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Effects of Prosocial Video Games on Resulting Prosocial Behaviors

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EFFECTS OF PROSOCIAL VIDEO GAMES ON RESULTING PROSOCIAL BEHAVIORS

By

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ABSTRACT

Past research indicates that prosocial video game play has a role in subsequent prosocial behaviors, affect, and accessibility of prosocial thoughts via the General Learning Model. The exposure time in this past research has varied widely, so an experiment that both replicates existing research and looks at exposure time was developed. In this study participants played either a prosocial game, or a neutral game for 10 or 20 minutes (participants in the control condition did not play a game at all). Differences between these groups were assessed, while correcting for trait measures of altruism and aggression. In general, there were no significant differences between participants that played the neutral or no game and those that played the prosocial game, though some variables trended in expected directions. This study found little support for the General Learning Model overall, though we did not necessarily find data that contradicted it either.

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Altruism is defined as an individual helping another person when there is no benefit to themselves. Under this definition, true altruism is difficult to observe. In many cases, helping behaviors might cause the helper to feel happiness or relief (from the guilt or shame of not helping) - thus providing them with a benefit and nullifying the altruism of the act (Batson, Duncan, Ackerman, Buckley, & Birch, 1981). Because of these definitional difficulties, many studies on helping behaviors have operationally defined “helping” as intervening in an unpleasant circumstance as opposed to cooperating or giving randomly.

In 1968, Latané and Darley published two papers on the bystander effect. This phenomenon explains why individuals in crowds are often less inclined to help relative to people that are alone or in small groups because they perceive their responsibility to help to be “diffused,” a metaphor to conceptualize how inert would-be helpers that absorb behavioral cues from others in the crowd to guide their behavior (Darley & Latané, 1968; Latané & Darley, 1968). Study of this phenomenon was prompted by the murder of Kitty Genovese. According to the legendary circumstances, the crime was witnessed by over 30 people, few of whom attempted to help her. This version of Genovese’s murder has been

debunked. It turns out that several neighbors did actually try to help her and only a few people witnessed the entire crime. However, there is no questioning the impact the case made on psychology (Lemann, 2014), especially on the development of the bystander effect.

One of Latané and Darley's more famous 1960s experiments on the bystander effect involved participants in an ostensibly smoke-filled room alone or with a few others. As the experimenters expected, fewer participants reported the smoke to the experimenter when non-reacting confederates were present. They surmised that this was due to diffusion of responsibility; the participants used the behavior of other people as a guide, assuming that a true emergency would compel action from others (Latané & Darley, 1968).

While prosocial behavior was predicted by a lack of diffusion, indirect moral salience (in the form of a story encouraging altruistic behavior) was also ineffective in encouraging prosocial behavior. In the "Good Samaritan" study by Darley and Batson (1973), experimenters investigated if being hurried or not on the way to teach about the "Good Samaritan" parable would prime participants to help someone in need. As expected, fewer hurried individuals than non-hurried individuals stopped to help a prone person. Further, helping rates were unaffected if they had the "Good Samaritan" prime (Darley & Batson, 1973). In this case, helping behavior was not increased even while en route to relay an anecdote encouraging altruism. In this study, Darley and Batson implied that

having some sort of media prime has no effect on our behavior. In the 43 years since the Good Samaritan Study was published, however, other researchers have concluded otherwise.

Media Modeling as a Guide

In Latané and Darley's 1968 paper, they note how little experience people tend to have with emergency situations. Often during emergencies the only information available "is the secondhand wisdom of the late movie, which is often as useful as 'Be brave' or as applicable as 'Quick, get lots of hot water and towels!'" (Latané and Darley, 1968, p. 215). The idea here is that novelty might engender confusion and paralysis. Therefore, should something novel occur, people may recall instances of media modeling as a guide.

The behavioral influence of television has been widely studied since its advent in the 1950s. A 1963 package of Bandura's Bobo Doll studies even addressed the impact of media modeling on aggressive behaviors in children. In one study, Badura designed an experiment using four conditions: an in-person aggression model, human-on-film aggression model, a cartoon-character aggression model, and a control condition. After the participants (aged between two and six years old) were exposed to their media condition, the experimenters induced frustration by limiting which toys they were allowed to play with and then let the participants play in a room for 20 minutes, during which their behavior was

observed. All three of the experimental conditions contributed to significantly more aggressive behavior than the control group (Bandura, Ross, & Ross, 1963).

As time has passed, media consumption has changed. ZenithOptimedia (a marketing firm), found that consumers spend an average of eight hours a day consuming various types of media, including both “old” media like TV and magazines and “new” media like the internet and video games (Karaian, 2015). With such a time commitment, it stands to reason that modeling can alter day-to-day behavior. A proposed model of this media influence is the General Learning Model (GLM; Buckley & Anderson, 2006).

GAM to GLM

In order to understand the General Learning Model, the General Aggression Model must be discussed to provide context. Following the significant increase in media coverage of violence (specifically school shootings) perpetrated by youth in the late 1990s, the public seemed anxious to identify a culprit. A popular target was video games, partially because they were relatively new and growing in popularity at an astounding rate, but also because newly popular game franchises like Doom and Mortal Kombat include a great deal of graphic content (Doom, 1993; Mortal Kombat, 1992; The Impact of Interactive Violence on Children, 2000). Additionally, Anderson and Bushman’s 2001 meta-analysis linked aggression and video game playing. In this meta-analysis, they

showed that media was influencing aggressive behavior, accounting for 19% of the variance (Anderson & Bushman, 2001).

Anderson and Bushman coined a theory called the General Aggression Model (GAM), which the two researchers formally published the next year (Anderson & Bushman, 2001). They theorized that aggressive behavior is primarily influenced by "learning, activation, and application of aggression-related knowledge structures stored in memory" (Anderson & Bushman, 2001, p. 355). The idea is that violent media exposure alters a person's worldview by teaching them how to behave aggressively then rewarding them for it vicariously via more points, secret content, or other rewards like "achievements," thus increasing the likelihood of them expressing aggressive behavior when aroused (Anderson & Bushman, 2002).

However, in 2006, Buckley and Anderson expanded the GAM into the General Learning Model (GLM), a more general version of the model that includes a more nuanced approach to what people learn via video game consumption (Buckley & Anderson, 2006). The General Learning Model (GLM) functions in largely the same way as the General Aggression Model (GAM), stating that individuals are reinforced for specific behaviors, thus increasing the likelihood those individuals will exhibit such behaviors again. The GLM, however, notes that these behaviors are largely dependent upon the content of the games:

Violent games teach violence, while prosocial games teach prosocial behavior (Buckley & Anderson, 2006).

This change in nomenclature from GAM to GLM was plausibly a response to more research that included positive results of video game exposure. Additionally, the development of the GLM is reflective of the fact that not all video games are inherently violent. They can have a variety of influences depending on their use, such as helping children to retain more spelling and decoding skills when playing an educational game in school (Din & Calao, 2001). The results of another germane study indicate that participants who utilized video games and virtual reality as part of exposure therapy showed higher reduction in anxiety than those that did not (Walshe, Lewis, Kim, O'Sullivan, & Wiederhold, 2003).

This research might not have been the only reason to compel a broader model in the form of the GLM. It could also have been a response to the criticism of the GAM. As previously stated, not all video games are inherently violent, especially not with the introduction and wide adoption of new gaming platforms like cell phones and Steam expanding gaming to new audiences. The number of U.S. households that owned a cell phone increased from 36% in 1998 to 71% in 2005 (Cellphone ownership soared since 1998, 2009). In 2003, the Valve Cooperation released Steam, a free online gaming platform for PC (personal computer) games that currently boasts 35 million active users ("Welcome to Valve," n.d.). This expansion allowed new/smaller game developers to make

more diverse games than had been seen in the past, breaking from the standard format of seemingly all popular video game franchises featuring extreme violence of the late 1990s to early 2000s.

Prosocial Video Game Research

Since the subsuming of the GAM into the GLM, researchers have studied the effects of prosocial video games on prosocial behavior. Overall, these studies seem to be supporting the theory that prosocial video game content influences prosocial behavior and cognitions. For instance, a meta-analysis showed that prosocial video game exposure increased prosocial behaviors and decreased aggressive behaviors (Greitemeyer & Mügge, 2014).

Greitemeyer has published several articles supporting the GLM, many of which specifically examine prosocial behavior and cognitions resulting from video games (Greitemeyer, 2013; Greitemeyer, Agthe, Turner, & Gschwendtner, 2012; Greitemeyer & Mügge, 2014; Greitemeyer & Osswald, 2011; Greitemeyer & Osswald, 2010; Greitemeyer, Osswald, & Brauer, 2010). For example, prosocial video game players indicated higher empathy with an individual in a vignette (either about a celebrity or adapted from an essay supposedly written by a peer) relative to those playing neutral or violent games in a 2010 study by Greitemeyer et al. Additionally, the authors found that participants that played the prosocial games experienced less “Schadenfreude” (pleasure in the pain of others) than those that played the neutral or violent game (Greitemeyer et al., 2010).

Another four-experiment paper showed that participants who played a prosocial game (Lemmings), versus a neutral or aggressive game (Tetris and Lamers, respectively) were more likely to engage in various helping behaviors like doing more research for the experimenters, picking up pencils that the experimenter knocked over, or trying to help a harassed woman (Greitemeyer & Osswald, 2010). Results from both this paper and another published in 2011 supported the idea that prosocial video games made prosocial thoughts more accessible via either a Lexical Decision Task or by writing down the thoughts they recalled having. These thoughts were then coded into either prosocial or neutral thoughts (Greitemeyer & Osswald, 2011; Greitemeyer & Osswald, 2010). Greitemeyer also showed that playing prosocial games decreased both aggressive cognitions and aggressive behaviors in another publication (Greitemeyer et al., 2012). In another publication, results support the General Learning Model by illustrating that video games influence participants' perceptions of their humanity by increasing positive traits and decreasing their perceptions of negative traits, while violent games seemed to have the reverse effect (Greitemeyer, 2013).

Other authors have also found support for the GLM. One study found that playing prosocial games decreased state hostility and increased positive state affect while playing violent games produced the reverse effect. However, it is worth noting that trait aggression moderated these effects (Saleem, Anderson, &

Gentile, 2012). Gitter, Ewell, Guadagno, Stillman, and Baumeister (2013) tackled the GLM in a more nuanced capacity, examining motivation for violence. In this experiment, motivation for violent behavior was examined. In one condition, participants played a violent game in which the violence was termed "morally ambiguous." In the other condition, participants engaged in violence that was prosocially motivated (participants had to protect another character as that character completed a nonviolent task). Results indicated that the prosocial motivation disrupted violent cognitions, though this disruption was not statistically significant (Gitter et al., 2013).

What is Missing

Almost all of these studies use similar methods with slight alterations to assess specific underpinnings of the GLM. One question, however, has not been explored in great detail: exposure time. In the previous research, the time participants were exposed to the games varied greatly: The shortest amount of time participants played was eight minutes (Greitemeyer & Osswald, 2010) while the longest was 20 minutes (Saleem, Anderson, & Gentile, 2012). However, the majority of these papers gives participants between 10 and 15 minutes of exposure time (Gitter et al., 2013; Greitemeyer, 2013; Greitemeyer et al., 2012; Greitemeyer & Osswald, 2011; Greitemeyer et al., 2010). So far, none of these papers has explored if there is a difference in effect between playing for eight minutes or playing for 20.

It is prudent to assess these differences for the benefit of future research, as it would help to standardize playtime for these types of studies. If there is no difference between participants playing a game for 10 minutes and 20 minutes, it would be a more efficient use of researchers' and participants' time for exposure to last less time. If there is a difference, researchers need to understand that the time they select could impact their results, thus adding complexity to the research design process.

Ceiling effects might also be important in the context of practical implications. It could indicate that though there are differences in initial behaviors and/or affect, these differences do not translate into more bombastic real-world behaviors after single instances of exposure. If that is the case, then perhaps research on the GLM should shift into a stronger focus on longitudinal effects of many instances of play over time instead of focusing on a singular instance of play time.

The Present Study

The present study further explores the effect of prosocial exposure on affect, behavior, and cognitions. In order to do so, most of the present study was modeled after Greitemeyer's previous work. In these studies, the researchers saw a variety of effect sizes ranging from small to very large without the added independent variable of different times of exposure. For example, effect sizes in these articles range from a Cohen's *d* of .41 to 1.44, and η^2 of .15 to .88, large

effect sizes, through methods vary slightly between publications (Greitemeyer, 2013; Greitemeyer et al., 2012; Greitemeyer et al., 2010; Greitemeyer & Osswald, 2011; Greitemeyer & Osswald, 2010).

To operationally define and measure affect, the Positive and Negative Affect Schedule was used (PANAS; Watson & Clark, 1988). As a behavioral measure, participants were given hypothetical situations in which they rated how likely they are to help in a given situation. This measure is based on two previous interventions, in which participants read and respond to two vignettes, one involving “ordinary, everyday helping,” and the other involving “extraordinary helping” (Burnstein, Crandall, & Kitayama, 1994; Graziano, Habashi, Sheese, & Tobin, 2007, p 586).

In order to assess the accessibility of prosocial thoughts, a lexical decision task in which the speed of word recognition is measured was given. This task has precedent in another paper studying the accessibility of prosocial thoughts due to video games (Greitemeyer & Osswald, 2011). As prescribed by the Saleem et al. paper, we also examined the role of covariates, specifically if trait aggression and trait altruism are responsible for the differences across conditions.

