Is cheating a human function? The roles of presence, state hostility, and enjoyment in an unfair video game [1] [2] [3]

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Abstract

In sports and board games, when an opponent cheats, the other players typically greet it with disdain, anger, and disengagement. However, work has yet to fully address the role of the computer cheating in video games. In this study, participants played either a cheating or a non-cheating version of a modified open-source tower-defense game. Results indicate that when a computer competitor cheats, players perceive the opponent as being more human. Cheating also increases player aggravation and presence, but does not affect enjoyment of the experience. Additionally, players that firmly believed that their opponent was controlled by the computer exhibited significantly less state hostility compared to players that were less certain of the nature of their competitor. Game designers can integrate subtle levels of cheating into computer opponents without any real negative responses from the players. The results indicate that minor levels of cheating might also increase player engagement with video games.

1. Introduction

In society, the concept of cheating is largely met with disdain, anger, and revenge. For example, Bernie Madoff enacted a largescale fraudulent investment operation, which resulted in the thievery of $64.8 billion from thousands of investors (Frank, Efrati, Lucchetti, & Bray, 2009). A judge sentenced Madoff to 150 years in prison and hundreds of billions of dollars in restitution. Thus, society viewed Madoff's cheating as highly unethical and inhuman. Similar rules about cheating are also applied to sporting events, children's games, schoolwork, and video games. For example, when humans are playing video games against other human gamers, cheating is not accepted. If one player cheats in the game world, other players either resort to cheating themselves or disengage entirely with the game (Kabus, Terpstra, Cilia, & Buchmann, 2005).

When it comes to computer-controlled agents, cheating is not only the norm; the human competitor generally accepts it (Fairclough, Fagan, Mac Namee, & Cunningham, 2001). That is, in order to construct a realistic and evenly matched competitor, designers must create algorithms that allow the agents to ‘‘see’’ through walls or use other means to locate the human player's avatar. The human player does not disengage with the game; rather, he or she is aware on some level that this subtle form of cheating is necessary in order for the game to possess an aspect of challenge (Fairclough et al., 2001). Interestingly, little empirical evidence has been collected and analyzed regarding a cheating agent controlled by the computer. This paper presents a study that begins to analyze the effects of the computer cheating in video games in order for designers to be able to create video games that are more enjoyable, immersive, and engaging. Two theoretical models will help to explain possible effects of cheating in a game.

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2. Theoretical models

2.1. Social cognitive Theory

Social environments cognitively shape people. In the mass communication literature, research has illustrated that media can have effects on individuals (Bandura, 1986). Given their interactive nature, video games provide a rich environment in which to study human–computer interaction. One of the earliest communicationand psychology-based theories to emerge from the field of mass communication research was Social Cognitive Theory (Bandura, 1986). This theory provides an explanation for how people's behaviors are shaped by their thoughts, behaviors, and environmental/social influences. In return, their thoughts are informed by their own behaviors, which involve responses to their environment. The cyclic process is one of the bases for why people do not behave in a uniform fashion (Bandura, 1986, 1994).

According to Bandura (1986, 1994), the process of symbolic modeling predicts an impact on people's thoughts, behaviors, and social environments. People replicate the behaviors and actions of those they see in society or, in the context of the present research, video games. However, not every person replicates the same actions and behaviors of others equally. People must pay attention to the models, retain the messages, consciously reproduce the actions, and be motivated to replicate the models (Bandura, 1986, 1994). For example, a troubled male teenager from a family with low socioeconomic status and with uninvolved parents might be more predisposed to enjoying violence. Thus, this teen will elect to play violent video games more frequently than nonviolent games. The negative effects, then, of violent games will be heightened for this youth compared to other teens from different environments (Anderson & Bushman, 2001). Granted, in order for people to properly model behaviors and integrate them into their daily lives, they must be intrinsically motivated to practice them (Bandura, 1986, 1994). In short, video games might be able to influence people's affect, cognition, and subsequent behaviors. Cognitive Dissonance Theory might help address the role of cheating in games.

2.2. Cognitive Dissonance Theory

People usually prefer to surround themselves with ideas, media, and people that are consistent with their worldview. When individuals meet ideas that disagree with their cognitive worldview, they tend to disengage. The Theory of Cognitive Dissonance explains this process. Simply, when a person's actions and attitudes are inconsistent with each other, cognitive dissonance occurs (Festinger, 1957). When a person is put in a state of cognitive dissonance, he or she will disengage or remove himself/herself from the situation in order to reach a more comfortable and familiar environment. For example, if a peace-loving, fear-averse individual is forced to play a violent war video game, he or she will attempt to mitigate the experience and return to a comfortable cognitive state (Festinger, 1957).

