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Interactive software and its effects on hostility

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INTERACTIVE SOFTWARE AND ITS EFFECTS ON HOSTILITY

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Abstract

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INTERACTIVE SOFTWARE AND ITS EFFECTS ON HOSTILITY
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Masters in School Psychology

The researcher will be exploring the relationship between violence in video games and the emotional responses to them. The goal of the study is to confirm the previous body of research that a short term increase in aggression and hostility exists after a violent video game is played. The study will also expand on the current existing body of data by examining other variables such as gender, age, typical time spent in a week playing videogames, overall familiarity with video games, the game genre that is normally played, and what consoles and systems are typically used to be played on. This data will be collected to see if they too have any significant effect on emotional responses. As interactive media increasingly becomes integrated into our day-to-day activities, data on how they may affect aggression and hostility become progressively more crucial. This is especially true at present as video games come under fire from current state legislation.

Table of Contents

List of Tables

Chapter 1

Introduction

Introduction

Technology has greatly changed over the last decade how societies interact and communicate with one another. Visual entertainment has become increasingly more interactive through the rise of the software entertainment industry and the production and development of videogames. Once limited to simple two dimensional shapes and large passages of text, videogames have quickly flourished into a thriving global multibillion dollar industry. While the impact of videogames on modern culture is often underestimated, the industry's influence permeates society through multiple levels such as the economy, the education system, and even at the federal level.

1.1 Videogames and the Economy

According to the Entertainment Software Association (ESA), the entertainment software industry employs more than 120,000 workers in the United States (Entertainment Software Association, 2011). One report found that (Siwek, 2010) the industry grew over 10% a year from 2005 to 2009, generating over $20 billion in revenue in 2009 alone. Additionally, the ESA claims that the software entertainment industry stimulates complementary purchases such as High Definition Televisions. According to the ESA, roughly $73 million in HDTV sales in 2009 can be directly attributed to the Xbox 360 console alone.

1.2 Videogames and Education

The NPD Group, a global market research firm, claims that there are 46 million children between the ages of 5 and 17 who currently play video games (NPD, 2011). The excitement that children show with videogames has not gone unnoticed by the Federation of American Scientists (FAS). In order to interest children, the FAS collaborated and worked with multiple game developers to create fun and educational based video games. *Immune Attack* teaches middle and high school students about cellular biology and molecular science. *DimensionM*, a math centered video game, has students take part in a 3-D adventure as they try to quickly answer mathematical questions. While certainly unorthodox, the FAS may be on to something. According to one study, students that played *DimensionM* over an 18 week period increased their math test scores 8.07 compared to an increase of 3.74 in the control group (Hirumi, 2008).

Videogames have also been used to train adult professionals at the business level. Games2Train, an entertainment software company, has developed numerous immersive employee training videogames for such companies as American Express, JP Morgan Chase, Pfizer, and more (Entertainment Software Association, 2011). These interactive videogames are used to educate as well as further develop work related skills.

1.3 Videogames and the Government

Videogames have also been a useful median for the United States Government. *America's Army*, first released in 2002 and currently in its third alliteration, is a federally funded online shooter game developed by the United States Army for educational and public

relational purposes. The player is exposed to a virtual soldier's experience that is meant to be both informative as well as entertaining. Players get a taste of what life in boot camp is like as well as glimpses of modern warfare.

President Barrack Obama has also recently announced the STEM (science, technology, engineering, math) Challenge, a videogame creation competition designed to help promote interest in the STEM related subjects. The hope is that by tapping into the natural passion of millions of children, interest in important academic and industrial fields may grow.

1.4 Videogames Today

The ESA currently estimates, more than two-thirds of households in the United States play video games (Entertainment Software Association, 2011). This number may change though, as the ways videogames are being distributed enter a digital revolution.

According to research released by the NPD Group, 48% of all PC game sales last year were digitally downloaded with an estimated 80% of those downloads through the digital distributor, *Steam* (NPD, 2010). Though the rest of the gaming market has not completely followed suit yet, selling video games digitally makes sense economically. There are virtually no packing and shipping costs and little overhead to account for. This allows a greater "cut" of the profit to return back to the companies. *EA Entertainment*, one of the giants in the industry estimates 20% of their sales this year will be digital (GameSpot,

2010). *Valve*, the company behind the *Steam* distribution service, was even lauded by *Forbes* magazine as a "name you need to know" (GameSpot, 2010).

Seeing the success of this business model, other companies have started to enter the digital distribution race. The major video game retailer, *GameStop*, unveiled at the end of last year the launch of their own digital distribution service (GameSpot, 2010). They seem to be doing very well as recent fiscal reports indicate that *GameSpot* has sold $290 million of digital content thus far (GameSpot, 2011). In fact, they went as far to acquire two companies this year to streamline their current distribution software (Business Wire, 2011).

Another major trend is the idea of the "cloud." The main principle of the cloud is the capability to access data in a separate location in real time. Applied to videogames, this means playing without installing and downloading the game, accessing videogames faster than ever before. OnLive, a company at this forefront, has already started offering these services. Subscribers are able to access OnLive's library of videogames to play in real time, unhindered by hardware limitations and downtime.

These advances in distribution technology open new doors in a culture that favors immediate satisfaction. However, they are not without their own set of possible dangers. In an age where less and less social interactions are done face-to-face, semi-anonymity is certainly a concern. Consumers only needs a credit or gift card to instantly purchase a violent videogame from across the globe and can be playing within hours.

1.5 Purpose of the Study

As it has been shown, videogames have certainly come a long way from their humble

beginnings as simple amusement for children. The technology behind videogames and

the systems used to play them are advancing at a rapid rate as they progressively become

more sophisticated and integrated with everyday life. In fact, it was recently revealed by

the Air Force that they have created a supercomputer made up of 1,716 linked

PlayStation 3's to process satellite surveillance data (Torbin, 2011). While originally

designed for entertainment, the raw visual processing power of modern day videogame

systems cannot underestimated.