As an additional practical measure of behavior or behavioral intent, participants created a measure of effort by selecting the ratio of easy or difficult

Raven's Progressive Matrices, which is based on a previously utilized measure using tangram puzzles (Gentile, et al., 2009; Raven & Court, 1998).

This behavioral measure of the matrices might seem pedestrian compared with more elaborate, bombastic interventions like the "Katie Banks" or "Elaine" scenarios that were used as dependent variables in other studies. The "Elaine" Scenario involves participants observing a confederate receiving electric shocks, whereas in the "Katie Banks" paradigm participants are given an elaborate story about a student who has experienced tragedy then asked how many hours they were willing to devote to helping her (Batson, Duncan, Ackerman, Buckley, & Birch, 1981; Coke, Batson, & McDavis, 1978). One paper which apparently was seeking a "prosocial personality" utilized the Katie Banks paradigm only to report light effects in tandem with statistical significance engendered with sample sizes above 600. Though this was personality research and not social research, we believed that because of these tepid effects, this intervention was not appropriate to our purposes (Habashi, Graziano, & Hoover, 2016). While both of these interventions have been used in several papers, their emphasis on external validity and general elaborateness are not of use in this context, so we are committing to a simpler intervention that minimizes misdirection dependent on the acting ability of researchers or confederates.

Hypotheses

Overall, we expect that the participants that play the prosocial game will exhibit higher positive affect, higher accessibility of positive thoughts, and prosocial behaviors than those that do not, after accounting for covariance of trait altruism and aggression. We also expect that the individuals that play the prosocial game for a longer period of time will exhibit higher positive affect and prosocial behaviors, after accounting for covariance of trait altruism and aggression. Therefore, the 20-minutes of prosocial gaming condition should have the highest positive affect and most prosocial behaviors of the five conditions, the other four of which are the no-game control, playing the neutral game for 10 minutes, playing the neutral game for 20 minutes, and playing the prosocial game for 10 minutes.

Hypothesis #1: Participants that play the prosocial game will show significantly higher positive affect scores on the PANAS than those that play the neutral game or no game at all, after adjustment for the covariates of the trait aggression and altruism measures.

This hypothesis is backed up by previous research which found that individuals that played a prosocial game experinced increased positive affect. The addition of the covariates is to combat excess noise in the data.

Hypothesis #2: Participants that play the prosocial game will endorse a higher percent chance of helping in the vignettes than those that play the neutral

game or no game at all, after adjustment for the covariates of the trait aggression and altruism measures.

Previous research has found such results from other non-hypothetical measures of prosocial or helpful behavior.

Hypothesis #3: Participants that play the prosocial game will recognize the helping-related words faster than those that play the neutral game or no game at all, after adjustment for the covariates of the trait aggression and altruism measures.

This dependent variable has been used to assess accessibility of prosocial thoughts before, and such research has found that prosocial games increase accessibility of prosocial thoughts.

Hypothesis #4: Participants that play the prosocial game will assign more easy than hard puzzles than those that do not play the prosocial game, after adjustment for the covariates of the trait aggression and altruism measures.

Previous research has found that playing a prosocial game increases performance of positive behaviors. It is expected that a more subtle measure would show a similar pattern.

Hypothesis #5: Participants that spend 20 minutes playing the prosocial game will score significantly higher positive affect scores on the PANAS than those that play for 10 minutes, after adjustment for the covariates of the trait aggression and altruism measures.

Presumably, more exposure to the prosocial game will increase positive affect. Previous research has not delved into this topic, though exposure time across previous research varies a great deal.

Hypothesis #6: Participants that spend 20 minutes playing the prosocial game will endorse higher percent chance of helping in the vignettes than those that play for 10 minutes, after adjustment for the covariates of the trait aggression and altruism measures.

Theoretically, more exposure to the prosocial game will increase prosocial behaviors. Exposure time across previous research varies a great deal and if this is causing the data to change exposure time should at least be considered.

Hypothesis #7: Participants that spend 20 minutes playing the prosocial game will recognize the helping-related words faster than those that play the game for 10 minutes, after adjustment for the covariates of the trait aggression and altruism measures.

This dependent variable has been used to assess accessibility of prosocial thoughts before, and such past research has found that prosocial games increase accessibility of prosocial thoughts. However, it is unknown if the exposure time will influence accessibility.

Hypothesis #8: Participants that spend 20 minutes playing the prosocial game will assign more easy than hard puzzles than those that play for 10

minutes, after adjustment for the covariates of the trait aggression and altruism measures.

Previous research has found that playing a prosocial game increases performance of positive behaviors, though it is unknown if exposure time factors in at all.

METHOD

Participants

Participants were recruited from a student population via Stephen F. Austin State University's SONA system, where they earned class credit for participation. The sample of 111 was primarily female (79.3%), and moderately diverse with 59.5% of participants being white, 24.3% Black, 3.6% Asian, and 12.6% either mixed or unknown. Of the 111 participants 20.7% indicated their ethnicity as "Hispanic or Latin". Most participants were Freshmen (53.2%) or Sophomores (20.7%). The average age of participants was 19.53.

Experimental Materials

In the interest of minimizing experimenter influence, the tasks described hereafter were launched and executed electronically and sequentially via Inquisit software (Inquisit 5, 2016) without experimenter intervention, in the context of the measures that precede and follow the video game intervention. Written

instructions prevent the experimenter from unconsciously influencing the participant with incidental interactions during the experiment, preserving the same insulation that experimenter blindness would have offered.

The rooms where the experiment was located were two small lab spaces, each with a computer sitting on a table with a chair in front of it. Adhered on the walls behind the computers were two papers which gave instructions on how to play the games in case participants forgot what they read from the computer screen (Appendices K and L).

Pre Experimental Measures

The Consent Form used for this study followed the existing format for Stephen F Austin State University's Psychology Department (Appendix G). Participants were required to indicate that they have read and understood the Consent Form before beginning the experiment proper.

Following the endorsement of the consent form, participants electronically completed two trait measures which were treated as covariates in the analysis. The first is the 29-item Aggression Questionnaire, which encapsulates four subtraits of aggression: Physical Aggression, Verbal Aggression, Anger, and Hostility. Participants rate each item on a five-point Likert scale. Items in this scale include "If I have to resort to violence to protect my rights, I will," and "I have trouble controlling my temper" (Buss & Perry, 1992; Appendix B). Use of this scale has precedent in this line of research, as two previous studies have

used the Aggression Questionnaire as a covariate (Greitemeyer et al., 2012; Saleem et al., 2012).

In addition to the Aggression Questionnaire, participants completed the Self-Report Altruism Scale, a 20-item measure of trait altruism. Participants rated the items (like “I have pointed out a clerk’s error [in a bank, at the supermarket] in undercharging me for an item” and “I have offered my seat on a bus or train to a stranger who was standing”) on a five-point Likert scale (Rushton, Chrisjohn & Fekken, 1981; Appendix C).

In order to assess the change in participant state affect, the Positive and Negative Affect Schedule (PANAS) was administered amongst the pre-experimental measures and post experimental measures. The PANAS is a 20-item state measure of participant affect. In this scale, participants rate adjectives (including “hostile,” “alert,” and “excited”) on a five-point Likert scale to express how well each adjective describes their mood state. Half of the items are related to positive affect, while the other half are associated with negative affect (Watson, Clark, & Tellegen, 1988; Appendix A).

Video Games

Two puzzle-focused video games were used, one prosocial and one neutral. The prosocial game is the 1991 game Lemmings, a game in which the player’s objective is to guide the “Lemmings,” which appear as cartoon, human-like characters, safely to the level’s exit (Lemmings, 1991). The neutral game is

Tetris, which requires players to correctly stack and break geometric figures under time pressure (Tetris, 1999).

These games were chosen because they have been used in several previous experiments and have precedent (Greitemeyer et al., 2012; Greitemeyer & Osswald, 2011; Greitemeyer & Osswald, 2010; Greitemeyer, Osswald, & Brauer, 2010). Research has found that the fictional characters players interact with in games can be very compelling, resulting in players becoming emotionally attached (Coulson, Barnett, Ferguson, & Gould, 2012). In the present study, the intervention of playing Lemmings might be partially dependent on this emotional attachment because the player has to want to save the lemmings characters in order to succeed (Lemmings, 1991).

Post-Experimental Measures

After the video game intervention, participants completed several post-experimental measures. First, participants got the Positive and Negative Affect Schedule (PANAS) a second time (Watson, Clark, & Tellegen, 1988; Appendix A).

Next, participants completed a lexical decision task using Inquisit, as were nearly all tasks (Inquisit 5, 2016). During this task they decide if an item is a word or not and press the appropriate key on the keyboard, while their speed of classification is recorded to the millisecond. There were 37 trials total, five practice trials, then half of the remaining 32 trials were nonwords, and the other

half actual words. Of the actual words, eight were words without prosocial content (like “run”) and eight are words with prosocial content (like “help”). This task is designed to be similar to a task used by Greitemeyer and Osswald (2011).

Afterward, the behavioral measure was given. Participants were asked to help create a measure of effort by selecting the number of easy to difficult Raven’s Progressive Matrices. A Raven’s Progressive Matrix (RPM) is a puzzle in which a participant must identify which of eight segments correctly complements both a vertical and horizontal pattern (See Appendix J; Raven & Court, 1998). For this study, participants were told that if the hypothetical person completing the measure solved all 11 puzzles within 10 minutes, they would “win” and be considered to have put forth adequate effort. The participants choose how many easy and how many difficult puzzles to assign out of 10 easy and 10 hard options to choose from. This measure is based on a previously utilized measure using tangram puzzles (Gentile et al., 2009). However, we do not take the step of offering the actual library of easy and hard matrices as was done in the prior research with tangrams. Doing so would involve the participant too heavily in classification thereof, and would likely take too much time. Instead, examples of decidedly easy/difficult matrices were offered as the model by which the participants made their decision (Appendix J). While participants were viewing these instructions, an auditory recording also gave them instructions.

This was added in order to reinforce the purpose and directions, as well as to slow participants down (they could not move on until the audio recording ended).

Then, participants completed a game evaluation. This evaluation included a question on how prosocial the game they played was as manipulation check. It also included ratings of difficulty and liking (Appendix D).

Afterward, participants read two vignettes, one involving “ordinary, everyday helping,” and the other involving “extraordinary helping.” Once they read each vignette, participants indicated how likely they thought they would be to help. These vignettes are based on ones used previously in the 2007 paper by Graziano et al., with one key difference. The individuals in the vignettes were presented as strangers (Burnstein, Crandall, & Kitayama, 1994; Graziano, Habashi, Sheese, & Tobin, 2007, p. 586; Appendix H). After participants finished a brief demographics survey, they were debriefed and dismissed (Appendix E; Appendix F).

Procedure

When participants arrived at the laboratory, they signed a consent form. Then the experimenter gave participants information, including that the computer may prompt them to get the experimenter at certain parts of the study. The participants were randomly assigned to five conditions: no-game control, 10 minutes playing the neutral game, 20 minutes playing the neutral game, 10 minutes playing the prosocial game, or 20 minutes playing the prosocial game.

First, they completed the PANAS, Aggression Questionnaire, and Self Report Altruism Scale in order to assess trait levels of aggression and altruism (Watson, Clark, & Tellegen, 1988; Buss & Perry, 1992; Rushton, Chrisjohn, & Fekken, 1981).

Afterward, participants received a brief explanation of the game they were to play (if they were to play one*).* In the four game conditions, participants were then prompted to call the experimenter. The experimenter entered, ensured that they understood the instructions, and then set a timer for the time they were meant to play the game. Then, participants were left to play the game for the specified amount of time. When the timer sounded, participants were to record the score they got on the game on a small piece of paper provided by the experimenter, and then they were to close out of the game entirely in order to preserve blindness for when they got up and prompted the experimenter to reenter and start the second part of the study.

Once the participants in the game playing conditions completed the experimental intervention, and the participants in the no-game control condition completed the Aggression Questionnaire and Altruism Questionnaire, all participants completed six more items. These items were the PANAS, the lexical decision task, the assignment of the Raven's Progressive Matrices, the game evaluation, the vignettes, and the demographics, after which the experimenter debriefed the participants, then dismissed them. They were told that the study

would last approximately one hour, though the actual time it took differed by condition.

RESULTS

Data Analysis

In order to assess the hypotheses, a Multivariate Analysis of Covariance (MANCOVA) was used. The MANCOVA allows the researcher to leverage power to test several dependent variables at once in a context with one independent variable of two or more levels. Similar to the advantage of a one-way ANOVA versus multiple *t*-tests, a MANCOVA decreases the likelihood of familywise Type I error by preventing the alpha level from inflating whilst controlling for covariates. The MANCOVA allows us to test the effects of the five levels of the independent variable on the four dependent variables, while controlling for trait aggression and altruism.

While prior research generally neglects to mention assumptions regarding the relation of these specific dependent variables, we make *a priori* assumptions in the use of the MANCOVA, barring evidence that can only be ascertained post hoc, as stated in the fourth edition of Tabachnik and Fidell's text (2000). Some of these assumptions are shared by all experimental projects, such as ideal sample size and the treatment of outliers. However, some assumptions only become

available during data collection, like multicollinearity and the linear relationships between the dependent variables across the five conditions. It is assumed that power will drop if these assumptions are not met, such as when the relationships between dependent variables do not fall between 0.1 and 0.9 on Pearson's *r*.

