GAMING RELATIONSHIP TO SOCIAL PSYCHOLOGY AND MICRO-EXPRESSIONS

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Abstract

With increasing popularity in society, gaming has become a common influence in most individuals' lives. Psychology as a field is generating a demand for research and a better understanding of how gaming has contributed to society with a positive or a negative impact. Social exchange that requires in-person interaction (such as interpreting emotional facial cues) has yet to be explored in the field of psychology in relationship to gaming. The purpose of this study is to determine if a relatively non-social task, such as gaming, can predict a social situation such as reading facial emotions. This study will determine if the amount of time and experience with gaming will influence the individual's ability read human emotion and micro-expressions accurately. In this study participants recorded the amount of hours spent gaming, completed a micro-expression eMETT3.0 practice, and the Experiences in Close Relationships attachment scale. Results concluded no relationships were found between gamers and the ability to read micro-expressions compared to non-gamers.

Keywords: gaming, emotions, micro-expression, reaction time

Dedication

This thesis is dedicated to my beloved family and friends. My parents Dan and Doris Durning, and my amazing advisor and mentor Dr. Robert D. Mather. I would never have been able to complete this project without them.

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Background of study

Gaming is a pastime that appeals to a diverse range of people, evolving over the past 30 years and acquainting itself into the mainstream of societies all over the world. The common place of video game play has long since shifted from arcades to households (DeMaria &Wilson, 2002). Video games are now played in over 65% of North American households (NPD Group, 2008) and gaming is no longer a pastime just for children. In fact, only 25% of gamers are under the age of 18 years old; that is 49% of gamers are aged 18 to 49 and 26% are over the age of 50. Across all age groups, 40% of gamers are females (Entertainment Software Association, 2008). The diversity of game type along with multiple formats and platforms in which games are now played on could be related to their increase in popularity.

The rapid change of how the games are being played (i.e., consoles, computers, hand-held devices, cellphones, etc.), the diversity of who is playing them, and where the video games are being played leads to new research ideas every day. Gaming skills correlate with laparoscopic surgical skills (Rosser et al., 2007), increased perceptual reaction times (Dye, Green, & Bavelier, 2009), increased open-minded and critical thinking (Gerber & Scott, 2010), and even self-concept clarity and correlation with individuals personality (Lee, Aiken, & Hung, 2012; Park & Lee, 2012). Action videogame (AVG) players are superior operators to non-gamers during attentionally demanding computerized tasks that require threat detection and vigilance (Falcone & Parasuraman, 2012; Schmidt et al., 2013). These finding reveal that AVG expertise may be a predictor of enhanced on the job performance. Tasks requiring optimal human

performance are not limited to vision alone. Auditory information is often needed in multimodal task design and expert action videogame players are less likely to make errors during auditory spatial discrimination tasks than non-gamers (Greenlee & Boles, 2014). However, there are still several avenues to be explored. Do we fully understand the new communications processes that are involved? What new sociological and psychological issues are they developing? How is this new common form of entertainment going to influence social behavior? The world of research is just starting to tap at the groundwork for the understanding of gaming and its influence on how it affects us as individuals and collectively in our society.

Although research on video games is increasing, it is still a nascent field (Lee, Aiken, & Hung, 2012). Due to the growing popularity of gaming there has been a demand for researchers to study the effects of time spent playing games on gamer psychologies (Lo, Wang, & Fang, 2005). Therefore, the purpose of the current research project is to investigate response time of gamers to the ability to read facial expressions at fast speeds. Additionally, gamers should be more adept to correctly identify the micro-expressions even under slight pressure because of their increased cognitive abilities with critical thinking (Giancarlo & Facione, 2001). Past research has found gamers tend to have a faster response time than non-gamers but it has yet to be introduced in face-to-face social interaction. Social aspects of emotional facial expressions as micro-expressions could be applied to gamers to test whether gamers are more sufficient at reading these rapid emotions than non-gamers.

Gaming can be used to describe the psychology of micro-expressions by testing if gamers are more efficient at reading them than non-gamers. A micro-expression is an

extremely brief involuntary facial movement shown on the face according to emotions which are being experienced and typically occur in high-stake situations, where people have something to gain or lose. Micro-expressions occur when a person is consciously trying to conceal all signs of how he or she is feeling, or when a person does not consciously know how he or she is feeling (Freitas-Magalhães, 2012). Micro-expressions can be shown to gamers by using micro-expression emotion detection training programs to see if their increased response time can be associated with a social situation such as reading facial emotions, thus giving them an advantage in social situations. The current research will help in the understanding of whether a relatively non-social activity, at least when interacting with individuals in person, such as gaming, can indeed positively influence a social situation.

Statement of Problem

Society is constantly being influenced by the growth and popularity of gaming. Industrialized societies with large amounts of technology tend to use forms of gaming for recreational use; thus there is an increasing demand of knowledge from the scientific community on the effects of time spent gaming (Lee, Aiken, & Hung, 2012). Gaming is a relatively new pastime in which there is much to discover, and we are still not aware of the effect on society.

Significance of Study

With increasing popularity in society, gaming has become a common influence in most individuals' lives. Psychology as a field is generating a demand for research and a better understanding of how gaming has contributed to society with a positive or a negative impact. For the past three decades, gaming has evolved from a gathering of

people at a local arcade to individuals sitting alone in their homes while interacting with others via headset, and even families dancing around in front of their televisions where a console scans their activities. Gaming is an activity with both social and individual components. Indeed, individuals are interacting through the game with one another in some forms of gaming, however they are not interacting face-to-face and thus are not receiving visual social cues. Identifying the ability to read micro-expressions amongst gamers will show that the increased response time found in gamers also influences the ability to read a primarily social situation as well, showing that gaming can have a positive influence on social interactions.

Need for Study

Social exchange that requires in-person interaction (such as interpreting emotional facial cues) has yet to be explored in the field of psychology in relationship to gaming. There has been plenty of research on micro-expressions and response time (Ekman, 2007; Rosser et al., 2007), but it has not been applied to gaming. The purpose of this study is to determine if a relatively non-social task, such as gaming, can predict a social situation such as reading facial emotions. Specifically, this study addresses the following research question: Does the amount of time spent gaming increase their accuracy of reading facial emotions in a social situation such as reading micro-expressions?

Hypotheses

The following is the primary hypotheses of this project: The amount of time and experience with gaming will influence the individual's ability read human emotion and micro-expressions accurately.

Literature Review

Micro-expressions

Human emotions and facial expressions have gone hand-in-hand since Darwin's basic hypotheses involving the two when he hypothesized that emotions were seen cross-culturally. Charles Darwin theorized that emotions were biologically determined and universal to human culture in *The Expression of the Emotions in Man and Animals* published in 1872. Criticism of the theory came during the 1950s, when it was thought that facial expressions were determined through behavioral learning processes (Ekman, 2007). Later it was through a series of studies by Paul Ekman and Wallace V. Friesen which established that everyone shares the same six basic emotions (anger, disgust, fear, happiness, sadness, and surprise). Their research extended to preliterate Fore tribesmen in Papua New Guinea, whose members would not have been introduced to the meaning of expressions from exposure to media depictions of emotion (Ekman & Friesen, 1971). Findings on contempt are debatable, though there is at least some evidence that this emotion and its expression are universally recognized (Matsumoto, 1992). In the 1990s, Ekman (1999) expanded the list of basic emotions which included a range of positive and negative emotions that are not all encoded in facial muscles. The newly incorporated emotions are: amusement, contempt, contentment, embarrassment, excitement, guilt, pride in achievement, relief, satisfaction, sensory pleasure, and shame.

Liars also frequently must facilitate their deceit by altering their expression through simulating, masking, or neutralizing an emotion (Ekman, 2007). However, in most causes this is deemed very difficult if not impossible, and so some form of emotion

will slip through. With these concepts he then applied the understanding of human emotions being shown in the face into micro-expressions.

A micro-expression is an extremely brief involuntary facial movement shown on the face according to emotions which are being experienced and typically occur in high-stake situations, where people have something to gain or lose. Micro-expressions occur when a person is consciously trying to conceal all signs of how he or she is feeling, or when a person does not consciously know how he or she is feeling (Freitas-Magalhães, 2012). People often try to inhibit their emotions, yet micro-expressions are so small that they are unable to consciously control them. Individuals with naturally faster response times (such as gamers) may be able to use this ability and apply it elsewhere (Dye, Green, & Bavelier, 2009). The ability to read micro-expressions could be useful in law enforcement, or any environment needing rapid response time in a social situation.

There is a correlation between the ability to detect deceit and the ability to identify micro-momentary facial expressions of emotions. Deception situations, in which signs are very subtle, and research has shown there are individual differences in abilities to spot subtle signs even when they are correlated with deception. The Facial Action Coding System or FACS is a system to taxonomize human facial movements by their appearance on the face, based on a system originally developed by a Swedish anatomist named Carl-Herman Hjortsjö (Hjortsjö, 1969). Adopted by Ekman and Friesen in 1978, it is more commonly used to identify facial expressions. A significant update was done to the program in 2002 (Ekman, P., Matsumoto, D., & Friesen, W. V., 2005). Movements of individual facial muscles are encoded by FACS from slight different instant changes in facial appearance. Identifying the muscles that produce the facial expressions, to measure

the muscle movements the action unit (AU). Commonly standardized to systematically categorize the physical expression of emotions, and it has proven useful to psychologists and to animators alike. FACS has been established as a computed automated system that detects faces in videos, extracts the geometrical features of the faces, and then produces temporal profiles of each facial movement (Hamm et al., 2011).