 On the other hand, videogames have also been thrown into the limelight under increased

scrutiny. The most recent example is the ongoing California Supreme Court case

Schwarzenegger v. EMA/ Entertainment Software Association. If the law is upheld, it

would regulate the sale and rental of video games at the state level by making it a

punishable offense of up to $1000 per offense if a ESRB "Mature" or "Adults Only" rated

game is sold to a minor. Another example from this year would be the reintroduction of a

bill to require violent videogames to have warning labels affixed to them much alike the

labels on cigarette packets (Sinclair, 2011). While these examples may seem extreme to

some, it serves to show how serious some state governments believe that violence in

mature oriented videogames have in developing children.

1.6 Significance of the Study

Previous study has established a short term effect on aggression after playing a violent video game (Barlett et al., 2009). Our study would like to try to replicate the data to lend support to the previous studies as well as expand the depth of the field. The researcher hypothesizes that exposure to a violent video game will have a short term effect on aggression. Furthermore the researcher would like to include other variables such as gender, fluency and competency with video games, time spent playing video games in a week, video games typically played, and what system they usually play on. To the researcher's knowledge, these variables have not been studied together before along with the short term effect of video games and could contribute to the data that has already been gathered in previous studies of video game violence

1.7 Definitions

PC Retail Game

A videogame that is bought through a retail store such as GameStop or Walmart. Videogames age appropriate ratings are regulated by the ESRB and are bought face to face. It is mandated that videogames rated "Mature" or "Adults Only," must be bought by someone at least 17 or 18 years old respectively.

PC Digitally Downloaded Game

A game that is bought online through intermediaries such as Steam or Direct2Drive then downloaded straight onto the computer. Video game age ratings are regulated by the

ESRB but are bought in anonymity and payments are handled through a credit/debit/gift card.

First Person Shooter (FPS)

A video game genre played from the character's point of view. The violent video game (Team Fortress 2) that will be used in this study, is considered a multiplayer FPS.

Fluency and Competency

While the majority of Americans play videogames on a regular basis, they do not all play the same amount nor the same genre. Exposure to certain types of video games could cause some type of desensitization effect to violence in players.

State Hostility Scale

The method the researcher will be using to quantify the subject's hostility and aggression level. The questionnaire will be given to the subject before testing and after testing to establish a baseline hostility level and their new hostility level.

Aggression and Hostility

Not all violent thoughts and emotions result in violent action. Nevertheless, violent behavior is influenced by a person's mood and beliefs.

1.8 Assumptions and Limitations with the Study

For the purposes of this study, the researcher will assume that the Rowan subject pool will reflect current population trends of ethnicity and gender. The researcher will also assume our perceptions of the designated violent game (Team Fortress 2) and control game (The Sims 3) are correct and will produce the desired emotional reactions.

The age range of our pool will be college aged students. While the researcher would like to include a greater range of subjects, the limited time frame makes it a difficult task to gather reliable data in a timely manner. The number of subjects that will be able to be drawn will also affect the consistency of the data collected. Lastly, the researcher is limited in the number of resources available to the researcher, namely hardware for experimentation and the amount of videogames legally owned.

1.9 Overview

The impact videogames have can be seen in today's modern culture. Advances in technology have made it easier and faster than ever to purchase and play videogames. Incidentally, the systems that are used to play videogames have grown increasingly sophisticated, naturally leading to greater visual realism. This has policymakers concerned due to the negative belief of violent videogames and children.

In Chapter 2, the researcher will discuss the literature and research that has already been done regarding violence in videogames. In Chapter 3, the researcher will detail the methodology for the experiment and this study.

<center>**Chapter 2**</center>

<center>**Literature Review**</center>

Introduction

Policymakers believe that violent videogames are a danger to the children that may be exposed to them. In order to combat this, they have tried implementing various pending legislature in hopes of increasing awareness and alerting parents. However are these beliefs justified? In this chapter, the researcher will discuss related violence studies and the literature that already exists.

2.1 Prevalence and Context of Media and Videogame Violence

While the supposed negative effects of violence in videogames are disturbing, one must also take into consideration the overall prevalence of violence in the media and the general context that they are being portrayed in.

The prevalence of violent media is a tricky one to reliably answer. In order to regulate the content of media and to empower parents, various rating systems have been enacted to quickly show caretakers what television shows, movies, or videogames are age appropriate for their children. However, these ratings are not always foolproof as studies have shown.

The ratings for movies are decided by the Motion Picture Associate of America (MPAA). One study that looked at violence in PG, PG-13, and R rated movies found that all three

<center>9</center>

ratings had similar amounts of violent and aggressive actions (Jenkins et al., 2005). This

may be due to how the ratings are decided upon. The presence of mature themes and

blood/gore typically raise the movie rating while a movie's overall seriousness and the

context of the violence are not taken into account. The ratings for videogames, decided

by the Entertainment Software Ratings Board (ERSB), also have similar gaps within the

judgment process.

As current state legislation show, the ERSB has been thrown into the limelight for their

rating process. Very much like the MPAA, a videogame's overall theme and context are

not taken into account when assigning ratings. This presents a problem as it may

reinforce certain themes and motives such as justification for violence or rewarding

negative behavior. A psychological cycle of what context that violence is acceptable may

warp a child's thinking and behavior.

 A study focusing on adolescents with Disruptive Behavior Disorder concluded with

several findings. Those with Disruptive Behavior Disorder had higher exposure to media

violence, video game violence, and television violence. Results from the study also

showed that exposure to violence on the television tended to be accompanied by exposure

to violence in videogames. (Kronenberger et al., 2005).