When an individual is in a state of cognitive dissonance, he or she tends to experience negative emotions (Bryant & Thompson, 2001; Festinger, 1957). As previously mentioned, the player generally accepts a computer using unfair or cheating practices in video games. In order for games to increase in difficulty and keep the player engaged, the computer must become more astute, which might result in unfair practices (Fairclough et al., 2001). Thus, in the case of a cheating computer opponent, cognitive dissonance might actually inspire players to become creative in order to remedy the situation. Subtle forms of cheating in a video game actually encourage player engagement (Fairclough et al., 2001). That is, a computer using cheating tactics in order to provide an adequately challenging gaming experience is not only accepted, but also expected. Thus, experiencing cognitive dissonance might be a normal state while playing a video game.

2.3. Effects of cheating

Thus far, the theoretical models illustrate how video games might affect individuals. According to Social Cognitive Theory, players' emotional and behavioral states might be influenced by a game session. Similarly, Cognitive Dissonance Theory explains that players generally accept the psychological schism created by a cheating computer. However, the type of cheating that is accepted of the computer is subtler in nature. Overt cheating, conversely, has not been adequately addressed in the video game literature. Therefore, it is important to discern what factors might influence how a player behaves after an overt cheating experience.

2.3.1. Presence, enjoyment, and perception of competitor

Three psychological factors that might be the product of the theoretical models are presence, enjoyment, and perception of the competitor. Research has found that game players are more likely to experience a sense of presence when they think they are playing against a human (Lim & Reeves, 2010; Weibel, Wissmath, Habegger, Steiner, & Groner, 2008). Thus, it is reasonable to hypothesize that players who compete against an overtly cheating opponent (a function that might be perceived as distinctly human) will be more likely to experience a heightened sense of presence and enjoyment than gamers who play against a non-cheating opponent. The Cognitive Dissonance Theory rationalizes this counterintuitive hypothesis; cheating in video games is largely accepted as the norm. Each of the three psychological concepts will be discussed in detail.

Recent research has linked enjoyment of gaming experience to feelings of immersion and presence within the game environment (Eastin & Griffiths, 2006; Tamborini et al., 2004). Data from these studies indicate that enjoyment and presence are highly correlated and that this relationship is mediated by flow (Weibel et al., 2008). While the literature offers various definitions of presence (Green & Brock, 2000; Klimmt & Vorderer, 2003; Regenbrecht & Schubert, 2002), the present study will consider presence as the degree to which a person believes he or she is located within a mediated environment (Biocca, 1997). In video gaming, presence might be construed as the extent to which a game environment affords the player the feeling as though he or she exists within the game environment during sessions of the game (Eastin, 2006; Eastin & Griffiths, 2006), providing players with a sense of being ''there'' (Witmer & Singer, 1998).

Researchers have argued that elements of the game environment might also shape feelings of presence (Eastin & Griffiths, 2006; Tamborini et al., 2004). One such element is the extent to which the game environment affords a realistic experience (Eastin & Griffiths, 2006), which might be facilitated by the perception that the player is interacting with other human players (Tamborini et al., 2004). Several studies explored the relationship between whether or not players believed that they are interacting with other human players and their feelings of presence, reporting mixed results. A study similar in scope to the present analysis noted no differences in evaluations of perceived presence between players who were told that they were competing against another human player and those who were told that they were competing against the computer (Eastin & Griffiths, 2006). On the other hand, Lim and Reeves (2010) found that participants who were told that their opponent was another human player reported higher levels of presence than those who were told that they were playing against the computer. Similarly, Weibel and colleagues (2008) told their participants that they were playing either against another human player or against the computer and found that ratings of presence was higher among participants who believed that their opponent was another human. These participants also reported higher levels of enjoyment and flow. Evidence provided by these studies suggests that believing that a game opponent is human, which might be further strengthened by overt cheating, might elicit heightened presence and enjoyment.

Based on the extant literature on perceptions of the computer, enjoyment, and presence, the following hypotheses are proposed for analysis.

H1. Participants who play against a cheating video game competitor will attribute more human likeness to their opponent than will those playing against a fair competitor.

H2–3. Participants who play against a cheating video game competitor will report (2) higher levels of enjoyment, and (3) a higher sense of presence than will those playing against a fair competitor.

2.3.2. State hostility

In a large body of video game research, state hostility, which is an aggressive affect, is often times studied in the context of violent games. That is, playing a violent game is associated with antisocial, negative effects on the gamer, particularly in the short term (Anderson & Bushman, 2001; Carnagey & Anderson, 2004; Lee, Peng, & Park, 2009). A growing body of research contends that the effects of violent gaming on players' behaviors are modest and less certain (Ferguson, 2010; Ferguson & Rueda, 2010). Regardless, state hostility has not often been associated with other gaming conditions such as cheating. As previously mentioned and as explicated by Cognitive Dissonance Theory, cheating most likely creates negative emotions within gamers while simultaneously inspiring greater engagement and creativity (Bryant & Thompson, 2001).

