

Searching for positive aspects of video games: Does cooperative play negate negative effects of violent video games on prosocial behavior?

Introduction

Why should one even invest their energy into researching the effects of games, that is the question that precedes all other follow-up questions. Allow me to answer that: a nation-wide study conducted in the United States a couple years ago (Lenhart et al., 2008) shows that 97% of adolescents in the age of 12 to 17 play some sort of video games - be it on a computer, a website, a mobile device or on a console. Another study conducted in the states, Gentile (2009), comes up with similar numbers (88% for the population of 8 to 18), along with finding the average hours spent on games per week - 13.2 hours, that is. As for the the Czech Republic, no such a study of a similar focus was found; the existing unscientific studies [1] shall be disregarded, and a basic assumption shall be made: due to a similar culture and distribution channels, the end numbers shall be expected to reach similar heights (after incorporating the European piracy rates [2], etc.) All in all, video games are a significant element in the daily lives of the distinct majority of the youth population. Therefore, a reason to take interest in video games and their influence on the youth can be justified.

The second big question regarding video games concerns the presence of negative bias. Are we biased in our culture-wide assessment of video games, and if so, to what extent? There were undoubtedly some major shooting incidents and violent tragedies that have been publicized and attributed to the effects of (violent) video games - be it Columbine in 1997, Beltway in 2002, Virginia Tech in 2007, or others [3]. Attributing the cause of such incidents solely to the negative effects of video games is not rooted in any empirical arguments, and can thus be viewed as simplifications, publicity stunts and scapegoating; the perpetrators who caused the violent crimes did suffer from mental health issues, and in violent video games, they seeked ways of expressing their (ill) selves (it is something else to link video games to tragedies as causations or as correlations). Nevertheless, this video game blame that has been going on in the public for the last 15 years or so has shed some negative light on video games. As for the scientific world, the focus on the negative aspects of gaming stands in the foreground as well. A recently published overview study (Adachi & Willoughby, 2013) counted the amounts of published papers that took interest in the negative and the positive aspects of gaming, and the overall ratio appears to be

about 10:1 in favor of the negative aspects. In the past decade, this negativistic ratio has remained somewhat the same, and the trend doesn't seem to be reverting itself to a more balanced ratio in the near future. Therefore, one has to state that the research focused on the positive aspects of video game influence needs more attention.

So, are there positive aspects to be found in video games, and if so, which ones? Larson (2000) did formulate a triad of factors that have positive effect on youth development. These three factors are: (1) intrinsic motivation, (2) concentration and cognitive effort, and (3) cumulative effort over time to achieve a goal. A study, (Adachi & Willoughby, 2013), goes into detail of each one of these factors, applying them to the structures of video games. And as long as game design mechanics of a specific game are in order, video games do meet these factors. In fact, it can be said that from the perspective of a game designer, these factors are actually highly correlated to the factors that make a game successful both in ratings and reception - intrinsic motivation leads the potential player to obtaining and/or playing a game, while the other two factors contribute to the enjoyment derived from playing the game, letting the player immerse in the game and experience the flow phenomenon [4].

Gentile (2009) provides a summary of all three significant (!) previous studies of social and developmental psychologists regarding positive effects of video games - the three studies that are not directly linked to this paper and its research proposal. There are also two other relevant studies, i.e. the ones directly linked to formulating this paper, that are relevant enough to be mentioned. The first one is Gentile et al., (2009), which studied the relation between prosocial context in video games and prosocial behavior (i.e. behavior intended to help others in social situations) in both correlational and longitudinal studies. The second study, Adachi et al., (2011), shows that it is primarily the presence of competitive gameplay elements in video games (in both prosocially and antisocially aligned games), not the presence of antisocial game context, that leads to antisocial behavior, in a short-term correlational study.

Research proposal and hypotheses

Using the previous findings of Gentile et al., (2009) and Adachi et al., (2011), while also reflecting upon the suggestions of further research mentioned in Gentile (2009), the following research question shall be formulated: does cooperative play of video games, despite the presence of antisocial in-game context, lead to prosocial behavior? The yet unanswered unknown behind such a question is whether

the cooperative gameplay of an antisocial game can lead to prosocial behavior, just like in a cooperative game of a prosocial nature. It is also worth mentioning that the the two previous studies were conducted on a population of university students (means of both studies approx. 19 years); this research proposal aims to utilize such an age group as well.

