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The motivational pull of video game feedback, rules, and social interaction: Another self-determination theory approach

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Abstract

This paper argues that most video game enjoyment can be understood in terms of the type of feedback used, the rules set out by the game and the social elements of the game - concepts that have been identified as critical to video games. Self-determination theory (SDT) is used as a lens for understanding the mechanism by which these traits might lead to enjoyment. Specifically, the argument is that feedback, rules, and social elements of games will fulfill the dimensions of SDT - competence autonomy, and relatedness. Then, the dimensions of SDT will predict enjoyment. Participants were presented with a game that emphasized feedback, rules, or social elements. Games that emphasized flexible rules led to feelings of competence while games that emphasized social elements led to feelings of relatedness. Competence and elatedness then led to feelings of enjoyment. In doing so, this study identifies key elements of video games while illuminating ways to understand video game enjoyment.

Many studies have been dedicated to understanding how audiences are entertained by media. More recently, scholarship has focused on how audiences enjoy video games. This is particularly relevant because 183 million people in the U.S. or 49% of American adults play video games (Duggan, 2015; McGonigal, n.d.). To date, evidence has shown that video games with quality controls, multiplayer options, and allowance for a connection to characters are enjoyable (Bowman et al., 2016; Ryan, Rigby, & Przybylski, 2006; Tamborini, Bowman, Eden, Grizzard, & Organ, 2010). This study aims to further explore this phenomenon. In particular, this paper suggests that most video game enjoyment can be understood in terms of the type of feedback used, the rules set out by the game and the social elements of the game – concepts that have been identified as critical to video games.

1. Self-determination theory and video games

Recent theorizing has suggested that video games can be used to gratify the needs of players (Oliver et al., 2015; Tamborini et al., 2010). Self-determination theory (SDT) defines these needs as competence, autonomy, and relatedness (Ryan & Deci, 2000). Broadly, the argument suggests that the more a video game gratifies the needs of SDT, the more enjoyable the experience will be for the player (Oliver et al., 2015).

Based on existing literature, the elements of video games that enhance competence, autonomy, and relatedness might be inferred. Two studies showed that when different attributes of a game were salient, different needs of SDT were gratified (Oliver et al., 2015; Rogers, Woolley, Sherrick, Bowman, & Oliver, 2016). Specifically, when a game focused on character and story, the need for relatedness was gratified. When game play was salient, the players felt more competence and autonomy.

Another piece demonstrated that different aspects of games, like genre and quality, impact the gratifications found therein (Ryan et al., 2006). Ryan et al. (2006) ultimately suggest that the relevant aspects of games were intuitive controls and that the intuitive controls led to feelings of competence and autonomy. To advance this line of inquiry, *Tamborini et al. (2010)*showed that the more naturally mapped a controller was, the more a player felt competence and autonomy while playing the game. Simultaneously, Tamborini et al. (2010) and Ryan et al. (2006) showed that playing a video game with another person enhanced feelings of relatedness. This applied to massively multiplayer online games as well as games with a human cooperator. But also game characters predicted the way in which the game gratified the player (Bowman et al., 2016).

Regardless of this literature, there is a wide range of game characteristics that might impact the dimensions of SDT. Consequently, the current study aims to provide more information on how video games might influence these dimensions by focusing on broader concepts critical to video games.

2. Concepts critical to video games

This article argues that several key concepts, frequently discussed in relation to video games, may be directly analogous to competence, autonomy, and relatedness and thus can explain how video games gratify needs. These concepts are feedback, rules, and social interactions. First, feedback should positively impact feelings of competence. Feedback is:

> When we desire a motion to follow a given pattern, the difference between this pattern and the actually performed motion is used as a new input to cause the part regulated to move in such a way as to bring its motion closer to that given by the pattern (Wiener, 1961, p. 6).

