number	Written Responses	Code
109	He was offensive to Adrian and me and called us names for not wanting to drink.	Insult Adrian Pressure
110	He was pushy in his approach and kind of rude to Adrian and I.	Pressure Rude Adrian
111	He just seemed like the typical "jock" "frat" guy who would push a beer on someone or call people nerds. He just gave off that vibe.	Stereotype Pressure Insult
112	Dylan was a little rude, and he kept pressuring us to drink. He also asked if his place was nice and referred to my living situation as "crappy."	Rude Pressure Insult
113	Dylan did not regard my opinion towards alcoholism and pressured me to go away from Adrian who needed conversation and friendly interaction.	Pressure Adrian
114	He kept insisting for us to drink, almost like peer pressure, and when he said no he kept referring us as "nerds."	Pressure Insult
115	Dylan was outgoing trying to keep a conversation. He focused more on himself, but he never felt mean-spirited nor aggressive toward me or Tina.	Outgoing Tina
116	He was calling us lame for simply sitting on the couch and talking to each other. he was also very pushy about us having a drink even though we continued to refuse.	Insult Pressure
117	He was trying to get us to drink and called us nerds when we didn't want to.	Pressure Insult
118	Dylan displayed a mixture of things when he sat down. He offered to get me a drink which was nice, but then when he stormed off he told me to get my own beer. He was aggressive and outgoing because he came over to us and started talking but was very aggressive about us joining the party.	Good host Nice Aggressive Outgoing
119	He was a douche. Try-hard.	Douche
120	Dylan must be smart because he is in the same University as Tina and I. He is outgoing because he is throwing a party and invited Tina from Biology class. I found him to be unlikeable, not because he offered me a drink but because he pushed drinking a call Tina and I lame for not wanting to drink. He seemed aggressive when I declined his offer of a drink. He is strong willed and mean just by how he responded to Tina and I not wanting to do anything but talk to each other. Although not physically unattractive, his personality made him ugly.	Smart Tina Outgoing Dislike Pressure Insult Aggressive Strong Mean

Participant Number	Written Responses	Code
		Unattractive
121	I felt this way because he verbally attacked us by saying that we seemed like the nerd corner while Adrian and I were talking on the couch. His character seemed to be under the influence so I know it affected him to become more aggressive.	Insult Adrian Drunk Aggressive
122	The way he was portrayed and how he spoke. What he said to Adrian and such.	Voice Adrian
123	because he acted as my friend in a kind manner	Friend
124	Dylan was friendly & came up to us to make conversation & offer us drinks, but he started getting aggressive and not as nice when we declined his offer.	Friend Good host Aggressive
125	Dylan had all the traits of a stereotypical frat guy who displays social tendencies and aggressive viewpoints which come across as mean to anybody not of a similar mindset / personality.	Stereotype Aggressive Mean
126	He opened up to me and showed interest in our conversation. He kept asking questions to get me involved. Also, when I said that I did not want a drink, he supported it.	
127	He immediately became obnoxious and kept pushing us to do something that we didn't want to do.	Obnoxious Pressure
128	Dylan came over very friendly but when we refused his offer for drinks he immediately became very rude and scoffed at us in our "cool section." He was probably defensive because he felt turned down or rejected and it showed in his personality.	Friend Rude Defensive
129	I didn't really get a feel from Dylan because he was just talking about drinking the entire time and how we were boring. I though he was aggressive and unlikeable to keep pushing the situation.	Can't judge Aggressive Dislike Pressure
130	Dylan's character was rude when I said I didn't want to drink, he also seemed misogynistic saying "you girls like that fruity stuff" or something along those lines. His pushy-ness made him seem aggressive & unlikeable.	Rude Misogynistic Insult Pressure Aggressive Dislike
131	When I responded with "I don't drink" at his offer of a beer, he was really pushy. Wouldn't' want to be friends with him if he were real.	Pressure Avoid
132	Dylan was not an approachable person. He seemed immature and not very welcoming for a host.	Immature Bad host
133	He pushed us to drink and tried to peer pressure the most he	Pressure