Internal Consistency

This study used three scales: the Aggression Questionnaire, the Altruism Scale, and the PANAS (administered pre- and post-game to serve as a dependent variable). The aggression and altruism questionnaires featured conventionally high levels of Cronbach's alpha (.88 and .83, respectively), as did each 10-item positive PANAS score, pre- and post- (.90 and .83). The negative values of PANAS had conventionally low values of Cronbach's alpha (.71 and .65, respectively), though not so much as to invalidate inferences (Bonett & Wright, 2014).

It should be noted that there was a recalculation of the Altruism scale mean. For this mean, four items were taken out of the data analysis because they were not universal to participant experience. For instance, "I have helped push a stranger's car out of the snow" is not very relevant to a population that is primarily from the Southern parts of the United States, where snow is rare.

Before analyses were run, we inspected chance significant differences across the five conditions in answer means for the covariates, the Altruism scale and the Aggression Questionnaire. There were none. Means on the altruism

scale ranged from 2.57 (no-video condition) to 2.75 (20-minute Lemming condition), but differences were not significantly different $F(4, 98) = .41$, $p = .81$. Means on the aggression questionnaire ranged from 2.51 (the 20-minute neutral-game condition) to 2.30 (the 10-minute pro-social condition), but differences were not significantly different $F(4, 98) = .36$, $p = .84$.

For the PANAS, an unexpected trend complicated inference tests. There was a strong inclination for participants to rate themselves as experiencing lower rankings for positive adjectives and higher rankings for negative adjectives in the post-manipulation PANAS scores. Positive adjective scores on the pre-manipulation PANAS ($M = 2.83$, $SD = .81$) were markedly higher than the post-manipulation PANAS ($M = 2.24$, $SD = .64$), $t(102) = 11.05$, $p < .001$. Negative adjective scores on the pre-manipulation PANAS ($M = 1.32$, $SD = .34$) were noteably higher than the post-manipulation PANAS ($M = 1.96$, $SD = .49$), $t(102) = 14.21$, $p < .001$. The positive side of all this is there was no response-setting. Had all participants answered the PANAS items in the same way, it would suggest memory for the earlier test iterating answers in the second. That was not the case.

Participants were also asked how often they played video games to ensure the participants in different conditions were approximately equal in potential skill level. Across games, there was no significant differences between

participant endorsement of how often they played video games, X^2 (8, N = 103) = 8.222, $p < .412$.

In previous research, experimenters assessed the participant's perception of the game's difficulty, enjoyment, and their perception of the game's helpfulness. In order to validate the study, these experimenters found no difference between the games for difficulty and enjoyment, and they found that Lemmings was perceived to be more helpful. Our results tended to be different. Tetris was perceived to be harder than Lemmings, $t(80)=-2.207$, $p=0.03$. The two games were not perceived to be significantly different in helpfulness, $t(80)=-0.202$, $p=0.84$. The only one of the questions that followed the pattern of previous research was how much participants enjoyed the game, which was not significantly different between games, $t(80)=1.293$, $p=0.20$.

Data Adjustment

Of the 111 participants whose data were collected, eight were omitted from analyses. Three of these were dropped due to technological malfunction. The remaining five were culled post data collection for low accuracy on the Lexical Decision Task. The Lexical Decision Task was a reaction-time task in which percentages correct were typically in the 90s. We culled those below 61% correct, as these were presumably not complying fully (participants that randomly pressed keys without paying attention would theoretically get 50% correct). We observe no other evidence of non-compliance in other tasks, including speeding

through or response-setting in the altruism questionnaire, the PANAS scales, the aggression questionnaire, or the helping vignettes.

The 103 participants were allocated to the prosocial-game-20-minute condition (*n*=21), prosocial-game-10-minute condition (*n*=22), neutral-game-20-minute condition (*n*=19), neutral-game-10-minute condition (*n*=21), or the no-game condition (*n*=20).

MANCOVA

This project used five chief dependent variables: the change in positive affect via the PANAS, two measures of helping via vignette, reaction time to helping related words, and delegation of easy puzzles. Additionally, there were two covariates: trait Altruism and trait Aggression. A Multivariate Analysis of Covariance (MANCOVA) was run. Due to the strong correlation of the ordinary helping and extraordinary helping scores (r = .25, p = .01), we were compelled to run a MANCOVA with each included but not the other. Each of those four-dependent-variable MANCOVAs strongly resembled the model with all five included with no difference in significance for any dependent variable or covanriate. Thus, we report the MANCOVA with all five dependent variables, with the understanding that the degrees of freedom are reduced.

Using the Wilks' Lambda criterion (because there are more than two levels of the dependent variable), the effect of the independent variable was not

significantly related to the aggression questionnaire $F(5, 20) = .83$, $p = .54$ or the altruism questionnaire, $F(5, 20) = .98$, $p = .80$.

The only dependent variable for which we see observe statistical significance in the corrected model is the change in positive affect, $F(6, 96) = 2.41$, $p = .03$. No covariates affected a dependent variable. As we will witness using the ANCOVA with only one dependent variable, this statistical significance of the positive affect may be a result of the magnified sensitivity in MANOVAs relative to ANOVAs.

Hypothesis 1

The first hypothesis was that participants playing the prosocial game would show a significantly higher change in affect scores on the PANAS, as operationalized by the post-game PANAS score minus the pre-game PANAS score, than those that played the neutral game or no game at all.

For change in prosocial affect, the means for the prosocial ($M = -.48$, $SD = .52$), neutral ($M = -.72$, $SD = .38$), and no-game conditions ($M = -.64$, $SD = .62$), each suggesting reductions in positive affect from pre-game from post-game, wherein the smallest reduction was in the prosocial condition. A one-way ANOVA was not significant, $F(2, 100) = 1.61$, $p = .21$, $\eta^2 = .03$. An ANCOVA that controlled for the potentially confounding aggression and altruism scales was also conducted, $F(2, 98) = 1.76$, $p = .18$, $r = .21$. This suggests only a small proportion of variance in positive PANAS scores were accounted for by the

covariates. When collapsing the neutral and no-game conditions, a marked contrast was shown between the prosocial-game condition and combined neutral-no-game condition (M = -.48, SD = .52; M = -.67, SD = .55), yielding an inference approaching statistical significance, $F(1, 101) = 2.99$, $p = .09$, $\eta^2 = .03$.

Additionally, investigation of the change in lower negative affect scores on the PANAS indicated another potential trend. The means for the prosocial (M = .67, SD = .46), neutral (M = .60, SD = .43), and no-game conditions (M = .62, SD = .49), each suggest increases in negative affect from pre-game from post-game, wherein the largest increase was in the prosocial condition. A one-way ANOVA was not significant, $F(2, 100) = 0.27$, $p = .76$, $\eta^2 = .01$. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(2, 98) = .22$, $p = .80$, $r = .31$. When collapsing the neutral and no-game conditions, a contrast was shown between the prosocial-game condition and combined neutral-no-game condition (M = .67, SD = .46; M = .61, SD = .45), yielding an inference of, $F(1, 101) = .52$, $p = .47$, $\eta^2 = .01$.

Table 1 was constructed for posterity and displays the results.

Hypothesis 5

We hypothesized that participants playing the 20-minute prosocial game would show significantly higher affect scores on the PANAS, as operationalized by the post-game PANAS score minus the pre-game PANAS score, than those that played 10-minute prosocial game.

The positive affect means for the 20-minute (*M* = -.25, *SD* = .51) and 10-minute conditions (*M* = -.70, *SD* = .43), each suggest reductions in positive affect from pre-game from post-game, wherein the statistically significant larger reduction was in the 20-minute condition, $F(1, 41) = 9.67$, $p = .003$, $\eta^2 = .24$ (Figure 1). This is a very large effect size, as .13 is considered large. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(1, 39) = 9.14$, $p = .004$, thus revealing the small proportion of the variance accounted for by covariates. An auxiliary question is whether sheer length of time playing the game affected scores on the positive PANAS items, irrespective of condition, social or prosocial. While not a part of hypotheses, the means for the 20-minute (*M* = -.53, *SD* = .59) and 10-minute conditions (*M* = -.74, *SD* = .64) for neutral game players were in the same pattern as the prosocial game players, and a main effect for length of time when each game-playing condition was in the model $F(1, 79) = 7.52$, $p = .01$, $\eta^2 = .10$. No interaction was witnessed, $F(1, 79) = .97$, $p = .33$.

For negative affect, it might stand to reason that the 20-minute prosocial game would show significantly lower negative affect scores on the PANAS than those that played 10-minute prosocial game. The means for the 20-minute (*M* = 0.66, *SD* = .48) and 10-minute conditions (*M* = .69, *SD* = .45), each suggested increases in negative affect from pre-game from post-game, wherein the slightly smaller increase was in the 20-minute condition, $F(1, 41) = 0.042$, $p = .84$, $\eta^2 =$

.01. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(1, 39) = 0.26$, $p = .61$, $\eta^2 = .01$, $r = .31$.

To check for additional interactions, we examined whether sheer length of time playing the game affected change in scores on the negative PANAS items, irrespective of condition, social or prosocial. While not a part of hypotheses, the means for the 20-minute ($M = .57$, $SD = .34$) and 10-minute conditions ($M = .63$, $SD = .53$) for neutral game players were in the same pattern as the prosocial game players, however, we found no main effect for length of time when each game-playing condition was in the model $F(1, 79) = 0.20$, $p = .66$, $\eta^2 = .01$, and no interaction was witnessed, $F(1, 79) = 0.02$, $p = .88$.

Hypothesis 2

Hypothesis two was that participants playing the prosocial game would show a significantly higher percent chance of helping in vignettes, for both ordinary acts and extraordinary acts, than the neutral game players or those that did not play the game. The ordinary-acts vignette means the prosocial ($M = 5.53$, $SD = 2.48$), neutral ($M = 5.23$, $SD = 2.77$), and no-game conditions ($M = 5.45$, $SD = 3.10$) did not differ significantly, $F(2, 100) = .14$, $p = .87$, $\eta^2 = .01$. An ANCOVA controlled for the potentially confounding aggression and altruism scales did little to alter the differences, $F(2, 98) = .15$, $p = .86$, $r = .16$. The extraordinary-vignette means for the prosocial ($M = 5.23$, $SD = 2.67$), neutral ($M = 4.45$, $SD = 2.82$), and no-game conditions ($M = 4.50$, $SD = 2.91$) did not differ

significantly, $F(2, 100) = .96$, $p = .39$, $\eta^2 = .02$ (Figure 2). An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(2, 98) = 1.06$, $p = .35$, $r = .22$. Table 1 displays the means, standard deviations, ANOVAs and ANCOVAs between conditions.

When collapsing the neutral and no-game conditions, a contrast emerged between in everyday helping between the prosocial-game condition and combined neutral-no-game condition ($M = 5.53$, $SD = 2.48$; $M = 5.30$, $SD = 2.86$), $F(1, 101) = 0.19$, $p = .67$, $\eta^2 = .01$. When collapsing the neutral and no-game conditions, a contrast was shown in extraordinary helping between the prosocial-game condition and combined neutral-no-game condition ($M = 5.23$, $SD = 2.67$; $M = 4.47$, $SD = 2.83$), $F(1, 101) = 1.93$, $p = .17$, $\eta^2 = .01$.

Hypothesis 6

The sixth hypothesis stated that participants playing the 20-minute prosocial game would show significantly higher helping scores on both the ordinary and extraordinary helping vignettes than those that played 10-minute prosocial game. The ordinary helping means for the 20-minute ($M = 5.62$, $SD = 2.48$) and 10-minute conditions ($M = 5.45$, $SD = 2.54$), $F(1, 41) = .05$, $p = .83$, $\eta^2 = .01$ were not significantly different. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(1, 39) = 0.04$, $p = .84$, $r = .41$, suggesting the small effect was wholly accounted for by the covariates. The extraordinary helping means for the 20-minute ($M = 4.71$, $SD = 2.45$) and 10-

minute conditions (M = 5.73, SD = 2.83) were in the reverse of the expected direction, $F(1, 101) = 1.57$, $p = .22$, $\eta^2 = .04$. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(1, 39) = 1.90$, $p = .18$, $r = .33$.

To assess if sheer length of time playing the game affected changes in score on the helping items, irrespective of condition. The means for the 20-minute (M = 5.05, SD = 2.59) and 10-minute conditions (M = 5.38, SD = .53) for neutral game players were in the same pattern as the prosocial game players, however, we found no main effect for length of time when each game-playing condition was in the model $F(1, 79) = 0.02$, $p = .89$, $\eta^2 = .01$, and no interaction was witnessed, $F(1, 79) = 0.18$, $p = .67$.

For extraordinary helping, the 20-minute (M = 4.68, SD = 2.91) and 10-minute conditions (M = 4.24, SD = 2.79) suggested longer-playing neutral game players were more generous, but no main effect was found for length of time when each game-playing condition was in the model $F(1, 79) = 0.22$, $p = .64$, $\eta^2 = .01$, and no interaction was witnessed, $F(1, 79) = 1.46$, $p = .23$.