Within a video game, feedback describes the fundamental interaction between the player and the game (Rogers, 2016). A player inputs control, the game evaluates the quality of that control, and information regarding that input is fed back to the player. The purpose of the feedback is to funnel the player toward or away from specific actions. In short, the video game experience is broadly a feedback loop.

Regardless of the domain, feedback is described to help people reach a specific goal such that the feedback pushes a person toward a desired outcome (Hattie & Timperley, 2007; Hawkins, Kreuter, Resnicow, Fishbein, & Dijkstra, 2008). In other words, feedback gives people the information and tools needed to succeed. As such, when a game emphasizes quality feedback the player should feel that he or she can reach the game's goals. This elevated feeling of efficacy and success should be related to competence.

H1

A game that emphasizes feedback will positively predict feelings of competence.

One important barrier to quality feedback is cognitive load. Feedback, if too rich, may present so much information that it might overwhelm the user. This influx of information from feedback could hinder one's ability to cognitively process information and deplete the cognitive resources available (Hattie & Timperley, 2007; Kluger & DeNisi, 1996; Sweller, 1988). Thus, feedback might actually work against itself if it creates cognitive overload.

H2

A game that emphasizes feedback will positively impact feelings of cognitive load.

Another one of the main components of video games is that they have rules. Indeed, rules define what a game is and what a game is not through what the game permits a player to do and what it prohibits a player from doing (Juul, 2010; Parlett, 1999; Rogers, 2016). The rules give shape to a game. As such, this paper argues that when rules allow a wide range of behaviors, the player will be able to gratify the need for autonomy.

H3

A game with rules that afford a wide range of actions will positively predict feelings of autonomy.

Lastly, many video games have social components. Indeed, more than half of teenagers playing video games play with others and games often lead to socializing outside of the game (Lenhart et al., 2008). Socializing is often one of the key motivations for video game players and games, broadly, are played in social contexts (Jansz & Martens, 2005; Squire, 2003). Players even develop relationships with characters within game as well (Klimmt, Hefner, & Vorderer, 2009; Lewis, Weber, & Bowman, 2008; Yee, Bailenson, & Ducheneaut, 2009).

H4

Games that are social will positively predict feelings of relatedness.

Ultimately, extant research suggests that the more media fulfills feelings of competence, autonomy, and relatedness, the more that media will lead to feelings of enjoyment (Oliver et al., 2015; Ryan et al., 2006; Tamborini et al., 2010). The final portion of the study examines this relationship.

H5

Feelings of competence, autonomy, and relatedness will positively predict enjoyment of the game.

3. Method

3.1. Participants and procedures

This sample consisted of 74 participants recruited from Amazon.com's mechanical Turk service. Mechanical Turk "is an online labor market created by Amazon to assist 'requesters' in hiring and paying 'workers' for the completion of computerized tasks" that has become popular in social science research (Paolacci & Chandler, 2014, p. 184). While there are concerns surrounding samples recruited from Mechanical Turk, the service provides more diverse samples than college participant pools and is capable of producing quality data provided that best practices are followed (Chandler, Mueller, & Paolacci, 2014; Goodman, Cryder, & Cheema, 2013; Paolacci & Chandler, 2014). On this point, limitations on participants were used. For example, participants were only included if their approval rate (%) was greater than or equal to 90, location was in the U.S, and they had been approved for 50 or more tasks on mechanical Turk. This

should have increased the likelihood of attentive and valid responses. Participants were offered 50 cents USD to participate in the study as this amount was commensurate with similar tasks on mechanical Turk. The majority of these participants were female (61.6%), ranging in age from 19 to 67 (*Median* = 31, *M* = 33.69, *SD* = 10.34). This is worth noting since male gamers typically outnumber female gamers (McGonigal, n.d.). Although, Turkers are 70% female so a skew toward female participants was expected (Ipeirotis, 2010) but more recent studies suggest that this female bias may be shifting (Hitlin, 2016).