The most current program for training is the Ekman Micro Expression Training Tool 3.0 (eMETT3.0). This program is used to train federal agents and other law enforcement in micro-expression for detecting deceit (Ekman & Frank, 2004). If deception detection can be effectively influenced by response time, then there is a good probability that gamers would be ideal candidates for these tasks and may also be indirectly influencing the strength of their social skills by building skills in traditionally non-social way.

Gaming

Psychology in relationship to gaming is purported to hold promise for cognitive skills and the ability and disposition toward critical thinking. The core set of cognitive skills involved in critical thinking, including analysis, interpretation, evaluation, explanation, and self-regulation (Abrami et al., 2008; American Philosophical Association, 1990; Ennis, 1987, Fischer, 2001). Additionally, disposition is crucial to critical thinking as it is the likelihood that one will approach problem solving by using reasoning consistent with internal motivation to engage problems and make decisions by thinking (Giancarlo & Facione, 2001). Some believe that these higher-order skills are being learned through gaming (Galatneau & Zibit, 2007; Prensky, 2007). This would lead to the belief that

compared to non-gamers, gamers would be better equipped for critical thinking in tasks that involve social abilities as well.

Response time

Perspective during a video game influences spatial presence experience and brain activation. Adequately designed virtual reality (VR) scenarios allow people to experience a subjective sense of actually being in the VR environment while transiently being unaware of the technology that delivers the stream on virtual input to the senses. This feeling has been coined *spatial presence* (SP), and it emphasizes the important role of spatial cues and subjective strategy involved in recruiting attentional resources for processing sensory input (perception oriented approach). An alternative view has been proposed to underline the particular contributions of supported actions in the real or virtual environment (VE) as a constituent feature of the experience of reality. Arguing that the sense of "being there" in a VE is strongly grounded on the ability "to do there" (action-oriented approach). Even though some gaming consoles are building on this idea, most are still played with a controller or mouse. A psychological construct known as *egocentric reference frame* is used to explain SP. An ERF is a mental model of the world organized from first-person perspective and contains information about the spatial properties of the immediate surroundings. Mediated environments (e.g., VR) offer an alternative to ERF to the users' real-world ERF. With the sense of SP individuals immerse themselves in alternative ERF over the competing ERF of the real physical world. It has been found that higher SP ratings were obtained in passive and active first person form more so than third person form (Havranek, Langer, Cheetham, & Jancke, 2012). So, in first person gaming, individuals engulf themselves increasing their spatial

presence allowing amplified spatial cues and subjective strategy involved in recruiting attentional resources for processing sensory input. This leads to effects on increased response time that can be used in social interaction as well.

Video game skill correlates with laparoscopic surgical skills because of the visual attention needed and response time (Rosser et al, 2007). Past and current video gaming capabilities amongst surgeons showed regression analysis suggesting that gaming experience was more important than traditional factors such as years of training and number of cases. The amount of past game play was also a significant predictor of demonstrated laparoscopic skill. Formal features that define video game play contain aspects of game design, such as the amount of visual attention needed and response time that is required to perform well. Playing action video games require rapid processing of sensory information and prompt action forcing players to make decisions and execute responses at a far greater pace than what is characteristically essential in everyday life (Dye, Green, & Bavelier, 2009). This is an ability that is common in surgeons.

Attachment Style

Attachment plays an important role in adult partnerships, because adult partners mutually support and depend upon each other (Bowlby, 1980). Mental models about self and others, which are learned at an early age, are assumed to be stable over a lifetime (Bowlby, 1973), but are able to change when an individual comes in contact with very different caregivers, such as stepmothers, teachers, or romantic partners. Attachment style scales have been developed to measure an individual's ability to interact with others in a close relationship (Bowlby, 1973). In the current study attachment style will be used to determine if gamers are more anxiety or avoidance prone than non-gamers.

One belief about gamers is that they could possibly have social anxiety, and will have difficulty creating close relationships. If true, possibly, this might inhibit their ability to interact with others, it eventually comes into conflict with the ability to read human emotion in general. However, it is speculated and currently debatable that neither attachment style nor social anxiety significantly correlated to online video game play time (Jordan, 2010); meaning that individuals did not necessarily have to be socially anxious or avoidant attachment to spend large amounts of time gaming online. In addition, implications for attachment style in gamers have found that there is a positive effect on their online relationships when individuals gamed more frequently.

Method

Participants

Fifty-six undergraduate students from the University of Central Oklahoma were recruited from a subject pool system (SONA) and offered class credit for their participation. After consenting to the study, participants sat at a desk and answered a few questions indicating how many hours a week they spent playing videogames. Out of 56 participants, only eight qualified by spending 10 or more hours per week gaming. Two of these eight participants were unable to have scores recorded. This leaves the study with only six participants who qualify to represent the gamer population. The sample consisted of undergraduates from the University of Central Oklahoma (UCO). UCO is a public university located in central Oklahoma and the enrollment is approximately 14,000 undergraduates and 1,800 graduate students (UCO, 2012).

Instruments

Computer hardware was a Dell desktop computer, Dell wired keyboards, Dell wired computer mouse, and one Dell 33-cm computer monitor. Participants sat in a lab environment with minimal distractions. Individuals began by recording the amount of hours they spent in a week gaming (See Appendix A). They also completed the Experiences in Close Relationship Scale (ECR) created by Brennan, Clark, and Shaver (1998), for the attachment style scale in regards to close relationship (See Appendix C). Format of the ECR is a general Likert style scale consisting of 36 questions and the questionnaire items can be grouped into two dimensions of attachment. One group of questionnaire items deal with how anxious a person is about their relationship, and remaining items deal with how avoidant a person is in their relationship. These items serve as a scale for anxiety and avoidance (Brennan et al., 1998). The program used to run the experiment is the Ekman Micro Expression Training Tool 3.0 (eMETT3.0) designed to teach individuals how to detect and categorize facial movements. The eMETT3.0 program was ready and on the screen for the participant. Participants sat in a chair that has them at an appropriate height to view the screen as they sit approximately 45-cm from the center of the computer screen.

Procedure

After consenting, participants sat in a chair in front of the computer. They were then asked to mark the approximate number of hours they spend each week gaming and complete the close relationships attachment style scale. After completing the forms they began the eMETT3.0 program. The program gave a brief explanation on the first page indicating what they would be asked to do. Participants were informed they would judge

42 people displaying flashes of expressions and receive immediate feedback about their judgments of the emotions they selected to be the correct choice. If participants made a wrong judgment they were directed by the program to click the repeat button and make another judgment, continuing to do so until they obtained the correct answer. Participants only needed to use their mouse to click the continuation arrow and select their answer choices. It was explained to them that they needed to select the continuation arrow at the box of the page for the task to start. They were informed that they would have approximately five seconds to then fix their focus on the picture before the micro-expression task would begin. Participants were taken through a series of self-paced trials that demonstrated the stimuli and the nature of the task. Once they started the program a randomized picture of a face appeared with a neutral expression.

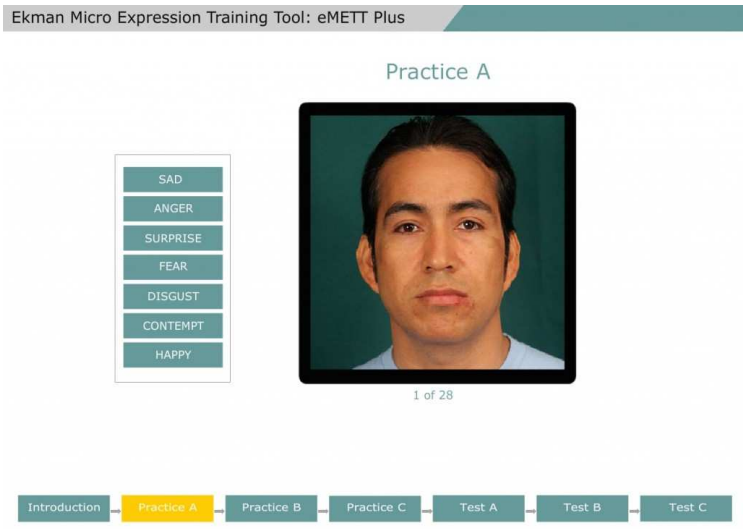
Figure 1. Example of face with a neutral expression (Ekman, 2007).

To the left of the picture there was an assortment of emotions listed (i.e., happy, sad, angry, etc.) and below the picture was an arrow that indicated continuation. When participants were ready they chose to continue with the arrow under the picture to begin the task and focus on the picture of the face. Each micro-expression was then briefly flashed of an emotion lasting only 1/25, and then transitioned back to the neutral face.

Figure 2. Example of a face with slight sadness (Ekman, 2007).