Participant Number	Written Responses	Code
	could. He seemed like the typical jock who throws parties to be popular and get friends.	Stereotype
134	Dylan was an interesting character. He joined in late in the conversation and seemed to be kind of rude and disrespectful towards Adrian. He also pushed the drinking and driving issue on Adrian.	Rude Adrian Pressure
135	Because though he might drink and make comments that are rude, doesn't make him completely unfriendly, some people just joke like that, but also didn't care about me, just the party and beer.	Rude Uncaring
136	He seemed like he was trying too hard to be the "cool" guy and he wasn't that likeable to me. He was outgoing but he wasn't the best influence on me and I'm sure he wasn't on others either.	Dislike Outgoing
137	He was somewhat pushy and rude, as far as personalities go. Overall he was not a very likeable person.	Pressure Rude Dislike
138	He came over and made fun of us about sitting by ourselves, and then said we were sitting on the nerd couch. He pushed me to try and drink even though I did not want to which made him seem aggressive.	Insult Pressure Aggressive
139	He was being mean to Adrian and I. However, he just wanted to have fun.	Mean Adrian Fun
140	He made rude comments about not drinking and seemed like a bully.	Rude Pressure
141	It seemed as if Dylan was harder to connect with, he was somewhat aggressive and rude. Adrian was far more appealing.	Connection Aggressive Rude Adrian
142	I don't feel inclined to make assumption about intelligence due to him being intoxicated. Other than that, he was malicious and rude for no reason to Adrian, with an aura of arrogant confidence.	Drunk Mean Rude Adrian Arrogant
143	I felt that Dylan was truly good person, but he's just unaware of other people's feelings and of how judgmental he is, based on his remarks (nerd couch etc...)	Decent Inconsiderate Judgmental
144	I felt this way because Dylan seemed like the typical party guy and certain personalities are connected to this stereotype and he displayed most of these traits.	Stereotype

Participant Number	Written Responses	Code
145	He tried to be cool and push his views on others. He did not consider other's interests, not to mention he was cocky.	Pressure Inconsiderate Arrogant

APPENDIX I: QUALITATIVE CODING OF PARTICIPANT VERBAL BEHAVIOR

Table 23 - Qualitative Coding of Statements about the Buddy

Participant Number	Transcribed Statements about the Buddy	Code
1		
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26		
27	"Thanks for standing up for me."	Stood up for me Gratitude
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Participant Number	Transcribed Statements about the Buddy	Code
38		
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47		
48		
49	"We're friends, right?"	Friend Check of relationship
50	"Still having fun since you're here."	Affirmation of partnership
51		
52	"Are you crying?"	Concern
53		
54		
55		
56		
57		
58	Showed concern by counseling (psych major), but didn't express any explicit words of consolation.	
59		
60		
61	"Glad you didn't have to deal with him by yourself."	Affirmation of partnership
62		
63		
64		
65	"Thanks, that was nice." - but only after being prompted	(no code due to prompting)
66		
67		
68		
69		
70		
71		

Participant Number	Transcribed Statements about the Buddy	Code
72		
73	"The nerd couch is pretty cool. I like the nerd couch."	Affirmation of partnership
74		
75		
76		
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83		
84		
85	"Happens to the best of us." - responding to Adrian's discomfort with Dylan's pressure	Consolation
86		
87		
88		
89		
90		
91		
92		
93		
94	"Are you OK? You want to get out, go somewhere else?"	Concern
95		
96		
97		
98		
99		
100		
101	"I think it's smart not to drink at parties..."	Affirmation of choice
102		
103		
104		
105		
106	Bucked up Adrian, but only after being prompted	
107		

Participant Number	Transcribed Statements about the Buddy	Code
108		
109		
110	"That was responsible of you."	Affirmation of choice
111		
112		
113		
114	"You look upset."	Concern
115		
116		
117	"I think you're cool for not drinking."	Affirmation of choice
118	"That was a good choice."	Affirmation of choice
119		
120		
121		
122		
123		
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138		
139	"I'm not [cool] either, so it's OK."	Affirmation of partnership
140		
141		
142		
143		

Participant Number	Transcribed Statements about the Buddy	Code
144		
145	"You were responsible, so that's good."	Affirmation of choice

