

CONFLICT RESOLUTION AND VIDEOGAMES: TAKING THE GAMES OUT OF GAMING STUDIES

*An Interactive Qualifying Project Report
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by*

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Abstract

This project's purpose was to experimentally determine whether strategies incentivized in a videogame influenced the strategies used by players in real world conflicts. The study tested for several strategies both inside and outside the context of a game. It was necessary to develop new experimental methodologies to test for a change in strategy because prior studies had used monitored play to test for changes in player behavior which due to the nature of games will not reflect real world decisions.

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Executive Summary

If as several researchers have suggested, violent videogames encourage players to respond aggressively to other conflicts, then could videogames be used to encourage other strategies besides aggression? To answer this question it was first necessary to determine whether previous research was correct in its assessment, and if so attempt to do the same with other measurable personality traits. To test for these other strategies, a new methodology needed to be developed to better understand how videogames change how people react to conflict.

A great deal of early research suggested a link between aggressive reaction and violent videogames, but others studies, especially more recent studies, reported mixed or contrary results. Furthermore many meta-analyses, when controlling for variables such as an individual's personal exposure to violence, or data skewed by the methodology of the experiment found no significant data pointing to a relationship between violent videogames and aggression.

The problem was made clear through several papers detailing the methodology of the studies in question; many early and current experiments used the General Aggression Model (GAM), developed by Anderson and Bushman, which measures aggression through a competitive reaction time test, or in other words, a game. Many other research articles questioned the efficacy of this test, and that perhaps the unaccounted variable of play was skewing the results of previous tests. I was clear that a new methodology would need to be developed.

By examining the procedures used in other experiments a decision was made to break up the experiment into three parts: a phase of pretesting to determine the participants' natural disposition toward certain strategies, the game play phase where the player's strategy should theoretically be altered by the incentivized strategy, and finally a staged conflict outside the context of a game. After establishing the player's predisposition toward a conflict strategy, and which strategy they used in the game, it would be possible to examine whether their predicted strategy differed from the one they used after the game.

Although play needed to be eliminated from the measure of aggression, the project still required a

game for the participants to play. A free online videogame that allowed for several different strategies and game modes was found to meet the needs of the experiment. The tools presented in the game allowed for the development of criteria for setting the field of play to incentivize different strategies through gameplay. If the hypothesis proved true, then the participants should adopt the strategies incentivized in the game during the staged conflict.

With the game in place, a pool of participants was gathered so that the experiment could begin. Before the day of testing, participants sent pretesting materials which they filled out indicating their preference toward one of the three different strategies they could utilize in the experiment. The pretesting materials also contained an informed consent form so that they were made aware of the nature of the experiment they were signing on for. On the day of the experiment, each participant was issued an emotional inventory to control for variations in mood during the experiment. The participants were then randomly assigned to one of the four game modes without being told which game they would play beforehand. After the participants finished playing the game the staged conflict would occur; in this case the conflict consisted of a confederate rudely taking a phone call that “holds up the experiment.” Their reactions to this staged conflict were then recorded, and after the experiment the participants were debriefed and were informed of the nature of the deception.

Now that all of the data has been analyzed, a solid trend has emerged. It can conclusively be said that based on the results of the experiment that this study found no relationship between the strategy incentivized, and the strategy used in a real life conflict afterward. Incentivization does have a consistent effect on player strategy, but the strategy used in the real life conflict is not the same as the strategy incentivized. This means that the strategy utilized in a game is not an accurate reflection of how a person would react to a real life conflict, and therefore measures involving play, like the Taylor Competitive Reaction Time Test are not accurate measures of real life aggression.

Introduction

The medium of videogames is a relatively recent addition to the world of popular entertainment, and as such the research of its effects on its audience is going through the same adolescence as the medium it studies. Although several researchers have written about the psychological effects of videogames on those who play them, any area of research takes time to standardize their measures and fully understand the subject of their studies. As with every new academic field, the ground work for the study of videogames research is based on the closest comparable subject; in this case research into other forms of media. While the general shape of experiments in this new field can be gleaned from those on older mediums; the study of videogames introduces one key element into consideration that previous forms of media did not have to contend with. Games are meant to be played as opposed to watched, and this element of interactivity must be accounted for in the research.

This is not to say that the element of interactivity has been overlooked by others in the study of videogames, research clearly proves that a videogames interactivity, its relationship to its audience through active play, increases engagement. Some of the early pioneers into the effects of videogames on their audience believed that the greater engagement created through active play would make the audience for these videogames more likely to imitate or repeat the behaviors shown in the game. These early researchers focused in particular on the mimicry of violence and aggression in videogames, hoping to draw a parallel between research done on the violent content of other media, and the violent content of games.

Although different researchers have come to differing conclusions, several studies have found a link between aggression shown in games and aggression shown in those who play it. Upon researching their findings, two issues were determined to be of particular importance to this project:

1. The methodology in many tests that showed a relationship between videogames and aggression in the players framed their tests of aggression in the form of another game.
2. Aggression is theorized to be an innate trait of human personality; some people are naturally passive, others naturally aggressive with others falling somewhere in the middle.

If and how videogames change these innate human traits is not well understood, but if the conclusions of these previous experiments are true, then videogames should be able to change other innate qualities like a person's willingness to lie, or they could encourage positive behaviors like a tendency to seek out diplomatic solutions to problems.

Using these observations, it was determined what was really needed for the next step forward in videogames studies is to understand how "play" effects how a person makes decisions. Will a decision made within the context of play be made outside of it? Does play change innate personality traits both inside and out of the play environment? These questions will be explored in this paper, and hopefully the conclusions of this paper will indicate areas where further research is necessary.

Literature Review

Incidents such as the 1999 Columbine high school shooting, the Devin Moore police shooting incident, and the Anthony Graziano firebombings on synagogues have been attributed to violent media. Early research examining the effects of violence in the media was prompted by the popularity of violent television program and movies. Myriad studies found evidence that viewing graphic violence affected young viewers by increasing viewer's aggressive behavior¹ and desensitizes viewers to subsequent acts of violence². Recently, videogames have become a popular source of entertainment, but the games are just as violent as television and film. Thus, it is not surprising that attention has now turned to studying on the effects of videogames on player's attitudes and behavior. Although there has been increasing evidence demonstrating a relationship

¹ Bandura, Albert, Dorothea Ross and Sheila A. Ross. "Imitation of film-mediated aggressive models." *The Journal of Abnormal and Social Psychology*, Vol 66(1), Jan 1963. (1963): 3-11.

² Linz, Daniel, Edward Donnerstein and Steven M. Adams. "Physiological Desensitization and Judgments About Female Victims of Violence." *Human Communication Research* (1989): 509-522.

between videogames and violence^{3 4}, there has also been studies that demonstrate little to no relationship^{5 6}. In addition, the underlying mechanism for this effect (or lack thereof) is not clear.

The “General Aggression Model” is one of the most widely used means of measuring aggression in aggression studies⁷. In their 2002 paper, Anderson and Bushman focused on the theory and history of the GAM, provided definitions and categorization of aggression and violence, and introducing the concept of mental scripting of aggressive behaviors as a result of viewing violent media. Later, Anderson and Bushman⁸ purported that videogames in particular have greater impact on player’s development of aggressive responses. Much of their work was influenced by their meta-analysis of previous studies into videogames and aggression⁹. In all of their studies, Anderson and Bushman specifically point out videogames immersive nature and the system of task and reward that videogames so effectively harness to entice players.

Anderson and Bushman’s evidence for these claims were a statistical correlation between

³ Anderson, Craig A. and Brad J. Bushman. "The Effects of Media Violence on Society." *Science* 295 (2002): 2377-2379.

⁴ Funk, Jeanne B., Debra D. Buchman, Jennifer Jenks and Heidi Bechtoldt. "Playing violent video games, desensitization, and moral evaluation in children." *Journal of Applied Developmental Psychology* 24 (2003),

⁵ Ferguson, Christopher J., Stephanie M. Rueda, Amanda M. Cruz, Diana E. Ferguson, Stacey Fritz and Shawn M. Smith. "Video-Gaming Among High School Students: Health Correlates, Gender Differences, and Problematic Gaming ." *Pediatrics* 126 (2010): e1414-e1424.

⁶ Ithori, Nobuko, Akira Sakamoto, Akiko Shibuya and Shintaro Yukawa. "Effect of Video Games on Children’s Aggressive Behavior and Pro-social Behavior: A Panel Study with Elementary School Students." *Authors & Digital Games Research Association* (2007)

⁷ Anderson, Craig A. and Brad J. Bushman. "HUMAN AGGRESSION." *Annual Reviews Psychology* 53 (2002),

⁸ Bushman, Brad J. and Craig A. Anderson. "Violent Video Games and Hostile Expectations: A Test of the General Aggression Model." *PERSONALITY AND SOCIAL PSYCHOLOGY BULLETIN* 28 (2002): 1679-1686.