In the recruitment posting, participants were provided a URL for an online questionnaire. Upon logging into the questionnaire, participants were provided with informed consent forms then, if they consented, were randomly assigned to read about a game that emphasized feedback, a game that emphasized open/flexible rules, or a game that emphasized social interactions with players and characters. These game descriptions were determined through a pretest of 10 different video game players. The final descriptions used terms that the pretest found were unique to games that provided high quality feedback, open/flexible rules, or encouraged social interaction.

After reading about the game, participants were asked to imagine playing that game for a few moments. After imagining playing the game, participants responded to a questionnaire with that game in mind.

3.2. Measures

Enjoyment was measured using a single item measure, "I would enjoy this game," from (Fu, Su, & Yu, 2009; Rogers, Bowman, & Oliver, 2015).

Cognitive load was measured by the NASA Task Load Index (Hart & Staveland, 1988). This consisted of six items assessing the demand, or difficulty of a given task. Items were measured on a 7-point Likert-type scale where 1 represented "very low" and 7 represented "very high." This measure was reliable ($\alpha = 0.78$).

Competence, autonomy, and relatedness were measured using the Player Experience of Need Satisfaction scale (Ryan et al., 2006; Tamborini et al., 2010). This measure consisted of three likert-type items per need. Examples of items from each of these measures included "The game let me do interesting things," "I felt very capable and effective when playing," and "I found the relationships I formed in this game fulfilling." All were reliable (competence $\alpha = 0.80$, autonomy $\alpha = 0.87$, relatedness $\alpha = 0.95$).

3.3. Analysis

In order to test the hypotheses, a series of statistical tests were used. A MANOVA, with game description entered as the IV and cognitive load, competence, autonomy, and relatedness entered as the DVs, showed the effect of the condition on these potential mediators as a whole. A MANOVA was used because it allowed differences to be parsed between groups, in this case between conditions, and also because it allowed for analysis of all the DVs at once reducing the likelihood of type I error. This analysis also provided individual supplemental ANOVAs for each potential mediator including post hoc Bonferroni correction that showed the differences, or lack thereof, between specific conditions. As a result, this MANOVA, including the supplemental ANOVAs and post hoc analysis, provided results for H1 – H4. In order to assess H5, the PROCESS macro was used in SPSS (Hayes, 2015). To test this hypothesis, model 4 using 2000 bootstrap samples and 95% CI, was used. The condition was entered as the IV while cognitive load, competence, autonomy, and relatedness were entered as potential mediators. Enjoyment was entered

as the outcome variable. This allowed for the analysis to show if the IV impacts the DV directly or via the potential mediators – something the MANOVA was not providing.

4. Results

The MANOVA revealed a significant multivariate effect of game description, $F(8, 136) = 10.93$, $p < 0.01$, Wilks' $\Lambda = 0.37$, $\eta_p^2 = 0.39$. As for the ANOVAs associated with this analysis, game description had a significant effect on cognitive load, competence, autonomy, and relatedness. For competence $F(2, 73) = 4.66$, $p < 0.05$, $\eta 2 = 0.12$, those in the feedback condition had the lowest feelings of competence ($M = 5.28$, $SD = 0.70$), those in the open/flexible rules condition had the highest ($M = 6.01$, $SD = 0.83$), and those in the social interaction condition were in between ($M = 5.70$, $SD = 0.89$). The only significant difference was between the open/flexible rules condition and the feedback condition $p < 0.05$. Thus, H1was not supported.

For cognitive load $F(2, 73) = 8.59$, $p < 0.01$, $\eta 2 = 0.19$, those in the feedback condition had the highest feelings of cognitive load ($M = 3.77$, $SD = 0.19$), those in the open/flexible rules condition had the lowest ($M = 2.77$, $SD = 0.18$), and those in the social interaction condition were in between ($M = 3.63$, $SD = 0.18$). The significant differences were between the open/flexible condition and the other two conditions (feedback $p < 0.01$, social interaction $p < 0.01$). Thus, H2 was partially supported.