Hypothesis 3

We hypothesized that participants playing the prosocial game would show a significantly faster reaction time for helping words than the neutral game players or those that did not play the game, thus prosocial cognitions were more accessible due to the gameplay. The reaction time in milliseconds for the

prosocial (*M* = 572.38, *SD* = 155.71), neutral (*M* = 610.70, *SD* = 295.81), and no-game conditions (*M* = 608.61, *SD* = 97.51) did not differ significantly, $F(2, 100) = .39$, $p = .68$, $\eta^2 = .01$. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(2, 98) = .54$, $p = .58$, $r = .16$. When collapsing the neutral and no-game conditions, a non-significant difference was shown in reaction time between the prosocial-game condition and combined neutral-no-game condition (*M* = 572.38, *SD* = 155.71; *M* = 610.00, *SD* = 246.79), $F(1, 101) = 77$, $p = .38$, $\eta^2 = .08$. Table 1 displays the results.

Hypothesis 7

We hypothesized that participants playing the 20-minute prosocial game (*M* = 624.92, *SD* = 170.24) would show a significantly faster reaction time for recognizing helping words than those playing the 10-minute prosocial game (*M* = 522.24, *SD* = 124.48). The means were statistically significant, but opposite of the hypothesized direction, $F(1, 41) = 5.13$, $p = .03$, $\eta^2 = .13$, a "Type III error," Cohen (2013; Figure 3). An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(1, 39) = 3.96$, $p = .05$, $r = .42$. We also found a faster mean for the 10-minute condition in the neutral-game condition (*M* = 602.67, *SD* = 155.78) than the 20-minute condition (*M* = 619.57, *SD* = 403.08). However no main effects were found for length of time $F(1, 79) = 1.35$, $p = .25$, or a length-condition interaction.

Hypothesis 4

For hypothesis four, we thought that participants playing the prosocial game would assign more “easy” Raven’s Progressive Matrices when creating a hypothetical measure than the neutral game players or those that did not play the game. Eleven puzzles total were assigned. The number of easy games assigned for the prosocial (M = 6.47, SD = 1.37), neutral (M = 6.55, SD = 1.62), and no-game conditions (M = 6.60, SD = 1.10) did not differ significantly, $F(2, 100) = .07$, $p = .93$, $\eta^2 = .01$ (Figure 4). An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(2, 98) = .06$, $p = .94$, $r = .06$. When collapsing the neutral and no-game conditions, a contrast was shown in Raven assignments between the prosocial-game condition and combined neutral-no-game condition (M = 6.47, SD = 1.37; M = 6.57, SD = 1.45), $F(1, 101) = 0.13$, $p = .72$, $\eta^2 = .01$. Table 1 displays results.

Hypothesis 8

The eighth and final hypothesis was that participants playing the 20-minute prosocial game (M = 6.24, SD = 1.18) would assign more easy puzzles while creating a measure of their peers than participants in the 10-minute condition (M = 6.68, SD = 1.52). The means were in the reverse of the anticipated direction, $F(1, 41) = 1.13$, $p = .29$, $\eta^2 = .03$. An ANCOVA controlled for the potentially confounding aggression and altruism scales, $F(1, 39) = 1.47$, $p = .23$, $r = .25$. The 20-minute (M = 6.53, SD = 1.76) and 10-minute conditions (M

= 6.57, *SD* = 1.50), suggested shorter-playing neutral game players were more generous, but no main effect was found for length of time when each game-playing condition was in the model $F(1, 79) = 0.55$, $p = .46$, $\eta^2 = .01$, and no interaction was witnessed, $F(1, 79) = 0.36$, $p = .55$.

DISCUSSION

The majority of the hypotheses yielded null results. However, though they were not statistically significant, many of these results indicated trends across the four dependent variables. None of our results were as decisive as previous research seemed to indicate. In previous research, such manipulations were successful and at least approaching statistical significance (Gitter et al., 2013; Greitemeyer, 2013; Greitemeyer, Agthe, Turner, & Gschwendtner, 2012; Greitemeyer & Mügge, 2014; Greitemeyer & Osswald, 2011; Greitemeyer & Osswald, 2010; Greitemeyer, Osswald, & Brauer, 2010; Saleem et al., 2012).

Change in Affect

The overall change in PANAS scores, for instance, showed a decrease in positive affect and an increase in negative affect. Individuals that played the prosocial game (Lemmings) for 20 minutes were significantly different from those that played the same game for 10 minutes in that their positive affect decreased significantly less than participants that played for 10 minutes. We saw no

significant difference in affect change across conditions; however, the combined prosocial conditions did showcase the highest mark in the predicted direction among the three and after collapsing neutral- and no-game conditions. In the corrected model (the MANCOVA), the only dependent variable to reach statistical significance was the change in positive affect.

The length of the PANAS was investigated as a main effect. For change in positive affect, we enjoyed a significant effect for the longer prosocial game relative to the shorter, though there was also a length-of-time effect in the neutral-game condition. There was no length-of-time effect at all for negative affect in either condition.

An additional analysis was completed in order to look more deeply at the data. Because the PANAS is made up of adjectives, the experimenters selected the four positive and the four negative adjectives that seemed to be the most relevant to the task at hand and re-ran the analyses with only these adjectives. The four positive adjectives were "proud," "inspired," "determined," and "attentive," while the four negative adjectives were "upset," "guilty," "hostile," and "ashamed". These modified results did not yield much difference to the original, as shown in Table 2.

In general, these results does not support previous research in the sense that playing the prosocial game did not increase positive affect or decrease negative affect significantly, despite being methodologically and numerically

comparable with previous research in terms of power (Greitemeyer, 2013; Greitemeyer et al., 2012; Greitemeyer & Osswald, 2010). Because participants took the PANAS twice, they may have been confused at having to complete the same task a second time. However, this confusion did not seem to be reflected in that participants did not fall back on response-setting. Instead, they indicated notably different ratings from pre-measure to post-measure. Additionally, overt arousal was not clear in the open-ended answers participants gave (Appendices N & O). Measuring affect once would be sufficient for future studies. Or perhaps using a different measure entirely, like the Prosocial Tendencies Scale used by Saleem et al. (2012).

Vignettes

The differences between groups for rating how likely they were to help in situations described via vignette were also not significant. However, these numbers did trend in the expected direction between game conditions, with individuals that played the Lemmings instead of Tetris or no game at all endorsing a higher chance of helping on average. When we examined the differences in exposure time, however, we found something different. Of the individuals that played Lemmings, those that played for 20 minutes said that, on average, they were more likely to help in an everyday situation. For extraordinary helping, however, the reverse occurred. We observed no main effect for prosocial condition for helping in both every day and extraordinary scenarios,

though the prosocial condition featured the highest mean for everyday and extraordinary helping. The same was true when considering extraordinary events. There were no main effects for time for either ordinary or extraordinary events. That being said, in this case the covariates seemed to account for much of the variance, so any “trend” in the data is moot.

Lexical Decision Task

The results of the Lexical Decision Task were similarly unexpected. Between games there was no statistically significant differences, though they were trending in the anticipated direction, with participants playing Lemmings recognizing the helping related words slightly faster than those playing Tetris or no game. The difference in exposure to the prosocial game was where these results took an unexpected turn. Participants that played Lemmings for 10 minutes recognized the helping related words significantly faster than those that played for 20 minutes.

This is the opposite of what was hypothesized and very different from what was found in previous research. Greitemeyer and Osswald (2011) used an extremely similar dependent variable, presumably the only difference being the actual words used, as they did not include their list of words in the publication. Even if they had, it is plausible that such a list would not have worked for our purposes because their list of words may not have been in English. It is interesting that they found much larger effect sizes than us despite having

comparable numbers of participants per condition and similar mean latencies (Greitemeyer & Osswald, 2011; Figure 5).

Raven's Progressive Matrices

For the behavioral measure of assigning easy and difficult Raven's Progressive Matrices for the creation of a measure there was also no statistically significant difference between the games or exposure time. In fact, individuals in the prosocial game conditions assigned slightly fewer easy puzzles than the other three conditions (Tetris for 20 minutes, Tetris for 10 minutes, and control), thus trending in the opposite direction than what was expected. The same trend appeared within exposure time. Participants that played Lemmings for 20 minutes gave slightly fewer easy puzzles than those that played for 10 minutes. There were also no main effects for prosocial condition or time for easy-puzzle assignment.

It is worth noting that this dependent variable is not an exact iteration of previous studies, which used dependent variables with large effect sizes, like picking up pencils spilled by the experimenter and willingness-to-contribute-to-future studies (Greitemeyer & Osswald, 2010). Instead, this study tried to refrain from dependence on variables that required a great deal of acting ability on the experimenter's part or participants spending a great deal of time on purposeless busy-work. As a result, we did not see the large effect sizes of previous research.

It is also plausible that our behavioral measure did not evoke as much out of participants because they had little contact with other people during the study. For the most part, the experimenter stayed out of the room where the study took place, participants also came in one at a time, and a face was never attached to the individual person that participants were assigning the Ravens to. Perhaps the lack of social contact with another person failed to evoke prosocial behaviors.

Overall Notes Between Games

There are multiple plausible reasons why the study did not turn out as expected overall. One, it is plausible that the difference between the games was not as overt due to Tetris invoking a sense of tranquility, or a state of "flow" (Csikszentmihalyi, 1990). Also, the games themselves were simplistic and old, thus potentially unable to invoke the emotions they were supposed to. Finally, the two games were inherently different in that Tertris is a game which never really ends, whereas Lemmings has a definitive "win" as players go from level to level.

However, despite all of these differences, previous research did find differences between the two games, regardless of tranquility or design. And this line of previous research was conducted recently, much of it within ten years.

Limitations

There are several limitations to this study. The most obvious is convenience sampling, as college students are not necessarily the best representation of the general population. Additionally, this study and most

previous research has only measured the result of a single instance of gameplay. If the General Learning Model is to truly be supported, researchers must demonstrate that these behavior changes are stable over time.

It is plausible that there were problems with participant fatigue (participants were told that they would be in the laboratory for about one hour, though the actual length of time they spent varied by condition). Because of this length perhaps participants experienced helping fatigue, thinking that because they are helped in one way they did not have to help in another. They “ran out” of helpfulness, so to speak. Additionally, most previous research had the dependent variables measured immediately after participants played the game. In this experiment, participants were interrupted for approximately three minutes in between game play and the dependent measures. They had to record their score, close the game, and get the experimenter- perhaps this interruption disrupted the cognitions that are responsible for previously seen differences.

Additionally, the behavioral measure that utilized the Raven’s Progressive Matrices also may have been flawed, given that participants in the experimental conditions had just completed games where the goal is essentially to solve puzzles. This could have had priming effects on how the participants felt about solving puzzles thus changing their decisions about what to assign. It is also possible that the delineation between easy and hard puzzles was not strong enough. It participants did not think there was much difference in difficulty, their

numbers might have been different than if they considered the hard puzzles genuinely hard.

Finally, participants could have altered the data with their own bias. For instance, if they had heard of the idea that video games change behavior and altered their endorsements accordingly (either to align with the convention that video games alter behavior, or to directly oppose it).

Future directions

Future studies could add a measure of frustration, since it is plausible that frustration with the puzzle aspect of the game might be interrupting prosocial cognitions. Only measuring the PANAS once is another idea, it turned out that having a pre-and-post measure did little beyond muddying the water in our case. The Prosocial Tendencies Scale used by Saleem et al. (2012) might also be used in the future. It could have supplanted our behavioral measure using the Raven's Progressive Matrices. More studies could also look into how or if interruption between gameplay and dependent measures has an effect of prosocial thoughts, feelings, and cognitions. Finally, if the General Learning Model is to be better supported, researchers must track the change in behavior, thoughts, and cognition over time.