⁹ Anderson, Craig A. and Bushman, Brad J. "Effects of Violent Video Games of Aggressive Behavior, Aggressive Cognition, Aggressive Affect, Physiological Arousal, and Prosocial Behavior: A Meta-Analytic Review of the Scientific Literature." *PSYCHOLOGICAL SCIENCE* 12 (2001): 353-359.

exposure to “violent content” and an increased measure of aggression using their primary aggression measure, the Taylor Competitive Reaction Time Test (TCRTT). The TCRTT is a mocked competition wherein participants are told they are competing against a fictitious opponent in a test of reflexes who will be “punished” for losing by receiving a blast of white noise if they fail to hit a button before the participant. The participants in the TCRTT could choose at what level to set the volume of the white noise for their opponent, with a choice for higher levels of white noise being observed as being more aggressive or violent.

Like Bushman and Anderson’s research on videogame violence, Karen and Jody Dill’s¹⁰ meta-analysis of several pertinent videogame studies found that findings from these experiments point towards a clear correlation between videogames and aggression. Dill and Dill¹¹ highlight that while some studies do indicate a relationship between aggression and videogames; several fail to illustrate any relationship between the two. Of particular interest was the methodology of several experiments mentioned in the paper, of particular interest was that studies that found a positive correlation with aggression used similar measures of aggression, either the Taylor Competitive Reaction Time Test, or monitored free play. It was apparent from this meta-analysis that the primary way of measuring a participant’s reaction to violent videogames was through play.

Further research about the link between aggression and videogames by Douglas Gentile¹² calls attention to an increase in behavioral problems in school correlating to increased videogame

¹⁰ Dill, Karen E. and Jody C. Dill. "VIDEO GAME VIOLENCE: A REVIEW OF THE EMPERICAL LITERATURE." *Aggression and Violent Behavior* 3 (1998): 407-428.

¹¹ Ibid. 407-428.

¹² Gentile, Douglas A., Paul J. Lynch, Jennifer Ruh Linder and David A. Walsh. "The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance." *Journal of Adolescence* 27 (2004): 5-22.

play. Jeanne Funk¹³ found lower scores in empathy measures after extended violent videogame play. Ballard and Weist¹⁴ found that playing violent videogames increases cardiovascular function in those playing, thus proving an increase in physical arousal that might lead to aggression. Bastien, Jetten & Radke¹⁵ also found evidence that playing violent videogames “dehumanized” others in the eyes of those who played them, and Carnagey, Anderson and Bushman¹⁶ found that violent videogames “desensitize” children to violence. Other studies^{17 18} corroborate this interpretation. Kirsh¹⁹ also paints a grim developmental portrait of how adolescence might be affected by exposure to violent media. Finally, Anderson recently²⁰ claims that a longitudinal study found direct evidence of an increase in aggression over time with continued violent game exposure.

Not all research agrees with the hypothesis that videogames cause an increase in

¹³ Funk, Jeanne B., Debra D. Buchmann, Jennifer Jenks and Heidi Bechtoldt. "Playing violent video games, desensitization, and moral evaluation in children." *Applied Developmental Psychology* 24 (2003): 413-436.

¹⁴ Ballard, Mary E. and Wiest J. Rose. "Mortal Kombat: The Effect of violent play on males' hostility and cardiovascular responding." *Journal of Applied Social Psychology* 28 (1996): 717-730.

¹⁵ Bastian, Brock, Jolanda Jetten and Helena R.M. Radke. "Cyber-Dehumanization: Violent video game play diminishes our humanity." *Journal of Experimental Social Psychology* 48 (2011): 486-491.

¹⁶ Carnagey, Nicholas L., Craig A. Anderson and Brad J. Bushman. "The effect of video game violence on physiological desensitization to real-life violence." *Journal of Experimental Social Psychology* 43 (2005): 489-496.

¹⁷ Funk, Jeanne B., Bechtoldt Baldacci Heidi, Tracie Pasold and Jennifer Baumgardner. "Violence exposure in real-life, video games, television, movies, and the internet: is there desensitization?." *Journal of Adolescence* 27 (2004): 23-39.

¹⁸ Funk, Jeanne B., Debra D. Buchman, Jennifer Jenks and Heidi Bechtoldt. "Playing violent video games, desensitization, and moral evaluation in children." *Applied Developmental Psychology* 24 (2003): 413-436.

¹⁹ Kirsh, Steven J. "The effects of violent video games on adolescents." *Aggression and Violent Behavior* 8 (2002): 377-389.

²⁰ Anderson, Craig A., Akira Sakamoto, Douglas A. Gentile, Nobuko Ichori, Akiko Shibuta, Shintaro Yukawa, Mayumi Naito and Kumiko Kobayashi. "Longitudinal Effects of Violent Video Games on Aggression in Japan and the United States." *Pediatrics* 122 (2008): 1067-1072.

aggression. For example, Laurence Kutner and Cheryl Olson authors of *Grand Theft Childhood*²¹, conducted their own experiments on physical aggression and violent videogames using tightly controlled experiments and a large sample size, found very little evidence linking play of violent videogames with any form of aggression. Also upon reviewing the methods of previous game studies, Kutner and Olson concluded that previous game studies were too short in scope, had ill-defined measures and methods, and did not contain a large enough sample size to effectively measure the relationship between videogames and aggression. Kutner and Olson's studies found no relationship between videogames and aggression within the general population, although did note that a small subset of the game playing population who played significantly more violent videogames than the average player showed signs of being more aggressive, and that further studies were needed as to the cause of aggression within this small demographic.

Other researchers have reached similar conclusions to those of Kutner and Olsen, first amongst them John L. Sherry²² found fault with previous research into videogames and aggression, especially with the fact that previous research did not draw on any comparative benchmarks. According to his meta-analysis, while exposure to violent videogames does increase aggression in the short term, the effects are so small as to be of little concern, noting that the increase in aggression in response to videogames is substantially lower than that to movies and television, and other studies²³ corroborate his findings that videogames have little influence on

²¹ Kutner, Lawrence, and Cheryl K. Olson. *Grand Theft Childhood: The Surprising Truth About Violent Video Games and What Parents Can Do*. New York, NY: Simon and Schuster, 2008.

²² Sherry, John L. "The Effects of Violent Video Games." *Human Communication Research* 27 (2001): 409-431.

²³ Sazonov, V. "Videogames and aggression in teenagers." *Open Society Institute Center for Publishing Development Electronic Publishing Program* (1999): 1-4.

youths. DeVane and Squire²⁴, find that adolescents have a deep understanding of the games they play, even graphically violent ones, and critically analyze their message rather than be passively brainwashed. Further critical appraisals of the idea that videogames leading to aggression comes from Ferguson²⁵. This study found that when controlled for such factors as exposure to violence within the family, the effects of violent videogame play become negligible. In an earlier paper, Ferguson pointed out a publication bias with regard to the printing of videogame aggression research, explaining that more funding and attention is lavished on studies that find links to aggression, while those that don't are deemed "uninteresting"²⁶. Bensley and Eenwyk²⁷ conducted a meta-analysis of a broad range of videogame and aggression studies, and found that only early adolescence showed any tendency at all to be influenced by violent videogames, and then only when measured through monitored play. Griffiths²⁸ also noted this peculiarity, so this over reliance on games and monitored would be crucial to avoid while forming the controls for the new methodology.

Gender, videogames and aggression

Further research was necessary to determine how to implement various aspects of the

²⁴ Devane, Ben and Kurt D. Squire. "The Meaning of Race and Violence in Grand Theft Auto : San Andreas." *Games and Culture* 3 (2008): 264-285.

²⁵ Ferguson, Christopher J., Stephanie M. Rueda, Amanda M. Cruz, Diana E. Ferguson, Stacey Fritz and Shawn M. Smith. "VIOLENT VIDEO GAMES AND AGGRESSION." *CRIMINAL JUSTICE AND BEHAVIOR* 35 (2008): 311-332.

²⁶ Ferguson, Christopher J. "Evidence for publication bias in video game violence." *Aggression and Violent Behavior* 12 (2006): 470-482.

²⁷ Bensley Ph.D, Lillian and Van Eenwyk Ph.D Juliet. "Video Games and Real-Life Aggression: Review of the Literature." *Journal of Adolescent Health* 29 (2001): 244-257.

²⁸ Griffiths, Mark. "Violent Video Games and Aggression: A Review of Literature." *Aggression and Violent Behavior* 4 (1999): 203-212.

proposed experiment. With regard to controlling for factors like gender in terms of playing videogames Jeanne B. Funk and Debra D. Buchman²⁹ found societal differences in the manner which males and females view videogames. Bartholow and Anderson also found women to be more affected by violent videogames than men³⁰. However based on more recent and comprehensive evidence given by Kutner and Olsen³¹ citing a lack of significant difference in playing habits between genders, it was ultimately decided not to control for difference in gender as recommended by Bartholow and Anderson.

B. Keith Payne³² offered some insight into cultural and social causes of aggression, that member of certain ethnic groups, the study citing black males in particular, are more likely to be associated with aggression. This information was used in the selection of the confederate and proctor to avoid accidentally instilling aggression in the test subjects during the experiment. Giumetti and Markey³³ also caution experimenters to screen for participants who are physically angry, as aggressive media seems to have a greater effect on them.