A related study had similar findings in addition to some new ones that offer insight into

the audience violent videogames appeal to. It was concluded that overall boys were more

attracted to playing violent videogames, especially in boys that had higher aggression and

lower empathy traits. Not only was this type more attracted, but they spent more overall time playing violent videogames (Lemmens & Bushman, 2006). Recent study have shown similar results where findings suggest players with more physical-aggressive personalities were also more likely to have a more aggressive style of play (Ping, Liu, & Mou, 2008). Possible causes for the decrease in empathy is a desensitization effect to the portrayed violence, the feelings of justified violence, or perhaps a combination of the two.

The portrayal of violence in videogames and other forms of media has also shown various key differences. One study statistically found that violence, especially gun violence, is more repetitive and extensive in videogames when compared to gun violence on television. Additionally, the physical and social consequences to these violent behaviors are depicted less realistically then those on the television. However the most major and relevant difference between the portrayal of violence in videogames and on the television was the context and reasons for violence. It was found that violence in videogames were more likely to be represented as justified and sanctioned (Lachlan et al., 2004). Moreover, in a separate study, it was found that mature themed videogames were more likely to feature young, child perpetrators along with rewarding acts of violence (Smith, Lachlan, & Tamborini, 2003). This hazardous combination of repeatable onscreen violence, justification for violent actions, and rewarding violent behavior may lead to negative cognitive and behavioral effects in players.

2.2 The Cognitive and Behavioral Effects of Violent Videogames

While the very nature of violent videogames justifies and reward aggressive behavior,

perhaps the most dangerous effect they may have on children is those that cause a

desensitization to violence. It has been previously suggested that violent videogames may

promote a disconnection between the emotions normally associated with violence in

children (Funk et al., 2002).

This has been shown to be the case in adolescents and adults as well in more recent

studies (Strenziok et al., 2011; Krcmar & Vieira, 2011). One study using young adult

participants found through two experiments that engaging in violent media reduced the

likelihood of aiding others in need (Bushman & Anderson, 2009). Additionally, this

desensitization effect has been shown in adolescents where a study found that exposure to

videogame violence and violent norms predicted physical and relational aggression

(Moller & Krahe, 2009). These studies show that a desensitization effect to violence

occurs regardless of age group. In combination with how violent videogames are

typically designed, this may cause harmful thinking and behavior in violent videogame

players.

A meta-analysis review of experimental and nonexperimental research provides several

conclusions. The findings suggest that exposure and engaging in violent videogame play

increase physiological arousal and aggressive thoughts and emotions. It was also found

that violent videogame players were also less likely to display prosocial behaviors

(Anderson & Bushman, 2001).

12

There is strong support in these findings as the negative effects on cognition and behavior have been well documented through several other studies (Cicchirillo & Chory-Assad, 2005; Sheese & Graziano, 2005; Wei, 2007; Nowak, Krcmar, & Farrar, 2008). These findings were confirmed again recently in another meta-analysis. Interestingly, findings were consistent across both Western and Eastern cultures. The researchers' suggest that violent videogames may actually be a causal risk factor for increased aggressive behavior and thought (Anderson et al., 2010).

Looking back at the possible causes for this increase in cognition and behavior, the effect of reward is one that should not be underestimated. Through three experiments, a study found that rewarding violence in videogames resulted in increased hostility, aggressive thinking, and aggressive behavior. In contrast, punishing violent actions led to increased hostility but no increase in aggressive thinking or behavior (Carnagey & Anderson, 2005).

The interaction and engagement between the player and game is one factor that has also not been as closely examined but may be a major contributing factor to aggressive thought and behavior in players. A study found that after gameplay participants that had been actively engaged in playing a violent videogame behaved more aggressively then participants that were only watching (Polman, Castro & Aken, 2008). This suggests that in general, the interactive violence in videogames may be more detrimental to a player's thoughts and behavior then violence on television.

Combined with the key differences between the portrayal of violence on television and videogames mentioned earlier, it would seem that at the very least, violent videogames should not be played by children.

Another understudied variable is gender, specifically gender differences. One study found that brief exposure to a violent videogame not only increased aggression but that this aggression was partly motivated by revenge. One interesting finding in this study was that the increase in aggression was greater when the female players controlled a same-sex character. (Anderson & Murphy, 2003).

Facial emotion recognition may be a contributing factor to the decrease in prosocial behavior. Research shows that typically, happy faces are recognized faster than angry faces. This phenomenon is called the happy-face advantage. However, after gameplay with a violent videogame, this led to a decrease in the happy-face advantage (Kirtsh & Mounts, 2007).

One study, measured the duration of the negative effects of violent videogames. The findings provides support to the previous studies above by revealing that after playing a violent videogame, aggressive emotions, thoughts, behavior, and heart rate increased. Time measurement showed that the increase in aggressive emotions and thoughts lasted around 4 minutes while increased heart rate and aggressive behavior lasted 4-9 minutes (Barlett et al, 2009). Not only did this study lend support to other previous related studies,

but showed that violent videogame effect players on a physical level as well as a cognitive and behavioral one.

2.3 The Physical Effects of Violent Videogames

Other studies focusing on the physical effects of playing violent videogames have revealed several interesting findings. One study found that after gameplay with a violent videogame, participants had higher SHS scores then those participants that played the nonviolent videogame. It was also found through physical measures, that females had higher heart rates and sweat production after gameplay suggesting that women are more likely to be aroused by violent videogames then men (Arriage et al., 2006). Regarding physical measures during gameplay, one study found that blood pressure was higher while the participant was playing a violent videogame then before or after gameplay (Baldaro et al., 2004).

2.4 Realism in Videogames

One current concern in recent research, is the increasingly interactiveness and realism of modern day videogames. As the systems used to play videogames grow increasingly sophisticated, so do the videogames that are able to be played. Research involving increasing player immersion through virtual environment system seem to suggest that aggressive thoughts and behavior are greater after playing a virtual violent videogame then a regular violent videogame (Persky & Blascovich, 2008; Psicologia et al., 2008). These findings are of particular interest today as 3D capable high definition televisions

and computer monitors enter the mainstream. 3D has also made a recent resurgence in movies as the technology behind it develops.