Every gaming encounter has the ability to influence a person based on the content involved in video games (Gentile & Gentile, 2008). However, depending on context, games can have positive, negative, and/or neutral effects on individuals. More specifically, gaming sessions can be seen as teaching players specific behaviors by rewarding or punishing actions (Gentile et al., 2009). For example, in the Resident Evil series of games, players are rewarded for killing zombies by being provided with more advanced weaponry. In the latest installment of the series, Resident Evil 5, players are punished for not helping and working with the computer-controlled protagonist that is the player's partner. As such, players learn to act aggressively and cooperatively in the same game session. The concept of learned behaviors is central to success within the game world for the players. Because games feature behavioral models, provide instructions, reward repetition, and follow with positive, negative, or neutral reinforcement, they are able to act as behavioral tools (Gentile & Gentile, 2008; Gentile et al., 2009). As previously discussed, cheating is a negative action; it is plausible that it teaches players to behave antisocially, hence inspiring the player to develop increased levels of state hostility. Thus, the following hypothesis regarding state hostility is proposed for analysis.

H4. Participants who play against a cheating video game competitor will report heightened levels of state hostility than will those who play against a fair competitor.

2.4. Player perception

Finally, a line of video game research has illustrated that playing against a human competitor elicits more engagement with the material. For example, a recent experiment tested the effects of agency of an opponent in a video game. Participants played either a cooperative or a competitive video game and were told that they would be playing with an avatar (another human) or agent (computer). As hypothesized, players who competed and those who played with an avatar exhibited heightened physiological arousal. Thus, players in the avatar condition were more involved in the gaming experience than those who played the game with an agent were (Lim & Reeves, 2010). Similarly, Weibel and colleagues (2008) found that playing against a human opponent elicited higher levels of presence, flow, and enjoyment. These increases in game outcomes are also noted in the violent gaming literature. One of the earliest video game violence studies noted that competition against a human opponent rather than cooperation increases state

hostility (Anderson & Morrow, 1995). More recently, Schmierbach (2010) found that playing competitive violent video games increases aggressive cognitions (as measured by a word completion task), a concept intimately linked to state hostility (Anderson & Carnagey, 2010). However, research has yet to formally illustrate how the dependent variables in the present study (presence, enjoyment, and state hostility) are affected by perceptions of the opponent. It is plausible that those who evaluate their opponent as more human will also show increases in presence, enjoyment, and state hostility, regardless of being in the cheating or non-cheating conditions.

H5–7. Players who perceive their opponent as more human than computer will experience greater (5) presence, (6) enjoyment, and (7) state hostility compared to players who believe that their opponent is controlled by the computer.

3. Method

3.1. Participants

Participants in this study were male and female students from a large public university in the Midwestern United States. They were recruited in two ways. First, emails were sent to mailing lists. Those who were interested made an appointment at a time and location that was convenient for them. Second, participants were recruited by approaching passersby in public buildings and asking them whether they would be interested in participating in a study. Participants played the game in various buildings around the University campus, such as a fraternity house, which provided them with a more naturalistic setting for playing video games than a research laboratory would. They received $5 upon completion of the game and subsequent questionnaire. In total, 37 participants successfully completed the experiment.

3.2. Experimental procedure

Following informed consent, participants received brief instructions on how to play the game. Players were encouraged to discern answers to any questions by themselves through trial and error but to ask the experimenter, if they needed help. The participants were then asked to play the computer game for 15–17 min. After playing the game, they completed a questionnaire on the computer that forced all questions to be answered.

Participants were randomly assigned to one of two different experimental conditions: a regular opponent ($n = 18$) or a cheating opponent ($n = 19$). They were told that either a human or a computer might control their opponent. In order to maximize experimental control and to maintain consistency with prior research, all participants were playing against a computer opponent (Lim & Reeves, 2010).

The game was a modified open-source tower-defense game (Da Campo, Farjallah, Putallaz, & Poulain, 2011). In a tower-defense game, waves of enemies (“creeps”) approach a certain target. Players build towers along the way that will automatically shoot at the enemies. If 20 creeps reach the target, the player loses. If all waves have passed, the player wins. Certain types of towers are effective against different types of creeps. To evaluate what type of tower they should build, players are notified of the next type of creeps in advance via a text box in the bottom of the screen. An artificial waiting screen was also included in the game that read, “Waiting for opponent. . .” to give participants the impression that they might be waiting for a human player to join the game or that the computer was loading the game.