In order to develop a model of what happens in the decision making process involved with strategies incentivized in games, reference was made not only to Anderson and Bushman's

²⁹ Funk, Jeanne B. and Debra D. Buchman. "Children's Perceptions of Gender Differences." *Sex Roles* 35 (1996): 220-231.

³⁰ Bartholow, Bruce and Craig A. Anderson. "Effects of Violent Video Games on Aggressive Behavior: Potential Sex Differences." *Journal of Experimental Social Psychology* 38 (2001): 283-290

³¹ Kutner, Lawrence, and Cheryl K. Olson. *Grand Theft Childhood: The Surprising Truth About Violent Video Games and What Parents Can Do*. New York, NY: Simon and Schuster, 2008.

³² Payne, B. Keith. "Prejudice and Perception: The Role of Automatic and Controlled Processes." *Journal of Personality and Social Psychology* 81 (2001): 181-192

³³ Giumetti, Gary and Markey, Patrick. "Violent video games and anger as predictors." *Journal of Research in Personality* 41 (2007): 1234-1243

General Aggression Model, but also to Icek Azjen's Theory of Planned Behavior³⁴. By referencing these two works, it was determined that while it was reasonable for players of videogames to develop aggressive scripts by being rewarded for aggressive strategies, there was nothing special about aggression that wouldn't also encourage the development of mental scripts for other strategies incentivized in a game. Reading Azjen's Theory of Planned Behavior suggested that a person's attitude toward a behavior at least has some effect on their decision making process, so screening for the players predisposition to various strategies before conducting the study would be prudent. Another interesting element about the Theory of Planned Behavior is that a person's decision is also informed by the subjective norm as perceived by the decision maker, this leads to the question of what happens if the subjective norm is changed by the game player crossing over into the realm of games where the ordinary rules of society are suspended³⁵? Clearly the element of play could have a different effect of the player's decision making process while inside the context of a game.

Current Study

If as some research claims, incentivizing aggression in games builds scripts for the use of aggression in real life situations, then this should also hold true for other possible strategies, like diplomacy or subterfuge. In order to test for the building of mental scripts an online questionnaire was used to determine the participant's predisposition toward the three strategies. The participants were then brought in for an experiment where they were asked to play a game that incentivizes one of these strategies, then placed into a simulated real life conflict to see if the strategy they used in

³⁴ Ajzen, Icek. "The Theory of Planned Behavior." *ORGANIZATIONAL BEHAVIOR AND HUMAN DECISION PROCESSES* 50 (1991): 179-211

³⁵ Huizinga, Johan. *Homo Ludens: A Study of the Play-Element in Culture*. Boston: The Beacon Press, 1955.

the confrontation differed from the strategy they were predisposed to using according to the data collected from the questionnaires. The most important part of the experiment was to remove the participant from the context of a game before the conflict began, and to see if these mental scripts carry over into contexts outside of a game.

Method

Procedure

Participants were recruited to participate in the experiment to test their response to incentivized strategies in a capture the flag computer game. Before each play session, participants were asked to fill out a survey consisting of a Buss-Perry Aggression survey as well as an Eysenck L Scale and an IPIP Agreeableness measure survey in order to quantifiably measure their predisposition toward aggression, subterfuge and diplomatic strategies respectively, so it would be possible to check whether their responses to the strategy incentivized against their natural inclinations. After signing informed consent forms and being given a day of emotional inventory and tested for their opinion of the confederate both through the questionnaire and by a seating distance test. The participants were randomly assigned into one of four groups, one non-incentivized control group, and one group for each of the three strategies: aggression, diplomacy and subterfuge. Each group played against a confederate who was under direct instruction from the investigators to allow the players to win the game, so that they would feel as though their choice of strategy had been rewarded.

Throughout the experiment, recordings were kept to document the number of shots fired in game, a measure of aggression; the number of flag captures, a measure of subterfuge; and whether or not they agreed to a tie, a measure of diplomacy. Recordings of the player's personal

interactions were kept, as well as a video recording of the game session in order to gauge the participants' emotional state. After the data from game play was collected, the participants were placed in a mock social conflict, where the participants were instructed that both they and their opponent, the confederate, must sign a form before the experiment could be concluded. At this point it was arranged for the confederate to receive a phone call that rudely held up the participant and forced them to wait while the confederate completed his conversation. During this portion of the experiment, the following data was collected:

1. **Participant's Decibel Level-** If the participant is experiencing aggressive arousal they are more likely to raise their voice.
2. **Time to Interruption-** More aggressive participant will interrupt the confederates phone call earlier, a more diplomatic participant was more patient but might open up communication with the confederate early on, and one hoping to solve the problem via subterfuge would aim to not call attention to themselves at all.
3. **Audio and Video Recordings-** Used to monitor for other influences that may have biased the study.

After the participant resolved the conflict, they were brought into the hall for a debriefing and the experiment concluded, with the participant given all the necessary paperwork and information to ensure proper compensation and explanation of the experiment was provided by the investigators. The participants' personal information was kept private, and the only records of their involvement are their informed consent forms.

IRB Approval

Before experimentation on participants could begin, the experiment needed to be approved

by WPI's governing ethics committee, the Internal Review Board, (IRB). The first step in gaining IRB approval was to learn the basics of ethical human experimentation through an online course offered by the National Institutes of Health. The online course teaches how to identify populations at risk for being coerced into participation, and how to ensure that the free will of the participant is not infringed upon. The training made clear that it was unethical to share the personal data of the participants even with other researchers except under specific circumstances, and that the anonymity of participants was to be maintained after the experiment was concluded.

The IRB also stressed the need for participants to be informed as much as possible about the study they are asked to participate in so that they can make informed decisions about whether or not. This presented a problem with the experiment design, as revealing the exact nature of the study in question would cause participants to act self-consciously during experimentation, and would provide inaccurate data. Through consulting with the IRB, it was determined that the most ethically sound solution to the problem, was to reveal as much information as possible about the experiment without revealing its true intentions. To this end the informed consent form read: "In this experiment, we investigate how people create and use strategies depending on how certain strategies are incentivized in the game." The form also warns participants that they would be recorded during their time in the laboratory, but that the information collected by the study would remain anonymous. By phrasing the warning in this way, and informing participants that they would be videotaped during lab sessions, participants had enough information to decide whether they felt comfortable participating in this experiment, while concealing the necessary deceit of the staged conflict from the participants, and the experiments interest in monitoring their reaction to it.

Even with the protections of the informed consent forms in place to ensure the participant

knew what manner of experiment they were participating in, it was still important to make sure they understood the purpose of the study after the data had been gathered. To make sure the participant were able to get all the necessary information, a debriefing form that explained all the details of the experiment, and made it clear that they had been deceived was drafted. Just giving the participants the form would not be enough, there needed to be a period after the experiment had been concluded where the investigators were on hand to explain any questions the participant had about the experiment, as well as providing the participant with contact information if any questions should arise in the future. After creating this form, submitting clarifications about the laboratory procedure and meetings with members of the IRB in person, the experiment was finally approved to begin.

The purpose of the IRB review is to protect experiment participants from any unintended harm, either psychological or physical in nature, and make it clear that that the wellbeing of participants comes first in any clinical study. Collecting the data for the experiment was important, but it was equally important to have an outside agency look out for the participants being tested. Using the comments and documents that resulted from meeting with the IRB, the project was able to maintain a high ethical standard during the experimentation phase.

Participants

Participants were recruited from the Psychology participant pool and introductory Interactive Media and Game design courses, those that participated through these classes received course credit for their participation. In order to gather the largest participant pool possible, participants were also solicited via fliers or recruited by the experiment proctor. Participants were taken from all ethnic and gender groups, all of which were college students aged 18 – 25 who had

at least some level of college education. The only group that was excluded from the participant pool within the given age range were potential participants that suffered from epilepsy due to the risks of seizure. The racial composition of the participant pool breaks down to: 62% Caucasian, 19% Hispanic, 9.5% Black, and 9.5% Asian. The breakdown along gender lines is 85.7% male and 14.3% female. This racial makeup of the participant pool was consistent with the student population on the campus on which this survey was conducted. However females were underrepresented by a margin of 15% due to the small size of the participant pool.

The Game

Now that the experiment had a methodology, IRB oversight, and a pool of participants, it still needed a game to incentivize strategy in the players. The game would need two player support, the option for the player to use several different strategies, and the ability to customize the game to some degree in order to incentivize the various strategies. Although it would have been ideal to develop a game specifically for this project, time and personnel restrictions made this option impossible. In the end, a free browser base web game that matched all of the specifications was used as the game for the experiment.

The game, titled simply Capture the Flag,³⁶ is rather simple to play. Each player controls a tank that can destroy their opponent's vehicle by shooting them, or the players can score points by capturing their opponent's flag and returning it to their base. Although the option to resolve the game diplomatically was not available within the virtual game, the participants were instructed that if they didn't feel like playing the game anymore, they could negotiate a truce with their opponent, and split the points. This way, any of the three incentivized strategies were possible,

³⁶ <http://www.youdagames.com/Capture-The-Flag-game-1935>

meaning in this case that the player could choose to be aggressive and attack his opponent, use subterfuge to steal his opponent's flag while avoiding confrontation, or be diplomatic and negotiate a truce.