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Table 1

Means, Standard Deviations, ANOVAs, and ANCOVAs Across Hypotheses

	Positive PANAS	Negative PANAS	Vignettes (everyday/ extraordinary)	LDT	RPM
Mean/SD (no-game)	-.72 (.38)	.62 (.49)	5.45 (3.10) 4.50 (2.91)	608.61 (97.51)	6.60 (1.10)
Mean/SD (prosocial-10)	-.70 (.43)	.69 (.45)	5.45 (2.54) 5.73 (2.83)	522.24 (124.48)	6.68 (1.52)
Mean/SD (prosocial-20)	-.25 (.51)	.66 (.48)	5.62 (2.48) 4.71 (2.45)	624.92 (170.24	6.24 (1.18)
F	7.31***	.10	.026/1.22	3.63*	.71
F_{adj}	7.65***	.19	.013/1.31	3.32*	.77
Mean/SD (no-game)	-.72 (.38)	.62 (.49)	5.45 (3.10) 4.50 (2.91)	608.61 (97.51)	6.60 (1.10)
Mean/SD (neutral-10)	-.74 (.64)	.63 (.51)	5.38 (2.97) 4.24 (2.79)	602.67 (155.78)	6.57 (1.50)
Mean/SD (neutral-20)	-.53 (.59)	.57 (.34)	5.05 (2.59) 4.68 (2.91)	619.58 (403.07)	6.53 (1.78)
F	.85	.10	.104/123	.023	.012
F_{adj}	.83	.19	.116/.098	.043	.026

**p<.001 *p<.01

Table 2

Modified PANAS Versus Complete PANAS

	Positive PANAS (modified)	Positive PANAS (original)	Negative PANAS (modified)	Negative PANAS (original)
Mean/SD (no-game)	-.43 (.42)	-.64 (.62)	.61 (.46)	.62 (.49)
Mean/SD (prosocial)	-.27 (.70)	-.48 (.52)	.72 (.57)	.67 (.46)
Mean/SD (neutral)	-.51 (.61)	-.72 (.38)	.73 (.49)	.60 (.43)
F	1.58	1.61	.37	.27
Fadj	1.87	1.76	.26	.22

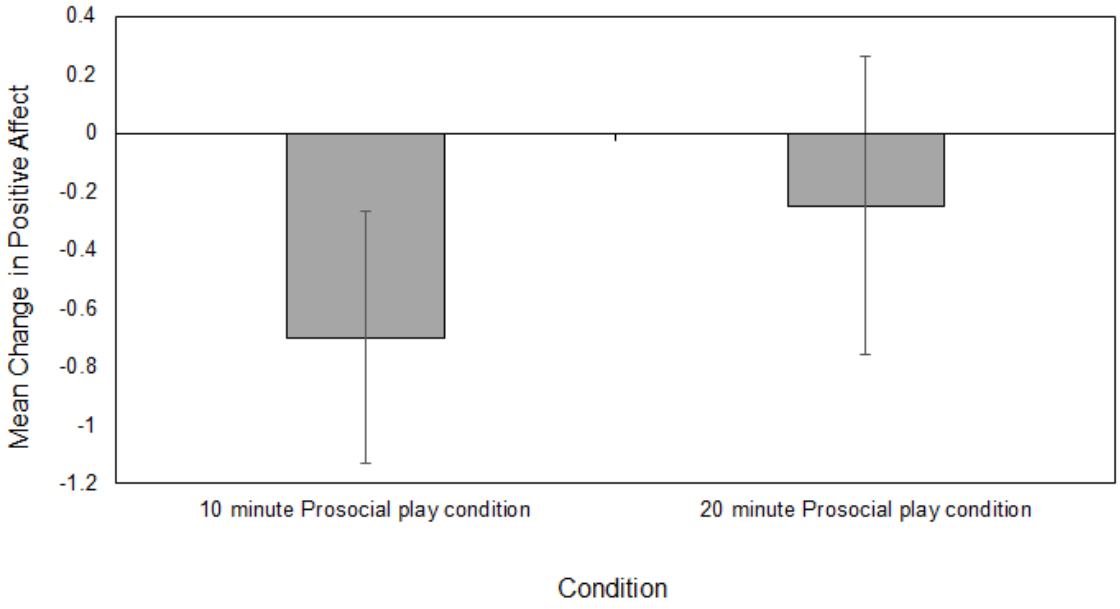


Figure 1. Mean total change in positive affect on the PANAS by exposure time with standard deviations is depicted.

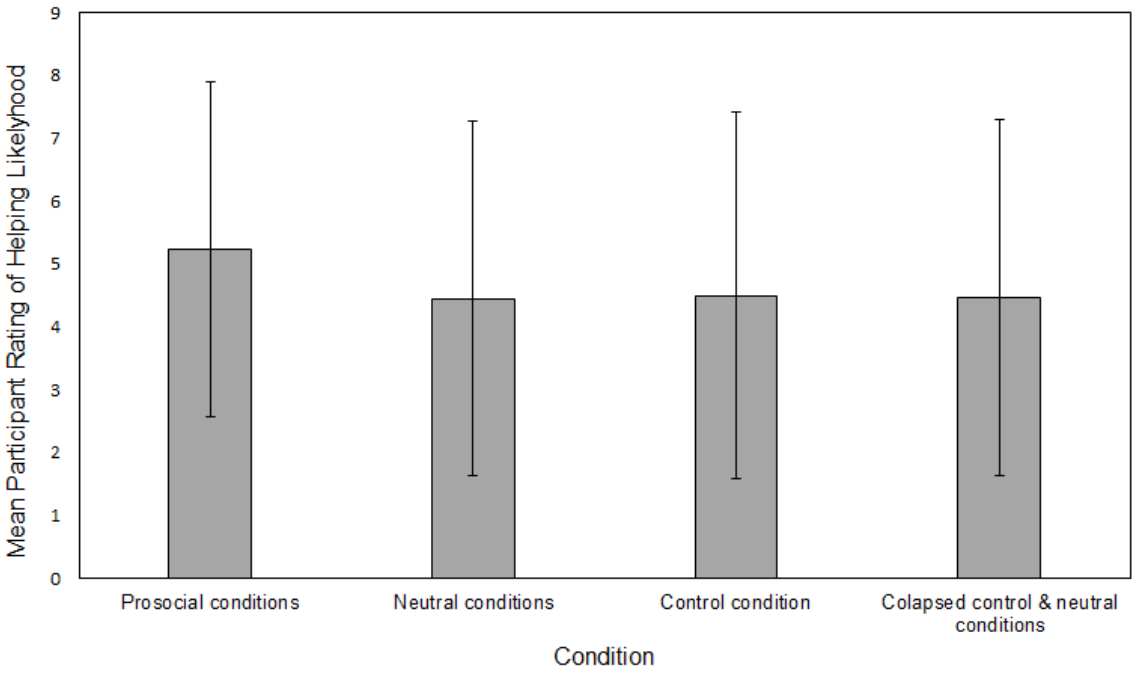


Figure 2. Participant's mean and standard deviation rating of helping likelihood in an extraordinary situation across conditions is depicted.

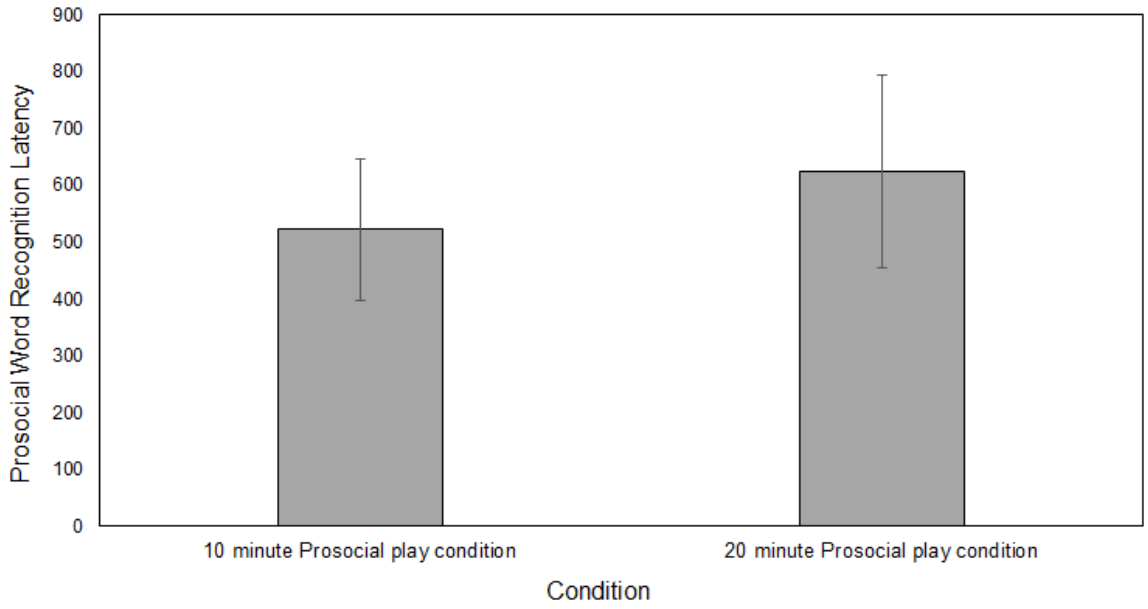


Figure 3. Mean prosocial word recognition latency by exposure time with standard deviations is depicted.

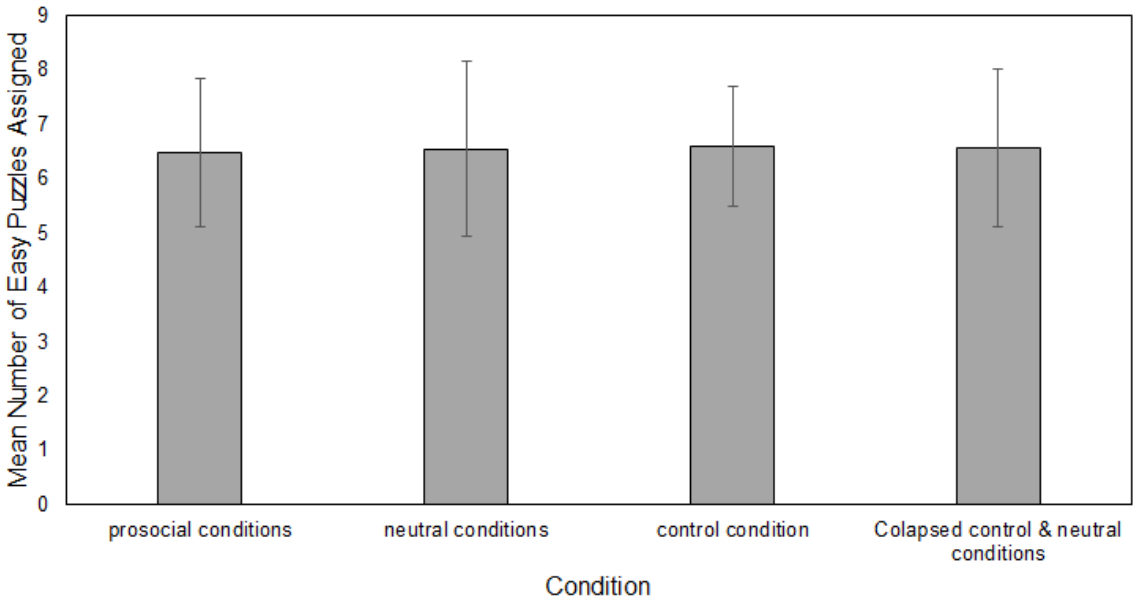


Figure 4. Mean participant assignment of Easy Raven's Progressive Matrices by condition with standard deviation is depicted.

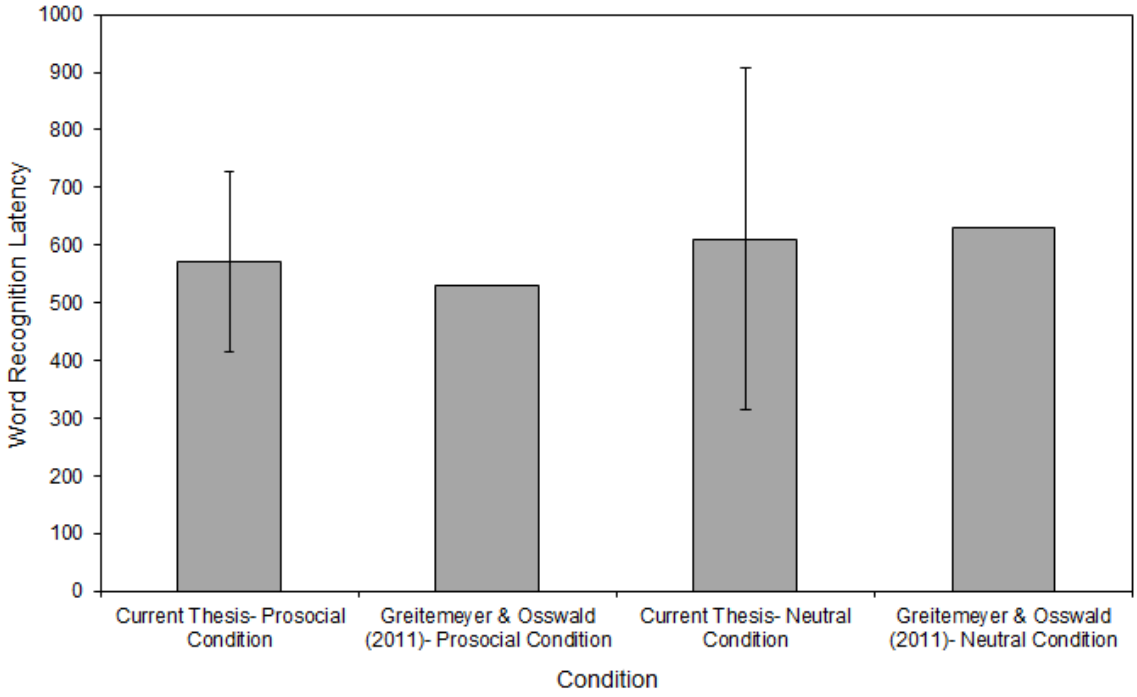


Figure 5. Mean prosocial word recognition latency of current study compared to previous research by Greitemyer and Osswald (2011) with available standard deviations is depicted.

APPENDIX A

The PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you feel this way right now, at the present moment. Use the following scale to record your answers.

