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Relatedness in Gaming: The Effect in-Game Touch Has on Player Connection

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Research Article

Relatedness in gaming: the effect in-game touch has on player connection

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Abstract
With the number of individuals becoming gamers on the rise, it has become ever so important to understand the underlying motivations and social interactions that occur within this video game medium. Research has revealed that player motivation and relatedness within a game setting can be affected by the interpersonal relationships that develop from in game social interactions. This specific study was interested in how interpersonal touch and relatedness gestures, more specifically positive or negative touch conditions within a gameplay experience, can impact both player motivations, as well as inter-player impressions. Additionally, observational data measuring the quality of interaction between the participant in the study and a research confederate, with whom they were playing an online game was collected. A positive relationship was found between player relatedness and positive touch between avatars.

Keywords Relatedness · Motivation · Interpersonal relationships · Impressions · Touch

1 Introduction to gaming and previous gaming research

While video games have been around for over 50 years, it was not until the late 70's and early 80's that they truly entered and became an integral part of society [3]. Researchers at that time, believed that video game players were isolated individuals who removed themselves from society and were interacting with no one while playing the game [6]. Today, that picture of gamers has drastically changed and reflects an environment infused with authentic social motivations and exchanges that can be studied. Currently, there are approximately 2.2 billion people playing video games, whether that is alone, with a friend, or online in massive multiplayer video games [6, 13]. Alongside the massive increase in video game players, and due to the change in how video game players are viewed, there has been an increase in interest in studying the effects of gaming on players. Previous research has examined the possible effects of gaming on one's: behavior, perception, attention, cognitive functioning, relationships, motivation, and relatedness [3, 8, 15, 21].

Of interest in the present study was an examination of how player relatedness, a key motivational component of self-determination theory [4, 5] may be impacted during gameplay. Self-determination theory (SDT) a widely researched and utilized theory of motivation, explains why individuals seek out and play video games [15]. SDT proposes three primary psychological needs that motivate human behavior: autonomy (free choice), competence (mastery) and relatedness (social connection). Video games provide the context in which players can experience and develop competency, autonomy, and relatedness, either playing online or face to face. Relatedness, particularly, has been identified as a basis for intrinsic motivation in video games [14, 19].

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1.1 Understanding relatedness

Humans are evolutionarily wired and have an intrinsic interest to socialize and gain satisfaction when they establish meaningful relationships with others, regardless of the environment [5, 7]. This need to connect with others positively is known as relatedness [17]. In everyday interactions, the ways in which we develop and show relatedness are countless. The words of support, friendship and love we speak genuinely support relatedness. Likewise, behaviors can also reflect relatedness. A handshake or a hug upon greeting a person establishes a connection between people. Supportive behaviors, (i.e. shared congratulatory actions such as a high five and actions between significant others like holding hands or kissing) have been shown to reinforce feelings of relatedness [11]. Similarly, gestures which are a form of non-verbal communication include any intentional or unintentional body movement made during the course of a conversation or interaction with another individual. Common gestures include but are not limited to waving, raising a fist, and pointing with laughter.

Digital gaming provides an environment that allows for the establishment and enhancement of relatedness to take place, whether playing with a non-player character (NPC), or with other people. Rigby and Ryan [15] argue that the way in which NPC or other human players interact with players in a multi-player environment can enhance feelings of relatedness when that interaction is meaningful and supportive. Examples of within-game behavior that can increase relatedness might be when one player praises another for good gameplay or when a player gifts another player a useful weapon, food or other desired commodity. With studies finding that massively multiplayer online game (MMOPG) gamers prefer spending time within a game environment instead of going out and socializing in real life, it is of the utmost importance to understand the underpinnings that make up specific social interactions and relations within the gaming environment [2, 10].