The various modes are shown in the screen shots below:

Aggression

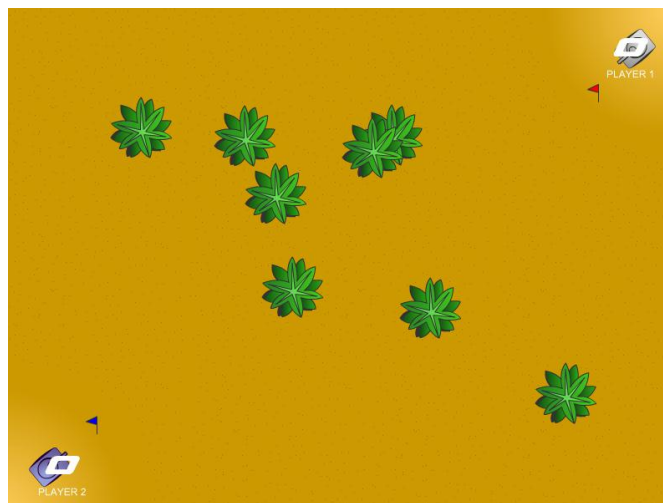


Figure 1: The aggressive game mode utilizes an open playing field, so that players can get right into the conflict. Without many places to hide, the player's best bet is to attack his opponent.

Diplomacy

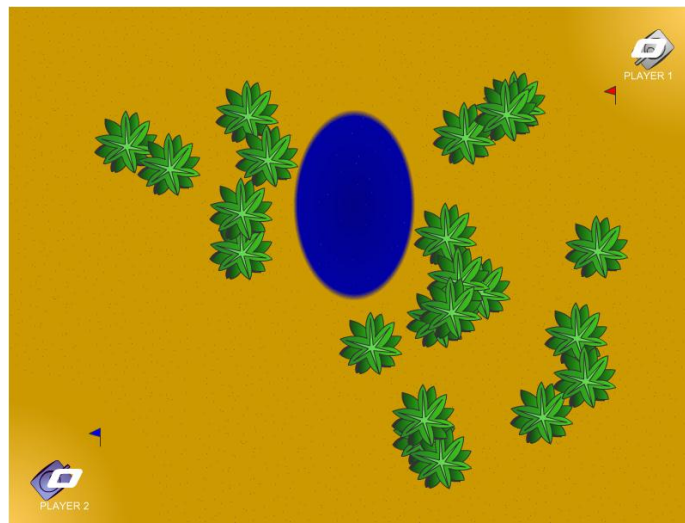


Figure 2: The diplomatic game mode makes the field difficult to transverse, reducing each player's ability to score points. The water in the center of the map slow anyone stuck in it to a crawl, incentivizing players to just make a truce and move on to something else.

Subterfuge

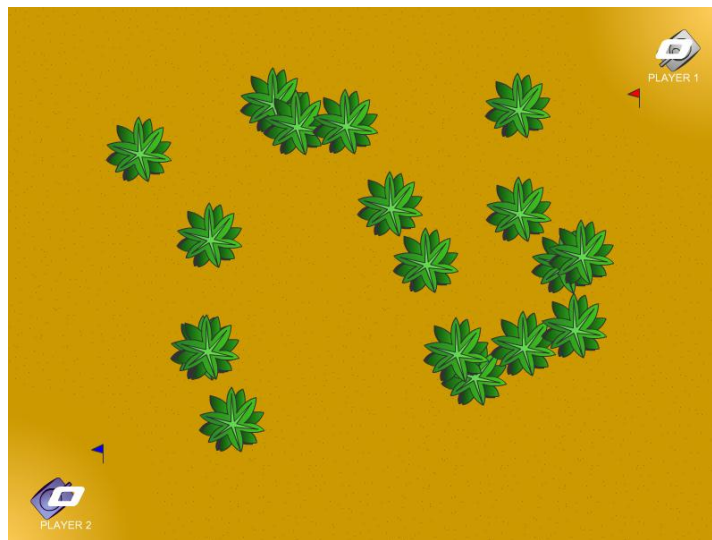


Figure 3: The subterfuge game mode has enough terrain to allow players to take cover from their enemy and get within striking distance of the flag without putting themselves in danger, while not being so cluttered as to incentivize quitting like the diplomatic game mode.

Control Group



Figure 4: The control group game mode doesn't lend itself to any particular strategy. There is enough terrain to take cover, but not enough to get close to the flag without risk. The map is open enough to keep players engaged, but not so open as to allow players to just run in and fight one another.

The game also allows for the option to adjust the amount of terrain in the game between rounds, allowing us to incentivize strategy through the use of terrain. Research³⁷ indicates that giving players and open field incentivizes them to attack their opponents, so games with very little terrain could be used to incentivize aggression. Giving the players plenty of terrain to take cover behind suggests careful play, incentivizing subterfuge³⁸. Finally, using too much terrain in a game will cause the game to play slowly, frustrating players³⁹, and incentivizing them to quit, making

³⁷ Feil, John, and marc Scattergood. *Beginning Game Level Design*. Boston, MA: Thomson Course technology PTR, page 176. 2005. [ftp://95.143.215.57/pub/Recycled/The Actually Useful Programming Library - Books \(Oct 2011\) - Unpacked/The Actually Useful Programming Library/Game Design/Beginning Game Level Design - Feil, Scattergood - Course Tech \(2005\).pdf](ftp://95.143.215.57/pub/Recycled/The Actually Useful Programming Library - Books (Oct 2011) - Unpacked/The Actually Useful Programming Library/Game Design/Beginning Game Level Design - Feil, Scattergood - Course Tech (2005).pdf) (accessed May 2, 2012).

³⁸ Smith, Randolph. "Levle-Building for Stealth Gameplay." Ronin Game Developer. <http://www.roningamedeveloper.com/Materials/LevelBuildingForStealth.doc> (accessed May 2, 2012).

³⁹ Feil, John, and marc Scattergood. *Beginning Game Level Design*. Boston, MA: Thomson Course technology PTR, page 51. 2005. [ftp://95.143.215.57/pub/Recycled/The Actually Useful Programming Library - Books \(Oct 2011\) - Unpacked/The Actually Useful Programming Library/Game Design/Beginning Game Level Design - Feil, Scattergood - Course Tech \(2005\).pdf](ftp://95.143.215.57/pub/Recycled/The Actually Useful Programming Library - Books (Oct 2011) - Unpacked/The Actually Useful Programming Library/Game Design/Beginning Game Level Design - Feil, Scattergood - Course Tech (2005).pdf) (accessed May 2, 2012).

the game a greater opponent to the participants than the confederate will incentivize diplomacy. The different game modes were further incentivized by the rules of the game, awarding more points for destroying the opponent's vehicle would incentivize aggression, more points for flag captures incentivize subterfuge, and making it difficult for the player to achieve either of these conditions incentivizes diplomacy. A fourth game mode that had a mix of elements from the other three game modes, was developed as a control game mode, where all three options were equally viable, and equally rewarded.

Measures

In this experiment several different variables needed to be measured and possibly controlled for. First, the investigators had to be aware of which strategy the player was predisposed toward using before the participant played the game. Next, the investigators needed to be made aware of the participant's emotional state, as false positives might have been generated by a participant acting unusually due to external emotional factors. The investigators also needed to be aware of the strategy the player used during game play as games allow players to experiment with different strategies without consequence, and as such the player might take the opportunity to act contrary to his or her usual temperament. Finally the investigator required some way of measuring the participant's response to the staged conflict after the game in order for the data collected up until that point to have any value in the final analysis. To collect this data, several measures and surveys were developed in order to breakdown the concept of strategy into quantifiable terms.

Predisposed Strategy – The first step in determining whether the games had any effect on a player's strategy was to determine which strategy the player would have used in a conflict without having played the game. In order to establish this baseline strategy preference was developed to test for each player's tendency toward each strategy. This survey consisted of questions from the

Buss-Perry Aggression Questionnaire⁴⁰ as a measure of aggression, questions from the “L Scale” from the Eysenck Personality Questionnaire⁴¹ as a measure of subterfuge, and questions from the IPIP Agreeableness Quotient Measure⁴² as a measurement of diplomacy. The Buss-Perry Aggression Questionnaire been established as measure of aggression that measures a participant’s level of aggression as well as codifying four different types of aggression. The Eysenck L Scale is part of a larger personality inventory, but its developers wanted to control for the possibility of dishonesty when filling out the form, so developed a battery of simple questions to test for dishonesty. The IPIP Agreeableness Quotient is a free online version of the Agreeableness measure of the Big Five personality inventory that is heavily linked to a diplomatic outlook in team building literature⁴³. The three questionnaires all had the benefit of being well established, short, and free. After compiling all the questions into a single questionnaire, the questions were randomly intermixed so that participants could not tell exactly which kind of behaviors were being tested for.