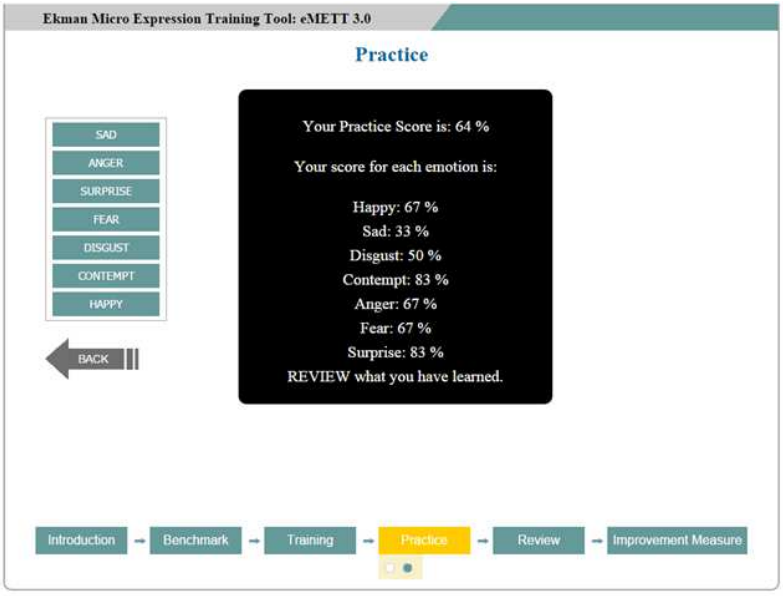
Participants were allowed to view each example three times before making a selection from the emotions listed to the left of the screen.

Figure 3. Example of eMETT3.0 training screen (Ekman, 2014).



They were then asked to make a choice on what emotion they believed was shown, and continued to repeat these steps until the completion of the program. There were 42 trials for each participant to complete. Upon completion participants scores were displayed in accuracy percentages for a total score and individual emotion scores.

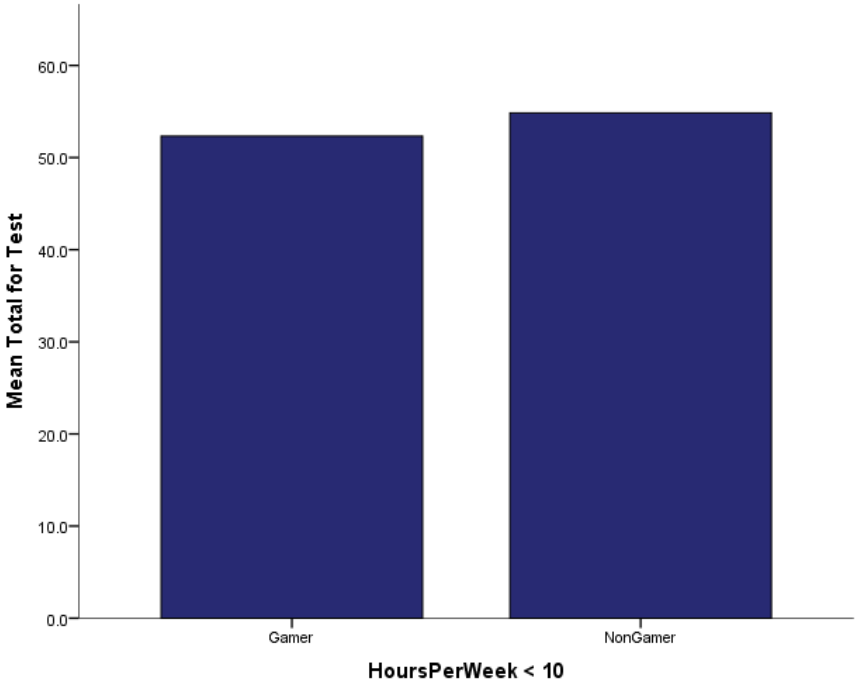
Figure 4. Example of eMETT3.0 score screen (Ekman, 2014).



Results

A bivariate correlation was conducted to evaluate whether response time of gamers was associated with increased ability and accuracy to read facial expressions at fast speeds. The correlation between hours gaming per week and total facial test score was not significant, $r(50) = -.042$, $p = .768$, two-tailed (See Appendix D, Table D1). A multiple regression was conducted with hours gaming per week as the criterion variable and predictor variables of scores for recognizing happy, sad, disgust, contempt, anger, fear, and surprise. The overall regression model was not significant, $R^2 = .162$, $F(7, 44) = 1.213$, $p = .316$. All standardized regression weights were nonsignificant for recognition of each emotion: happy ($\beta = -.155$, $p = .293$), sad ($\beta = -.195$, $p = .169$), disgust ($\beta = .214$, $p = .158$), contempt ($\beta = -.153$, $p = .311$), anger ($\beta = .020$, $p = .891$), fear ($\beta = -.148$, $p = .308$), and surprise ($\beta = .118$, $p = .445$) (See Appendix D, Table D2).

Figure 5. Gamer vs. Non-Gamer and Total Score.



Additionally differences are not seen in attachment style for gamers vs non-gamers. A multiple regression was conducted with total facial test score as the criterion variable and avoidance and anxiety as predictor variables. The overall regression model was not significant, $R^2 = .001$, $F(2, 49) = .019$, $p = .982$, avoidance ($\beta = .028$, $p = .848$), anxiety ($\beta = -.008$, $p = .956$) (See Appendix D, Table D3). A second multiple regression was conducted again but this time with hours gaming per week as the criterion variable and avoidance and anxiety as predictor variables, and was also not significant, $R^2 = .056$, $F(2, 53) = 1.576$, $p = .216$, avoidance ($\beta = .770$, $p = .096$), anxiety ($\beta = .734$, $p = .986$) (See Appendix D, Table D4). A third multiple regression was then conducted with avoidance as the criterion variable and predictor variables of scores for recognizing happy, sad, disgust, contempt, anger, fear, and surprise. The overall regression model was not significant, $R^2 = .115$, $F(7, 44) = .817$, $p = .578$. All standardized regression weights

were nonsignificant for recognition of each emotion: happy (β = .081, p = .591), sad (β = .206, p = .157), disgust (β =.212, p = .171), contempt (β = -.145, p = .349), anger (β = -.059, p = .700), fear (β = .066, p = .658), and surprise (β = -.154, p = .334) (See Appendix D, Table D5). A last multiple regression was conducted with anxiety as the criterion variable and predictor variables of scores for recognizing happy, sad, disgust, contempt, anger, fear, and surprise. The overall regression model was not significant, R^2 = .107, $F(7, 44)$ = .752, p = .630. All standardized regression weights were nonsignificant for recognition of each emotion: happy (β = .127, p = .403), sad (β = .222, p = .130), disgust (β = -.053, p = .733), contempt (β = .157, p = .313), anger (β = -.147, p = .342), fear (β = -.041, p = .784), and surprise (β = -.028, p = .862) (See Appendix D, Table D6).

Discussion

Previous research demonstrated that gamers had more proficient action response time than non-gamers. In this study, it was hypothesized that gamer's abilities with overall increased response time would also be adept to non-gamers when applied to reading micro-expressions. Overall no relationships were found between gamers and the ability to read micro-expressions compared to non-gamers.

One limitation of this study was the small "gamer" representation in the participant population. Out of 56 participants, only eight qualified by spending 10 or more hours per week gaming. Two of these eight participants were unable to have scores recorded. This leaves the study with only six participants who qualify to represent the gamer population. A possibly solution would be to target a population that is more likely to have a higher representation of gamers than general psychology students (e.g., social interest groups and clubs). Additionally, in this study the cutoff for the gamer population

was at 10 or more hours per week. Where as in previous research has had some cutoffs as low as 4 or more hours per week (Schmidt et al., 2013).

Another avenue to consider is that reaction time may only hold for automated responses that are already habitually set for the individual. Thus, if gamers spend a significant amount of their time gaming, they may be getting less experience in focus and processing of social interaction. So if a possible effect were to be found it may be only due to social experience rather than gaming. There also may have been a floor effect of social interaction experience. An option that could have been done to observe this is, when asking participants how many hours they spent gaming, to also have them record how many hours a week they spend interacting with other people.

Additionally, participants who could be classified as gamers did not follow directions carefully and their scores were not recorded. Two participants who qualified as proficient gamers, with 20 or more hours a week spent gaming did not have any scores recorded because they did not stop the activity when they were directed to do so by the experimenter. By continuing past the practice section for the eMETT3.0 the scores desired for the experiment were lost for these participants. It is possible that gamers are poor at following directions; however, it is also possible that gamers become too "trigger happy" when completing the tasks and click past the score by mistake. Even if their scores were indeed recorded, there is a good chance their faster response time would make them less accurate and lead to more mistakes and lower scores. If gamers were indeed faster but less accurate it leads to the questions of who should be trained, the non-gamers to increase their response time or gamers in their ability to read emotions, and which would be more difficult to achieve?

Possibilities for future exploration is to train both groups (gamers and non-gamers) in reading micro-expression and to see, not only who learned the task more quickly, but also which group then received better scores. This would look further into a gamer's response time abilities compared to a non-gamers perceived increased ability to read emotions. Basically, it would allow each group to meet on equal grounds by increases to one another's skillset. Then it would be beneficial to examine external validity with an outside group.

Although no significant results were found regarding the relationship of attachment style of gamers compared to non-gamers, this too could be simply because of a small gamer sample size. An examination of attachment style in the gamer population may show very different results. Participants in this study were enrolled in an undergraduate general psychology class and received credit for participation. Because participants were asked to select the amount of hours they spent gaming in a week, validity could be threatened if they did not accurately report their time spent gaming. Participants may have a self-reporting bias if they do not wish to accurately share the number of hours they spend gaming per week.