1.2 Relatedness in gaming: the role of touch and gestures

To date, there has been little to no research on touch in gaming, a component of the relatedness construct. Touch and gesture behaviors are normal and common in human interactions and help to establish relatedness. Examples of these include greeting someone with a handshake, hugging a close friend, high fiving a teammate after success, patting a friend on the back to express connection or support, in-game laughing, and even waving to get someone's attention. It is interesting that although these behaviors are normal in real life interactions, rarely are they integrated into video games as options during play. It's not unusual in a video game to be able to shoot a teammate, or fight with them (negative aspects of relatedness or touch), or gift them with useful game items (positive behaviors), however it is rare that players can engage in actions like a handshake, hug, wave or high five. As a result, few studies have addressed the effect of touch and gestures in gaming. One study that did examine an aspect of touch in a gaming environment proposed that the "Virtual Midas Touch" (a short touch to the shoulder or arm of the player in real life) enables helping behavior later on [9]. In the real world, humans have the opportunity and ability to connect with each other through touch both positively (e.g. high-five and hug) and negatively (e.g. hitting). Incorporating this notion of touch in video games between avatars or characters may produce a real connection between gamers, (i.e. increase their sense of meaningful social interaction and relatedness: [1, 20]. [22] found that nonverbal social interactions in virtual environments are governed by the same social norms as found in the physical world. This implies that it is possible to research social interactions in virtual environments and generalize them to social interactions in the physical world.

While there are many different ways that characters can interact within the game, this study specifically examined a fundamental piece of the experience of relatedness: touch and gestures. The study investigated the effect of positive and negative touch and gestures on player relatedness and motivation in the cooperative game *Portal 2*. Our first hypothesis was that relatedness, as measured by both the Intrinsic Motivation Inventory (IMI [12]) and the Player Experience Needs Satisfaction Survey (PENS [18]) will be higher for those in the positive touch condition as opposed to both the control and negative conditions. The second hypothesis was that motivation, as measured by the IMI will be higher for those in the positive touch condition as compared to both the control and negative touch condition. The third hypothesis was that the level of interaction started by the participant would be higher for those in the positive touch condition as opposed to both the control and negative touch condition.

2 Proposed methodology

2.1 Participants

Participants were 74 undergraduate students (65 males, 9 females) with a mean age of 20.62 (SD 3.28). They were

recruited from a private southeastern university for class credit. After providing informed consent, each student was randomly assigned to play in one of three conditions described below.

2.2 Materials and procedure

The video game used in this study was *Portal 2*. *Portal 2* is a puzzle game that requires two, robot-like characters to work together to move through the game. The motivation for using *Portal 2* in the study is that it is one of the few video games that has a repertoire of touch gestures included in the game mechanics. Players can initiate the following touches and gestures from their character to another during gameplay: high five, hug, team tease (i.e. one robot interacts with the other by taking the opposing robot's head off, plays with it, and then returns it to the opposing robot's body), laugh, small wave, rock, paper, scissors (the two robots engage and play rock paper scissors), and robot dance (where the robot does the robot). These gestures either interact directly with the player or are presented on the screen for the participant to see and fully experience. For the present study, the positive gestures and touches used consisted of team hug and high five while the negative gestures used after unsuccessful play were team tease and laughter.

At the beginning of the study, participants were asked to read and sign an informed consent. After signing, participants were randomly assigned to one of the three conditions (control, positive, negative). The researcher then conducted a review of the basic *Portal 2* controls and provided participants with the option to complete the game tutorial in order to acclimate to the game controls. Players were given a "cheat sheet" for the game controls that they were able to reference at any time during gameplay.

Participants were then told that they would be playing *Portal 2* for 30 min with another character, unaware that they were actually playing with a confederate located in another lab. In the control condition, participants completed the levels and no touch gestures were used by the confederate to communicate with the participant. Within the positive condition, participants were positively gestured to (e.g. high-five or hug) six times at specific sections and level completions. In the negative condition participants were negatively gestured to (e.g. team tease or a laugh) at six specific times where they were killed or embarrassed in gameplay. While they were playing the game with the confederate, a research observer in the room was documenting when touch occurred, as well as the reaction that the participant had to it (both in the game and out of the game). Reactions, such as generating an in-game emotion back to the confederate or making a comment outside of the game related to the touch, were recorded, as well as whether the reaction included emotional components. Once the participants reached a specified level, they were told to stop playing the game.

Participants were then given two measures to complete: The Intrinsic Motivation Inventory (IMI) and the Player Experience Needs Satisfaction Survey (PENS). The IMI is a 45-item multidimensional measure of a participants' subjective experience [12]. The seven subscales assess interest/enjoyment (number of items in subscale (n) = 7, α = .86), perceived competence (n = 6, α = .93), effort/important (n = 5, α = .84), pressure/tension (n = 5, α = .86), perceived choice (n = 7, α = .82), value/usefulness (n = 4, α = .89), and relatedness (n = 8, α = .79). The PENS is a 21-item scale that was developed to assess participants' play experience (α = .79 [18]). The five subscales assess competence (n = 3, α = .89), autonomy (n = 3, α = .82), relatedness (n = 3, α = .84), presence/immersion (n = 9, α = .86), and intuitive controls (n = 3, α = .87).