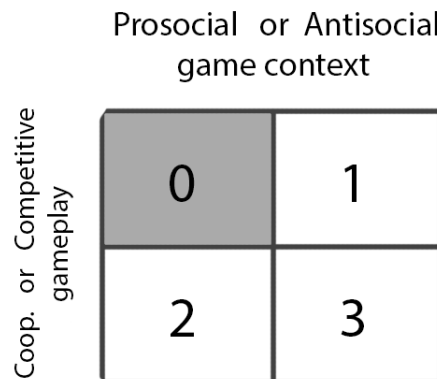
In formal wording, there are two independent variables to be concerned with:

- IV1: The presence of antisocial context in the game (an ordinal scale of two levels: yes/no, i.e. antisocial/prosocial). Antisocial context shall be loosely defined [5] as violent, aggressive and hurtful themes implicitly present in the game.
- IV2: The presence of competitive gameplay elements (an ordinal scale of two levels: yes/no, i.e. competitive/cooperative). Competitive gameplay shall be loosely [6] defined as core game mechanics requiring players to engage other players in win/lose strategies.

Based on these IV's, one dependent variable shall be measured:

- DV1: Prosocial behavior (an interval scale computed based on evaluating a test)

It would seem that the presence of two IV's asks for a 2x2 between subject factorial design, i.e. dividing the research subjects into four groups. This is not exactly the case, though, as one of the groups can be left out. To illustrate on the following figure:



The aforementioned research of Gentile et al., (2009), already explored the short-term effects the games under the categories "1" and "2" have on prosocial behavior (using a population sample of

college students, in its pilot study no. 3). This study did not use a game that would fall into the category "0"; on top of that, the results of the study of Adachi et al., (2011) suggest that using a game from the category "0" would also lead to antisocial behavior - these, among others [7], and others [8], are the reasons for not including the category "0" into the current research design. However, the category that shall be included in the design, as per the research question, is no. "3" - shall it's DV1 results correlate closer to the DV1 results of "1" or "2", that is the question (also, an implicit expectation based on the previous findings predicts the overall DV1 scores of group "3" to land somewhere in between "1" and "2", taking these two as the lowest/highest possible extremes of a perceived interval).

To operationalize the research groups (and the participants within):

- The group "1" shall be measured on prosocial behaviour after engaging in a competitive play of an antisocial video game. The participants within this group are expected to score the lowest on DV1, as per previous studies.
- The group "2" shall be measured on prosocial behaviour after engaging in a cooperative play of a prosocial video game. The participants within this group are expected to score the highest on DV1, as per previous studies.
- The group "3" shall be measured on prosocial behaviour after engaging in a cooperative play of an antisocial video game. The scoring of DV1 within this group is unknown.

Let the null hypothesis be stated as: the results of prosocial behaviour (DV1) of the group "3" shall be the same as the ones of the group "1" (i.e. still on the low side of the score).

Method

Let N be a research sample of 1200 university freshmen from the Czech Republic, aged 19, with a balanced ratio of males and females. Using a sample of three experimental groups per 400 participants is to achieve satisfactory statistical accuracy (even after dismissing some data due to a portion of invalid outputs produced by some of the participants). Let these participants be assigned randomly into one of the three research groups. While leading the participants through all the methodical phases, all relevant ethical rules shall be abided - i.e. obtaining the consent of parents (if needed), debriefing the subjects at the end, etc.

Now, onto the procedure of the research: it can be said that despite minor alterations, this study follows a similar path to the one described in pilot study no. 3 of Gentile et al., (2009), i.e. letting the participants of the three groups play an assigned game for 20 minutes (allowing the IV's to take effect on the participants), followed by administering a series of 11 tantagram puzzles (to test the participants' levels of prosocial behavior, i.e. the DV1), a video game evaluation questionnaire (Anderson et al., 2007), the Buss-Perry Aggression Questionnaire (Buss & Perry, 1992), and, finally, probing the participants for suspicion.

As far as picking the right games for the experiment goes, the previous experiments did not use an "antisocial cooperative" game in their research. This, and the objection of possible different cultural understandings (this study shall take place in the Czech Republic, after all) leads to a need of picking those three games, and evaluating them on interval scales of IV1 and IV2, similarly to the pre-research phase of Adachi et al., (2011). The need of evaluating the games prior to using them in the research gives the researchers a free hand in choosing these games: now, instead of opting for existing games, as in Gentile et al., (2009), three simple games shall be built from scratch, using the same game engine, graphics and other assets (i.e. Unity engine [9], using the assets from the shared Unity store); only the game mechanics and prosocial/asocial elements shall differ across the games - a similar approach to Narvaez et al., (2008). On justifying such an approach: deploying three games of as many as possible similar design elements prevents the occurrence of intervening variables caused by differences of design - differences, which could otherwise make their mark on DV1. Furthermore, whilst individual video games that offer both the "antisocial competitive" and "antisocial cooperative" gameplay are quite common, no such game extends its gameplay to the realms of "prosocial cooperative". Therefore, instead of having one game covering two research groups with a second game covering the third group, or instead of another rather unprecise option - having three individual games covering each one of the groups - this research chooses the most convenient solution: covering all three groups using one Unity engine prefab with three variants of adapted gameplay.