1	2	3	4	5
Very slightly/not at all	A little	moderately	Quite a bit	Extremely

1.		interested	11.		irritable
2.		distressed	12.		alert
3.		excited	13.		ashamed
4.		upset	14.		inspired
5.		strong	15.		nervous
6.		guilty	16.		determined
7.		scared	17.		attentive
8.		hostile	18.		jittery
9.		enthusiastic	19.		active
10.		proud	20.		afraid

APPENDIX B

Aggression Questionnaire

This scale consists of a number of situations. Read each item and then mark the appropriate answer in the space next to that word. Indicate to what extent you experience these situations in general. Use the following scale to record your answers. [Items marked with an asterisk were reverse coded]

1	2	3	4	5
disagree	Slightly disagree	neutral	slightly agree	Agree

1.		Once in a while I can't control the urge to strike another person	11.		I often find myself disagreeing with people	21.		I have trouble controlling my temper.
2.		Given enough provocation, I may hit another person	12.		When people annoy me, I may tell them what I think of them.	22.		I am sometimes eaten up with jealously.
3.		If someone hits me, I hit back.	13.		I can't help getting into arguments when people disagree with me.	23.		At times I feel I have gotten a raw deal out of life.
4.		I get into fights a little more than the average person.	14.		My friends say I'm somewhat argumentative.	24.		Other people always seem to get the breaks
5.		If I have to resort to violence to protect my rights, I will.	15.		I flare up quickly but get over it quickly	25.		I wonder why sometimes I feel so bitter about things.
6.		There are people who pushed me so far that we came to blows.	16.		When frustrated, I let my irritation show.	26.		I know that "friends" talk about me behind my back
7.		I can think of no good reason for ever hitting a person.*	17.		I sometimes feel like a powder keg ready to explode.	27.		I am suspicious of overly friendly strangers
8.		I have threatened people I know.	18.		I am an even-tempered person.*	28.		I sometimes feel that people are laughing at me behind my back
9.		I have become so mad that I have broken things.	19.		Some of my friends think I'm a hothead.	29.		When people are especially nice, I wonder what they want.
10.		I tell my friends openly when I disagree with them.	20.		Sometimes I fly off the handle for no good reason.			

APPENDIX C

Altruism Scale

Tick the category on the right that conforms to the frequency with which you have carried out the following acts. [Items marked with an asterisk were excludes from analyses]

	Never	Once	More than once	Often	Very Often
1. I have helped push a stranger's car out of the snow.*					
2. I have given directions to a stranger.					
3. I have made change for a stranger.					
4. I have given money to charity.					
5. I have given money to a stranger who needed it (or asked me for it).					
6. I have donated goods or clothes to a charity.					
7. I have done volunteer work for a charity.					
8. I have donated blood.					
9. I have helped carry a stranger's belongings (books, parcels, etc.)					
10. I have delayed an elevator and held the door open for a stranger.					
11. I have allowed someone to go ahead of me in a lineup (at a Xerox machine, in the supermarket).					
12. I have given a stranger a lift in my car.*					
13. I have pointed out a clerk's error (in a bank, at the supermarket) in undercharging me for an item.					
14. I have let a neighbor whom I don't know too well borrow an item of some value to me (e.g., a dish, some tools).					
15. I have bought "charity" Christmas cards deliberately because I knew it was a good cause. *					
16. I have helped a classmate who I did not know that well with a homework					

assignment when my knowledge was greater than his or hers.					
17. I have before being asked, voluntarily looked after a neighbor's pets or children without being paid for it.					
18. I have offered to help a handicapped or elderly stranger across a street.					
19. I have offered my seat on a bus or train to a stranger who was standing.*					
20. I have helped an acquaintance to move households.					

APPENDIX D

Game Evaluation

What game did you play?

A. Tetris
B. Lemmings
C. None

How difficult was the game you played?

Very difficult				Not difficult
5	4	3	2	1

How positive and/or helpful were the actions you performed in the game?

Very positive/helpful				Not positive/helpful
5	4	3	2	1

How much did you enjoy the game you played?

Very Enjoyable				Not Enjoyable
5	4	3	2	1

.

How frequently do you play video games?

a. Never

b. A few times each year

c. At least one or two days each month

d. At least once or twice each week

e. Every day

If you play video games, what platform do you use most frequently?

a. I never play video games

b. cell phone

c. Personal computer

d. Microsoft product (Xbox360, XboxOne)

e. Sony (PlayStation 2, PlayStation 4)

f. Nintendo (GameCube, Wii)

g. Nintendo handheld (Gameboy, 3DS)

h. Vintage discontinued consoles (Atari, Sega Dreamcast)

If you play video games, what genre do you play most frequently? (Check all that apply)

a. I never play video games

b. First Person Shooter

c. Role playing games (RPGs)

d. Party games

e. Horror games

f. Action/adventure games

g. Turn based Strategy

h. Visual novels

i. Fighting Games

j. Massively multiplayer online role-playing games (MMORPG)

k. Sports

l. Racing

m. massively multiplayer online game (MMO)

n. Simulation

o. Platform games (platformers)

p. Puzzle games

APPENDIX E

Demographics Survey

1. What is your age?
2. Please specify your class rank.
    a. Freshman
    b. Sophomore
    c. Junior
    d. Senior
3. What is your race?
4. What is your ethnicity?
5. What is your sex?
    a. Female
    b. Male
4. Why did you select the ratio of Raven's Progressive Matrices that you did?
5. If you had to guess, what was the purpose of this study?

APPENDIX F

DEBRIEFING FORM

Thank you for agreeing to participate in this research, your time is appreciated.

As you were previously informed, this study is concerned with thoughts, feeling, and cognitions on retro video games. Actually, the main goal of this study is to specifically study prosocial thoughts, feelings, behaviors, and cognitions related to video game play.

For completion of this study you are going to be awarded 2 research credits for one hour of participation. Your SONA credits should appear within a day or two. If they don't, or you have any other questions, please contact Danielle Langlois (langloisdk@jacks.sfasu.edu).

If you would like more information regarding your rights as a research participant, you may also contact the SFASU Office of Research and Sponsored Programs at osrp@sfasu.edu or 936-468-6606.). You may also contact research supervisor Dr. Scott Drury at drurygs@sfasu.edu (SONA questions should be exclusively directed at Danielle Langlois).

Additionally, if you continue to feel disturbed or upset with regard to your experience today, you can contact SFASU counseling service at counseling@sfasu.edu or 936-468-2401. Counseling Service hours are 8:00 am – 5:00 pm, Monday - Friday.

The Counseling Services office is located in the Rusk Building on the third Floor. Appointments may be made in person or by telephone.

APPENDIX G

Informed Consent Document

Study title: Thoughts, Feelings, and Cognitions on Retro Video Games.

Introduction to the study: The current study is within the department of Psychology of Stephen F. Austin State University conducted by Danielle Langlois, a graduate student, under the supervision of Dr. Scott Drury. The purpose of this study is to compare thoughts, feelings, opinions, and cognitions about retro video games. You will be asked to complete a few preliminary measures, and then you will be given a selection of other tasks and measures to complete.

Duration: Participation in this study will take approximately one hour.

Who to go to with questions: If you have any questions or concerns about being in this study you should contact Danielle Langlois at langloisdk@jacks.sfasu.edu. If you have further questions you may contact the SFASU Office of Research and Sponsored Programs at osrp@sfasu.edu or 936-468-6606 if you would like more information regarding your rights as a research participant.

Participant privacy: An individual's results will be pooled with the results of all other participants. These results will not include any identifying information, like name or student id number. This privacy will be further ensured by remaining in a password protected file. We will not include any information that will make it possible to identify a participant in any form of publication or presentation resulting from this study.

Risks and discomforts: Minor discomfort due to frustration, fatigue, or boredom may occur in some individuals. Therefore, be aware that if at any point during the experiment, you are uncomfortable completing a task or answering a survey question, you are free to skip that task or withdraw your participation.

Compensation: If participating for credit, you will receive 2 research credits for 1 hour of participation. If you should decide you no longer wish to participate in the study; you will not be penalized and may still receive credit depending on the instructor in the course in which you are enrolled.

If you have read and understand all that is stated above and wish to continue please indicate so below. Your endorsement of this item will be considered an electronic signature.

I have read and understand all that is stated above and wish to continue

I do not wish to continue

APPENDIX H

Helping Vignettes

Ordinary or everyday helping:

You are driving to work, where a very important meeting will be starting soon. As you are driving, you see a car broken down on the side of the road in an area notorious for being a dead zone. It is probable that the vehicle's owner is not getting cell service. You have the option to either help them or not. If you do not help them, you will definitely get to your meeting on time. If you choose to help you can either pull over or try to help them in person, or slow down and call 911 to tell the authorities that someone needs help once your cell service returns. If you choose to help the stranger you run the risk of being late to your meeting.

1. What is the percentage chance that you will help them even if it means you would risk being late?

2. If you did decide to help, which way do you think you would help?
   Pull over

   Call 911

Extraordinary helping:

You are on your way home one evening, when you notice a small plume of smoke and a crowd around someone's house. As you get closer you can smell the distinct scent of fire, and can hear some crying. Before you can ask what is wrong, a crash comes from the house, and flames suddenly become visible. A woman starts screaming that someone is still inside the house, and you notice a vaguely human figure through one of the windows.

3. What is the percentage chance that you run into the burning building to save the house's occupant?

APPENDIX I

Lexical Decision Task

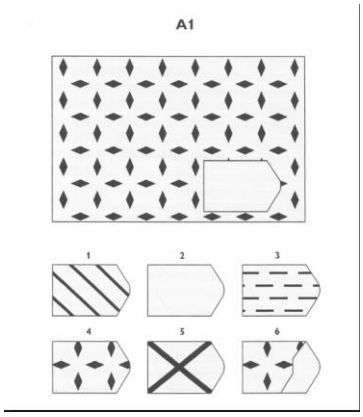
Prosocial Words	**Prosocial anagrams**	**Neutral Words**	**Neutral anagrams**
help	Lphe	run	Unr
assist	sisats	describe	scebdrie
give	eigv	slip	Plis
guidance	negcuida	travel	elavrt
donate	deotna	memorize	morimeez
provide	voidrpe	check	Khecc
volunteer	ervlonuet	attach	taacht
contribute	bitrnotecu	balance	abalecn

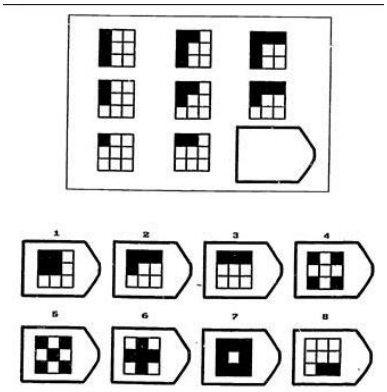
APPENDIX J

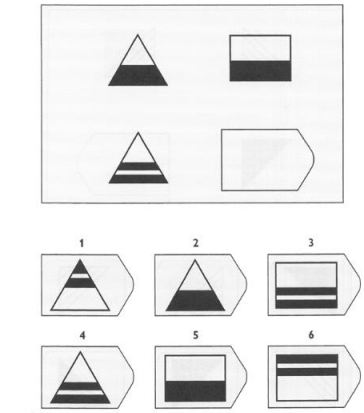
Raven's Progressive Matrices

Instructions: We are creating a measure of effort for your peers in the form of a puzzle game. You have been assigned an experimental partner for the next part of this study. One of you will be the puzzle selector, while the other will be the puzzle completer. If they correctly solve 11 puzzles in 10 minutes, they will "win", and will be considered to have put forth an acceptable amount of effort. In order to make the measure fair, we are asking their peers to select the number of difficult vs easy puzzles that will make up the game.

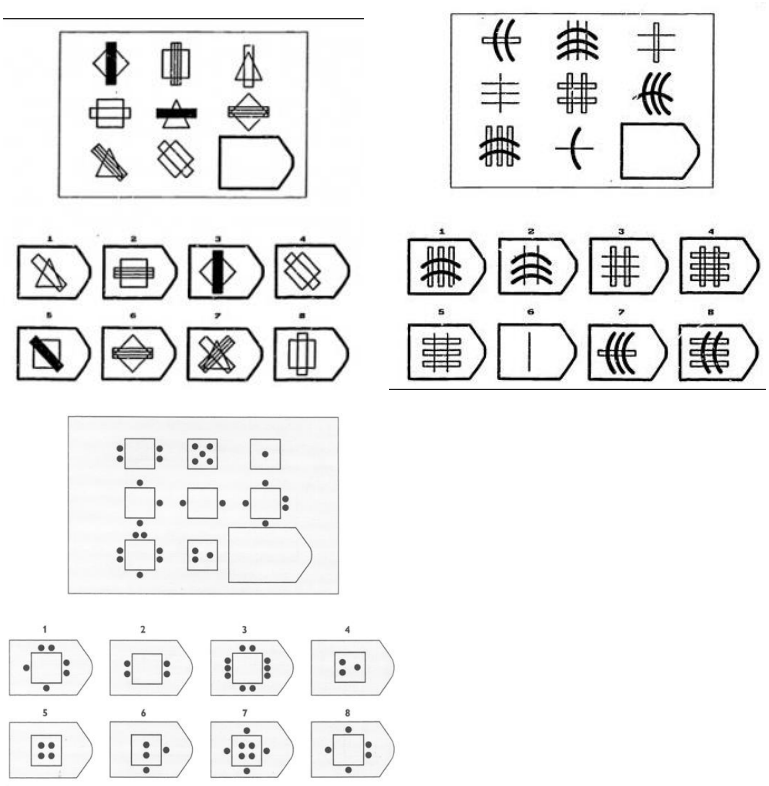
You will choose how many easy and how many difficult puzzles for the game, out of a pool of 10 for each difficulty level. This means that you must have at least one puzzle of each difficulty level. Here are some examples.







Examples of easy Matrices



Examples of difficult Matrices

How many easy puzzles would you like to assign? (Remember the total of easy and hard puzzles MUST be 11)

How many hard puzzles would you like to assign? (Remember the total of easy and hard puzzles MUST be 11)

Please add the total of the hard and easy puzzles assigned. It should add to 11. Please enter that number here.

APPENDIX K

LEMMINGS Overview

In the FIRST WINDOW **press "1" for VGA**

Once Lemmings launches, **press F1 to start playing**.