A similar study supports the findings of the above studies through use of a realistic violent, unrealistic violent, and nonviolent videogame. Confirming previous research, participants that played the two violent games were more aggressive after gameplay then their counterparts that did played the nonviolent videogame. One finding of particular interest was that the more realistic the violent videogame was, the greater the aggressive thoughts and behavior and increase in arousal was (Barlett & Rodeheffer, 2009).

Chapter 3

Methodology

Introduction

In this chapter, the researcher will further discuss how the experimental portion and data collecting will be done. This specifically includes how participants for the study were selected and the logic behind the design of the experiment. Furthermore, this chapter will point out what measures are being collected for this study and why they are being collected.

3.1 Participants

The study's participants will be selected through the Rowan Subject Pool on a first-come, first-serve basis. Participants will only be permitted to participate as long as they are over the age of eighteen which they must acknowledge through the Rowan Subject Pool website and the consent form on the day of the experiment. This requirement is due to one of the experiment's videogames being rated Mature (M).

3.2 Measures

The study will collect a variety of measures throughout the experiment. The primary measure of interest being collected is the State Hostility Scale (SHS) score. The experiment will use the State Hostility Scale developed by Craig A. Anderson, Ph.D to help assess a player's emotional reactions to the game after it is played. The State Hostility Scale is a 35-item self assessment that has participants rating various feelings

(e.g., "I feel furious,""I feel friendly") using a 5-point Likert scale that range from 1 (strongly disagree) to 5 (strongly agree).

Other measures of interest being collected in the experiment are age, gender, familiarity with videogames, typical amount of time spent playing videogames in a week, typically played genres, and systems where the videogames are typically played on. This data will be collected through a self-questionnaire designed by the researcher to see if they too may have an effect on aggression or the level of emotional response.

3.3 Collection of Data and Analysis

The experiment will take place in Room 2108-Library Tech Lab of Rowan University's Education Hall over a span of four Fridays with four timeslots (48 total time slots). This room was selected in particular as it houses many of the building's computers that are not accessible by general university students. This provides a quiet and controlled environment where the experiment can take place while also speeding up the data collecting process. Three computers will be used, two running the violent game and one running the non-violent game. The ratio difference between which game is being run is due to how many copies are legally owned by the researcher.

3.4 Research Design

Participants that come in for the experiment will first sign a consent form and answer the researcher-made questionnaire detailing their personal background and videogame related

habits. Participants are then asked to play a pre-designated game, either violent or non-violent, for 45 uninterrupted minutes.

The violent videogame chosen for this study is the 1st person shooter multiplayer game, "Team Fortress 2." This game was picked due to its premise of two sides capturing or defending certain "control points." In order to do so, both sides try to eliminate others players while completing these objectives. With nine different classes and roles, the game emphasizes a team based collaborative effort in order to succeed. Team Fortress 2 was also chosen as it is a fairly easy game to pick up and learn for first timers in the genre. The game does not unfold very fast or overwhelm the new player with complex concepts. The map that will be used is cp_dustbowl, a three stage world where if the offense wins, they move on to the next stage. This was done so that participants would not be bored after playing a couple of rounds as each stage is geographically different. While the game was designed to be played online against other people, for the purposes of this study, participants will be playing against computer controlled "bots." This was decided in order for the participant to play at their own pace and to control the environment that they are playing in further. This ensures that the participants in this study playing the violent videogame have roughly similar experiences when playing the game. While there will be two computers running this game, participants will not be playing against each other but rather in their own self-contained worlds.

"The Sims 3" was chosen for this study as the nonviolent videogame. In contrast with the violent videogame mentioned above, the ideas and goals of Sims 3 are the very antithesis

of Team Fortress 2. The Sims 3 is a casual "life simulator" where the player create characters, try to advance those characters' careers while juggling wants and needs, and build and decorate player made houses. There is virtually no violence in the game as it centers more on customization and fulfilling certain life goals. Participants were asked to make their own character to live in the researcher-made world of "Lazy Town." To help newer players to the franchise, premade houses were designed and plotted prior to the start of the experiment. Players could then either spend time customizing their new houses or interact with the computer controlled characters of the small town.

After playing for 45 minutes, participants were then asked to complete the State Hostility Scale self-assessment. Once finished, participants were debriefed and given the researcher's email in case of any unforeseen problems. Consent forms were the only documents with the participant's name on it and were separated from the assessment forms.

Chapter 4

Findings

Introduction

In this chapter, the researcher will present the results of the experimental portion from the study. The hypothesis made was that those playing the violent videogame will also have higher levels of hostility and aggression. Other data was sampled such as participant's age, gender, familiarity with videogames, time typically spent a week playing videogames, genre typically played, and system typically played on. This data will also be individually tested to see if they result in significant findings. In total there were 21 participants ranging from the ages of 18-23.

4.1 Results

SHS/Violence In Videogame

The study's primary research of interest, data for SHS for the experiment's violent and nonviolent videogame were conducted and collected.