Another direction to consider is the difference between biological and social learning when reading emotions. Recent findings define the neural substrates for behavioral biases in attention elicited by viewing emotional stimuli (Davis, 2010). Electron paramagnetic resonance (EPR) studies show that stimuli communicating emotional state, such as facial expressions of emotion, enhance activity in parietal and sensory cortices (Pourtois et al., 2004). Additionally, neuroimaging studies demonstrate that neural activity in visual cortices are enhanced when viewing emotional stimuli

compared to neutral (Fecteau et al., 2007). However, other experiments have demonstrated that facial expressions of emotion also influence memory, and that this memory enhancement is associated with increased activity in the amygdala (Sergerie et al., 2006); amygdala activity has more constant influence on environmental monitoring (Whalen, 1998), which allows organisms to detect and respond to subtle changes in the environment. Thus, not only do emotions communicate in the internal state of the individual, but they also convey important information about the immediate environment. When observed in this manner, facial expressions can be associated with conditioned stimuli. As a result, emotional facial expressions allows prospects between two different possibilities as to how emotion is observed: neural processes associated with learning that predict biological outcomes, and those that have acquired similar predictive value, but through our experiences in the social world (Davis, 2010). So in relationship to the current study some participants may already be biologically predetermined with the ability to read emotions compared to others.

Impaired face processing is a widely documented deficit in autism, and while the origin of this deficit is unclear, several groups have suggested that a lack of perceptual expertise is contributory (Scherf et al., 2008). Thus, a possibility for future research is to associate micro-expressions and gaming in relationship to autism. One technique may be to modify game play to allow individuals with autism to play through storylines that require multiple areas of the brain and mechanisms to be tapped into. Additional sensory input could also be introduced as well, such as auditory and olfactory senses. Platforms involving multiple stimuli such as this, when played habitually, could have a positive impact on an individual with autism and their ability to process environmental stimuli.

Another limitation is that the eMETT3.0 instrument is typically used for training law enforcement in reading micro-expressions. The instrument is a pre-made test and may not be the best for testing a layperson compared to the law enforcement population for which it was initially designed. Although the program states it can be used for personal use, it is primarily directed towards the work force that must interact with a large population (i.e., nurses, police officers, teachers, etc.) This could have affected the results if it was designed specifically towards those who are already well versed in reading the emotions of others.

Increased reaction time skills of gamers is not found to be of use across social aspects, such as micro-expressions, as evaluating non-social reaction time tasks. If the implications were supported possible programs could be created implementing micro-expression training into a videogame like platform. In summary, this study did not provide support for the hypothesis that gamers would be better at reading micro-expression than non-gamers due to past research showing better response time in gamers.

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Appendix A

How many hours a week do you spend gaming?

_____

Table: Description of gaming genres

Genre	*Description*
Adventure	Player must complete puzzles or tasks by interacting with characters in a scenario.
Fighter	Player competes using some means of combat, usually one-on-one.
First-person shooter	Player takes first-person view, centered one a weapon, such as a gun.
Music	Player emulates music using mock instruments or body movements to represent tones.
Platformer	Specific type of action game involving jumping onto platforms to travel through a course with obstacles.
Puzzle	Player solves logic puzzles or maneuvers through mazes.
Racing	Player drives a vehicle and competes in race.
Role Play	Player assumes the role of a character and explores a world, gaining new abilities along the way. Many game shave science fiction or fantasy component.
Simulation	Player is involved in realistic simulation of the world. May involve life, building or business.
Sports	Player emulates experience of a sports game.
Strategy	Player has command of units, such as an army, and seeks to defeat opponents.

Appendix B

University of Central Oklahoma
Informed Consent Form for Participation

Emotions Revealed

This is to certify that I, the undersigned, agree to participate in research as part of an authorized research program of the University of Central Oklahoma, under the supervision of Dr. Robert Mather. The purpose of this study is to examine social interactions and response-time. I understand that I will answer a variety of questions toward this goal, including describing my feelings and opinions and providing demographic information.

If I have any questions about this study, I may contact Kiersten Durning, kdurning@uco.edu. Robert Mather, Ph.D., (405) 974-5474, rmather@uco.edu. You may also contact the Research Administrator at uco-admin@sona-systems.net I may also contact the Research Administrator by phone at (405) 974-5707, or by e-mail, at experimentrak@uco.edu. If I have any questions about my rights as a research participant, I may contact the Chair of the UCO Institutional Review Board by phone, at (405) 974-5479 or by e-mail at irb@uco.edu.

- For this study, I will participate in one laboratory session, lasting approximately 1 hour. I will receive 1 credit for completing a variety of tasks on the computer using a basic keyboard and mouse. The tasks will be completed with mouse movements no different from average computer use. This experiment will not benefit you in anyway, but the results will further knowledge for understanding human behavior and abilities.

- I understand that there will be no harm or discomfort anticipated in the research greater than what is ordinarily encountered in daily life or during routine physical examinations, psychological examinations or tests. Participants will always be fully debriefed at the conclusion of the experiment. Results are reported only about groups of people or by a number that conceals your identity. All results are reported in summary form. Any recordings of computer screen activity will be deleted immediately following the research session.
- This study is voluntary – I do not have to participate if I choose not to, and I may withdraw from the study at any time without penalty. However, because I am participating in this study to obtain course credit and I withdraw from participating, I might not get the full course credit associated with the study. Any recordings of computer screen activity will be deleted immediately following the research session and all other data will be destroyed after 5 years. Except for the computer recordings, electronic information will be kept on a password-protected flash drive prior to deletion.

- I understand that this study is anonymous – any information collected from me will only be used in an analysis as part of a larger group of participants. Thus, I understand that the researchers cannot refer me to anyone based on my answers to the materials, but if I would like to visit with someone regarding sensitive or special concerns, I may contact the UCO Student Counseling Center by phone at (405) 974-2215 or via the website at http://www.uco.edu/student_counseling.
- I understand that I must be 18 years of age or older and must speak English.
- Data are coded, securely stored, and reported in aggregate form.

I will be given a copy of this form to keep. I understand that by agreeing to participate in this research and signing this form, I do not waive any of my legal rights. I understand that the research investigator named above will answer my questions about the research procedure and my rights as a participant. At the experiment's conclusion, I will be debriefed about the purpose, significance, and expected results of the experiment. I understand all of the above information. **I hereby agree to participate in the above-described research. I understand my participation is voluntary and that I may withdraw at any time without penalty.**

Print Your Name _____

Sign Your Name _____ Date _____

Appendix C

Experiences in Close Relationships

Instructions: The following statements concern how you feel in romantic relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by indicating how much you agree or disagree with it. Use the following rating scale:

Disagree strongly Neutral/mixed Agree strongly
1 2 3 4 5 6 7

1. I prefer not to show a partner how I feel deep down.
1 2 3 4 5 6 7

2. I worry about being abandoned.
1 2 3 4 5 6 7

3. I am very comfortable being close to romantic partners.
1 2 3 4 5 6 7

4. I worry a lot about my relationships.
1 2 3 4 5 6 7

5. Just when my partner starts to get close to me I find myself pulling away.
1 2 3 4 5 6 7

6. I worry that romantic partners won't care about me as much as I care about them.
1 2 3 4 5 6 7

7. I get uncomfortable when a romantic partner wants to be very close.
1 2 3 4 5 6 7

8. I worry a fair amount about losing my partner.
1 2 3 4 5 6 7

9. I don't feel comfortable opening up to romantic partners.
1 2 3 4 5 6 7

10. I often wish that my partner's feelings for me were as strong as my feelings for him/her.
1 2 3 4 5 6 7

11. I want to get close to my partner, but I keep pulling back.

1 2 3 4 5 6 7

12. I often want to merge completely with romantic partners, and this sometimes scares them away.

1 2 3 4 5 6 7

13. I am nervous when partners get too close to me.

1 2 3 4 5 6 7

14. I worry about being close.

1 2 3 4 5 6 7

15. I feel comfortable sharing my private thoughts and feelings with my partner.

1 2 3 4 5 6 7

16. My desire to be very close sometimes scares people away.

1 2 3 4 5 6 7

17. I try to avoid getting too close to my partner.

1 2 3 4 5 6 7

18. I need a lot of reassurance that I am loved by my partner.

1 2 3 4 5 6 7

19. I find it relatively easy to get close to my partner.

1 2 3 4 5 6 7

20. Sometimes I feel that I force my partners to show more feeling, more commitment.

1 2 3 4 5 6 7

21. I find it difficult to allow myself to depend on romantic partners.

1 2 3 4 5 6 7

22. I do not often worry about being abandoned.

1 2 3 4 5 6 7

23. I prefer not to be too close to romantic partners.

1 2 3 4 5 6 7

24. If I can't get my partner to show interest in me, I get upset or angry.

1 2 3 4 5 6 7

25. I tell my partner just about everything.

1 2 3 4 5 6 7

26. I find that my partner(s) don't want to get as close as I would like.

1 2 3 4 5 6 7

27. I usually discuss my problems and concerns with my partner.

1 2 3 4 5 6 7

28. When I'm not involved in a relationship, I feel somewhat anxious and insecure.

1 2 3 4 5 6 7

29. I feel comfortable depending on romantic partners.

1 2 3 4 5 6 7

30. I get frustrated when my partner is not around as much as I would like.

1 2 3 4 5 6 7

31. I don't mind asking romantic partners for comfort, advice, or help.

1 2 3 4 5 6 7

32. I get frustrated if romantic partners are not available when I need them.

1 2 3 4 5 6 7

33. It helps to turn to my romantic partner in time of need.

1 2 3 4 5 6 7

34. When romantic partners disapprove of me, I feel really bad about myself.

1 2 3 4 5 6 7

35. I turn to my partner for many things, including comfort and reassurance.

1 2 3 4 5 6 7

36. I resent it when my partner spends time away from me.

1 2 3 4 5 6 7

Appendix D

Table D1:

Correlation matrix

Correlations

		FreeResponse	TotalforTest	Happy	Sad	Disgust	Contempt	Anger	Fear	Surprise
FreeResponse	Pearson Correlation	1	-.042	-.187	-.204	.244	-.072	-.020	-.109	.119
	Sig. (2-tailed)		.768	.185	.146	.081	.610	.889	.444	.401
	Sum of Squares and Cross-products	1640.996	-103.587	-1026.62	-830.452	1626.740	-284.577	-108.144	-564.077	684.606
	Covariance	29.836	-2.031	-20.130	-16.283	31.897	-5.580	-2.120	-11.060	13.424
	N	56	52	52	52	52	52	52	52	52
TotalforTest	Pearson Correlation	-.042	1	.494**	.239	.490**	.367**	.587**	.322*	.659**
	Sig. (2-tailed)	.768		.000	.088	.000	.007	.000	.020	.000
	Sum of Squares and Cross-products	-103.587	4682.827	5153.769	1841.096	6199.481	2743.846	6056.712	3175.846	7209.212
	Covariance	-2.031	91.820	101.054	36.100	121.558	53.801	118.759	62.271	141.357
	N	52	52	52	52	52	52	52	52	52
Happy	Pearson Correlation	-.187	.494**	1	.064	-.076	.171	.225	.008	.167
	Sig. (2-tailed)	.185	.000		.654	.593	.226	.108	.958	.236
	Sum of Squares and Cross-products	-1026.62	5153.769	23233.69	1093.462	-2135.69	2844.462	5179.615	165.462	4073.615
	Covariance	-20.130	101.054	455.563	21.440	-41.876	55.774	101.561	3.244	79.875
	N	52	52	52	52	52	52	52	52	52
Sad	Pearson Correlation	-.204	.239	.064	1	-.052	-.072	.042	-.008	-.016
	Sig. (2-tailed)	.146	.088	.654		.717	.611	.769	.957	.913
	Sum of Squares and Cross-products	-830.452	1841.096	1093.462	12712.06	-1073.71	-888.692	710.827	-124.692	-279.673
	Covariance	-16.283	36.100	21.440	249.256	-21.053	-17.425	13.938	-2.445	-5.484
	N	52	52	52	52	52	52	52	52	52
Disgust	Pearson Correlation	.244	.490**	-.076	-.052	1	.210	.061	-.035	.290*
	Sig. (2-tailed)	.081	.000	.593	.717		.135	.666	.804	.037
	Sum of Squares and Cross-products	1626.740	6199.481	-2135.69	-1073.71	34149.44	4240.538	1709.135	-937.462	8562.635
	Covariance	31.897	121.558	-41.876	-21.053	669.597	83.148	33.512	-18.382	167.895
	N	52	52	52	52	52	52	52	52	52
Contempt	Pearson Correlation	-.072	.367**	.171	-.072	.210	1	.180	-.182	.146
	Sig. (2-tailed)	.610	.007	.226	.611	.135		.203	.197	.300
	Sum of Squares and Cross-products	-284.577	2743.846	2844.462	-888.692	4240.538	11918.31	2957.077	-2863.69	2554.077
	Covariance	-5.580	53.801	55.774	-17.425	83.148	233.692	57.982	-56.151	50.080
	N	52	52	52	52	52	52	52	52	52
Anger	Pearson Correlation	-.020	.587**	.225	.042	.061	.180	1	.098	.269
	Sig. (2-tailed)	.889	.000	.108	.769	.666	.203		.491	.054
	Sum of Squares and Cross-products	-108.144	6056.712	5179.615	710.827	1709.135	2957.077	22770.52	2125.077	6475.019
	Covariance	-2.120	118.759	101.561	13.938	33.512	57.982	446.481	41.668	126.961
	N	52	52	52	52	52	52	52	52	52
Fear	Pearson Correlation	-.109	.322*	.008	-.008	-.035	-.182	.098	1	.143
	Sig. (2-tailed)	.444	.020	.958	.957	.804	.197	.491		.311
	Sum of Squares and Cross-products	-564.077	3175.846	165.462	-124.692	-937.462	-2863.69	2125.077	20796.31	3301.077
	Covariance	-11.060	62.271	3.244	-2.445	-18.382	-56.151	41.668	407.771	64.727
	N	52	52	52	52	52	52	52	52	52
Surprise	Pearson Correlation	.119	.659**	.167	-.016	.290*	.146	.269	.143	1
	Sig. (2-tailed)	.401	.000	.236	.913	.037	.300	.054	.311	
	Sum of Squares and Cross-products	684.606	7209.212	4073.615	-279.673	8562.635	2554.077	6475.019	3301.077	25524.52
	Covariance	13.424	141.357	79.875	-5.484	167.895	50.080	126.961	64.727	500.481
	N	52	52	52	52	52	52	52	52	52

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Tables D 2:

Multiple regression: Hours per week vs. happy, sad, disgust, contempt, anger, fear, and surprise

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.402[a]	.162	.028	4.9751	.162	1.213	7	44	.316

a. Predictors: (Constant), Surprise, Sad, Fear, Happy, Contempt, Anger, Disgust

b. Dependent Variable: FreeResponse

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	210.119	7	30.017	1.213	.316[b]
	Residual	1089.088	44	24.752		
	Total	1299.207	51			

a. Dependent Variable: FreeResponse

b. Predictors: (Constant), Surprise, Sad, Fear, Happy, Contempt, Anger, Disgust

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	8.037	4.786		1.679	.100
	Happy	-.037	.034	-.155	-1.065	.293
	Sad	-.062	.044	-.195	-1.399	.169
	Disgust	.042	.029	.214	1.438	.158
	Contempt	-.050	.049	-.153	-1.025	.311
	Anger	.005	.035	.020	.137	.891
	Fear	-.037	.036	-.148	-1.032	.308
	Surprise	.027	.035	.118	.771	.445

a. Dependent Variable: FreeResponse

Tables D 3:

Multiple regression: Total Score vs. Avoidance and anxiety

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.028[a]	.001	-.040	9.7722	.001	.019	2	49	.982

a. Predictors: (Constant), ANXIETY, AVOIDANCE

b. Dependent Variable: TotalforTest

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	54.041	5.722		9.445	.000		
	AVOIDANCE	.277	1.440	.028	.193	.848	.938	1.066
	ANXIETY	-.075	1.354	-.008	-.056	.956	.938	1.066

a. Dependent Variable: TotalforTest

Tables D 4:

Multiple Regression: Hours spent gaming vs. Avoidance and anxiety

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.237[a]	.056	.021	5.4059	.056	1.576	2	53	.216

a. Predictors: (Constant), ANXIETY, AVOIDANCE

b. Dependent Variable: FreeResponse

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	7.706	2.926		2.633	.011		
	AVOIDANCE	-1.306	.770	-.238	-1.696	.096	.907	1.102
	ANXIETY	.013	.734	.002	.017	.986	.907	1.102

a. Dependent Variable: FreeResponse

Tables D 5:

Multiple regression: Avoidance vs. happy, sad, disgust, contempt, anger, fear, and surprise

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.339[a]	.115	-.026	.99312	.115	.817	7	44	.578

a. Predictors: (Constant), Surprise, Sad, Fear, Happy, Contempt, Anger, Disgust

b. Dependent Variable: AVOIDANCE

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	3.235	.955		3.386	.002		
	Happy	.004	.007	.081	.542	.591	.895	1.117
	Sad	.013	.009	.206	1.440	.157	.985	1.015
	Disgust	.008	.006	.212	1.390	.171	.861	1.161
	Contempt	-.009	.010	-.145	-.947	.349	.860	1.163
	Anger	-.003	.007	-.059	-.388	.700	.871	1.148
	Fear	.003	.007	.066	.445	.658	.926	1.079
	Surprise	-.007	.007	-.154	-.977	.334	.814	1.228

a. Dependent Variable: AVOIDANCE

Tables D 6:

Multiple regression: Anxiety vs. happy, sad, disgust, contempt, anger, fear, and surprise