In both the competitive and cooperative games, the participants shall interact with other participants, not with artificial intelligence (i.e. playing a multiplayer game, not singleplayer). However, the interaction of participants beyond the scope of gameplay defined by game mechanics (such as verbal communication) shall be limited, to reduce the influence of intervening variables.

In the following tantagram puzzle task, the participants shall be put into the role of a puzzle chooser - assigning puzzles for their (fictious and actually non-existent) partner to complete. The following rules

would be explained to the participants: if their partner completes at least 10 of 11 assigned puzzles within 10 minutes, the partner would win a 200 CZK gift certificate. There would be 30 puzzles for the participant to choose from: 10 easy one, 10 medium one, 10 hard ones. Needless to say, preferring the easy puzzles counts for prosocial behavior, preferring the opposite would be interpreted as a tendency to behave antisocially.

The video game evaluation questionnaire (Anderson et al., 2007) would provide us with two variables derived from the experience of playing the game per participant - difficulty, and fun; the following Buss-Perry Aggression Questionnaire (Buss & Perry, 1992) then checks for aggression as an inane trait of a participant. All three of these variables shall be checked for correlation with DV1 - instead of not accounting for them, let us consider them as possible mediator variables that may be influencing the results.

Finally, probing the participants for suspicion (testing, whether they had realized the link between video game play and the following tangram test prior or during participating in the latter) shall serve as an indicator of whether to keep the data or to disregard it as invalid.

Discussion

Where lies the significance of findings of this research? As the title suggests, it lies in verifying whether the cooperative elements of an antisocial game can reduce (or even negate) the game's negative aspects on short-term prosocial behavior. This alone is a small goal; however, further scientific effort in this direction may allow us to uncover whole sets of in-game factors that influence players of video games (both the developing youth and the players of other age groups), be it in positive or negative light. Exchanging the fears and superstitions surrounding the game industry for scientific knowledge is an effort worth pursuing as video games are a product consumed by a significant portion of the population. Further research leading to reducing the negative aspects of games and fortifying the positive ones is not a bad cause at all, considering that, in a way, the findings of future may aid positive development of the youth and help elevating the quality of life of all gamers.

Of course there are limitations and shortcomings - in this study specifically, and in this area of focus as well. More studies on the positive aspects of gaming would provide a better ground for further research; moreover, despite the studies being just a few, (some aspects of) the older pieces may start losing their

credibility - there are studies dating back to 2002/2003 whilst the year is 2014 now. In the language of game development, the former date represents the pinnacle of the 5th generation of games, whilst the latter date marks the coming of the 8th generation of games [10], and in those years, game design and gameplay has changed drastically (video games have had a tendency to become obsolete faster than scientific papers, at least for the last decade - and this is one more reason to produce more research on this topic).

Regarding this study in particular, some possible shortcomings regarding its technical execution shall be kept in mind. Taking university students as a "general population sample" is the most generic objection, as it can lead to some questionable distortion of results [11]. Moreover, despite this study merely replicating Gentile et al., (2009), at least to some extent, some variables have changed. Most notably, instead of conducting the study in the United States and/or in Japan, this one takes place in the Czech Republic (the "cultural variable"). Also, this study administers the participants a different set of video games to play - games, that need to be re-evaluated on the respective scales first (Anderson et al., 2007).

Still, the study can't steer too far away from its predecessors and their reference results. For instance, it would be desirable to conclude a similar study using younger participants (age mean of 13 years), since such an age group frequents video games the most and takes the most out of it (see positive youth development, mentioned in the introduction). However, such experimental design would have to deal with further obstacles - i.e. questioning the suitability of using the tangram task on such a young sample; if unsuitable, the experiment would need to use a different task [12].

The decision for letting the participants partake in the video game task in multiplayer gameplay (i.e. while interacting with other participants within the context of in-game mechanics) may prove difficult in sense of providing standardized environment and eliminating intervening variables; on the other hand, such an experiment design draws closer to ecological validity. While the previous research preferred placing the participants into games where the participants interacted with artificial intelligence only, one has to object that not only is multiplayer becoming more common among the population of gamers, but the difference of results (in prosocial/asocial behavior) becomes more pronounced when real people (i.e. in-game allies/adversaries) are involved.

As far as ethical questions are concerned, the contemporary research designs that choose short term exposure to video games are relatively safe (if there is any harm to be done to the participants by games

full of ill factors, the brief, 20-minute gameplay of such a game, in laboratory conditions, is considered neither too lengthy nor significant enough to harm the participants). Let's think of a harmful antithesis of today's research design: i.e. letting the participants play antisocial, competitive video games in a longitudinal design, while initiating such an study at a very early age of the participants (i.e. school or preschool children).