WHEN THE TIMER GOES OFF:

1. RECORD THE HIGHEST LEVEL YOU GO TO
2. CLOSE THE GAME BY ENDING THE LEVEL & PRESSING **escape (esc)** REPEATEDLY
3. GET THE EXPERIMENTER

Bottom Bar Icons (From left to right)

1. Decrease flow of Lemmings
2. Increase flow of Lemmings
3. Climber
4. Floater
5. Bomb
6. Blocker
7. Bridge Builder
8. Basher
9. Miner
10. Digger
11. Pause
12. Nuke

APPENDIX L

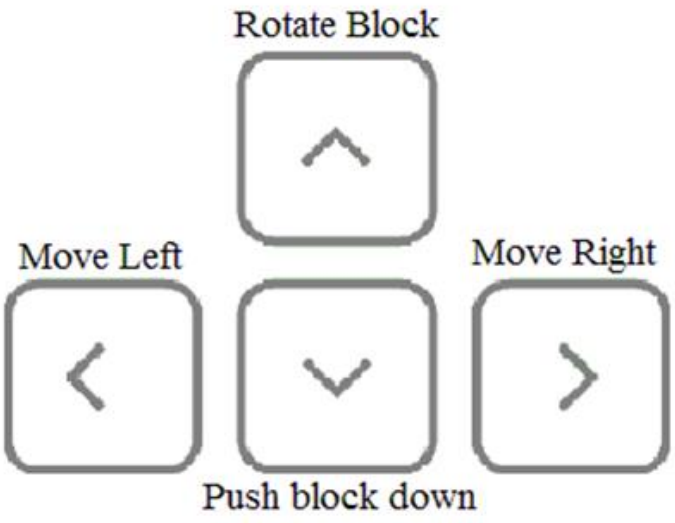
Tetris Overview

PLAY IN **"CLASSIC MODE"**

WHEN THE TIMER GOES OFF:

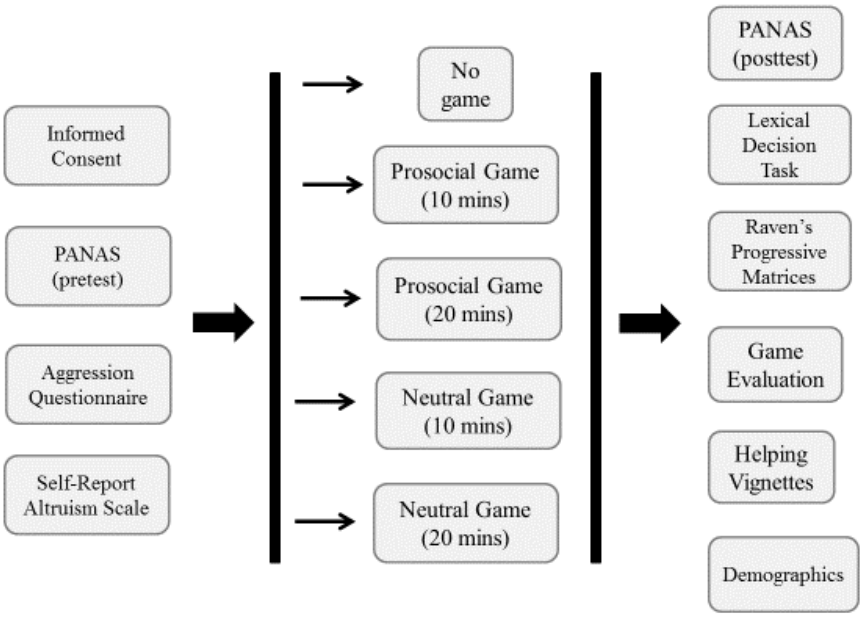
1. RECORD YOUR SCORE
2. CLICK THE **x** AT THE TOP RIGHT OF THE WINDOW TO CLOSE
3. GET THE EXPERIMENTER

In-game controls



APPENDIX M

Procedure of the Experiment



APPENDIX N

Open Ended Answers to “Why did you select the ratio of easy to difficult Raven’s Progressive Matrices that you did?”

participant	condition	reasoning
1	control	I chose to assign 6 easy puzzles and 5 hard puzzles because I feel that the easy puzzles would be a good way to get the "test taker" used to the way the puzzles work, and once they get a better understanding of the test, they can begin working on the hard puzzles.
2	control	not great with puzzles
6	control	I chose 6 easy and 5 hard puzzles because it would give every player 1 more chance to succeed with an easier puzzle before moving onto the harder puzzles. It might also offer more practice chances to prepare for the harder puzzles.
14	control	I chose 6 easy and 5 hard puzzles because I felt like the last 5 puzzles would have been much harder than the first 6
27	control	i chose 6 easy and 5 hard puzzles because personally i would rather have the easy way out rather than get stuck on hard puzzles.
28	control	I chose 6 easy and 6 hard puzzles because when looking at the example problems, I knew I would be able to figure out the easier ones better than the hard ones.
35	control	I chose 7 easy and 4 hard puzzles because I am not the best puzzle solver, and it takes me a while to solve a really hard one.
36	control	I chose 7 easy and 4 hard puzzles because the easy puzzles still require the ability to find a pattern and I fail to see the need to give people many difficult puzzles.
41	control	because i can get at least 6 puzzles right, because there [sic] easy
43	control	I chose 8 easy and 3 hard because I didn't want to make the puzzels [sic] too hard.
60	control	People should be challenged more often, rather than breezing through some easy questions.
62	control	I chose 7 easy and 4 hard puzzles because you have less than a minute to do each one and if you can complete some of the easy ones in less than a minute then it gives you a little more time to complete the hard ones.
65	control	I chose 6 easy and 5 hard puzzles because in order to win, they have to complete the puzzles in 10 minutes. So I thought this would give them a fair chance at winning, while still having to earn it with 5 hard puzzles.

71	control	I chose 7 easy and 4 hard, because it seemed an adequate ratio. The easy puzzles wre [sic] simple however the harder ones required a lot more thought and would take more time
77	control	I chose 7 easy and 4 hard mostly because it seems like a good ratio. Not too easy, not too hard.
78	control	I chose 6 easy and 5 hard puzzles because I knew there had to be 11 total, and it is fair to try and split the number in half, but since the number is odd it makes sense to put one more easy puzzle so that the test is not too difficult.
88	control	I chose 7 easy and 4 hard puzzles because the time frame for finishing that shows that effort was put forth is a mere 10 minutes, so it is only fair to give the puzzle worker an adequate amount of time to accomplish that goal, and I felt a 7-4 ratio would suffice.
93	control	I tried to make it even. I chose one more easy to make it easier on the person.
97	control	I chose10 easy and 1 hard because I wanted the game to be fun not hard
98	control	Because I want them to be successful
111	control	I chose 8 easy and 3 hard puzzles because I believe that being able to recognize simple patterns, as in the easy puzzles, is more important in daily life than the more complicated patterns.
3	L10	I chose 6 easy and 5 hard puzzles because I wanted to make it as close to half and half as possible, and I'd rather have one more easy puzzle than one more hard puzzle so I made it 6 easy and 5 hard.
4	L10	I chose 5 easy and 6 hard so it could be a close balance of both types. To give the teams a good chance of solving some (5 easy) but keeping in the competitive spirit (6 hard).
9	L10	i chose 6 easy and five hard because i figured it would be best to start with more easy puzzles to get their mind warmed up
13	L10	To be a fair test, both easy and hard should be given. I selected one more easy puzzle than necessary because I found them to be challenging already.
18	L10	I chose 6 easy and 5 hard puzzles because I feel like my peers would be able to solve the hard puzzles but that if they still had more easy puzzles it would keep them motivated. If there were too mayn [sic] easy puzzles they would get bored; more difficult puzzles they would quit. So, I tried to distribute them easily.
20	L10	I prefer there to be more easy puzzles. Less stressful
22	L10	I chose 5 easy and 6 hard because I think it would be good to challenge yourself by doing one more harder [sic] puzzle than easy.
32	L10	I chose 6 easy and 5 hard puzzles to even out the 6 easy puzzles with the harder puzzles to even out the ratio
47	L10	I chose 6 easy puzzles and 5 hard puzzles because I wanted my peers to have more easy puzzles than hard puzzles, but enough

		hard ones to put some effort in.
54	L10	I chose 10 easy puzzles and 1 difficult puzzle because I want to build my confidence up.
55	L10	I chose 7 easy puzzels amd [sic] 4 hard puzzles because i wanted to make the puzzels [sic] easier for myself to play.
59	L10	So I could feel good about completing something.
72	L10	I chose 7 easy and 4 hard because it seems like it was fair.
80	L10	it's close to half and half
85	L10	i chose 6 easy and 5 hard puzzles because it was the simplest method
90	L10	I chose 7 easy and 4 hard because accomplishing 11 of the puzzles in ten minutes would be difficult but doable and rewarding task if completed.
91	L10	I chose 7 easy and 4 hard puzzles,because it wanted the payers to not get frustrated.
94	L10	I chose 8 easy and 3 hard because the easier ones wouldn't take as long to complete as the hard ones, therefore the group may have an easier time finishing within the time limit
100	L10	I chose more easier one's [sic] so that I would'nt [sic] have too many hard ones.
103	L10	Prefer a challenge when playing games, but will choose some easy puzzles to complete this research within the time limit.
104	L10	I chose 5 easy and 6 hard puzzles because I felt like the easy puzzles should be less so they can be used as practice. and five times is enough to practice something and then 6 hard so they can do 1 for acclimation [sic] and the other 5 for improvement
109	L10	i chose 7 easy and 4 hard because i sometimes like trying the easy way out but attempting hard task as well.
8	L20	I chose 6 hard and 5 easy puzzles because, when doing the puzzle and having almost the same amount of puzzles will confusing the person solving them, asking which are actually the harder puzzles.
11	L20	easy puzzles can be solved in under 1 minute and hard over a minute so i went with 7 easy 4 hard.
12	L20	I chose 6 easy and 5 hard puzzles because I figured people would be more likely to "win" if they had a higher likelihood of getting something right.
17	L20	I chose 6 hard and 5 easy because they only had 10 minutes to solve the problems. I wanted it to be a slight challenge.
24	L20	I chose 6 easy and 5 hard puzzles because splitting it even seemed fair. Since it had to add to 11, I decided to help my peers out and give them an extra easy puzzle.
25	L20	I chose 6 easy and 5 hard puzzles because it seemed fair.
29	L20	I want to get more than average score so I chose 6 and I chose 5 for hard puzzles to challenge myself. In this way, I can get the score more than the average score and I can exercise my brain too.

45	L20	usually the easy questions are the warmup
46	L20	I chose 7 easy and 4 hard puzzles because I am not very good with puzzles and don't want someone else to have difficulty with them.
49	L20	I chose 8 easy puzzles and 3 hard puzzles because the time limit seemed constrictive for more hard puzzles, but only one hard puzzle wouldn't be as fun.
51	L20	I choose 3 easy puzzles and 8 hard puzzles because if I give them a few easy puzzles, then they won't question the ratio and say all the puzzles are hard. Thus, making them question themselves [sic].
52	L20	I chose 6 easy and 5 hard puzzles because having more easy puzzles will boost the moral of the participant, which will make them more confident to try to accomplish the harder puzzles.
57	L20	I chose 6 easy and 5 hard puzzles because I was nervous of what to expect, but I wanted to also challenge myself.
67	L20	7 easy puzzles will be able to be completed quickly, and they must complete 3 hard ones as well
70	L20	I felt that it should be fairly split evenly but since there had to be one that had more I would pick hard just to give it a good brain exercise
74	L20	I chose 10 easy and 1 hard, because if I have the option to make my life a little easier, I will.
79	L20	I chose 6 easy and 5 hard puzzles because in my opinion, it takes more effort to complete harder puzzles and therefore there should be more hard than easy puzzles.
89	L20	I dont [sic] like to think too much or hard when I dont have too [sic]
95	L20	I chose 7 easy and 4 hard puzzles because I had difficulty with the hard practice puzzles.
96	L20	I choose 7 easy and 4 hard because altough [sic] I like can sometimes like a challenge if it takes too much time for me to solve I lose the will and the attention span to do it.
108	L20	I wanted things to not be too hard but still hard enough to where it was a challenge.
7	T10	I chose 8 easy and 3 hard because the time limit. The students would still have to out in the effort to do the 3 hard ones. Doing 8 easy ones gives them more than enough time to finish the 3 hard ones.
10	T10	It gives a good balance to determine the skill level of the student.
15	T10	i chose 7 easy and 7 hard because i don’t [sic] want anyone to feel that they are not good enough due to some silly puzzle games. games should be played for fun and not to stress anyone out.
19	T10	I chose 6 easy and 5 hard puzzles because you should give yourself a challenge, but you should also take the route you know best and that you know will bw [sic] successful.
30	T10	I chose 8 easy and 3 hard puzzles because the easy games is more fun and does not cause more pressure than the hard puzzles