Table 1: Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Violent	13	83.7692	20.10039	5.57484	71.6227	95.9158	57.00	121.00
Nonviolent	8	61.1250	18.55061	6.55863	45.6163	76.6337	43.00	104.00
Total	21	75.1429	22.13207	4.82961	65.0685	85.2173	43.00	121.00

Table 2: Mean State Hostility Scale Score
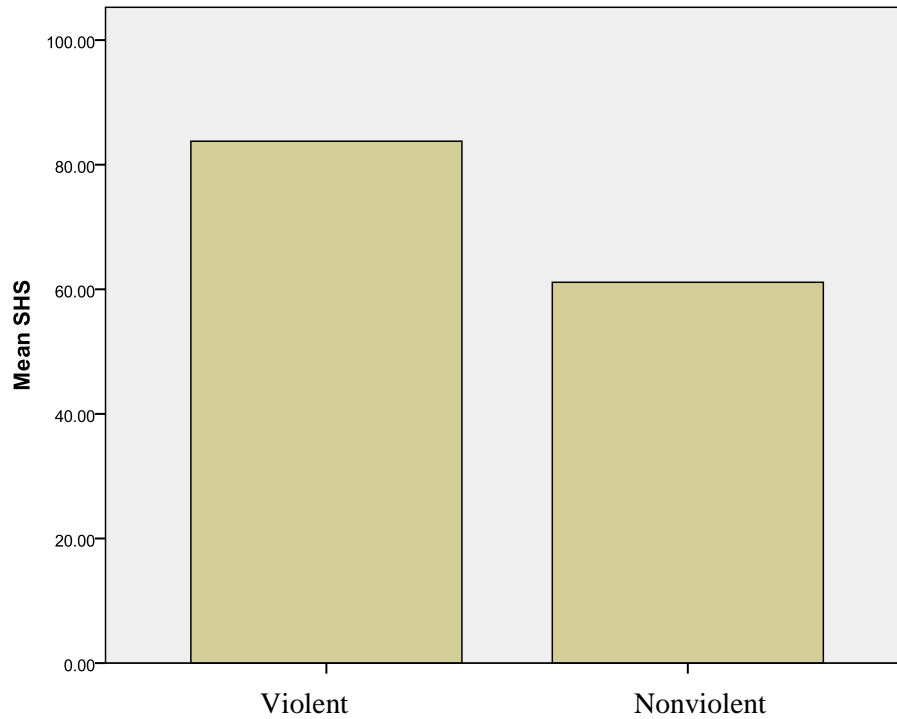
In the experiment, thirteen (13) participants played the violent videogame with a mean

SHS score of 83.77 and a standard deviation of 20.1 points. The lowest score among the

SHS scores reported was 57 while the highest was 121. The nonviolent videogame was

played by eight (8) participants with a mean SHS score of 61.13 and a standard deviation

of 18.55 points. Among the nonviolent videogame data, the lowest reported SHS score

was 43 and the highest 104.

Table 3: Between-Subjects Analysis of Variance Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2539.389[a]	1	2539.389	6.648	.018
	103971.960	1	103971.960	272.209	.000
Game	2539.389	1	2539.389	6.648	.018
Error	7257.183	19	381.957		
Total	128372.000	21			
Corrected Total	9796.571	20			

a. R Squared = .259 (Adjusted R Squared = .220)

Using a Between-Subjects Analysis of Variance test, the study's finding regarding SHS and violence in videogames were statistically significant at the p<.05 level. $F_{(1,19)} = 6.65$, $p = .018$.

SHS/Age of Participant

Out of the twenty-one (21) participants in the experiment, six were 18 years old, four were 19 years old, five were 20 years old, four were 21 years old, one was 22 years old, and one was 23 years old. This data was collected to see if a player's age significantly affected their emotional responses to violent videogames. Using the Between-Subjects Analysis of Variance test, results were non-significant at a statistical level. $F_{(1,15)} = .538$, $p = .745$.

SHS/Gender

There were seventeen (17) males and four (4) female participants in the experiment. Data regarding their gender was collected to see if a player's gender would possibly affect their emotional responses to violent videogames. With the Between-Subjects Analysis of Variance test, results were found to be non-significant. $F_{(1,19)} = 1.087$, $p = .310$.

SHS/Familiarity with Videogames

Data on the participant's general familiarity with videogames was also collected. Using a likert scale, with 1 meaning a casual player and 5 meaning a competitive/professional player, participants self reported their skill and expertise. A "non-applicable" option was also given in the scenario that the participant was totally unfamiliar with any type of

videogame or genre. The data collected show that three participants rated themselves as 1's, six rated themselves as 3's, nine as 4's, and three as 5's. There were no participants that selected a familiarity level of 2 or N/A. The Between-Subjects Analysis of Variance test shows that familarity with videogames was not found to have a statistically significant on SHS. F(1, 17) = .744, p = .540.

SHS/Typical Playtime in a Week

With the Between-Subjects Analysis of Variance, results for participant typical playtime with videogames in a week and the affect on SHS was found to be non-significant. F(1,9) = .763, p = .540. The typical hours spent playing ranged from 1 hour per week to 30 hours per week.

SHS/Videogame Genre

Data regarding the participant's typically played videogame genre were also collected for this study. In order to see the statistical significance of a videogame's genre and effects on SHS, multiple genres were coded into six general categories depending on the genre's goals and premise (shooter, adventure, simulation, strategy, casual, and fighting). Using the Between-Subjects Analysis of Variance test, the findings proved to be non-significant. F(1,15) = 1.367, p = .291.

SHS/System Typically Played

The last piece of data collected was what system participants typically played on to see if there was a relationship between certain systems and SHS. In order to test for statistical

significance, systems were broken down into three categories (console, PC, and portable) The Between-Subjects Analysis of Variance test resulted in significant results at the p<.05 level. $F(1,18) = 3.736$, $p=.044$. However, these results are inconclusive as nineteen of the twenty-one participants primarily played on a console system while only one played primarily on the PC and one, a portable system.