Table 24 - Qualitative Coding of Statements about Dylan

Participant Number	Transcribed Statements about Dylan	Code
1	"A little too pushy"	Pushy
2	"You kind of seem a little worked up" "You're the one kinda seeming lame right now."	Upset Returned insult
3	"He wasn't that bad." (After Tina calls him an a*hole)	Mild defense
4	"That's pretty rude dude." "yeah, pretty rude."	Rude
5		
6		
7	"He wasn't nice"	Mean
8	"He's a jerk, huh?"	Jerk
9		
10	"People who think you have to drink to be cool.."	Alcohol
11	"Guys are gonna be guys, no matter how immature they are"	Gender Immature
12		
13		
14	"He's probably just a nervous host"	Mild defense Host Different Behavior
15	"I think he's had a few too many drinks"	Alcohol
16	"That guy was pretty rude" "I don't like people who are being mean"	Rude Mean
17	"What a douche"	Douche
18		
19		
20		
21	"He didn't have to treat you that way"	
22		
23		
24		

Participant Number	Transcribed Statements about Dylan	Code
25	"I've never seen him do that before."	Distancing
26		
27		
28		
29	To Dylan: "How rude!" To Adrian about Dylan:"It's OK, I'm used to it."	Rude
30	Strong "Yeah" to Adrian saying Dylan's an angry drunk	
31	"Looked like it was gonna get rough."	Rough
32		
33	"Nice friend" said sarcastically	Sarcasm
34		
35		
36	"He looks really drunk"	Alcohol
37	To Dylan: "Psh, rude!" About Dylan to Tina: "He's cute."	Rude Cute
38		
39	"He's a jerk"	Jerk
40		
41	"What a charmer." said sarcastically. "I don't get people like that."	Sarcasm
42		
43	"He's not usually like that, obviously I wouldn't be friends with him if he was."	Different behavior Distancing
44		
45	"Some people change when they're a little drunk. Maybe he's trying to have fun."	Different behavior Alcohol
46		
47		
48	"Maybe he's not like that all the time."	Different behavior
49	"I don't remember him being so rude."	Rude
50		
51	"Well, he's not very nice. He's not that cute either."	Mean Unattractive
52		
53	To Dylan: "You're a drunk..sicko." About Dylan: "Are there any guys here who AREN'T drunk?"	Alcohol
54		

Participant Number	Transcribed Statements about Dylan	Code
55	"I don't think he handles rejection too much."	Rejection
56		
57		
58	"That was a little rude."	Rude
59		
60	Agreed that Dylan's a bad choice, but then suggested "Maybe he's different in his outside element."	Different behavior
61	"Nice guy." - said sarcastically. "That's guys for ya."	Sarcasm Gender
62	"He was rude."	Rude
63	"He seemed a little bit displeased. Felt like we were being pressured."	Upset Pressure
64		
65		
66		
67		
68		
69		
70	"Crazy." - said to Dylan's face during pressure to drink. "To each his own" - about Dylan when Adrian criticized Dylan after the fact.	Crazy
71		
72	"So, yeah, I don't really know why I'm friends with that guy."	Distancing
73		
74	"That's lame." - Dylan after he insulted them. Agreed that Dylan was drunk "I can tell from his eyes."	Alcohol
75		
76	"He was a real jerk."	Jerk
77		
78		
79	"He IS throwing a party, and I'm pretty sure he's drunk. You have to expect stupidity."	Host Alcohol
80	"He was a jerk." "Whatever!"	Jerk
81		
82		
83		
84		
85		
86		
87		

Participant Number	Transcribed Statements about Dylan	Code
88		
89		
90	"To each his own."	
91	"So he's....excited"	Upset
92	"Apparently you need to drink to be a man."	Alcohol
93	"This guy's crazy." "He had a few drinks, his brain is swimming."	Crazy Alcohol
94	Agreed with Tina that Dylan was a jerk.	
95		
96	"He seemed nice." Tina:"Really?" "No."	Sarcasm
97		
98	"He was being a jerk."	Jerk
99	"He was mean."	Mean
100		
101		
102		
103	"So he's so friendly." - sarcastically	Sarcasm
104		
105	"He's a tool."	Tool
106		
107		
108		
109	"There's no need for that type of stuff."	
110		
111		
112	"That's rude." - as Dylan was leaving	Rude
113	"Rough guy, [that] Dylan."	Rough
114		
115	"That wasn't awkward at all." - sarcastically.	Sarcasm
116	"Some guys are just too pushy."	Pushy
117		
118	"I was just trying to get rid of him."	Avoid
119	"He was a real douche."	Douche
120	"He was nice." - sarcastically. But then said it was OK, like she understands people usually drink.	Sarcasm
121		
122		
123		
124		