Players “Day Of” Emotional Outlook – A person’s reactions to a situation can be affected by their emotions. If the player displayed an unexpected reaction to the conflict, it would be irresponsible of the investigator to assume that the game was the cause of the reaction without being aware of the participant’s emotional state at the time. To this end, each participant was given

⁴⁰ Buss, Arnold H. and Mark Perry. "The Aggression Questionnaire." *Journal of Personality and Social Psychology* 63 (1992): 452-459.

⁴¹ Francis, L. J., Christopher A. Lewis and H. G. Ziebertz. "The short-form revised Eysenck personality Questionnaire (EPQ-S): A German edition." *Social Behavior and Personality* 34 (2006): 197-204.

⁴² Donnellan, M. Brent, Frederick L. Oswald, Brendan M. Baird and Richard E. Lucas. "The Mini-IPIP Scales: Tiny-et-Effective Measures of the Big Five Factors of Personality." *Psychological Assessment* 18 (2006): 192-203.

⁴³ Digman, John M. "Personality Structure: Emergence of the Five-Factor Model." *Annual Review of Psychology* 41 (1990): 417-440.

a Brief Mood Introspection Survey⁴⁴ before they played the game. This way, unusual results could be checked against the participant's emotional state on the day of the experiment to determine if they were in an unusual emotional state that day, and if it was the cause of the unexpected reaction to the conflict.

Opinion of Confederate- It was not only necessary to take a participant's reactions to their own emotions into account, as it was possible that the participant could react negatively to the person they were playing the game against. Because the opponent in each case was a confederate working with the investigators, if the players did not trust their fellow player, they might have suspect the collusion and become more guarded with their reactions during the experiment. To test for this, the BMIS survey presented to the participants included a brief question as to their opinion of their opponent, in order to screen for any emotional feedback possibly caused by the player's perception of the confederate.

Additionally, in order to gauge participant's reactions to the confederate in a more easily quantifiable way a Seating Distance Test was employed. In the Seating Distance Test, the participants were asked to take a seat in "the waiting area" while they fill out their informed consent form and BMIS. The confederate was in the same seat every time, and the participant was allowed to choose which seat they would take in relation to the confederate. The participants could choose to sit near the confederate, or choose to sit farther away. This measure gave the investigators some concept of the opinion the player held toward the confederate without directly asking them. Furthermore the test was repeated after completion of the game, allowing the investigators to see if the player's opinion of the confederate changed while the participant and

⁴⁴ Mayer, J.D. and Y. N. Gaschke. "The experience and meta-experience of mood." *Journal of Personality and Social Psychology* 55 (1988): 102-111.

confederate were playing the game.

Strategy Used in The Game – It was also important for the investigators to determine which strategy was employed by the player during play. To do this, various game data such as number of flag captures and route taken by the player were recorded using game software. These metrics helped to determine how the participant responds to incentive, as aggression has been linked to increased physical arousal, so a route that maximize likelihood of getting into combat would serve as an indication of in game aggression. Avoiding confrontation could be an indication of either diplomacy or subterfuge, so this information must be coupled with other data, such as the offering of truces, or attempts to steal the opponent's flag.

In order to gather this data, the game sessions were recorded twice. First the game being played between the two participants was recorded on the computer using a free video capture program called Taksii. The Taksii recordings allowed investigators to know which routes the player took, how many shots they fired, and how many times the participant fired their weapon. This information was supplemented by the second recording, a video record of the players during play. Monitoring their physical reaction yielded an understanding of how physically aroused the players were by the game. If the player showed a greater level of physical arousal, it would be an indication that they were acting aggressively, if they kept a cool head, they might be engaging in subterfuge or diplomacy. Other reactions, like how often they engaged the confederate in conversation, and if they offered a truce are further measures of which strategy the player used.

Strategy Used in Conflict – The last and most crucial piece of data that needed to be collected was which strategy the participant used in the conflict outside of the game. Designing measures for this section of the experiment was difficult, but several measures were developed for this experiment. As mentioned earlier, aggression leads to greater physical arousal, and as such

aggression can manifest itself by the participant speaking louder than they usually do. Physical arousal may also limit the participant's ability to restrain their reactions, therefore the earlier and louder a person interrupts the confederate, the more aggressive their response may be. Research into subterfuge has found it to be a deliberate and well thought out choice by those that employ it⁴⁵. Also, subterfuge by its very nature involves a desire to avoid notice. From this it was concluded that subterfuge can be measured as someone taking a moderate amount of time to quietly extricate themselves from the situation. Diplomacy is perhaps the most difficult strategy to measure, but it is possible. Those with a high agreeableness quotient will seek to diffuse any conflict they are presented with, so they might react in two very different ways. They might seek to immediately find an amicable solution to the conflict, or they might seek to avoid the conflict by ignoring it⁴⁶. Either way, they would not become physically aroused, and therefore maintain their normal speaking volume or just remain quiet.

In order to measure these reactions several measurements were deployed to render this data into a quantifiable number. During the experiment, the decibel level in the room was constantly monitored, both before the game and during the conflict. Also, as the planned conflict is in the form of a phone call, the phone will keep a log of how long the phone call lasted. So those participants that increase their decibel level and interrupt the phone call early can be classified as aggressive. Those that lower their decibel level and attempt to leave a moderate amount of time into the phone call can be classified as using subterfuge. Finally those that interrupt early, or wait for a long time before interruption while maintaining a constant decibel level can be classified as

⁴⁵ Pelsak, Alan R. "The Impact of Personality on Information Technology Team Projects." *Proceedings of the 2006 ACM SIGMIS CPR conference on computer personnel research* 1 (2006): 273-279.

⁴⁶ Digman, John M. "Personality Structure: Emergence of the Five-Factor Model." *Annual Review of Psychology* 41 (1990): 417-440.

diplomatic.

Observations

The data collected by the experiment can be seen in Appendix 1. In order to make sure no outside variable affected the data, several controls were tested for. For example, the participants were asked to describe their initial reactions to the confederate in order to determine whether their opinion of the confederate biased their reaction to the staged conflict. The most popular comments to this question made reference to the confederates lack of interaction, the confederate being impatient but calm, lost in thought, quiet, not very social (with one exception, describing him as a little talkative), and “out of it.” Data regarding the participants sit test and BMIS results were also gathered, and in the final analysis showed no correlation between any of the other measures in the study, indicating that it was not necessary to weight any of the player responses based on these variables.

Most participants who did react to the staged conflict did so within the first minute or two of the conflict. Although some participants said that they had figured out that the conflict they are presented with was staged, this realization usually occurred shortly after the time it took others to react to the confederate’s phone conversation. These participants then chose to wait out the phone call, later stating that they believed that they couldn’t be “kept there forever.” It should also be noted that most participants seemed to enjoy the game they played. This was not tested for, but may have affected the outcome of the real-life conflict since they had been put into a good mood by having played the game.

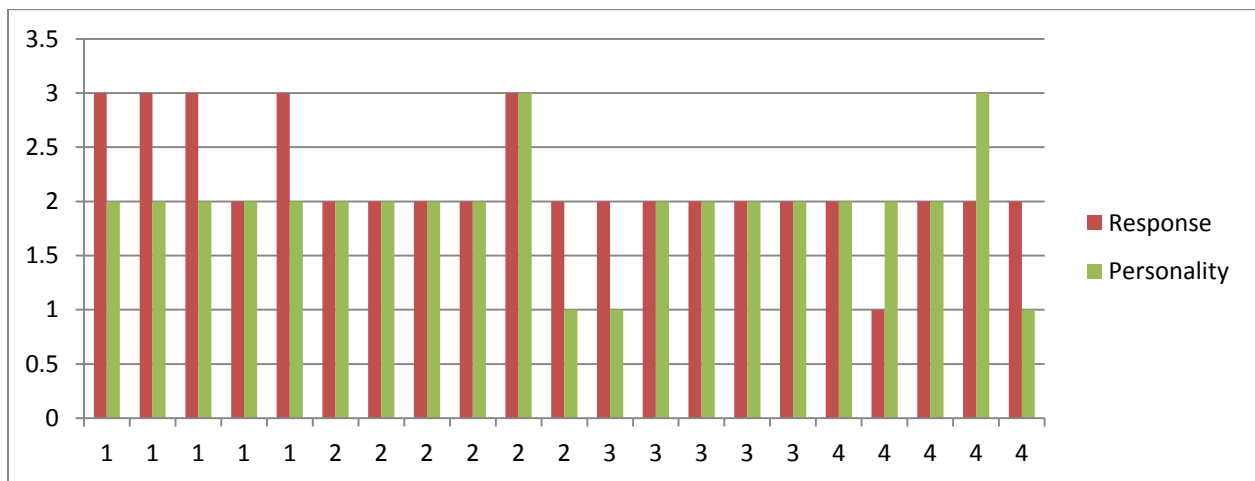
The vast majority of participants chose to utilize a diplomatic solution to the conflict. This

makes sense, as the data shows the participant pool was composed mostly of people with a diplomatic predisposition. A participant pool with a greater variance in disposition might have been more preferable, but the purpose of the study was to measure for changes in the participants strategy, so the initial predisposition of the participant should not have had too much of an impact.