Cheating was implemented in two ways. The first five waves of enemies were the same for both versions of the game. However, after the fifth wave in the cheating condition, there was a 25% chance that the player would receive false information regarding the enemies in the following wave. After the revelation that the information was not true, participants received the following message in the text box: "Ha ha, I lied to you! This is what you're really getting: <real wave information>." Furthermore, enemies were extremely difficult to beat 25% of the time, while there was an additional 25% chance that the enemies would be un-killable. In these situations, the player received the message, "I am now invincible! You can't kill me!" Thus, players subtly were taunted in the cheating condition. Taunting the player could be a confounding factor in the dataset. However, this function was included in order to make the competitor seem more human (and not the computer) and for the cheating/level of unfairness to seem overt. In tradeoff between complete experimental control and the generation of a realistic video game session, the experimental game favored realism.

3.3. Measures

To ensure that our manipulation was successful, the participants answered two questions regarding the fairness of their opponent: "How fair was your opponent?" and "My opponent cheated." ($r = .80$, $p < .01$). These questions were answered on a seven-point scale.

The first dependent variable was perception (of the opponent), which was measured by a single-question variation of the Turing Test (Bailenson, Yee, Patel, & Beall, 2004; Turing, 1980), "My opponent was a human." on a 7-point scale ($M = 1.78$, $SD = 0.917$).

A six-item subscale of the media enjoyment scale was used to measure enjoyment (Murry & Dacin, 1996). Consistently with prior research (Nelson, Yaros, & Keum, 2006), items of the subscale were adapted to the context of video game play, as the original subscale was designed to measure enjoyment of television programs. Participants evaluated using seven-point rating scales (1 = strongly disagree, 7 = strongly agree) whether they agreed with statements such as "I liked playing this game." Five other items were added to this scale to capture other nuanced components of enjoyment in video game play. The resulting scale showed acceptable internal consistency (Cronbach's $\alpha = 0.74$). Responses to the 11 items were averaged into a single measurement of enjoyment ($M = 3.25$, $SD = .63$).

A four-item scale of presence was constructed using items from scales developed to measure telepresence (Kim & Biocca, 1997) and transportation (Green & Brock, 2000; Green, Brock, & Kaufman, 2004). These items were modified to appropriately measure presence in the context of video game play, particularly how involved the players perceived themselves to be in the experience using positively and negatively keyed items. Participants rated these items on a scale of 1 to 7 (1 = strongly disagree, 7 = strongly agree). The four items were averaged into a single measurement of presence ($M = 4.35$, $SD = 1.34$). The resulting scale showed acceptable internal reliability (Cronbach's $\alpha = 0.70$).

The 35-item state hostility scale (Anderson, Deuser, and DeNeve, 1995) was used to measure state hostility. Frequently used in research on video game play, the scale asks participants to rate their current mood on a scale from 1 to 5, in which 1 represents "strongly disagree" and 5 represents "strongly agree." Half of the items in the scale were positively keyed and the other half were negatively keyed. The scale consists of three smaller sub-scales, each targeting a different nuance of state hostility (Anderson, Deuser, and DeNeve, 1995): meanness ($M = 3.1$, $SD = .79$), lack of positive feelings ($M = 3.1$, $SD = .79$), and aggravation ($M = 2.05$, $SD = .82$). All sub-scales exhibited at least acceptable internal reliability (meanness, Cronbach's $\alpha = 0.94$; lack of positive feelings, Cronbach's $\alpha = 0.70$; and aggravation, Cronbach's α = 0.83). The state hostility scale, which combines the three sub-scales, also showed high internal reliability (Cronbach's α = 0.91).

4. Results

In each of the analyses, age was selected as a covariate due to the wide range of ages (18–42) represented in the sample. The covariate in the models was evaluated at the following value: Age = 21.73.

In order to test the strength of the manipulation, a one-way ANCOVA test was conducted. The manipulation check showed that the participants recognized that their opponent was cheating; they rated the cheating opponent (M = 4.48, SD = 1.75) as significantly more unfair and cheating than the rated the non-cheating opponent (M = 2.06, SD = .91), F(1, 36) = 25.6, p < .001. The effect size was very large, Cohen's d = 1.74.

4.1. Hypothesis testing

The first hypothesis addressed the perception of the players' competitor. Specifically, the hypothesis predicted that the gamers in the cheating group would believe their competitor was more human compared to the non-cheating group. The difference was significant in the predicted direction, F(1, 36) = 4.38, p = .04; those who played with the cheating computer (M = 2.11, SD = 1.05) rated their opponent significantly more human than those who played with the non-cheating computer (M = 1.44, SD = 0.62) did, showing a modest effect size, Cohen's d = 0.78. Thus, the first hypothesis was supported.