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.327[a]	.107	-.035	1.06113	.107	.752	7	44	.630

a. Predictors: (Constant), Surprise, Sad, Fear, Happy, Contempt, Anger, Disgust

b. Dependent Variable: ANXIETY

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Collinearity Statistics	
		B	Std. Error	Beta			Tolerance	VIF
1	(Constant)	2.651	1.021		2.597	.013		
	Happy	.006	.007	.127	.845	.403	.895	1.117
	Sad	.015	.009	.222	1.544	.130	.985	1.015
	Disgust	-.002	.006	-.053	-.343	.733	.861	1.161
	Contempt	.011	.010	.157	1.020	.313	.860	1.163
	Anger	-.007	.008	-.147	-.961	.342	.871	1.148
	Fear	-.002	.008	-.041	-.276	.784	.926	1.079
	Surprise	-.001	.007	-.028	-.175	.862	.814	1.228

a. Dependent Variable: ANXIETY

Appendix E: Data Set 1 eMETT3.0 Scores

ID	HoursWeek	Total	Happy	Sad	Disgust	Contempt	Anger	Fear	Surprise
1	2.0	69.0	67.0	17.0	83.0	100.0	67.0	50.0	100.0
2	3.0	68.0	100.0	25.0	75.0	100.0	75.0	.0	100.0
3	3.5	50.0	67.0	33.0	67.0	50.0	33.0	33.0	67.0
4	2.0								
5	1.0	50.0	50.0	17.0	67.0	83.0	33.0	17.0	83.0
6	7.0	50.0	100.0	33.0	50.0	83.0	17.0	.0	67.0
7	.0	62.0	83.0	17.0	67.0	50.0	50.0	33.0	100.0
8	.0	69.0	83.0	33.0	83.0	67.0	50.0	67.0	100.0
9	.0	64.0	67.0	33.0	50.0	83.0	67.0	67.0	83.0
10	1.5	43.0	67.0	33.0	50.0	83.0	17.0	17.0	33.0
11	3.0	64.0	83.0	.0	83.0	100.0	67.0	33.0	83.0
12	.0	55.0	100.0	.0	.0	100.0	83.0	17.0	83.0
13	1.5	48.0	67.0	17.0	50.0	100.0	.0	.0	100.0
14	.0	57.0	83.0	33.0	83.0	100.0	33.0	.0	67.0
15	3.0	60.0	83.0	50.0	50.0	100.0	50.0	.0	83.0
16	6.0	62.0	100.0	17.0	83.0	83.0	67.0	.0	83.0
17	.0	62.0	83.0	17.0	50.0	83.0	33.0	67.0	100.0
18	1.5	62.0	50.0	67.0	67.0	67.0	67.0	33.0	83.0
19	.0	55.0	67.0	33.0	50.0	100.0	50.0	.0	83.0
20	10.0	67.0	67.0	17.0	83.0	100.0	67.0	33.0	100.0
21	15.0	62.0	83.0	.0	83.0	83.0	67.0	17.0	100.0
22	1.0	67.0	67.0	17.0	83.0	100.0	67.0	33.0	100.0
23	7.0	57.0	67.0	17.0	50.0	83.0	83.0	.0	100.0
24	.5	40.0	50.0	.0	67.0	67.0	.0	50.0	50.0
25	2.5	45.0	33.0	.0	83.0	100.0	33.0	.0	67.0
26	5.0	64.0	100.0	50.0	33.0	83.0	67.0	33.0	83.0

27	3.0	62.0	83.0	17.0	83.0	67.0	67.0	17.0	100.0
28	.0	48.0	100.0	17.0	33.0	50.0	33.0	17.0	83.0
29	.0	55.0	83.0	.0	17.0	83.0	50.0	67.0	83.0
30	5.0	52.0	67.0	17.0	33.0	67.0	50.0	33.0	100.0
31	7.5	50.0	83.0	17.0	67.0	83.0	17.0	17.0	67.0
32	.0	50.0	83.0	17.0	17.0	83.0	83.0	33.0	33.0
33	1.0	45.0	50.0	17.0	50.0	67.0	33.0	17.0	83.0
34	.0								
35	4.5	60.0	67.0	.0	67.0	83.0	83.0	33.0	83.0
36	17.0	45.0	17.0	.0	83.0	67.0	67.0	17.0	67.0
37	12.0								
38	20.0								
39	3.0	62.0	83.0	17.0	50.0	83.0	67.0	33.0	100.0
40	.0	31.0	50.0	17.0	.0	83.0	50.0	17.0	.0
41	5.0	55.0	83.0	.0	50.0	83.0	50.0	17.0	100.0
42	24.0	64.0	83.0	17.0	67.0	83.0	33.0	67.0	100.0
43	3.5	50.0	100.0	33.0	33.0	67.0	50.0	17.0	50.0
44	4.0	55.0	100.0	33.0	33.0	67.0	50.0	17.0	50.0
45	15.0	24.0	17.0	17.0	17.0	50.0	17.0	.0	50.0
46	13.5	52.0	67.0	.0	83.0	83.0	33.0	.0	100.0
47	.0	52.0	100.0	.0	67.0	67.0	50.0	17.0	67.0
48	1.0	57.0	33.0	50.0	67.0	83.0	50.0	17.0	100.0
49	4.0	48.0	67.0	.0	67.0	100.0	17.0	17.0	67.0
50	2.0	52.0	67.0	33.0	17.0	50.0	50.0	33.0	100.0
51	.0	57.0	100.0	33.0	.0	100.0	50.0	17.0	100.0
52	3.5	64.0	67.0	33.0	83.0	83.0	67.0	50.0	67.0
53	2.0	52.0	100.0	.0	50.0	83.0	50.0	17.0	67.0
54	.0	62.0	83.0	17.0	50.0	83.0	50.0	50.0	100.0

55	.0	38.0	50.0	17.0	17.0	67.0	17.0	50.0	50.0
56	4.0	43.0	50.0	.0	.0	67.0	50.0	33.0	100.0

Appendix F: Data Set 2 Experiences in Close Relationships Scale

ID	ECR_1	ECR_2	ECR_3	ECR_4	ECR_5	ECR_6	ECR_7	ECR_8	ECR_9
1	3	6	6	3	3	7	2	5	2
2	1	4	7	3	1	5	2	3	2
3	2	3	7	6	3	4	2	4	3
4	4	5	6	4	3	5	4	5	4
5	1	4	6	2	3	3	4	4	1
6	4	6	3	6	5	7	4	6	5
7	5	1	3	4	5	4	6	3	5
8	6	6	2	5	6	5	3	5	3
9	5	5	2	3	4	5	5	4	6
10	2	5	6	3	2	6	2	3	3
11	2	6	3	4	4	5	4	4	3
12	4	4	7	2	1	2	1	2	1
13	4	6	5	4	6	6	4	4	3
14	4	4	7	7	1	1	1	4	4
15	2	4	6	4	1	5	2	5	2
16	4	4	5	2	3	3	4	2	5
17	3	4	6	3	6	4	6	3	3
18	5	6	5	7	5	6	4	6	6
19	2	7	6	3	1	6	1	4	2
20	2	4	7	1	2	2	1	2	1
21	1	5	7	6	1	5	1	5	1
22	5	4	6	4	7	3	2	2	4
23	5	2	6	4	2	2	3	3	2
24	3	6	3	4	5	2	2	4	2
25	4	6	5	3	2	7	2	4	4
26	1	5	6	4	5	7	2	3	2

27	2	7	4	6	4	7	3	6	3
28	4	1	7	4	1	5	1	5	2
29	1	5	6	5	1	1	4	3	2
30	2	2	6	6	1	4	2	5	6
31	1	5	7	5	1	5	1	6	1
32	6	5	6	5	2	6	2	6	2
33	4	2	7	7	6	7	2	6	2
34	1	5	7	1	1	1	1	5	1
35	5	1	5	1	2	1	2	1	2
36	2	2	6	3	1	4	3	4	3
37	1	4	7	4	4	4	1	4	1
38	1	1	7	2	1	2	1	3	1
39	3	4	6	6	5	6	3	5	5
40	5	2	5	2	3	2	3	2	2
41	2	1	7	1	1	3	2	4	1
42	3	5	4	7	1	5	2	4	2
43	3	5	5	6	4	5	3	3	3
44	2	2	6	2	2	2	2	2	2
45	4	2	3	5	4	3	4	7	5
46	4	1	7	5	1	6	1	1	1
47	4	6	6	6	6	7	3	7	7
45	2	4	6	4	2	3	3	3	2
46	6	4	6	5	2	7	2	6	2
47	3	2	6	2	2	2	2	3	5
48	2	7	6	6	2	7	2	7	2
49	5	2	6	1	2	3	4	2	5
50	2	2	7	6	2	5	7	3	2
51	5	1	7	1	1	1	1	1	1

52	3	7	6	1	4	3	2	7	3
53	2	2	6	2	2	2	1	1	2
54	3	6	6	3	3	7	2	5	2
55	1	4	7	3	1	5	2	3	2
56	2	3	7	6	3	4	2	4	3

ID	**ECR10**	**ECR11**	**ECR12**	**ECR13**	**ECR14**	**ECR15**	**ECR16**	**ECR17**	**ECR18**
1	5	2	5	1	1	6	5	2	7
2	2	2	2	1	2	6	2	2	4
3	2	1	2	2	2	6	2	1	6
4	4	2	3	3	4	5	3	3	4
5	4	2	3	2	2	6	1	1	4
6	7	7	2	6	6	1	2	7	7
7	4	5	3	5	4	6	1	5	1
8	5	5	5	5	4	3	3	5	3
9	4	4	2	4	5	4	2	4	4
10	3	4	2	2	4	5	2	3	6
11	5	4	2	4	4	3	1	2	2
12	1	1	3	3	4	4	3	4	7
13	7	5	3	5	2	4	2	5	7
14	7	1	1	1	1	5	6	7	7
15	5	1	5	2	4	6	5	2	7
16	3	2	1	4	4	4	1	3	2
17	4	3	3	4	3	6	2	3	3
18	7	5	3	5	4	5	2	2	7
19	1	1	1	1	1	6	2	1	6
20	2	1	2	1	1	7	1	1	5
21	3	1	2	2	2	6	1	1	4