Participant Number	Transcribed Statements about Dylan	Code
125	"He was being a dick."	Jerk
126		
127	"What a dick."	Jerk
128	"He was kind of a douche."	Douche
129		
130		
131		
132		
133		
134	"Screw that guy."	
135		
136	"He's crazy."	Crazy
137	"What a jerk."	Jerk
138		
139	"He's kind of mean."	Mean
140		
141		
142	"Tools are always gonna try to get you to drink."	Tool Pressure
143		
144	"That was nice." - sarcastically	Sarcasm
145	"That was a little rude."	Rude

Table 25 - Qualitative Coding of Verbal Protective Behaviors toward Buddy

Participant Number	Transcribed Responses about Protective Behaviors	Code
1	"Hey Dylan, you're not being too nice right now" "Could you go get me that punch."	Stating bad behavior Mean Sending Dylan away
2		
3	"She can just drink what she wants, I mean is it that big a deal."	Asserting personal choice De-escalation
4		
5		
6		
7	"Whoah. You're a little hostile"	Stating bad

Participant Number	Transcribed Responses about Protective Behaviors	Code
		behavior Hostile
8	"Tina, you want to get going?"	Leaving
9		
10		
11	"Hey don't talk to my friend like that. How 'bout YOU shut up?"	Aggression
12		
13		
14		
15		
16	"Guess you should go be a good host somewhere else"	Sending Dylan away
17		
18	"Why you gotta be such a jerk?...Screw you. You wanna fight?"	Aggression
19	"C'mon, man, get the diet coke!..My friend's waiting, man, hurry up."	Sending Dylan away
20		
21	"Hey, leave Adrian alone!"	Aggression
22		
23		
24		
25		
26		
27		
28		
29		
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31		
32		
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35		
36		
37		
38		
39	"She's not being rude"	Defense of buddy against insult

Participant Number	Transcribed Responses about Protective Behaviors	Code
40		
41	Interrupted Dylan when he insulted Tina by saying "No need to be rude."	Stating bad behavior Rude
42		
43	"Glad we're friends."	Appeal to friendship
44	"Nah, you probably shouldn't talk to her that way." - in response to prompt by Dylan	No code due to prompting
45	"Hey man, you gotta respect people's opinions, y'know if she don't wanna beer that's alright."	Assertion of personal choice
46	"It was really nice meeting you." - as a signal for Dylan to leave	Sending Dylan away
47		
48		
49	Tried to distract the conversation away from drinking to take pressure off Tina. "Hey Tina, so um how is your Biology class going."	Change of topic
50		
51	"Hey, be nice." when Dylan insulted Tina.	Stating bad behavior Mean
52	"It's you, it's definitely you." "Don't tell my friend to shut up."	Aggression
53		
54		
55		
56		
57		
58	"Why you giving her that face, man?" "Hey, chill, dog. She want a soda, she want a soda. It's simple as that."	Assertion of personal choice De-escalation
59		
60		
61		
62		
63		
64		
65		
66		
67		

Participant Number	Transcribed Responses about Protective Behaviors	Code
68	"That wasn't very nice." "You're being mean."	Statement of bad behavior Mean
69	"I don't have to be cool to drink." (sic)	
70	"We're different" justifying his and Adrian's choice not to drink (placing himself in the same group as Adrian)	Alignment with buddy
71		
72	"Hey, guys, c'mon, chill out, it's fine." - interrupted Dylan's attack on Adrian	De-escalation
73	"He's probably had too many already, don't want to push him over the edge." winking at Adrian to use the lie to take pressure off Adrian.	Alcohol defense
74		
75		
76	"He doesn't want any of that crap." - in defense of Adrian, referring to Dylan's cheap beer. "You shouldn't underestimate him…Still not cool."	Alcohol defense
77		
78		
79	Used pressure on Dylan to go get him a drink to take pressure off Tina. "You haven't gotten me my drink" "You still haven't gotten me my drink." "She doesn't want one."	Sending Dylan away Affirmation of personal choice.
80		
81		
82		
83		
84		
85	"Pretty sure Adrian's right."	Defense of buddy against insult
86		
87	"I'll dance" - may have been a protective behavior for both, not specifically Adrian	Leaving
88	"That's a little harsh" - to Dylan after he insulted Adrian	Statement of bad behavior Harsh
89	"Maybe he's driving." - interrupted Dylan while he was insulting Adrian	Driving defense
90		