The second hypothesis predicted that gamers in the cheating condition would experience heightened levels of enjoyment of the experience compared to those in the non-cheating condition. This hypothesis was not supported; the cheating group (M = 3.27, SD = 0.61) and the non-cheating group (M = 3.23, SD = 0.65) means were not significantly different F(1, 36) = .078, p = .78.

The third hypothesis addressed the gamers' presence, predicting that the gamers in the cheating condition would experience higher levels of presence during the experience compared to the non-cheating group. The hypothesis was supported; participants in the cheating condition (M = 4.69, SD = 1.25) reported significantly higher presence than those in the non-condition (M = 4.02, SD = 1.37) did, F(1, 36) = 4.148, p = .05. The effect size was moderate, Cohen's d = .51.

The fourth hypothesis predicted that the cheating group would experience higher levels of state hostility compared to the non-cheating group. As previously mentioned, state hostility was measured via three sub-scales: lack of positive feelings, aggravation, and meanness. The manipulation did not have a significant effect on having a lack of positive feelings, F(1, 36) = .156, p = .64, nor it did on meanness, F(1, 36) = .359, p = .55. However, it had a marginal effect on aggravation, F(1, 36) = 3.821, p = .059; those in the cheating condition (M = 2.3, SD = .85) reported marginally higher levels of aggravation than those in the non-cheating condition (M = 1.78, SD = .71) did. The effect size was moderate (Cohen's d = 0.69). The marginal effect of the manipulation on one of the three sub-scales of state hostility provides partial support for the fourth hypothesis. When combining the three sub-scales (Cronbach's a = 0.91), the difference is not statistically significant, F(1, 36) = 1.51, p = .228. The results for the cheating/non-cheating independent variable are illustrated in Fig. 1.

Finally, hypotheses 5–7 predicted relationships between the dependent variables (presence, enjoyment, and state hostility) and perception of the opponent as the independent variable. Two relatively equal-sized groups were created by splitting groups at the median value. Nearly 50% (N = 18) of the participants indicated that they strongly disagreed with the statement that their opponent was controlled by a human, while the other half (N = 19) of the participants indicated that they disagreed with the statement that their opponent was controlled by a human, neither agreed nor disagreed with the statement that their opponent was controlled by a human, or agreed with the statement that their opponent was controlled by a human. Because these two groups do not clearly represent computer or human perceptions, the reporting hereafter uses computer to refer to ‘‘clearly non-human’’ and human to refer to ‘‘possibly non-computer.’’ The limitations of this grouping are discussed in more detail in the next section.

To ensure that perception of the competitor was a distinctly different independent variable from the cheating/non-cheating independent variable, two steps were taken. First, a correlation test reveals no significant relationship between the two variables ($r = 0.243$, $p = .15$). Secondly, for every dependent variable, two-way ANCOVAs, with perception of competitor and cheating-non-cheating as the independent variables, were conducted. No interaction effects were revealed (enjoyment interaction $F(1, 36) = .066$, $p = .80$; presence interaction $F(1, 36) = .061$, $p = .81$; lack of positive feelings interaction $F(1, 36) = .07$, $p = .79$; aggravated interaction $F(1, 36) = .31$, $p = .583$; feeling mean interaction $F(1, 36) = .071$, $p = .79$). Indeed, only the aforementioned main effects were more-or-less replicated for the cheating/non-cheating independent variable. Similarly, main effects for the perception independent variable were comparable for the one-way ANCOVA tests. Thus, it was concluded that the two independent variables are different concepts, even when perception first served as a dependent variable. Thus, only the data from the one-way ANCOVA tests are reported.

Perception of the competitor significantly affected neither the enjoyment, $F(1, 36) = 0.002$, $p = .96$, nor the presence, $F(1, 36) = 2.01$, $p = .17$, of the participant. It had a marginal effect on lack of positive feelings sub-scale of the state hostility scale, $F(1, 36) = 3.247$, $p = .08$; participants who perceived their opponent as human ($M = 3.28$, $SD = .75$) reported marginally more lack of positive feelings than those who perceived their opponent as the computer ($M = 2.83$, $SD = .78$) did, yielding a modest effective size (Cohen’s $d = .58$). Similarly, those who perceived their opponent as human reported significantly higher aggravation ($M = 2.4$, $SD = .73$) than those who perceived their opponent as the computer ($M = 1.7$, $SD = .78$) did, $F(1, 36) = 7.084$, $p < .01$ (Cohen’s $d = .92$). Participants who perceived their opponent as human also reported significantly higher meanness ($M = 1.92$, $SD = .77$) than those who perceived their opponent as the computer ($M = 1.37$, $SD = .52$) did, $F(1, 36) = 5.754$, $p = .02$ (Cohen’s $d = .83$). Finally, an ANCOVA test was conducted to evaluate the effects of perceptions of the competitor on the overall state hostility scale (Cronbach’s $a = 0.91$). Participants who perceived their opponent as human ($M = 2.19$, $SD = .42$) reported significantly higher state hostility than those who perceived their opponent as the computer ($M = 1.70$, $SD = .4$) did, $F(1, 36) = 12.185$, $p < .001$. The effect size was very large (Cohen’s $d = 1.19$). Thus, players that were less certain of the nature of their opponent exhibited increased state hostility compared to players that believed they were playing against the computer, supporting the final hypothesis. The results for the perception independent variable are illustrated in Fig. 2. The means, standard deviations, and F-values for every dependent variable are provided in the Table 1.