22	5	6	3	5	6	6	2	5	2
23	2	3	1	1	3	4	1	4	4
24	2	2	5	3	2	2	4	3	4
25	4	2	1	1	1	4	1	1	4
26	3	5	4	5	6	6	6	2	7
27	7	4	7	5	5	4	7	2	7
28	5	1	1	1	1	7	6	1	5
29	1	1	2	2	2	6	2	2	5
30	1	1	2	2	2	6	2	3	5
31	4	1	3	1	1	1	3	1	5
32	6	2	6	2	2	6	6	2	6
33	7	6	2	6	6	2	4	6	6
34	1	1	1	1	1	7	1	1	1
35	1	1	1	5	2	6	1	4	1
36	4	3	2	2	1	6	4	4	4
37	4	4	4	1	1	7	1	1	4
38	1	1	1	1	2	7	2	1	1
39	6	4	2	6	3	3	1	3	5
40	2	1	1	3	5	6	1	5	1
41	2	1	1	1	1	7	1	1	1
42	4	1	4	3	4	4	5	1	4
43	2	3	1	2	2	6	2	3	2
44	2	2	2	2	2	6	2	2	4
45	4	2	6	3	2	5	1	1	7
46	4	1	2	1	1	5	1	2	4
47	7	6	4	5	3	4	3	4	7
45	3	2	3	2	2	5	2	3	4
46	5	2	2	2	2	6	2	2	3

47	2	2	2	2	2	5	2	2	6
48	7	2	4	6	4	6	4	4	7
49	1	2	1	2	1	6	1	1	2
50	6	2	2	2	2	7	2	2	7
51	1	1	1	1	1	4	1	1	4
52	4	2	1	5	4	6	3	4	6
53	2	2	4	1	2	6	4	2	2
54	5	2	5	1	1	6	5	2	7
55	2	2	2	1	2	6	2	2	4
56	2	1	2	2	2	6	2	1	6

ID	**ECR19**	**ECR20**	**ECR21**	**ECR22**	**ECR23**	**ECR24**	**ECR25**	**ECR26**	**ECR27**
1	6	3	6	2	1	7	6	4	7
2	5	3	4	2	2	2	5	2	6
3	6	1	6	3	1	3	6	1	6
4	6	3	4	3	2	4	6	1	6
5	6	3	4	4	2	3	3	1	6
6	1	2	6	1	3	4	1	4	2
7	6	3	4	6	6	4	2	2	3
8	5	3	5	3	5	3	3	3	4
9	3	3	6	4	5	4	3	3	4
10	5	2	6	3	4	2	4	2	4
11	4	3	5	2	3	2	4	2	4
12	4	4	3	4	1	4	6	4	5
13	6	5	3	4	4	3	5	2	5
14	7	1	7	6	3	7	3	7	1
15	6	5	2	4	1	6	6	4	5
16	5	2	4	4	5	3	1	2	4

17	6	3	2	3	4	3	7	3	6
18	6	7	5	2	2	6	3	4	3
19	4	5	2	1	1	5	6	1	5
20	7	4	2	4	2	2	7	1	7
21	6	4	2	2	1	4	6	1	6
22	6	4	3	6	5	3	4	2	6
23	3	5	5	6	2	5	6	4	6
24	6	5	4	5	2	3	5	4	6
25	4	4	3	1	2	4	3	2	6
26	5	5	3	1	1	5	6	5	5
27	4	7	7	1	3	3	4	5	7
28	7	6	4	7	1	4	7	2	7
29	6	2	6	4	1	4	7	1	7
30	5	3	1	7	3	1	6	1	6
31	7	4	2	2	1	5	7	1	7
32	6	6	6	2	2	6	6	6	6
33	2	5	7	2	2	6	5	7	5
34	7	1	2	5	1	1	6	1	7
35	6	1	4	7	5	1	6	1	7
36	5	3	4	7	3	1	5	4	5
37	4	1	4	1	1	1	4	4	4
38	6	4	1	2	1	1	6	1	7
39	5	5	2	5	3	7	1	6	5
40	4	2	6	1	6	1	4	2	6
41	7	1	2	2	2	2	6	1	6
42	4	3	2	1	1	7	4	4	4
43	4	2	7	3	3	2	4	3	6
44	6	2	3	6	2	2	6	2	6

45	6	1	1	4	1	3	2	1	5
46	6	2	4	7	1	4	6	2	6
47	4	6	7	1	1	6	4	4	6
45	5	2	2	5	2	3	5	2	6
46	6	3	4	4	2	3	6	2	6
47	5	3	3	6	3	2	6	3	6
48	7	6	5		5	7	5	6	6
49	6	1	4	7	2	2	7	1	7
50	6	3	5	6	2	4	7	2	7
51	7	2	2	7	1	1	6	1	7
52	6	2	4	1	3	3	6	2	6
53	6	2	2	6	2	4	6	1	6
54	6	3	6	2	1	7	6	4	7
55	5	3	4	2	2	2	5	2	6
56	6	1	6	3	1	3	6	1	6

ID	**ECR28**	**ECR29**	**ECR30**	**ECR31**	**ECR32**	**ECR33**	**ECR34**	**ECR35**	**ECR36**
1	4	5	5	6	4	6	5	7	2
2	1	6	2	5	2	5	5	5	1
3	1	4	4	7	4	6	2	7	2
4	3	4	4	6	4	6	6	6	3
5	1	4	6	7	6	6	4	6	2
6	6	1	2	4	5	2	7	2	2
7	1	2	1	3	1	3	1	2	1
8	3	3	5	4	2	2	4	2	5
9	3	3	4	4	3	4	3	3	2
10	1	2	2	4	2	4	2	4	2
11	2	3	2	4	2	4	3	4	2

12	7	7	7	7	7	7	7	7	7
13	6	2	4	4	2	2	6	5	2
14	1	1	7	7	7	7	1	3	4
15	5	6	7	7	7	6	6	7	5
16	1	3	1	5	1	4	1	2	3
17	1	7	2	6	3	6	3	6	1
18	4	5	3	2	5	4	7	7	3
19	2	6	5	4	3	5	6	6	2
20	4	6	4	6	3	6	4	7	3
21	5	6	6	6	6	6	7	6	2
22	1	5	4	7	5	7	4	7	3
23	4	4	3	6	2	6	4	6	1
24	3	6	5	6	4	5	6	6	4
25	6	4	4	5	3	5	3	5	2
26	7	3	6	5	6	7	6	6	2
27	7	4	5	5	5	6	6	6	6
28	1	5	1	7	1	7	6	7	1
29	1	2	4	7	6	6	4	5	1
30	1	1	1	6	1	6	1	5	1
31	3	7	6	7	4	7	5	7	2
32	6	4	6	6	6	6	6	6	6
33	5	4	6	4	4	6	1	3	4
34	4	5	1	7	3	7	6	7	5
35	1	5	1	7	1	4	5	5	1
36	3	5	3	6	3	5	4	5	4
37	4	4	1	4	1	4	1	4	1
38	1	7	2	7	1	7	1	6	1
39	2	5	6	6	7	7	6	6	6

40	3	3	5	4	6	6	1	5	2
41	1	5	2	6	1	6	4	6	2
42	5	6	5	4	5	6	6	4	4
43	2	3	2	5	2	6	2	3	1
44	2	5	2	6	3	6	5	6	2
45	4	4	6	7	6	5	6	6	4
46	2	5	5	6	2	6	5	7	2
47	5	2	6	6	6	6	5	6	2
45	2	5	4	6	3	6	4	6	2
46	1	5	3	6	3	6	4	5	2
47	2	5	3	6	3	5	4	5	2
48	4	4	4	6	4	5	7	5	4
49	1	4	2	7	2	5	1	4	1
50	1	7	5	7	5	7	6	7	2
51	1	6	5	7	4	7	1	5	1
52	3	4	4	7	2	6	3	7	2
53	1	5	5	6	5	6	2	6	4
54	4	5	5	6	4	6	5	7	2
55	1	6	2	5	2	5	5	5	1
56	1	4	4	7	4	6	2	7	2

ID	ECR3r	ECR15r	ECR19r	ECR20r	ECR22r	ECR25r	ECR27r	ECR29r	ECR31r
1	2.00	2.00	2.00	5.00	6.00	2.00	1.00	3.00	2.00
2	1.00	2.00	3.00	5.00	6.00	3.00	2.00	2.00	3.00
3	1.00	2.00	2.00	7.00	5.00	2.00	2.00	4.00	1.00
4	2.00	3.00	2.00	5.00	5.00	2.00	2.00	4.00	2.00
5	2.00	2.00	2.00	5.00	4.00	5.00	2.00	4.00	1.00
6	5.00	7.00	7.00	6.00	7.00	7.00	6.00	7.00	4.00