Analysis

After the data had been collected, it needed to be analyzed against the hypothesis before any conclusions could be reached. Most of the data did not show any correlation or causation between the response during the conflict and the game the participant played. One of the weaknesses of this study was its relatively small sample size. Due to this small sample size there is not a high level of confidence in the conclusions that can be drawn from the data.

Figure 1.1



To begin the analysis, the data shows the relationship between Personality Type (green, 1 = aggressive, 2 = diplomatic, and 3 = subterfuge) and Response to the game shown along the X-axis. Incentivized strategies in the game keep the same numbering system as Personality Type, with the

additional of fourth type being a control group which was not incentivized any strategy.

Figure 1.1 shows that the majority of the participants have a diplomatic predisposition according as measured by the Agreeableness Quotient. Seven participants out of twelve that reacted diplomatically despite playing a game type that incentivized a strategy other than diplomacy. More interestingly, when those predisposed to diplomacy were given an aggressive game type (Type 1) four of five players, all of whom were predisposed to diplomacy, resolved the conflict using subterfuge. The final major statistic came from the control group, game type 4. Three of the five players in this group used a strategy to resolve the staged conflict that differed from their predisposed strategy.

Figure 1.2

	Emotional Inventory	BussPerry Aggression	Agreeableness	LScale
Total N	21	21	21	21
Mean	8.57	.387800	.678248	.364529
Median	11.00	.379300	.680600	.333300
Std. Error of Mean	1.640	.0407237	.0298054	.0428246
Std. Deviation	7.514	.1866193	.1365855	.1962471
Variance	56.457	.035	.019	.039
Skewness	-.457	.228	-.028	.023

Figure 1.2 shows that all three personality categories are not equally well represented. Personality types predisposed to subterfuge and aggression were underrepresented, so no conclusions could be drawn about how games affected people predisposed toward these two strategies. The participant's tendency for subterfuge and aggression is heavily right skewed with the median falling at around one third of their respective scales. On the other hand participants

with a high degree of agreeableness, the measure of diplomatic tendency are over represented. The median of the participant pools agreeableness clusters around two thirds of the scale.

Figure 1.3

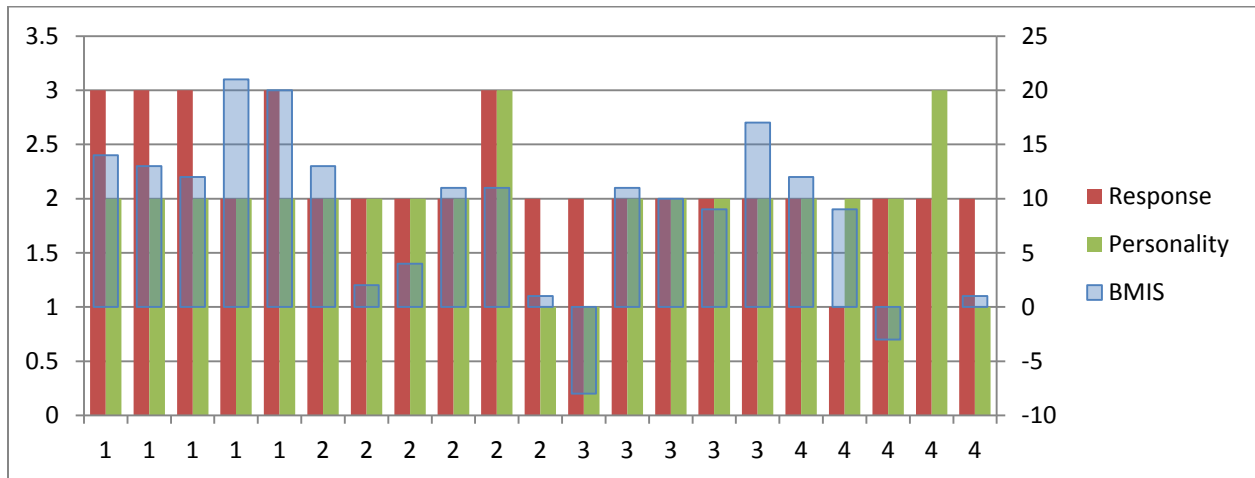


Figure 1.3 shows the Emotional Inventory results. No relationship was found between their BMIS responses and their predisposed strategy. The mean score as shown by Figure 1.2 is 8.57, and out of the 12 who had a higher BMIS score, only five (41.7%) had a different response than their personality would indicate. Of those that did, four changed their strategy to subterfuge and of the ten who had a lower score, four (40%) responded in a way contrary to the strategy they were predisposed to. Of those that did, three chose to take a diplomatic approach at resolving the problem, and the fourth participant used aggression.

Figure 1.4

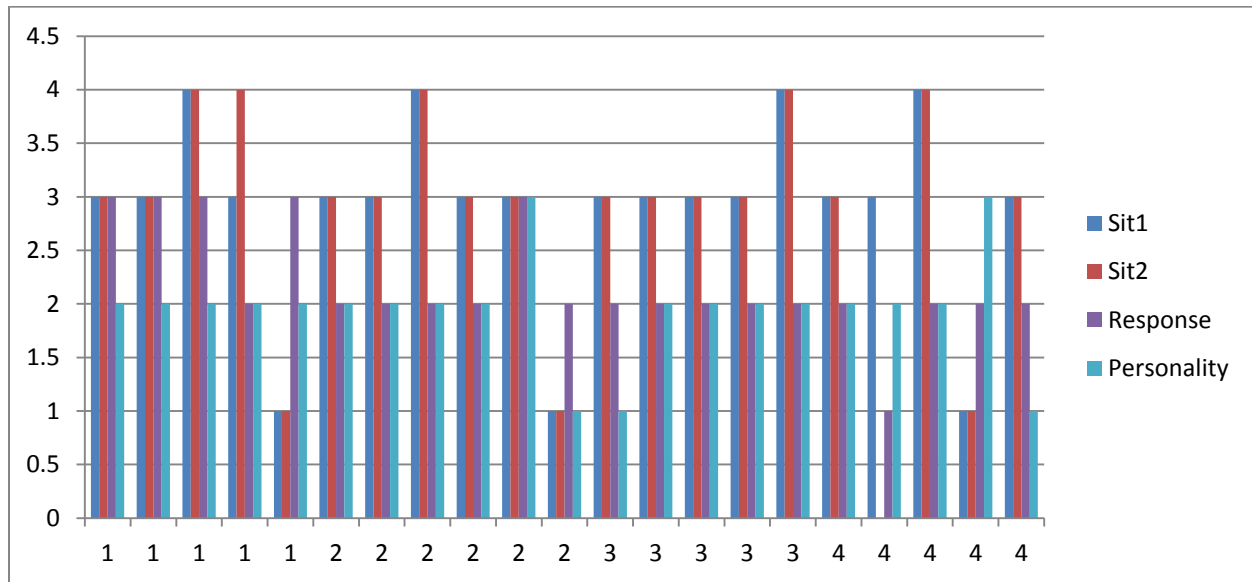


Figure 1.5



Figure 1.4 includes the results from the Seating Distance Test. In this test, illustrated by Figure 1.5, Seat One is near the confederate, the second seat is where the confederate sat, the third seat is also near the confederate and the fourth seat is one seat away from the confederate. Nineteen of twenty-one participants sat in the same seat after the game session. Of the two that did not, one used sat farther away afterward, used diplomacy to resolve the conflict, had a diplomatic

disposition, and was playing a game that incentivized aggression. The other participant originally sat in Seat Four, was in the control group and chose not to sit down after the game session even after being asked to, and used an aggressive strategy.

The raw data does not support any causation of response based on game incentivization. Likewise, it seems that emotional inventory does not have any effects on results of the reactions to the conflict. Outside of the raw data, however, it is important to take into consideration that a good amount of the participants pieced together that the confederate's phone call was staged, and while they were unaware of what was being studied, it definitely skewed the results. An argument to this is the fact that all other participants who did not realize that the phone call was staged, took action within two minutes of the phone call – around the same time that participants who did figure out the conflict's ruse realized that the call was staged. The data for when the participants realized the conflict was not real was not recorded, but rather asked after the experiment during debriefing.

Appendix 2 shows that the only statistically significant variable was the dependent variable. This supports the hypothesis that incentivizing a strategy in a videogame influences the player. Another variable, average decibel level shows some relationship to the dependent variable, but the relationship is of insufficient significance. However, it is important to note that the microphone recorded the decibel level of the proctor, confederate, and other incidental sounds such as chair shifting and button clicking. The data about the relationship between game and personality type does not point towards any significant correlation with response. This means that while there seems to be a response to incentivization, the response does not always match the strategy incentivized.

In terms of the other variables, there was no main effect on the response by the personality.