Participant Number	Transcribed Responses about Protective Behaviors	Code
91		
92		
93	Created several distractors to divert away from Dylan's drink offers; snacks, Wii games, etc. “What happened to all the salsa and chips?” “Who else is coming to this party?” “Adrian, why don’t you go to my place and we do a wii tennis game.”	Change of Topic Leaving
94	"Don't be rude."	Statement of bad behavior Rude
95		
96		
97		
98		
99	"True that, smart move" - about Adrian's choice not to drink before driving. "Better safe than sorry. Just go get my Yingling." - to get Dylan to leave.	Driving defense Sending Dylan away
100		
101		
102		
103	"That's not nice."	Statement of bad behavior Mean
104		
105		
106		
107	"Responsible guy. I like it." "You made the right choice."	Support of buddy
108		
109	"That's not nice."	Statement of bad behavior Mean
110	"He shouldn't drink if he's going to drive."	Driving defense
111		
112		
113		
114		
115		
116		
117		

Participant Number	Transcribed Responses about Protective Behaviors	Code
118		
119	"Douche!" "Totally just called you a douche." "Bye, douche!"	Aggression
120		
121	"I think you're just overreacting." - to Dylan	De-escalation
122	"Kinda harsh."	Statement of bad behavior Harsh
123		
124	"It's OK if he doesn't want to drink."	Assertion of personal choice
125	"He has to drive, it's the smarter option not to drink anything."	Driving defense
126		
127	"He doesn't want to have a beer, man, it's fine."	Assertion of personal choice
128	"Hey, Tina, you wanna get out of here?" Later agreed to beer pong, obviously to get Dylan to leave the couch.	Leaving
129		
130		
131		
132	"What do you mean 'you people'?"	Aggression
133		
134	"Don't listen to this guy. One beer will put you in jail."	Underage drinking
135		
136		
137	"That's not very nice. So how about that drink?"	Statement of bad behavior Sending Dylan away Mean
138		
139		
140		
141	"Wow...You're kinda mean."	Statement of bad behavior Mean
142	"He said he was driving. Chill." "You don't gotta drink to relax. If he's driving, let him drive."	Driving defense
143		
144	"It's not a problem. People have fun in different ways."	Assertion of

Participant Number	Transcribed Responses about Protective Behaviors	Code
		personal choice
145	"I think that you should leave her alone."	Aggression

APPENDIX J: IRB APPROVAL LETTER

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

Approval of Human Research

From: **UCF Institutional Review Board #1**
FWA00000351, IRB00001138

To: **Kathleen M. Ingraham**

Date: **September 13, 2013**

Dear Researcher:

On 9/13/2013, the IRB approved the following human participant research until 9/12/2014 inclusive:

Type of Review:	UCF Initial Review Submission Form
Project Title:	Virtual Character Design for Simulation
Investigator:	Kathleen M Ingraham
IRB Number:	SBE-13-09586
Funding Agency:	
Grant Title:	
Research ID:	N/A

The scientific merit of the research was considered during the IRB review. The Continuing Review Application must be submitted 30days prior to the expiration date for studies that were previously expedited, and 60 days prior to the expiration date for research that was previously reviewed at a convened meeting. Do not make changes to the study (i.e., protocol, methodology, consent form, personnel, site, etc.) before obtaining IRB approval. A Modification Form **cannot** be used to extend the approval period of a study. All forms may be completed and submitted online at https://iris.research.ucf.edu .

If continuing review approval is not granted before the expiration date of 9/12/2014, approval of this research expires on that date. When you have completed your research, please submit a Study Closure request in iRIS so that IRB records will be accurate.

Use of the approved, stamped consent document(s) is required. The new form supersedes all previous versions, which are now invalid for further use. Only approved investigators (or other approved key study personnel) may solicit consent for research participation. Participants or their representatives must receive a copy of the consent form(s).

In the conduct of this research, you are responsible to follow the requirements of the Investigator Manual.

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

Signature applied by Joanne Muratori on 09/13/2013 04:35:49 PM EDT

Joanne Muratori

IRB Coordinator

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