7	5.00	2.00	2.00	5.00	2.00	6.00	5.00	6.00	5.00
8	6.00	5.00	3.00	5.00	5.00	5.00	4.00	5.00	4.00
9	6.00	4.00	5.00	5.00	4.00	5.00	4.00	5.00	4.00
10	2.00	3.00	3.00	6.00	5.00	4.00	4.00	6.00	4.00
11	5.00	5.00	4.00	5.00	6.00	4.00	4.00	5.00	4.00
12	1.00	4.00	4.00	4.00	4.00	2.00	3.00	1.00	1.00
13	3.00	4.00	2.00	3.00	4.00	3.00	3.00	6.00	4.00
14	1.00	3.00	1.00	7.00	2.00	5.00	7.00	7.00	1.00
15	2.00	2.00	2.00	3.00	4.00	2.00	3.00	2.00	1.00
16	3.00	4.00	3.00	6.00	4.00	7.00	4.00	5.00	3.00
17	2.00	2.00	2.00	5.00	5.00	1.00	2.00	1.00	2.00
18	3.00	3.00	2.00	1.00	6.00	5.00	5.00	3.00	6.00
19	2.00	2.00	4.00	3.00	7.00	2.00	3.00	2.00	4.00
20	1.00	1.00	1.00	4.00	4.00	1.00	1.00	2.00	2.00
21	1.00	2.00	2.00	4.00	6.00	2.00	2.00	2.00	2.00
22	2.00	2.00	2.00	4.00	2.00	4.00	2.00	3.00	1.00
23	2.00	4.00	5.00	3.00	2.00	2.00	2.00	4.00	2.00
24	5.00	6.00	2.00	3.00	3.00	3.00	2.00	2.00	2.00
25	3.00	4.00	4.00	4.00	7.00	5.00	2.00	4.00	3.00
26	2.00	2.00	3.00	3.00	7.00	2.00	3.00	5.00	3.00
27	4.00	4.00	4.00	1.00	7.00	4.00	1.00	4.00	3.00
28	1.00	1.00	1.00	2.00	1.00	1.00	1.00	3.00	1.00
29	2.00	2.00	2.00	6.00	4.00	1.00	1.00	6.00	1.00
30	2.00	2.00	3.00	5.00	1.00	2.00	2.00	7.00	2.00
31	1.00	7.00	1.00	4.00	6.00	1.00	1.00	1.00	1.00
32	2.00	2.00	2.00	2.00	6.00	2.00	2.00	4.00	2.00
33	1.00	6.00	6.00	3.00	6.00	3.00	3.00	4.00	4.00
34	1.00	1.00	1.00	7.00	3.00	2.00	1.00	3.00	1.00

35	3.00	2.00	2.00	7.00	1.00	2.00	1.00	3.00	1.00
36	2.00	2.00	3.00	5.00	1.00	3.00	3.00	3.00	2.00
37	1.00	1.00	4.00	7.00	7.00	4.00	4.00	4.00	4.00
38	1.00	1.00	2.00	4.00	6.00	2.00	1.00	1.00	1.00
39	2.00	5.00	3.00	3.00	3.00	7.00	3.00	3.00	2.00
40	3.00	2.00	4.00	6.00	7.00	4.00	2.00	5.00	4.00
41	1.00	1.00	1.00	7.00	6.00	2.00	2.00	3.00	2.00
42	4.00	4.00	4.00	5.00	7.00	4.00	4.00	2.00	4.00
43	3.00	2.00	4.00	6.00	5.00	4.00	2.00	5.00	3.00
44	2.00	2.00	2.00	6.00	2.00	2.00	2.00	3.00	2.00
45	5.00	3.00	2.00	7.00	4.00	6.00	3.00	4.00	1.00
46	1.00	3.00	2.00	6.00	1.00	2.00	2.00	3.00	2.00
47	2.00	4.00	4.00	2.00	7.00	4.00	2.00	6.00	2.00
45	2.00	3.00	3.00	6.00	3.00	3.00	2.00	3.00	2.00
46	2.00	2.00	2.00	5.00	4.00	2.00	2.00	3.00	2.00
47	2.00	3.00	3.00	5.00	2.00	2.00	2.00	3.00	2.00
48	2.00	2.00	1.00	2.00		3.00	2.00	4.00	2.00
49	2.00	2.00	2.00	7.00	1.00	1.00	1.00	4.00	1.00
50	1.00	1.00	2.00	5.00	2.00	1.00	1.00	1.00	1.00
51	1.00	4.00	1.00	6.00	1.00	2.00	1.00	2.00	1.00
52	2.00	2.00	2.00	6.00	7.00	2.00	2.00	4.00	1.00
53	2.00	2.00	2.00	6.00	2.00	2.00	2.00	3.00	2.00
54	2.00	2.00	2.00	5.00	6.00	2.00	1.00	3.00	2.00
55	1.00	2.00	3.00	5.00	6.00	3.00	2.00	2.00	3.00
56	1.00	2.00	2.00	7.00	5.00	2.00	2.00	4.00	1.00

ID	ECR33r	ECR35r	Avoidance	Anxiety	SecureCo	FearfulCo	PreoccupiedCo	DismissingCo	Attachment
1	2.00	1.00	2.17	4.78	21.74	22.40	26.44	17.33	3.00
2	3.00	3.00	2.17	2.94	11.71	7.40	8.64	8.27	1.00
3	2.00	1.00	2.11	3.33	13.66	10.18	12.20	9.79	1.00
4	2.00	2.00	2.78	4.00	19.50	20.46	21.29	17.99	3.00
5	2.00	2.00	2.33	3.28	14.08	11.34	12.53	11.15	1.00
6	6.00	6.00	5.67	5.11	35.08	50.45	43.41	44.75	2.00
7	5.00	6.00	4.89	2.39	17.62	22.56	13.93	25.58	4.00
8	6.00	6.00	4.83	4.22	27.47	37.15	31.51	34.23	2.00
9	4.00	5.00	4.72	3.61	23.76	31.35	25.14	30.39	2.00
10	4.00	4.00	3.44	3.22	17.43	18.92	16.35	19.06	4.00
11	4.00	4.00	3.89	3.28	19.20	22.59	18.63	22.60	4.00
12	1.00	1.00	2.06	4.39	19.25	18.41	22.23	14.59	3.00
13	6.00	3.00	4.06	4.06	24.00	30.16	26.84	27.67	2.00
14	1.00	5.00	3.33	4.50	24.06	28.57	28.32	24.55	2.00
15	2.00	1.00	1.78	5.06	21.98	21.85	27.61	15.84	3.00
16	4.00	6.00	4.06	2.44	15.19	16.98	11.20	19.72	4.00
17	2.00	2.00	2.78	3.06	14.33	12.73	12.11	13.32	1.00
18	4.00	1.00	3.94	4.83	27.89	35.72	33.96	30.70	2.00
19	3.00	2.00	2.00	3.61	14.81	11.65	14.46	10.34	1.00
20	2.00	1.00	1.39	2.72	7.94	-.04	3.43	1.45	1.00
21	2.00	2.00	1.56	4.11	16.08	12.52	17.57	9.53	3.00
22	1.00	1.00	3.33	3.28	17.37	18.57	16.45	18.51	2.00
23	2.00	2.00	2.89	2.78	13.17	11.27	9.85	12.77	1.00
24	3.00	2.00	2.94	3.78	18.83	19.85	19.78	18.12	2.00
25	3.00	3.00	2.89	3.67	18.04	18.54	18.48	17.16	2.00
26	1.00	2.00	2.72	5.11	25.39	29.14	31.86	23.07	3.00
27	2.00	2.00	3.39	5.78	31.24	39.42	40.95	31.27	3.00

28	1.00	1.00	1.50	2.89	9.21	2.12	5.48	3.09	1.00
29	2.00	3.00	2.22	3.17	13.11	9.62	11.01	9.78	1.00
30	2.00	3.00	2.56	2.33	9.64	5.22	4.23	8.12	1.00
31	1.00	1.00	1.39	4.06	15.23	10.86	16.37	8.03	3.00
32	2.00	2.00	2.56	5.44	26.67	30.66	34.44	23.49	3.00
33	2.00	5.00	4.17	4.94	29.23	38.23	35.91	32.88	2.00
34	1.00	1.00	1.22	2.67	7.08	-1.70	2.23	-.05	1.00
35	4.00	3.00	2.83	1.61	6.61	1.32	-1.69	6.60	1.00
36	3.00	3.00	2.72	3.11	14.45	12.79	12.44	13.19	1.00
37	4.00	4.00	2.67	3.17	14.57	12.84	12.76	13.05	1.00
38	1.00	2.00	1.17	1.83	2.34	-8.92	-6.08	-4.58	1.00
39	1.00	2.00	3.44	4.67	25.34	30.73	30.38	26.19	2.00
40	2.00	3.00	3.50	2.83	15.49	16.14	12.79	17.55	4.00
41	2.00	2.00	1.61	2.28	6.23	-2.07	-.02	.89	1.00
42	2.00	4.00	2.67	5.00	24.60	27.83	30.56	22.11	3.00
43	2.00	5.00	3.39	2.94	15.73	16.25	13.43	17.28	4.00
44	2.00	2.00	2.11	2.56	9.40	3.82	4.64	5.94	1.00
45	3.00	2.00	3.00	4.33	22.05	24.79	25.39	21.27	3.00
46	2.00	1.00	1.89	3.00	11.10	5.85	8.09	6.50	1.00
47	2.00	2.00	3.94	5.17	29.72	38.44	37.19	32.34	2.00
45	2.00	2.00	2.33	3.17	13.47	10.43	11.45	10.60	1.00
46	2.00	3.00	2.44	3.50	15.66	13.96	15.12	13.06	1.00
47	3.00	3.00	2.61	2.72	11.96	8.80	8.22	10.45	1.00
48	3.00	3.00	2.89	5.35	27.27	32.33	34.86	25.49	3.00
49	3.00	4.00	2.61	1.78	6.79	1.08	-.95	5.78	1.00
50	1.00	1.00	2.00	3.72	15.42	12.56	15.54	10.89	3.00
51	1.00	3.00	1.67	1.83	3.98	-5.30	-4.11	-.90	1.00
52	2.00	1.00	2.67	3.78	17.91	17.84	18.69	16.07	3.00

53	2.00	2.00	1.94	2.83	10.37	4.89	6.69	6.09	1.00
54	2.00	1.00	2.17	4.78	21.74	22.40	26.44	17.33	3.00
55	3.00	3.00	2.17	2.94	11.71	7.40	8.64	8.27	1.00
56	2.00	1.00	2.11	3.33	13.66	10.18	12.20	9.79	1.00