5. Discussion

This early exploration into how cheating might shape video gaming experience adds to the literature on the psychological effects of video games. The result on the first hypothesis was perhaps the most significant finding in the study; the data illustrated that participants playing against a cheating video game competitor perceived their opponent as more human than participants playing against a non-cheating video game competitor did. This finding suggests that cheating can be perceived as a human function. Designers of future video games can increase the believability and perceived humanness of the game by integrating less subtle instances of deception.

The results from hypothesis 2, however, suggest that cheating does not affect the level of enjoyment. Previous research indicates that competitiveness and difficulty are major factors of video game enjoyment (Vorderer, Klimmt, & Kuhrcke, 2003). Playing against a cheating opponent does increase the difficulty of a video game; hence, it provides a more challenging and competitive situation. However, because the cheating condition made the video game become impossible to win for the human player, the insurmountable difficulty might have decreased the level of enjoyment. Future research should explore whether winning against a cheating competitor results in higher enjoyment than winning against a non-cheating competitor does. Nevertheless, the results indicate that a cheating version of a game does not offer any less enjoyable and fun than the non-cheating version does. This finding has implications for design, as including some aspects of unfairness or cheating in a video game does not seem to affect the fun factor of it.

Results regarding the third hypothesis show that participants playing against a cheating video game competitor experienced higher levels of presence compared to a non-cheating competitor. Research indicates that presence is a key component in creating the experience of video games (Tamborini et al., 2004). The higher level of immersion players experience when gaming, the more likely they are willing to continue playing for an extended amount of time. Interestingly, research on presence has illustrated a strong positive relationship between presence and enjoyment, which is mediated by flow (Weibel et al., 2008). Indeed a significant positive correlation exists between presence and enjoyment in the present study ($r = .491, p < .01$). Therefore, it is odd that presence was significantly affected by the cheating but enjoyment was not. One explanation for this result is that the present study's sample size might have been too small to detect a positive relationship between enjoyment and gaming condition. However, it is also likely that cheating in a video game simply does not impact the enjoyment of a video game. In the future, designers of video games might consider integrating more levels of deception to heighten players' feelings of presence, which, as the results of this study illustrate, might not have a negative impact on the enjoyment experience of the game.

The results from hypothesis 4 show that playing against a cheating video game competitor encouraged higher levels of aggravation than playing against a non-cheating competitor did. This outcome is expected; playing against a cheating opponent logically increases aggravation. On the other hand, cheating did not make players feel mean or less positive, which is actually a positive outcome, as it indicates that designing a video game with some form of cheating does not lead to strong negative feelings in the player. Future video game designers might integrate deception without worrying about increased state hostility, saving aggravation.

Interestingly, when perception of the competitor was considered as the independent variable, those that solidly believed that they were not competing against a human had lower state hostility compared to those that were less certain did. This finding illustrates that playing competitively against a human opponent might result in heightened levels of state hostility than playing against a computer opponent might. Recent research has illustrated a link between increased negative cognition and competitive play against a human during a violent game (Schmierbach, 2010). Research has also shown that priming individuals to be competitive in a violent game results in heightened aggression measures (Anderson & Morrow, 1995; Sheese & Graziano, 2005). The game in the present experiment, however, was not inherently violent. Thus, the results of the study lend credence to the notion that competitive play against humans—regardless of game content—might have negative affective outcomes. With so many games now featuring competitive and cooperative modes of play (either in person or online), it is essential that researchers begin to explore the role competition plays on people's affective states. That there was no difference in reported presence between the two perception groups is not surprising; previous research has illustrated this lack of difference (Eastin & Griffiths, 2006). Likewise, given the established relationship between presence and enjoyment, it makes sense that the two groups did not report different levels of enjoyment (Weibel et al., 2008).

5.1. Limitations and future directions

The present study has three key limitations. First, the relatively small sample size of the data raises the question of whether the data offer sufficient statistical power to discern some of the hypothesized differences. However, the many statistically significant results obtained in the tests and the moderate to very high effect sizes illustrated by the data do suggest that sufficient power was present.