For autonomy $F(2, 73) = 11.98$, $p < 0.01$, $\eta 2 = 0.25$, those in the feedback condition had the lowest feelings of autonomy ($M = 5.06$, $SD = 0.99$), those in the open/flexible rules condition had the highest ($M = 6.41$, $SD = 0.97$), and those in the social interaction condition were in between ($M = 5.89$, $SD = 0.97$). The significant differences were between the feedback condition and the other two conditions (open/flexible rules $p < 0.01$, social interaction $p < 0.05$). Thus, H3 was partially supported.

For relatedness $F(2, 73) = 29.38$, $p < 0.01$, $\eta 2 = 0.45$, those in the feedback condition had feelings of relatedness in the middle of the other two conditions ($M = 3.88$, $SD = 1.66$), those in the open/flexible rules condition had the lowest ($M = 3.49$, $SD = 1.28$), and those in the social interaction condition had the highest ($M = 6.19$, $SD = 1.03$). The significant differences were between the social interaction condition and the other two conditions (both $p < 0.01$). Thus, H4 was supported.

The PROCESS macro (Hayes, 2015) showed that there were no direct effects of condition on enjoyment. However, there were indirect effects via competence (point estimate = 0.90, Boot SE = 0.18, CI [0.02, 0.49]) and relatedness (point estimate = 0.18, Boot SE = 0.10, CI [0.02, 0.46]). Thus, H5 was partially supported.

5. Discussion

Taking the findings of H1 and H2 in conjunction, feedback is perceived as a burden for players, not something that helps them reach in-game goals. This is interesting because it defies the stated definition of feedback. Inherent to feedback is goal pursuit (Hattie & Timperley, 2007; Ramaprasad, 1983). One of the important outcomes of this study is how people perceive feedback, especially video game feedback. In this instance, feedback seems to be perceived as a barrier to competence, not a boon. With the game focusing too much on feedback, it gives the player too much to think about and increases cognitive load. On a conceptual level, this suggests that what we understand feedback to be may not align with how people perceive it. Ultimately, this is not surprising given the lack of consensus in feedback literature. For example,

positive and negative feedback are understood differently in different works (Carver & Scheier, 2001; Connellan & Zemke, 1993; Hattie & Timperley, 2007; Ramaprasad, 1983; Reinecke et al., 2012). Thus, what feedback is seems to be generally agreed upon but the nuances of it seem to create conflicts and this should be investigated. For practical suggestions, the way in which feedback is implemented in games should be carefully considered. Maybe feedback needs to be more subtle or engrained in other game mechanics in order to be effective. Further exploration of perceptions of feedback should also be explored to see how and where the concept and the perceptions of the concept are diverging. In conclusion, this paper takes the position that feedback can impact players' competence but the way in which the player perceives the feedback is paramount. Likewise, concerns about cognitive load should be a consideration when delivering feedback.

In terms of H3, those in the open/flexible rules condition demonstrated the highest feelings of autonomy, as expected. As set forth previously in this paper, the rules of a video game can lead to feelings of autonomy if they allow for a wide range of actions. Meanwhile, if a game allows for a narrow set of actions, feelings of autonomy should be diminished. Interestingly, and expanding on the previous discussion of feedback, those in the feedback condition felt the least amount of autonomy. This was likely because feedback is meant to funnel player's behaviors and actions. If feedback is too prominent it may feel limiting and thus reduce feelings of autonomy. While not an initial prediction of this study, the implementation of feedback was critical to feelings of autonomy as well competence.

For H4, evidence is provided that people can feel connected to one another when playing a game. This is compelling given the stigma that video games are socially isolating (Stone, 2015). The findings here confirm previous research (Ryan et al., 2006; Tamborini et al., 2010). Another interesting finding is that a game with open/flexible rules may encourage autonomy but discourage relatedness. When a game feels open, it may also feel so individualized that it cuts the player off from relationships. In this vein, some of the elements of video games may work against one another to fulfill the aspects of SDT.