3 Results

Two one-way multivariate analyses were completed to investigate the differences between three touch groups and the: (1) IMI subscale scores, and (2) PENS subscale scores. Observational data on participant gameplay was also gathered and analyzed.

The first one-way multivariate analysis of variance was performed to investigate differences between the three touch groups and the IMI subscale scores. Seven dependent variables were used: interest/enjoyment, perceived competence, effort/important, pressure/tension perceived choice, value/usefulness, and relatedness. The independent variable was the touch condition (control, positive, negative). Preliminary assumption testing was completed

Table 1 Intrinsic Motivation Inventory (IMI) and Player Experience Needs Satisfaction Survey (PENS) descriptives

Inventory_Subscale	Condition	n	Mean	SD
IMI_Perceived Competence	Control	22	4.3636	1.22651
	Negative	26	4.2179	1.09926
	Positive	26	5.3333	1.39841
IMI_Effort/Importance	Control	22	4.5909	1.1288
	Negative	26	4.2923	1.27025
	Positive	26	5.1538	0.95047
IMI_Relatedness	Control	22	4.3466	0.8282
	Negative	26	4.125	0.79608
	Positive	26	4.9904	0.93067
PENS_Relatedness	Control	22	3.8182	1.5421
	Negative	26	4.1538	0.92966
	Positive	26	4.7436	1.2695

and was found to not be in violation of any assumptions when using a MANOVA analysis (Table 1).

A significant difference was found between the touch conditions and the IMI subscale scores (F (14,130) = 5.31, p = .000, Wilk's Λ = .405, partial η2 = .364). When the results for the dependent variables were considered separately, perceived competence, effort/importance, and relatedness were the only ones to reach statistical significance (perceived competence: F (2,71) = 6.029, p = .004, partial η2 = .145; effort/importance: F (2,71) = 3.927, p = .024, partial η2 = .100; and relatedness: F (2,71) = 7.130, p = .002, partial η2 = .167).

Post hoc analyses for the dependent variable of perceived competence indicated that there was a significant difference between the positive touch group and both the control (p = .024) and negative group (p = .005). There was no significant difference between the negative touch condition and the control (p = .915).

Post hoc analyses for the dependent variable of effort/importance indicated that there was a significant difference between the positive touch group and the negative group (p = .02). There was no significant difference between the control condition and both the negative (p = .631) and positive touch conditions (p = .202).

Finally, post hoc analyses for the dependent variable of relatedness revealed that there was a significant difference between the positive touch condition and both the negative (p = .001) and the control condition (p = .030). No statistically significant difference was found between the control condition and the negative touch condition (p = .645).

The second one-way multivariate analysis of variance was performed to investigate the differences between the three touch groups and the PENS subscale scores (competence, autonomy, relatedness, presence/immersion, and intuitive controls). There was no statistically significant difference when linearly combined between the type of touch and the subscores on the PENS, F (10,134) = 1.45, p = .164, Wilk's Λ = .814, partial η2 = .098.) However, when each subscale item was looked at separately, relatedness was found to be statistically significant (F (2,71) = 3.386, p = .039, partial η2 = .087).

Post hoc analysis for the PENS relatedness subscores revealed that there was a statistically significant difference between the positive touch condition and the control condition (p = .035). There was no significant difference between the control and negative touch condition (p = .627).

Lastly, observational data was coded and analyzed for trends (Refer to Table 2). In the control condition participants (n = 22) enacted 12 interactions with the other online player (e.g. the confederate) during gameplay. These interactions included but were not limited to the participant completing high fives, team hugs, and even laughing with the confederate when they completed levels. This behavior eventually died out after no reciprocation from the confederate. Of those 12 responses (e.g. high five, laugh, etc.) none were observed with an emotional response outside of the game. In the positive touch condition participants (n = 26) initiated 14 interactions with the confederate during gameplay. Of those 14 responses (e.g. high fives, laughing, robot dance, etc.), seven were accompanied by a recorded real-life emotional response such as smiling or laughing. Finally, in the negative touch condition, participants (n = 26) initiated 39 interactions with the confederate during gameplay. Of those 39 interactions (e.g. waving to get the confederate's attention, laughing, etc.), eight were accompanied by a recorded emotional response, such as frustration or anger.