Table 4: Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Console	19	71.5263	19.61113	4.49910	62.0741	80.9786	43.00	105.00
PC	1	121.0000	.	.	.	.	121.00	121.00
Portable	1	98.0000	.	.	.	.	98.00	98.00
Total	21	75.1429	22.13207	4.82961	65.0685	85.2173	43.00	121.00

Table 5: Between-Subjects Analysis of Variance Test

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	2873.835[a]	2	1436.917	3.736	.044
	41120.648	1	41120.648	106.919	.000
System	2873.835	2	1436.917	3.736	.044
Error	6922.737	18	384.596		
Total	128372.000	21			
Corrected Total	9796.571	20			

a. R Squared = .293 (Adjusted R Squared = .215)

4.2 Summary of Results

The experiment's main purpose, to see the impact of violence in videogames and the level of emotional response to them, yielded statistically significant results. The findings of the experiment showed that indeed, playing a violent videogame may result in higher aggression and hostility after it is played. The mean SHS scores were also shown to be

higher overall in participants playing the violent videogame when compared to those participants that played the nonviolent videogame.

One other category, system typically played, did seem to yield statistically significant results. However, those numbers are unreliable due to the overabundance of those sampled typically played videogames on a console system.

All other data categories (age, gender, familiarity with videogames, playtime per week, genre typically played) produced statistically non-significant results.

Chapter 5

Summary, Conclusions, and Implications for Further Study

Introduction

In this chapter, the researcher will discuss the findings of the experiment as well as their interpretation of these results. Limitations and suggestions for further study will also be discussed as well.

5.1 Review of Results and Interpretation of Findings

From the experiment done in this study, the researcher was able to statistically test several different variables and their relation to levels of aggression and hostility after playing a violent or nonviolent videogame.

In the first chapter, it was originally hypothesized by the researcher that participants playing the violent videogame would have higher SHS scores after gameplay then those participants playing the nonviolent videogame. Level of aggression would be reflected through these SHS scores as the greater the SHS score, the higher that particular participant aggressively felt. After compiling and analyzing the data, the presence of violence in videogames and the level of aggression was found to be statistically significant. That is, participants that played the violent videogame were more likely to have elevated SHS scores when compared to participants that played the nonviolent videogame.

Out of the other numerous variables tested, the system that participants claimed in the initial questionnaire to typically play on was found to be statistically significant to their SHS scores. However those results are unreliable as the data they are pulled from are too categorically uniform.

The other variables included in this study (participant's age, gender, familiarity with videogames, time typically spent a week playing videogames, and genre typically played) were found to be statistically nonsignificantly related to the level of SHS scores.

5.2 Limitations

A key limitation to the study was the limited amount of participants that were included in the study. Sign-ups were done through the Rowan University Subject Pool, however the majority of this study's experimentation was done in the final two weeks.

Another limitation to this study was the overall uniformity of the participants. The gross majority of participants were 18-19 year old males that typically play on console systems. The uniformity of the ages of participants may be due to the introduction class tied to the subject pool which is normally taken by freshman and sophomores. While the overall amount of female participants in the study was disappointing, this may be due to low interest that was generated from the experiment's description on the subject pool website when compared to competing female focused studies.

The final limitation would be the amount of personal resources available to the researcher. The maximum amount of subjects for each available time slot was limited to how many copies of the videogames were legally owned by the researcher. In this case, two copies of the violent videogame "Team Fortress 2" and only one copy of the nonviolent "The Sims 3." The room where the actual experimentation took place was done through special request as it was an isolated computer lab typically used for classes. The room was made available for the researcher for four Fridays.

5.3 Conclusions

It was hypothesized that participants playing the violent videogame would also have higher SHS scores afterwards. The results of the experimental portion of this study would seem to support previous related research in media violence. The researcher's findings indicate that statistically, after gameplay, those that played the violent videogame tended to have greater aggression in thought and emotion then participants that played the nonviolent videogame.

The study used modern videogames with simple to learn features and goals to great effect. However, the study's findings would seem to suggest that perhaps too much was being aspired to as there simply was not enough participants for reliable and diverse data across all variables collected. On the other hand, the main goal of the study, to see if violent videogames have an effect on aggression and hostility after gameplay, was a success.

Put into the perspective of today, the study's results and the findings of previous related studies would seem to indicate that policymakers concerned about the state of today's entertainment software business, have concerns and beliefs backed by strong scientific support and evidence.

5.4 Implications for Further Study

The implications of this study are both fascinating and frightening. Playing violent videogames has been shown in previous studies to increase aggressive behavior and thought. The researcher's study was able to confirm this finding as participants that played the violent videogame were also more likely to have higher SHS scores, linking to a greater amount of aggression and hostility after gameplay.

This is alarming when current cultural and economical trends are taken into consideration. Advances in today's technology have certainly made it more convenient than ever to purchase digitally distributed items such as videogames. However, the anonymity of internet purchases and lack of a reliable system of checks and balances leaves exploitable opportunity.

While extensive research has been done on violent videogames and their effect on thoughts and behavior, not much has been done on the variables included in this study. While it was disappointing that there was not enough data to reliable find support for these variables, they are important to consider in future studies.

List of References

Anastasio, P.A. (2005). Does viewing justifed violence lead to devaluing others? *Current Psychology: Developmental, Learning, Personality, Social, Vol 23 (4),* 259-266.

Anderson, C.A., Berkowitz, L, Donnerstein, E., Huesmann, L.R., Johnson, J.D., Linz, D., Malamuth, N.M., & Wartella, E. (2003). The influence of media violence on youth. *Psychological Science in the Public Interest, Vol 4 (3),* 81-110.

Anderson, C.A. & Bushman, B.J. (2001). Effects of violent video games on aggressive behavior, aggressive cognition, aggressive affect, physiological arousal, and prosocial behavior: A meta-analytic review of the scientific literature. *Psychological Science, Vol 12 (5),* 353-359.

Anderson, C.A. & Murphy, C.R. (2003). Violent video games and aggressive behavior in young women. *Aggressive Behavior, Vol 29,* 423-429.