Finally, the partial support of H5 shows that when a game positively impacted feelings of competence and relatedness, those feelings led to greater enjoyment of the game. First and foremost, this lends credibility to the argument that the dimensions of SDT can provide a lens through which to understand how video games entertain audience (Ryan et al., 2006; Tamborini et al., 2010), especially since there was no direct relationship between condition and enjoyment. Second, only competence and relatedness impacted enjoyment. In the case of video games, perhaps these traits are more relevant. Thirdly, the findings show that cognitive load and autonomy, at least in this instance, were not as important to enjoyment. As such, the degree to which a video game satisfies some aspects of SDT but not others is worth exploring to see what the appropriate balance might be.

This study had a handful of limitations that should be detailed. Most notably, this study had no game play. As such, the study did not test these concepts in the most appropriate setting. While it would be ideal to do so, this study used game descriptions as they provided for a larger degree of experimental control. For example, the feedback of a game would be extremely difficult to control experimentally without a researcher-designed game. A skilled player would receive one set of feedback while an unskilled player would receive another. All of the findings in this study should be interpreted with an understanding that this study contained no game play. Indeed, these findings, especially those related to feedback, may differ when participants play a game instead of imagining game play. The function of feedback in games might *feel* different when experienced than when *ruminated* upon as in this study. Further, the single item measure of enjoyment could be replaced by any other number of enjoyment measures and might garner other results. A single item was used for several reasons. The researchers aimed to keep the questionnaire short in order to avoid fatigue. When a questionnaire is too long, single item measures are a viable

alternative (Gogol et al., 2014). Enjoyment is a complex concept that eludes consensus. For example, there are two item measures (Abuhamdeh, Csikszentmihalyi, & Jalal, 2015), 18 item measures (Motl et al., 2001), and the aforementioned single item measures. Based on this and the notion that enjoyment is a general positive affect (Oliver & Bartsch, 2011), the researchers opted for a single broad item. Single item measures of enjoyment have shown to be correlated to multi-item scales of enjoyment (Fu et al., 2009) and single item measures may be sufficient "even though the overwhelming practice in academic research is to measure them with multiple items" (Bergkvist & Rossiter, 2007: p, 182; Abdel-Khalek, 2006). While multiple item scales tend to be more reliable, Diamantopoulous and colleagues argued that a single item measure can be used when the sample is small, when the multiple items are homogenous, and the multiple items are semantically redundant (Diamantopoulos, Sarstedt, Fuchs, Wilczynski, & Kaiser, 2012) Another limitation is that the social condition did not examine game characters. This would have been a valuable advancement to the current body of knowledge. Lastly, the sample was comprised of Mechanical Turk users, which can generate limitations such as a lack of lab oversight and invalid user responses. These concerns have been documented and so long as best practices are followed, these limitations can be minimized (Chandler et al., 2014; Goodman et al., 2013; Paolacci & Chandler, 2014). On this point, the sample was smaller than preferred and slightly skewed toward female participants which was surprising given the fact that video game players tend to slightly skew toward male (McGonigal, n.d.). As a result, the sample may not be precisely representative of the gaming population. The pattern of women's increased use of mediated communication might help explain the skew of the sample (Kimbrough, Guadagno, Muscanell, & Dill, 2013; Thompson & Lougheed, 2012). Likewise, the age of participants had a large degree of variability and this may have influenced the results given the sample size. Notably, one of the benefits of Mechanical Turk is diversity of sample but perhaps less representative of populations (Paolacci & Chandler, 2014) however, most (47%) video game players are between the ages of 35 and 54 while just over 21% were 55 and older (Weaver et al., 2009). Based on this, the average age of the sample was not terribly inaccurate (33.69) and some older gamers should be expected in the sample.

In conclusion, this paper shows how aspects of games do or do not satisfy dimensions of SDT. There are likely many other concepts germane to this discussion though given the particular import of feedback, rules and social elements in games, this paper provides a meaningful step forward in understand how games entertain.

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