Second, although the results show that the perception of the competitor is significantly different across the cheating and the non-cheating groups, both values are low (cheating: M = 2.1; non-cheating: M = 1.4 on a seven-point scale). This indicates that the participants from both groups perceived their competitor to be more the computer than a human. There are two possible reasons for this perception. First, the cheating text messages might be too simple and perceived as computer-generated. More sophisticated messages with sufficient variability should be implemented in further research. Second, tower defense games are mostly considered as a human-versus-computer genre, rather than a multiplayer competition. A different type of game might provide more varied results on the Turing Test, such as a card game. However, the result is significant enough to show that cheating is perceived as a more human function. Additionally, different levels of deception might lead to different learned states and emotions. Knowing that a video game is unbeatable due to cheating might lower players' enjoyment. However, winning against a known cheater might also inspire higher levels of satisfaction, hence resulting in greater enjoyment. On the other hand, this prediction points to another question: do varied levels of cheating make a difference to the players' perception of a competitor (i.e., human versus computer)? Future research should explore this important question.

Another important limitation to note is that the independent variable used to test hypotheses 5–7 was a measured independent variable. Because this variable was not precisely controlled by the researchers, one group was comprised entirely of individuals that firmly believed they were playing with a computer opponent, whereas the other group believed that they could be playing against a computer opponent, were unsure of their opponent, or believed they were playing against a human opponent. Thus, the groups can be conceived as ‘‘definitely computer’’, and ‘‘possibly human,’’ rather than clear ‘‘computer’’ and ‘‘human’’ groups. Including this variable as a manipulated independent variable in the experimental design would eliminate this limitation and improve the validity of the results obtained for hypotheses 5–7.

6. Conclusions

In the non-virtual world, cheating is typically met with disdain and anger. Bernie Madoff bilked his clients of billions of dollars. Society and the news media demonized Madoff for his heinous cheating fraud. In video games, however, cheating does not elicit such strong, negative emotions by gamers compared to non-virtual cheating. Rather, computer cheating inspired some greater involvement within the gamers. What is it about a cheating video game that is not only considered somewhat acceptable, but also immersive? Certainly, the data of this study illustrate an interesting psychological process that needs more analysis. What conditions must be present in order for individuals to accept cheating and become psychologically immersed in a narrative rather than becoming extremely angered? Future research ought to address the myriad shades of the affective outcomes of cheating.

This article is a starting point in addressing the role of unfairness in video games introduced by the game itself. In the experiment, participants played either a cheating or a non-cheating version of a modified open-source tower-defense game. The results showed that a cheating competitor was perceived as more human than a non-cheating competitor was. The cheating condition also increased players' feelings of presence and aggravation and had no real negative effect on players' emotional state. Furthermore, players who believed that they were playing against the computer exhibited significantly lower state hostility compared to others who were less sure of the nature of their opponent did. The results suggest that video game designers can integrate some level of deception in the design of their games in order to enhance players' feeling of presence without worrying about truly negative effects.

References

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

Anderson, C., & Carnagey, N. (2010). Causal effects of violent sports video games on aggression: Is it competitiveness or violent content? Journal of Experimental Social Psychology, 45, 731–739.

Anderson, C., Deuser, W., & DeNeve, K. (1995). Hot temperatures, hostile affect, hostile cognition, and arousal: Tests of a general model of affective aggression. Personality and Social Psychology Bulletin, 21, 434–448.

Anderson, C., & Morrow, M. (1995). Competitive aggression without interaction: Effects of competitive versus cooperative instructions on aggressive behavior in video games. Personality and Social Psychology Bulletin, 21, 1020–1030.

Bailenson, J., Yee, N., Patel, K., & Beall, A. (2004). Detecting digital chameleons. Computers in Human Behavior, 24, 66–87.

Bandura, A. (1986). Social foundations of thought and action: A social cognitive theory. Englewood Cliffs, NJ: Prentice-Hall.

Bandura, A. (1994). Social cognitive theory of mass communication. In J. Bryant & D. Zilmann (Eds.), Media effects: Advances in theory and research (pp. 61–90). Hillsdale, NJ: Erlbaum.

Biocca, F. (1997). The Cyborg's dilemma: Progressive embodiment in virtual environments. Journal of Computer Mediated Communication, 3. <http:// jcmc.indiana.edu/vol3/issue2/biocca2.html> Retrieved 31.09.09.

Bryant, J., & Thompson, S. (2001). Fundamentals of media effects. New York: McGrawHill.

Carnagey, N., & Anderson, C. (2004). Violent video game exposure and aggression: A literature review. Minerva Psichiatrica, 45, 1–18.

Da Campo, Farjallah, L., Putallaz, P., & Poulain, R. (2011). ASD-tower defense. <asdtd.com> Retrieved 19.12.11.