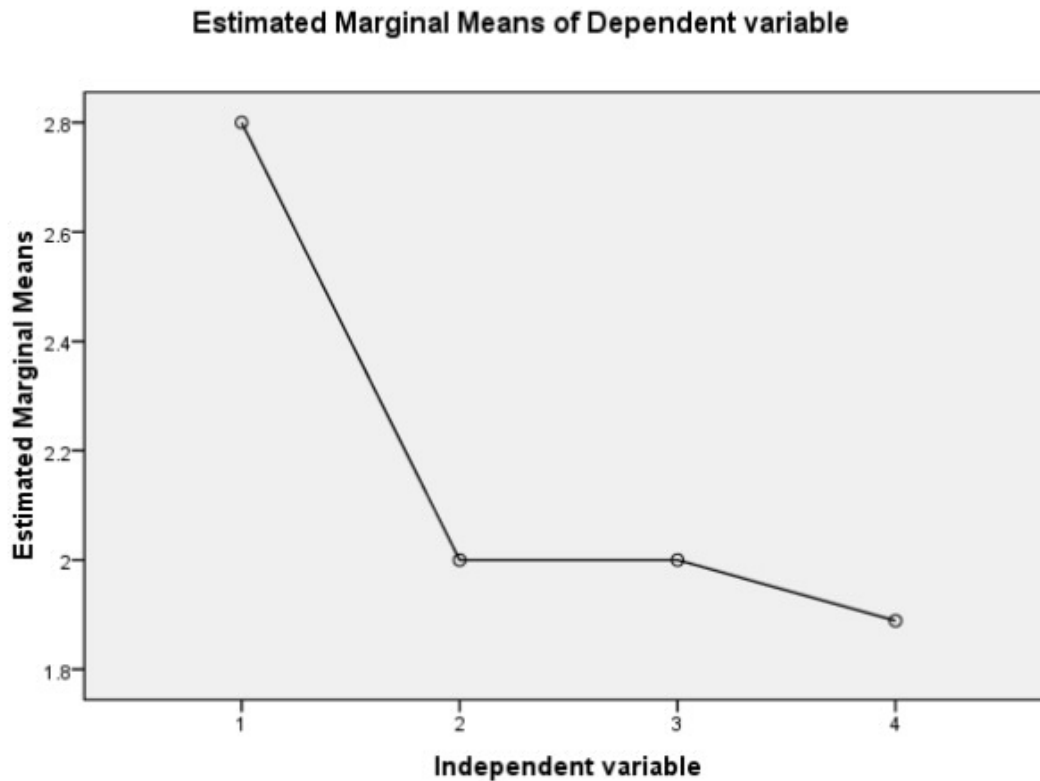
There was also no interaction between personality and the game condition.

Figure 1.6 Independent variable

Dependent Variable	Independent variable	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Dependent variable	1	2.800 ^a	.156	2.459	3.141
	2	2.000 ^a	.195	1.574	2.426
	3	2.000 ^a	.195	1.574	2.426
	4	1.889	.178	1.501	2.277
Voice loudness avg	1	48.020 ^a	2.695	42.147	53.893
	2	45.487 ^a	3.369	38.146	52.829
	3	52.925 ^a	3.369	45.584	60.266
	4	53.656	3.069	46.969	60.342
Voice loudness max	1	76.720 ^a	3.641	68.788	84.652
	2	73.263 ^a	4.551	63.347	83.178
	3	80.813 ^a	4.551	70.897	90.728
	4	82.956	4.145	73.924	91.987
Seatingdistance	1	.200 ^a	.115	-.052	.452
	2	4.337E-19 ^a	.144	-.314	.314
	3	4.337E-19 ^a	.144	-.314	.314
	4	1.735E-17	.131	-.286	.286
Phonecall interruption time	1	2.360 ^a	.744	.738	3.982
	2	6.165 ^a	.930	4.138	8.192
	3	5.000 ^a	.930	2.973	7.027
	4	4.444	.847	2.598	6.291

a. Based on modified population marginal mean.

Figure 1.7



While other measures were unfruitful due to the experiments small sample size, one interesting statistic arose from the data. As can be seen in Figures 1.6 and 1.7, both graphs show that according to the marginal mean of the group that played a game that incentivized aggression, the response was largely in the realm of subterfuge, the appears to be the main effect of the game conditions, as it had an effect on the participants reaction, $F(3,20) = 7.83, p < .004$, such that participants in condition 1, games that incentivized aggression used response mean 2.8 (mostly subterfuge) compared to participants in condition 4 (control group) who used an average of 1.8 (mostly diplomacy). These participants' decibel levels (both average of the session and maximum recorded) were lower than average. The other two incentivized groups, diplomacy and subterfuge, show tendency of diplomatic resolution, with the control group largely favoring diplomatic

resolution, with some aggressive disposition. This data is statistically significant with a Confidence Interval of 95%.

Two conclusions can be drawn from this data. First, the strategy employed by a player inside of a game, is not consistent with the strategy they use in a real life conflict. Secondly, when a strategy is incentivized in a game, players consistently diverge from the strategies they are predisposed to, but they do not necessarily use the strategy incentivized by the game. Despite this studies small sample size, this relationship has been shown with statistically significant data, and as such these findings warrant further research.

Conclusion

The initial hypothesis, that games can be used to build mental scripts to encourage a particular strategy in a real life conflict was not supported by the evidence we gathered in this experiment. This study found no relationship between the strategy incentivized by the game, and the strategy used by the player in a real life conflict. Incentivizing a strategy in a game does change how the players react to a conflict in real life, but not in a way that is consistent with the strategy incentivized in the game.

Further research into the findings of this study is necessary going forward. The results gathered using the small sample size in this experiment may not hold true over a larger population. The data collected indicated a statistically important relationship between what a game incentivizes and the player's strategy in a real life conflict, but the nature of this relationship is unclear at this time. New experiments are needed to understand how the strategies incentivized in a game relate to strategies used in a real life conflict, but this study shows that there might be some

relationship between the two. Hopefully this study has contributed something to the larger field of games studies, and further insights can be gained from the research presented in this paper.

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Appendices

Appendix 1: Raw Experimental Data

PID	Time to Interruption	Average Decibels	Max Decibels	Sit 1	Sit 2	Game	Response	Personality	BMIS	BusPerryA ggTest	Agreeableness Quotient	Lscale
1	1.43	40.3	61.1	3	3	1	3	2	14	0.3448	0.6528	0.5833
2		44.4	71.4	3	3	2	3	3	11	0.1724	0.4166	0.4166
3	7.33	42.1	69.6	1	1	2	2	1	1	0.5172	0.486	0.1818
4	1.47	44.9	74.2	3	3	1	3	2	13	0.2414	0.6944	0.3333
5	5	46	78.4	1	1	4	2	3	0	0.3793	0.5728	0.6667
6	5	47.7	70.3	3	3	2	2	2	13	0.3793	0.8056	0.5
7	5	59.4	84	3	3	3	2	1	-8	0.6207	0.5833	0.25
8	5	44	72	4	4	2	2	2	4	0.2308	0.7917	0.3333
9	5	47.9	78.5	3	3	3	2	2	10	0.4815	0.6406	0.375
10	5	57.2	90	3	3	2	2	2	2	0.1379	0.75	0.5833
11	5	44.2	84.3	3	3	3	2	2	11	0.069	0.7083	0.5833
12	5	57.6	85.6	3	3	4	2	1	1	0.8333	0.5	0

13	5	47.5	78.5	3	4	1	2	2	21	0.1034	0.8611	0.25
14	0	48.6	79.8	4	4	1	3	2	12	0.3793	0.9444	0.25
15	0	65.5	90	3		4	1	2	9	0.5517	0.5694	0.16 67
16	5	46.6	75.4	3	3	2	2	2	11	0.5172	0.8333	0.08 33
17	5	48.7	82.4	3	3	4	2	2	12	0.3571	0.6029	0.18 18
18	3.9	58.8	90	1	1	1	3	2	20	0.5172	0.7083	0.25
19	5	57.9	82.2	4	4	4	2	2	-3	0.5172	0.6667	0.41 67
20	5	46.1	74.6	4	4	3	2	2	17	0.3793	0.6806	0.66 67
21	5	47.6	73.1	3	3	3	2	2	9	0.4138	0.8194	0.58 33

Appendix 2: Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power ^b
Corrected Model	Dependent variable	3.083 ^a	7	.440	3.604	.025	.678	25.227	.814
	Voice loudness avg	462.310 ^c	7	66.044	1.818	.173	.515	12.726	.480
	Voice loudness max	309.510 ^d	7	44.216	.667	.696	.280	4.670	.185
	Seatingdistance	.150 ^e	7	.021	.321	.930	.158	2.250	.108
	Phonecall interruption time	36.017 ^f	7	5.145	1.858	.165	.520	13.005	.490
Intercept	Dependent variable	41.626	1	41.626	340.573	.000	.966	340.573	1.000
	Voice loudness avg	22255.497	1	22255.497	612.632	.000	.981	612.632	1.000
	Voice loudness max	55921.230	1	55921.230	843.808	.000	.986	843.808	1.000
	Seatingdistance	.011	1	.011	.171	.686	.014	.171	.067
	Phonecall interruption time	213.565	1	213.565	77.112	.000	.865	77.112	1.000