Anderson, C.A., Ihori, N., Bushman, B.J., Rothstein, H.R., Shibuya, A., Swing, E.L., Sakamoto, A. & Saleem, M. (2010). Violent video game effects on aggression, empathy, and prosocial behavior in Eastern and Western countries: A meta-analytic review. *Psychological Bulletin, Vol 136 (2),* 151-173.

Attraiga, P. Esteves, F., Carneiro, P, & Monteiro, M.B. (2006). Violent computer games and their effects on state hostility and physiological arousal. *Aggressive Behavior, Vol 32,* 146-158.

Attraiga, P., Esteves, F., Carneiro, P., & Monteiro, M.B. (2008). Are the effects of *unreal* violent video games pronounced when playing with a virtual reality system? *Aggressive Behavior, Vol 34,* 521-538.

Baldaro, B., Tuozzi, G., Codispoti, M., Montebarocci, O., Barbagli, F., Trombini, E., & Rossi, Nicolino. (2004). Aggressive and non-violent videogames: short-term psychological and cardiovascular effects on habitual players. *Stress and Health, Vol 20,* 203-208.

Barlett, C., Branch, O., Rodeheffer, C. & Harris, R. (2009). How long do the short-term violent video game effects last? *Aggressive Behavior, Vol 35,* 225-236.

Barlett, C.P. & Rodeheffer, C. (2009). Effects of realism on extended violent and nonviolent videogame play on aggressive thoughts, feelings, and physiological arousal. *Aggressive Behavior, Vol 35,* 213-224.

Bushman, B.J. & Anderson, C.A. (2009). Comfortably Numb: Desensitizing effects of violent media on helping others. *Psychological Science, Vol 20(3).* 273-277.

Business Wire. (2011). *GameStop announces acquisition of Spawn Labs and agreement to acquire Impulse, Inc.* Retrieved from http://www.businesswire.com/news/home/20110331006835/en/GameStop-Announces-Acquisition-Spawn-Labs-Agreement-Acquire

Carnagey, N.L & Anderson, C.A. (2005). The effects of reward and punishment in violent video games on aggressive affect, cognition, and behavior. *Psychological Science, Vol 15 (11),* 882-889.

Cicchirillo, V. & Chory-Assad, R.M. (2005). Effects of affective orientation and video game play on aggressive thoughts and behaviors. *Journal of Broudcasting & Electronic Media, Vol 49(4),* 435-449.

Entertainment Software Association. (2011). *Game player data.* Retrieved from http://www.theesa.com/facts/gameplayer.asp

Entertainment Software Association (2011). *Video games & education*. Retrieved from http://www.theesa.com/gamesindailylife/education.asp

Ertwin, E.J. & Morton, N. (2008). Exposure to media violence and young children with and without disabilities: Powerful opportunities for family-professional partnerships. *Early Childhood Educ J, 36,* 105-112.

Ferguson, C.J. (2007). The good, The bad and the ugly: A meta-analytic review of positive and negative effects of violent video games. *Psychiar Q, 78,* 309-316.

Funk, J.B., Hagen, J., Schimming, J., Bullock, W.A., Buchman, D.D., & Myers, M. (2002). Aggression and psychopathology in adolescents with a preference for violent electronic games. *Aggressive Behavior, Vol 28,* 134-144.

GameSpot. (2010). *EA expects 20% of sales to be digital.* Retrieved from http://www.gamespot.com/news/6284941.html

Gamespot. (2010). *Forbes lists Gabe Newell as a 'name you need to know' in 2011.* Retrieved from http://www.gamespot.com/news/6284041.html

Gamespot. (2011) *GameStop posts record annual sales of $9.47 billion.* Retrieved from http://www.gamespot.com/news/6305608.html

Hirumi, A. (2008). *The effects of modern math computer games on learners' math achievement and math course motivation in a public high school setting.* Retrieved from http://www.caseforlearning.com/files/Tabula%20UCF%20Research%20NR%20FINAL%20June%2013%202008.pdf

Hoy, M.G., & Andrews J.C. (2006). Entertainment industry ratings disclosures and the clear and conspicuous standard. *The Journal of Consumer Affairs, Vol 40(1),*117-143.

Ivarsson, M., Anderson, M., Akerstedt, T., & Lindblad. F. (2008). Playing a violent television game affects heart rate variability. *Acta Paediatrica, Vol 98,* 166-172.

Jenkins, L., Webb, T., Browne, N., & Krauss, J. (2005). Evaluation of the motion picture association of America's treatment of violent in PG-, PG-13-, and R-Rated Films. *Pediatrics, Vol 115(5),* e512-e517.

Kirsh, S.J. & Mounts, J.R.W. (2007). Violent video game play impacts facial emotion recognition. *Aggressive Behavior, Vol 33,* 353-358.

Kronenberger, W.G., Mathews, V.P., Dunn, D.W., Wang, Y., Wood, E.A., larsen, J.J., Rembusch M.E., Lowe, M.J., Giauque, A.L., & Lurito, J.T. (2005). Media violence exposure in aggressive and control adolescents: Differences in self- and parent-reported exposure to violence on television and in video games. *Aggressive Behavior, Vol 31,* 201-216.

Kronenberger, W.G., Mathews, V.P., Dun, D.W., Wang, Y., Wood, E.A., Giauque, A.L., Larsen, J.J., Rembusch, M.E., Lowe, M.J., & Li, T. (2005). Media violence exposure and executive functioning in aggressive and control adolescents. *Journal of Clinical Psychology, Vol 61(6),* 725-737.

Lemmens, J.S. & Bushman, B.J. (2006). Appeal of violent video games to lower educated aggressive adolescent boys from two countries. *Cyber Psychology & Behavior, Vol 9,* 638-641.

Moller, I. & Krahe, B. (2009). Exposure to violent video games and aggression in German adolescents: A longitudinal analysis. *Aggressive Behavior, Vol 35,* 75-89.