Eastin, M. (2006). Video game violence and the female game player: Self and opponent gender effects on presence and aggressive thoughts. Human Communication Research, 32, 351–372.

Eastin, M., & Griffiths, R. (2006). Beyond the shooter game: Examining presence and hostile outcomes among male game players. Communication Research, 33, 448–466.

Fairclough, C., Fagan, M., Mac Namee, B., & Cunningham, P. (2001). Research directions for AI in computer games. In Proceedings of the 12th Irish conference on artificial intelligence and cognitive science (pp. 221–232). Dublin, Ireland: Trinity College Dublin.

Ferguson, C. (2010). Blazing angles or resident evil? Can violent video games be a force for good? Review of General Psychology, 14, 68–81.

Ferguson, C., & Rueda, S. (2010). The Hitman study: Violent video game exposure effects on aggressive behavior, hostile feelings, and depression. European Psychologist, 15, 99–108.

Festinger, L. (1957). A theory of cognitive dissonance. Evanston, IL: Row, Peterson. Frank, R., Efrati, A., Lucchetti, A., & Bray, C. (2009). Madoff jailed after admitting epic scam. The Wall Street Journal. <http://online.wsj.com/article/

SB123685693449906551.html?mod=djemalertNEWS> Retrieved 19.12.11. Gentile, D., Anderson, C., Yukawa, S., Ihori, N., Saleem, M., Ming, L., et al. (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.
Gentile, D., & Gentile, J. (2008). Violent video games as exemplary teachers: A

conceptual analysis. Journal of Youth Adolescence, 37, 127–141.
Green, M., & Brock, T. (2000). The role of transportation in the persuasiveness of

public narratives. Journal of Personality and Social Psychology, 79, 701–721. Green, M., Brock, T., & Kaufman, G. (2004). Understanding media enjoyment: The role of transportation into narrative worlds. Communication Theory, 14,

311–327.
Kabus, P., Terpstra, W., Cilia, M., Buchmann, A. (2005). Addressing cheating in

distributed MMOGs. In NetGames ’05 proceedings of the 4th ACM SIGCOMM workshop on network and system support for games. New York: ACM. http:// dx.doi.org/10.1145/1103599.1103607.

Kim, T., & Biocca, F. (1997). Telepresence via television: Two dimensions of telepresence may have different connections to memory and persuasion. Journal of Computer Mediated Communication, 3. <http://jcmc.indiana.edu/vol3/ issue2/kim.html> Retrieved 28.09.10.

Klimmt, C., & Vorderer, P. (2003). Media psychology ‘‘is not yet there’’: Introducing theories on media entertainment to the presence debate. Presence: Teleoperators and Virtual Environments, 12, 346–359.

Lee, K., Peng, W., & Park, N. (2009). Effects of computer/video games and beyond. In J. Bryant, & B. Oliver (Eds.), Media effects: Advances in theory and research (pp. 551–566). New York: Routledge.

Lim, S., & Reeves, B. (2010). Computer agents versus avatars: Responses to interactive game characters controlled by a computer or other player. International Journal of Human–Computer Studies, 68, 57–68.

Murry, J., & Dacin, P. (1996). Cognitive moderators of negative-emotion effects: Implications for understanding media context. Journal of Consumer Research, 22, 439–447.

Nelson, M., Yaros, R., & Keum, H. (2006). Examining the influence of telepresence on spectator and player processing of real and fictitious brands in a computer game. Journal of Advertising, 35, 87–99.

Regenbrecht, H., & Schubert, T. (2002). Real and illusory interactions enhance presence in virtual environments. Presence: Teleoperators and Virtual Environments, 11, 425–434.

Schmierbach, M. (2010). ’Killing spree’: Exploring the connection between competitive game play and aggressive cognition. Communication Research, 37, 256–274.

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

Tamborini, R., Eastin, M. S., Skalski, P., Lachlan, K., Fediuk, T. A., & Brady, R. (2004). Violent virtual video games and hostile thoughts. Journal of Broadcasting and Electronic Media, 48, 335–357.

Turing, A. (1980). Computing machinery and intelligence. Creative Computing, 6, 44–53.

Vorderer, P., Klimmt, C., & Kuhrcke, T. (2003). Why is virtual fighting fun? Motivational predictors of exposure to violent video games. In Paper presented at the international communication association annual meeting, Dresdesn, Germany.

Weibel, D., Wissmath, B., Habegger, S., Steiner, Y., & Groner, R. (2008). Playing online games against a computervs. human-controlled opponents: Effects on presence, flow, and enjoyment. Computers in Human Behavior, 24, 2274–2291.

Witmer, B., & Singer, M. (1998). Measuring presence in virtual environments: A presence questionnaire. Presence: Teleoperators and Virtual Environments, 7, 225–240.