		would have if all 11 puzzles had to be completed in 10 minutes.
37	T10	I wanted enough hard puzzles but not too much to overwhelm anyone who does it.
38	T10	I feel like inorder [sic] for them to succeed it would be easier for them to have more easy than hard, plus the hard puzzles didn't [sic] look that difficult
40	T10	I chose 6 easy and 5 hard so that the easy puzzles would outweigh the hard ones, but there would still be a challenge.
42	T10	I chose 10 easy and 1 hard because it was my first time doing this
44	T10	I chose 6 easy and 5 hard puzzles because I wanted to make it mostly easy but still have some hard ones.
48	T10	I chose 4 easy and 7 hard puzzles because everybody deserves a challenge nothing is easy. [sic]
50	T10	I chose 7 easy puzzles and 4 hard puzzles because I believe the test should not only be the easy ones that take little effort, but there should also not be so many hard ones to where participants could not complete the task or "win."
56	T10	I chose 6 easy and 7 hard puzzles to total 11 becuase the [sic] I feel like there needs to be more of a challenge.
61	T10	i chose 1 hard and 10 easy because i wanted them to feel accomplished but have a challenge at the end.
63	T10	you have to get their brains working first, then have the hard puzzles
66	T10	I chose 5 easy and 6 hard puzzles to be semi fair but and extra hard to be kind of challenging.
68	T10	I wanted the amount of puzzles to be as even as possible while still giving participants the option to get more than half correct.
69	T10	i chose 5 easy and 6 hard puzzles because i find the hard puzzles more fun and interesting
75	T10	I chose 7 hard and 4 easy puzzles because I wanted there to be more of a challenge to solve them, while still presenting a good amount of easy puzzles to solve.
82	T10	I chose 7 easy puzzles and 4 hard puzzles because I think a minumum [sic] of 4 hard puzzles will help a person not feel as stressed to solve a puzzle rather than having 7 hard puzzles.
92	T10	I chose 6 easy and 5 hard puzzles because the easier puzzles will build up the person's confidence to do the harder ones
102	T10	I chose 9 easy and 2 hard puzzles because I would hate to have to do a bunch of hard puzzles and I would feel bad for the experimented person [sic] if I gave them a lot of hard puzzles
107	T10	I chose 6 easy and 5 hard puzzles because I want them to win, but I don't want it to be a walk in the park. I want them to actually have to work for it but have better odds of winning by giving them more easy puzzles than hard puzzles.
110	T10	I chose 6 easy and 5 hard puzzles because I thought people would

		have a better chance of winning with a less amount of hard puzzles.
5	T20	I chose 5 easy and 6 hard so it could be a close balance of both types. To give the teams a good chance of solving some (5 easy) but keeping in the competitive spirit (6 hard).
16	T20	I chose 6 easy and 5 hard in order to give more time to be able to work the harder ones.
21	T20	For a puzzle to be "just stimulating enough", it should be an almost even mix between passive and challenging quizzes. Therefore, 6 easy and 5 hard seemed optimal.
23	T20	I chose 6 easy and 5 hard puzzles because if I were doing the puzzles I would want mostly easy ones but still be challenged by the hard ones.
26	T20	I chose 4 easy and 7 puzzles because [sic] I wanted them (my peers) to have a challenge when they did the puzzles and making more hard puzzles than eaier [sic] ones just made sense.
31	T20	I chose 9 easy and 2 hard because I want the game to be a little challenging, but I want to players to win
33	T20	I just picked random numbers.
34	T20	I chose 9 easy and 2 hard because [sic] to finish 11 puzzles in 10 minutes is hard and the possibilty [sic] of a person achieving that is easier if the puzzles are easier.
39	T20	I'm really unmotivated right now.
53	T20	I chose the ratio of 6 easy and 5 hard because I wouldn't want anyone to be frustrated trying to figure out too many hard puzzles.
58	T20	I CHOSE 6 EASY AND 5 HARD TO ENSURE THAT THEY WOULD BE CHALLENGED BUT STILL BE ABLE TO SUCCEED
64	T20	there should be more difficult questions than easy so that youre [sic] being challenged
73	T20	i wanted it to be even for both puzzles but since it could not i chose one more easy than difficult
76	T20	I choose 7 easy and 4 hard because they can easily get over half the puzzles right but would actually have to try on the last 4 to win like a test without much effort certain students could only glance at their notes and pass but everyone has to try to make an A on a test, so to win I think they need to put some effort into it and really think.
81	T20	because after playing the game my mind became tired and I wanted to take the easy way out, I included some difficult puzzels [sic] in order ot [sic] show that I was not incapable of trying to solve them.
83	T20	I chose 6 easy and 5 hard because I feel like it's an even mixture.
84	T20	Because there where [sic] more easy ones.
86	T20	I chose 7 easy and 4 hard puzzles because I thought 5 hard ones would be overwhelming.

87	T20	That’s [sic] would be common sence [sic] to me and more easy wioll [sic] help
99	T20	I chose 8 easy and 3 hard puzzles because I just took an exam and I'm very tired from staying up all night studying.
101	T20	I chose 4 easy and 7 hard puzzles because I wanted enough easy puzzles for them to do while including a bit more challenging ones.
105	T20	I chose 7 easy and 4 hard puzzles because having looked at the easy puzzles, I completed each one in less than 30 seconds. While I solved two of the hard ones fairly quickly, I had gotten stuck on the other. You could take 30 seconds on each easy problem and 90 seconds on each hard problem and have half a minute remaining.
106	T20	I chose 6 easy and 5 hard puzzles because I am stressed at the moment so I think others are too.

APPENDIX O

Open Ended Answers to “If you had to guess, what was the purpose of this study?”

participant	condition	answer
1	control	To measure the relationship of college students who play videogames vs their level of interation [sic] and amount of empathy they have towards the outside world.
2	control	To see how productive people are even if they play games
6	control	To determine the behaviors of people who play video games before and after the games are played.
14	control	To study the levels of aggression in people that play video games
27	control	Peoples [sic] feelings on aggression and kindheartedness
28	control	To see who can figure out the pattern of the harder puzzles.
35	control	To see what your response would be if put in a situation you would not be normally put in.
36	control	To compare the desire/ability to problem solve of people who play video games and those who do not.
41	control	to see what kind of person you are
43	control	How someone's emotions/personality determines what video games they play.
60	control	Do videogames help individuals who are suffering from self doubt, depression, and, or anxiety.
62	control	To see if there is a direct correlation between violence and video games.
65	control	To see if video games change our thoughts and how we interact with others.
71	control	Gain an understanding of someones [sic] thought process while using a computer or playing a video game console.
77	control	Obviously, too view people's opinions regarding video games. It also seemed like perhaps the researchers might relate how often the participant plays video games with the answers he or she gave regarding violence and/or helping people.
78	control	I would guess that the purpose of this study is to see how different people react and how long they usually spend playing games such as puzzle games.
88	control	I would guess the purpose of this study is to further understand how things like playing certain types of video games correlates with the reactions and thoughts of people in certain situations.
93	control	I didn't really analyze, but I would guess something to do with if a person plays video games a lot are they less likely to help someone.
97	control	To see how people react to certain things

98	control	To measure the amount of human compassion that I have
111	control	To dicern [sic] whether or not certain activities influence the choices an individual makes.
3	L10	The role video games play on the human mind, if they're a stimulant or if they calm people down instead.
4	L10	To evaluate one's feelings and thinking before and after playing video games.
9	L10	determining the effect video games have on a person's thoughts and feelings
13	L10	How the difficulty of my test would affect how difficult I make someone else's.
18	L10	Seeing how likely people are to help others
20	L10	emotion connected to video gaming
22	L10	To see how the video game I played changed my feelings and emotions before and after playing.
32	L10	To study the effects of video games on feelings and/or emotions
47	L10	To test my mood before and after I was given an unsolvable task. Also, to see if I would risk something to help someone else out.
54	L10	The game is to see my feelings and thoughts towards it and the puzzles may determine my IQ
55	L10	The purpose of this study is to test how we feel after playing a game that may, or may not have interested me.
59	L10	Problem solving
72	L10	The purpose of the study was to see if you easily angred [sic] by things you control.
80	L10	patience when frustrated
85	L10	attentiveness to detail
90	L10	See how a person's life experinces [sic] may shape the way they feel and thus treat others.
91	L10	I believe the purpose is to gain insight in how video games affect mood.
94	L10	To analyze if video games have an impact on our mood or emotions.
100	L10	How much people care about others, and how willing they would be to help.
103	L10	If I had to guess the purpose of this study, I would guess it would have to do something with how participants feel before and after playing a game and how a participant would react knowing if the participant plays games or not.
104	L10	maybe, how differnt [sic] video games change or affect your mood.
109	L10	how you feel after certain situations
8	L20	to test the mind to see if we can pick up on the simularities [sic] on if it is harder or easier.
11	L20	The assessment [sic] of problem solving skills.
12	L20	I would guess that the purpose is to see how video games affect people's mindsets. Like, how you feel about something before you play

		a video game and how your mood and/or behavior is affected after you play.
17	L20	How video games effect a persons simpathy. [sic]
24	L20	The effects of different levels of aggressive video games have on your emotions.
25	L20	I think the purpose is to see how video games effect the individual's emotions/actions.
29	L20	It can be about games and impacts of it on the players [sic] and to conclude how their thoughts and moods are before and after game.
45	L20	to see peoples feelings towards video games
46	L20	The purpose of this study is to determine my thoughts on video games and whatever other questions were asked of me.
49	L20	How video games change perception of situations involing [sic] altruistic acts.
51	L20	I would guess that the purpose is to see how games affect our minds after we play them and how our choice making and decisions change after because some people might still be in the "gaming world" mindset and think that they are invinvible [sic] or make bad choices.
52	L20	The purpose of this study was to see if a hard video game could change someone's mood.
57	L20	How the artistic part of the brain would work
67	L20	to test violence levels and video game performance
70	L20	Probably to see if video games effect someones [sic] tendencies or risk taking abilities
74	L20	To see if aggression [sic] comes along with frustrating games.
79	L20	To measure levels of hostility in people after they play video games
89	L20	How video games take a toll on a persons mind and attitude
95	L20	To evaluate an individual's response to time sensitive matters through the use of video games.
96	L20	I would say the purpose of this study is to understand how video games can change or affect your mood.
108	L20	To see if your results after playing a video game affects your determination to do other things such as other puzzles.
7	T10	To see how video games affect your mood before and after you finish playing. Also to see if your reflex skills are good after you play the game.
10	T10	To discover the feelings, opinions, and emotions towards going out of one's way to help someone else.
15	T10	to see how video games makes us feel depending on if we are good at it or not at the game we are playing and how our score makes us feel.
19	T10	Monitoring peoples thoughts, feelings, and enjoyment involving video games. I also believe that the purpose of this study was to also see if video games can trigger aggression, depression, or other mood changes.
30	T10	I would guess the purpose of this study is to see how video games can

		affect a person's reflex and how playing video games can simulate the brain to perform better and faster with certain stimulation games such as the Tetris game.
37	T10	To test how people think and feel when the play video games and after they're done playing.
38	T10	probably critical thinking
40	T10	To see how emotions change when you are placed in a frustrating situation.
42	T10	To see how challenging we like things and are good at them
44	T10	How you react to different situations.
48	T10	To express how we feel after playing a video game.
50	T10	To analyze differences in attitudes among peers
56	T10	I guess the purpose of this study is to see the relationship between the mood of the person before and after playing a video game.
61	T10	To see how video games can affect someones [sic] mental state and to determine what type of character people who play video games often have.
63	T10	how people react or their emotions towards problem solving
66	T10	To test individuals cognitive skills in certain tasks.
68	T10	I believe that the purpose of this study is to see how a participant's behavior changes under pressure.
69	T10	to see how technology effects a person's attitude/mood.
75	T10	to see how different things make us react (what triggers certain emotions)
82	T10	I would guess the purpose of this study is to compare an individual's personality to how they play a game.
92	T10	To study how video games make people react to certain situations
102	T10	To see if retro video games could possibly enhance performance of indviduals [sic] by making them more alert
107	T10	If video games affected a person's willingness to help someone.
110	T10	To see what feelings come up when people play video games.
5	T20	To evaluate if playing older video games affects/correlates/relates with a person's empathy/sympathy.
16	T20	To see how an individual think after playing a game.
21	T20	Well, since my emotions were monitored before I played the game, perhaps it is to see how one's emotional wellbeing before initiating video games has an effect on video game performance. This same relevance could be applicable to one's emotions before, say, taking a test or studying.
23	T20	The purpose of this study might be the effect of video games on a persons alertness.
26	T20	I would guess to see how emotional people were before and after trying to perform tasks that might put a strain on their brain.
31	T20	how do video games effect your nerves

33	T20	I have no idea.
34	T20	To test how video games effect a persons [sic] thinking and actions.
39	T20	To see how the frustration from the first game affected the difficulty levels chosen for the puzzles.
53	T20	How games influence the way you act towards others ???
58	T20	FEELINGS TOWARDS VIDEO GAMES
64	T20	honestly no idea
73	T20	how video games effect your emotions and behaviors
76	T20	To see how our emtions [sic] change after playing a video game and see how those emotions affect our decisions.
81	T20	How videogames demolish the brain and how it makes learning directly after playing difficult
83	T20	To see if playing the game had any influence over feelings and overall judgement.
84	T20	To see what type of video games people play and how it makes them feel.
86	T20	I would guess the purpose was to study the effects of playing games on a person's mood, personality and overall character.
87	T20	the different reactions towards video games and the effects on actual life decisions
99	T20	If someone's effort and focus correlates to how someone feels at the moment
101	T20	To study if video games can affect the choices we make.
105	T20	I would guess the purpose of this study is to see how older skill-based video games effect behavior. The fact that the score is tallied explains this.
106	T20	Finding a relationship between agression [sic] and videogames.

VITA

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