The ethical issue explains why the researchers are focusing on short-term effects of video games. Short-term effects are mere substitutions for longitudinal studies - they pack a minimum amount of perceived/real issues (such as the harm done to participants, the issue of keeping the participants playing specific types of games for a long time while keeping their intrinsic motivation to continue playing intact, the existing negative bias associated with video games in the public, etc.), and the researchers are only referring to developmental models of influence [13], as a way of assuming long-term effects.

Footnotes

[1] http://www.herniasociace.cz/wp-content/themes/AHP/images/AHP_herniprumysl2011.pdf

[2] http://www.nationmaster.com/graph/cr_i_sof_pir_rat-crime-software-piracy-rate

[3] http://en.wikipedia.org/wiki/Video_game_controversies#Publicized_incidents

[4] As far as designing engaging game mechanics goes, let the overview study be Sylvester, Tynan: Designing Games: A Guide to Engineering Experiences. 2013, or the following design basics class: <http://www.youtube.com/watch?v=tKepZ1ZpaOk>

[5] The ability to be specific here depends on the nature of a selected game. for specifics, refer to Gentile et al., (2009), p. 10 - 11, the appendix section - specific games were assigned to the operationalized categories there, and the qualitative evaluations of the games explain the why's.

[6] See footnote no. 5

[7] As per qualitative research on the subject, i.e. Olson et al., 2009, it can be argued that the participants within the range of a self-aware age (i.e. 12-14 year olds, and older) are quite aware of the factor of aggressiveness in games (reflecting upon it in the interviews, etc.), and can thus regulate the influence of such a factor on their further behavior in other (social) contexts.

---http://mprcenter.org/mpr/index.php?option=com_content&view=article&id=35&Itemid=121

[8] Adachi et al., (2011) only tests competitive and "competitive-less" games (as in neutral in competitiveness); whereas this research proposal pushes the variable to "non-competitive" (as in negative in competitiveness).

[9] Unity is a game engine with a rich database of premade game assets: <http://unity3d.com/>

[10] For the evolution and periodization of game "generations", refer to http://en.wikipedia.org/wiki/Video_game_console#Eighth_generation

[11] It can be argued that the population of university students scores higher in some factors than the general population - such as intelligence or self-regulation, etc.; based on these assumptions, further assumptions can be made (i.e. the effect of elevated self-regulation in the sample on the course of the DV1 curve in the results). Such assumptions are, however, far beyond the scope of this research.

[12] For example, some studies involving younger participants resorted to presenting the participants a series of narrative stories involving conflicts of two people; the participants were then asked to empathize with one of the characters and to express their emphasized feelings using 20 adverbs; quantization of this approach involved researchers grading the adverbs produced by the participants - evaluating the adverbs (anti)social nature of the adverbs.

[13] I.e. the "spiral model" of Lerner et al. (2003)

References

- Adachi, P. J. C., & Willoughby, T. (2011). The effect of video game competition and violence on aggressive behavior: Which characteristic has the greatest influence? *Psychology of Violence, 1*, 259-274.
- Adachi, P. J. C., Willoughby, T. (2013). Do Video Games Promote Positive Youth Development? *Journal of Adolescent Research, 28*(2) 155 –165.
- Anderson, C. A., Gentile, D. A., & Buckley, K. E. (2007). *Violent video game effects on children and adolescents: Theory, research, and public policy.*
- Buss, A. H., & Perry, M. (1992). The aggression questionnaire. *Journal of Personality and Social Psychology, 63*, 452-459.
- Cheryl K. Olson, Lawrence A. Kutner and Dorothy E. Warner (2008) The Role of Violent Video Game Content in Adolescent Development: Boys' Perspectives. *Journal of Adolescent Research 2008; 23; 55-76*
- Gentile, D. A. (2009). Pathological video-game use among youth ages 8 to 18: A national study. *Psychological Science, 20*, 594–602.
- Gentile, D. A., Anderson, C. A., Yukawa, S., Ihori, N., Saleem, M., Ming, L. K., Shibuya, A., & Sakamoto, A. (2009). The effects of prosocial video games on prosocial behaviors: International evidence from correlational, longitudinal, and experimental studies. *Personality and Social Psychology Bulletin, 35*, 752-763.
- Larson, R. W. (2000). Toward a psychology of positive youth development. *American Psychologist, 55*, 170-183.
- Lenhart, A., Kahne, J., Middaugh, E., Macgill, A. R., Evans, C., & Vitak, J. (2008). *Teens, video games, and civics* (Report No. 202-415-4500).
- Lerner, R. M., Dowling, E. M., & Anderson, P. M. (2003). Positive youth development: Thriving as a basis of personhood and civil society. *Applied Developmental Science, 7*, 172-180.
- Narvaez, D., Mattan, B., MacMichael, C. & Squillace, M. (2008) Kill Bandits, Collect Gold or Save the Dying: The Effects of Playing a Prosocial Video Game. *Media Psychology Review. Vol. 1*(1)