Game	Dependent variable	2.868	3	.956	7.823	.004	.662	23.468	.944
	Voice loudness avg	252.338	3	84.113	2.315	.128	.367	6.946	.445
	Voice loudness max	256.263	3	85.421	1.289	.323	.244	3.867	.260
	Seatingdistance	.137	3	.046	.684	.578	.146	2.053	.154
	Phonecall interruption time	21.714	3	7.238	2.613	.099	.395	7.840	.495
Personality	Dependent variable	.058	2	.029	.239	.791	.038	.477	.079
	Voice loudness avg	102.237	2	51.119	1.407	.282	.190	2.814	.244
	Voice loudness max	36.009	2	18.004	.272	.767	.043	.543	.084
	Seatingdistance	.000	2	.000	.000	1.000	.000	.000	.050
	Phonecall interruption time	5.236	2	2.618	.945	.416	.136	1.891	.176
Game * Personality	Dependent variable	.057	2	.028	.232	.796	.037	.464	.078
	Voice loudness avg	159.790	2	79.895	2.199	.154	.268	4.399	.362

	Voice loudness max	75.822	2	37.911	.572	.579	.087	1.144	.124
	Seatingdistance	.000	2	.000	.000	1.000	.000	.000	.050
	Phonecall interruption time	2.300	2	1.150	.415	.669	.065	.830	.102
Error	Dependent variable	1.467	12	.122					
	Voice loudness avg	435.932	12	36.328					
	Voice loudness max	795.270	12	66.272					
	Seatingdistance	.800	12	.067					
	Phonecall interruption time	33.234	12	2.770					
Total	Dependent variable	97.000	20						
	Voice loudness avg	50758.340	20						
	Voice loudness max	124978.580	20						
	Seatingdistance	1.000	20						

	Phonecall interruption time	423.145	20					
Corrected Total	Dependent variable	4.550	19					
	Voice loudness avg	898.242	19					
	Voice loudness max	1104.780	19					
	Seatingdistance	.950	19					
	Phonecall interruption time	69.252	19					

a. R Squared = .678 (Adjusted R Squared = .490)

b. Computed using alpha = .05

c. R Squared = .515 (Adjusted R Squared = .232)

d. R Squared = .280 (Adjusted R Squared = -.140)

e. R Squared = .158 (Adjusted R Squared = -.333)

f. R Squared = .520 (Adjusted R Squared = .240)

Appendix 3: Phone Conversation Script

****Note: Person calling (A) starts, confederate (B) is receiving the call.****

A: Hey Ed!

B: Hey, Tom. What's going on?

A: Do you have a minute to talk? I need some help.

B: Yeah I've got a minute.

A: Thanks. Where's our Calculus book?

B: Mine or yours?

A: It's not mine, so it must be yours. I never bought one.

B: Wait, I've seen you with one before.

A: Yeah, well it was yours.

B: Really?

A: Yeah, I figured there was no sense in both of us buying it.

B: Well I guess that makes sense, but I wish you would've told me, we could've like split the cost or something.

A: We did, 100 - 0.

B: Ha, oh well, you'll just owe me something later on.

A: Okay, so about the book.

B: Yeah what about it?

A: I can't find it.

B: Oh? [Thinks for a minute] I thought I left it out in the living room.

A: [Pause to look] I thought so too, when was the last time you were doing homework?

B: Last time...? I think it was on Friday after I got back from the club.

A: No, you had work that day.

B: You're right, it wasn't Friday. I guess it was Saturday or Sunday. [Long Pause] I don't remember, it was a weekend, I know that.

A: Doesn't matter. Do you have any idea where it might be?

B: Let me think for a minute. Did you try under the table in the living room?

A: Yes, I looked under the table and on the sofa.

B: On the sofa, but did you look behind it?

A: Why would you put it under the sofa?

B: Well it might of fell down there, I don't know why it wouldn't just be on the couch unless it fell behind there.

A: Let me check. [Pause] No, I don't see anything.

B: What about on the sides, see anything there?

A: No. Let me see the other side. Nothing here either.

B: Damn. Okay, did you ask Seth where it might be?

A: Yeah, he said he hasn't seen it.

B: Then I don't know, try the kitchen or something.

A: I'm in the kitchen right now.

B: Good. See it there?

A: No, I'm looking around... it doesn't seem to be on the table. Or in the fridge.

B: Why would it be in the fridge?

A: I don't know, some of your stuff ends up in weird places sometimes.

B: Like when?

A: Like that time you left your socks in the sink.

B: They had to soak.

A: It was still gross.

B: It'd been raining that night, I walked in the mud a bit, some mud got on the socks and then they had to soak.

A: Well, I'm just saying sometimes you put stuff in weird places is all.

B: But I don't do it for no reason, there'd be no reason to put my book inside the fridge... on top of it maybe?

A: Okay. No, I do not see it on the fridge either. Seems dusty though, we need to clean it later.

B: Yeah, we can clean the fridge over the weekend I suppose. I've got like that spray stuff. How's the oven looking by the way?

A: I know that's awesome spray stuff, and it smells great.

B: Yeah, but what about the oven though?

A: Oh, I cleaned the oven just last weekend with the spray stuff. It's still clean now because that spray stuff is so awesome.

B: Good. I plan on using it when I get back.

A: The spray stuff?

B: Well the oven, then the spray stuff this weekend.

A: Awesome. Now back to the Calculus book.

B: Oh right. The book. I don't think it's in my room.

A: It could be. I mean did you take the book to class with you?

B: Yeah I did. I remember dropping it on the table in the living room when I got back.

A: Ah, okay. Well, I don't see it there.

B: I know you don't see it there.

A: So I'm guessing it's in your room. Can I go look and see? I promise not to go into your room.

B: Don't go in my room man, it's private.

A: Why? I've been in there before.

B: Yeah, but I was there with you, keeping an eye on you. Now it's like your just rifling through my stuff.

A: But I need to find the book, I'm just looking for the book.

B: I don't know, I mean, it's just weird having people go through my stuff.

A: It's not weird.

B: Fine go in, or whatever, I've got nothing to hide, but I just feel I should be there if you are coming into my room.

A: That's a weird feeling... Okay. So your room door is locked.

B: Locked? Oh yeah, I just have it lock when you close the door.

A: Why would you do that?

B: I just forgot to unlock it is all. Now I'm sure it's not in my room. Like I said, I dropped it in the living room.

A: Well I checked there and it's not there.

B: Check your own room, Like since your borrowing it without me knowing, I can't really be sure I've got a good track on it.

A: What?

B: Well like, I thought I knew where my book was all the time, but apparently you've been moving it all over the place without me knowing,

B: so I don't know what to think.

A: It has to be in your room, there isn't anywhere else it could be.

B: Well that's what I'm saying it could be in your room.

A: I'll check, but it isn't in there, I'm sure of it.

B: Well?

A: Nope nothing. Not on my bed, not on my desk.

B: Maybe you threw it fell under your bed or something.

A: No, if I was using it, it would've been on the desk, which is far away from the bed, though I'll check anyways... Nope.

B: At this point I think you should go to the library and just borrow a copy. I mean I don't think I can help you.

A: Alright, where do you keep the key to the locker?

B: The locker? Oh, I keep the key on the counter in the kitchen.

A: I'm in the kitchen and I don't see it.

B: It's near the microwave, but behind it really, somewhat near the toaster.

A: I don't follow you. I just picked up and took out the microwave.

B: Why'd you take out the microwave?

A: I was looking for the key!

B: It's not there.

A: You told me it is.

B: I said it's near the microwave, not directly behind it.

A: Alright, well I put the microwave back. I'm near the toaster... and I can't see it.

B: *sigh* Alright. When you look at the toaster.

A: Yeah.

B: Now you will go up to it, and put your hand between it and the microwave.

A: Alright. And I got nothing.

B: Oh? Wait. Ohhhhh! Now I remember, I got the key with me.

A: Dammit Ed.

B: Don't worry, I think I know where the book is, it'll just have to wait until I get back home.

A: Alright, thanks... Oh, I think I got it.

B: Okay good. Where was it?

A: Oh no, it was just my Chem Eng book.

B: How did you confuse those two books, they're completely different looking?

A: They are both blue!

B: But there not even remotely the same size.

A: They're both really thick and hardbound.

B: But the Calculus book is a lot wider across.

A: Don't blame me, it's dark under my bed.

B: So it's not under your bed.

A: Yeah I really don't think so.

B: Look, I got to go, really.

A: Wait no I found it.

B: Good where did you find it?

A: It was behind the sofa pillows.

B: Wow. So it was like lodged behind the sofa pillows? Who put it there?

A: It wasn't me! Maybe you threw it there.

B: I set it on the table.

A: Well someone must have thrown it there.

B: Wasn't me.

A: Me neither.

B: Alright, well I really got to go now.

A: What are you doing anyway?

B: I'm playtesting a game. Well, WAS playtesting a game.

A: Really, cool is that for some MQP?

B: I don't know, it gets me extra credit is all.

A: Oh, alright, what is the game about?

B: Oh just a tank game.

A: Cool, was it like a side scroller or-?

B: No, you could see the whole screen the entire time... I don't know what those are called.

A: That's cool I guess.

B: Yeah, but I'll talk to you later, alright?

A: Yeah sure no problem.

B: Alright, talk to you later.

A: You too.