Nowak, K.L., Krcmar, M., & Farrar, K.M. (2008). the causes and consequences of presence: Considering the influence of violent video games on presence and aggression. *Presence, Vol 17(3),* 256-268.

NPD Group. (2010). *PC full-game digital downloads surpass retail unit sales.* Retrieved from http://www.npd.com/press/releases/press_100920.html

Peng, W., Liu, M., & Mou, Y. (2008). Do aggressive people play violent computer games in a more aggressive way? Individual difference and idiosyncratic game-playing experience. *CyberPsychology & Behavior, Vol 11(2),* 157-161.

Persky, S. & Blascovich, J. (2008). Immersive Virtual video game play and presence: Influences on aggressive feelings and behavior. *Presence, Vol 17 (1),* 57-72.

Polman, H., Orobio de Castro, B., & Aken, M.A.G. (2008). Experimental study of the differential effects of playing versus watching violent video games on children's aggressive behavior. *Aggressive Behavior, Vol 34,* 256-264.

Sheese, B.E. & Graziano, W.G. (2005). Deciding to defect: The effects of video-game violence on cooperative behavior. *Psychological Science, Vol 16(5),* 354-357.

Sinclair, B. (2011). *US gaming warning label bill reintroduced.* Retrieved from http://www.gamespot.com/news/6286933.html

Siwek, S.E. (2010). *Video games in the 21st Century:The 2010 report.* Retrieved from http://www.theesa.com/facts/pdfs/VideoGames21stCentury_2010.pdf

Strenziok, M., Krueger, F., Deshpande, G., Lenroot, R.K., Meer, E., & Grafman, J. (2011). Fronto-parietal regulation of media violence exposure in adolescents: A multi-method study. *Social Cognitive & Affective Neuroscience.*

Smith, S.L., Lachlan, K., Pieper, K.M., Boyson, A.R., Wilson, B.J., Tamborini, R., & Weber, R. (2004). Brandishing guns in American Media: Two studies examining how often and in what context firearms appear on television and in popular video games. *Journal of Broadcasting & Electronic Media, Vol 48(4),* 584-606.

Smith, S.L., Lachlan, K., & Tamborini, R. (2003). Popular video games: Quantifying the presentation of violence and its context. *Journal of Broadcasting & Electronic Media, Vol 47(1),* 58-76.

Tobin, D. (2011). *Rome lab's supercomputer is made up of 1,700 off-the-self PlayStation 3 gaming consoles.* Retrieved from http://www.syracuse.com/news/index.ssf/2011/03/rome_labs_supercomputer_is_mad.html

Unsworth, G., Devilly, G.J., & Ward, T. (2007). The effect of playing violent video games on adolescents: Should parents be quaking in their boots? *Psychology, Crime & Law, Vol 13(4),* 383-394.

Wei, R. (2007). Effects of playing violent videogames on Chinese adolescents' pro-violence attitudes, attitudes toward others, and aggressive behavior. *CyberPsychology & Behavior, Vol 10(3),* 371-380.

Appendix A: Consent Form

I agree to participate in a study entitled "Interactive Software and its Effect on Hostility," which is being conducted by Warren Shya of the Psychology Department, Rowan University.

I acknowledge that I am at least 18 years of age.

The purpose of this study is to expand on previous research into the effects of video game violence and hostility.

I understand that I will be required to answer a survey and questionnaire. Furthermore, I understand that I will also have to play 45 minutes of the designated game uninterrupted. My participation in the study should not exceed three hours.

I understand that my responses will be anonymous and that all the data gathered will be confidential. I agree that any information obtained from this study may be used in any way thought best for publication or education provided that I am in no way identified and my name is not used.

I understand that there are no physical risks and minimal psychological risks involved in this study, and that I am free to withdraw my participation at any time without penalty.

I understand that my participation does not imply employment with the state of New Jersey, Rowan University, the principal investigator, or any other project facilitator.

If I have any questions or problems concerning my participation in this study, I may contact Warren Shya at 201-572-1954 or email warshy86@gmail.com or Dr. Roberta Dihoff at x3783 or dihoff@rowan.edu.

_____ _____
(Signature of Participant) (Date)

_____ _____
(Signature of Investigator) (Date)

Appendix B: Variables Questionnaire

Please answer all questions truthfully and to the best of your ability.
If the question does not apply, put N/A (Not Applicable).

How old are you?
What is your gender?
On a five point rating scale, how familiar are you at playing video games? *1= casual player, 3 = average player, 5 = professional player, etc.*   1   2   3   4   5   N/A
Typical amount of time spent playing video games per week
Genre(s) of video games typically played
System(s) typically used to play on *Please write the complete name, i.e. "Xbox", "Xbox 360"*

Appendix C: State Hostility Scale

Current Mood

Please indicate the extent to which you agree or disagree with each of the following mood statements. Use the following 5 point rating scale. Write the number corresponding to your rating on the blank line in front of each statement.

Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1	2	3	4	5

____ I feel furious.

____ I feel willful.

____ I feel aggravated.

____ I feel tender.

____ I feel stormy.

____ I feel polite.

____ I feel discontented.

____ I feel like banging on a table.

____ I feel irritated.

____ I feel frustrated.

____ I feel kindly.

____ I feel unsociable.

____ I feel outraged.

____ I feel agreeable.

____ I feel angry.

____ I feel offended.

____ I feel disgusted.

____ I feel tame.

____ I feel like I'm about to explode.

____ I feel friendly.

____ I feel understanding.

____ I feel amiable.

____ I feel mad.

____ I feel mean.

____ I feel bitter.

____ I feel burned up.

____ I feel like yelling at somebody.

____ I feel cooperative.

____ I feel like swearing.

____ I feel cruel.

____ I feel good-natured.

____ I feel disagreeable.

____ I feel enraged.

____ I feel sympathetic.

____ I feel vexed.