4 Conclusions and future work

Physical human touch has been shown to have a powerful effect on the lives of humans, in regard to being able to soothe, congratulate, convey frustration/anger, and connect people in both positive and negative ways. Can this phenomenon be seen within a virtual environment? This study investigated the relationship and effect of positive and negative touch on player relatedness and motivation in a cooperative video game, *Portal 2*. The statistical analyses with 74 undergraduate participants revealed that there are some significant relationships between certain in-game, character-based touch and particular *subscales* from both the IMI and PENS.

Participants in the positive touch condition were found to feel: more competent (IMI), more willing to put more effort into the study because they understood its importance (IMI), and more related to the confederate (IMI, PENS), with whom they played the game, but never met face to face. While the positive touch condition showed significant differences from the other conditions, the negative touch condition was not significantly different from the control group. The lack of statistically significant differences for the negative touch condition is believed to be due to the constrictions of the game and the type of touch used to try and elicit a negative touch experience. The gestures in *Portal 2*, even those that may be considered negative, may be perceived to be more playful than negative, and while the negative touch condition was trying to produce a sarcastic feeling within the participant, it is entirely possible that individuals took it differently based on their humor styles, as well as their level of familiarity with the game.

Qualitative data looking at both in-game and real-world reactions during the study was also collected. This data

Table 2 Summary of qualitative data

Experimental condition	In-game interactions completed by participant	Number of each interaction that the participant completed	Out of game response/reactions by participant	Number of each out of game response that the participants completed
Positive touch	High-five	5	Smiled as they returned the high-five to the confederate; Looked like they were enjoying the game (e.g. smiling, laughing, stayed engaged)	3
	Laughing	3	Laughed out loud and continued playing the game	3
	Team hug	3	None	0
	Rock, paper, scissors	2	Testing out the gesture menu (laughed when the Robots actually played rock, paper, and scissors with each other)	1
	Robot dance	1	None	0
Negative touch	Waving	17	Visibly confused; showed frustration when the confederate killed them even though they tried to get their attention	5
	Laughing	15	Showed disbelief at being killed once again; laughed out loud at "how bad the confederate was"; looked like they were starting to become disinterested	3
	Team Tease	7	None	0
Control	High-five	5	None	0
	Team hug	3	None	0
	Laughing	2	None	0
	Waving	2	None	0

revealed that there were differences in how individuals reacted both virtually and physically to the confederate's gameplay behaviors (or lack thereof in the control). In the control condition, four participants interacted with the confederate in the game (for a total of 12 interactions) and none had a notable reaction outside of the game. These four participants at the beginning of the study were trying to interact and celebrate with the confederate after completing a task. However, without reciprocation or acknowledgment of the completed interactions, participants stopped trying to interact. In the positive touch condition, five individuals interacted with the confederate in the game (for a total of 14 interactions), with seven of those interactions being coupled by a recorded emotional response outside of the game. The participants in the positive touch condition visibly laughed and smiled while interacting with the confederate. They were outwardly enjoying their time playing the game. This contrasts with the negative touch condition. In the negative touch condition, 12 participants interacted with the confederate in the game (for a total of 39 interactions), with eight being accompanied by a recorded emotional response. Within the negative touch condition, a few trends emerged. The first trend was that people were visibly frustrated and annoyed that the confederate kept killing them. The second was that some participants felt confused in regard to why the confederate was interacting with them in that manner. Finally, the participants in the negative condition started to mess around and care less about progressing. One participant summed it up by saying to the observer "the other player (confederate) didn't know what they were doing". Boredom and frustration could start to help explain why the number of participant-initiated interactions with the observer tripled in this condition.

Like most, if not all lab studies, there are limitations in the present study worth mentioning. They include: the rigid structure of *Portal 2* and the lack of customizability in regard to the specific actions used to elicit positive and

negative feelings; the use of mostly male undergraduate students as the participants; and the possibility that the negative touch condition did not actually elicit/represent negative reactions within the game. Despite these limitations, this study begins to shed light on the importance of touch in gaming. The positive touch condition had statistically significant differences when compared with both the control and negative condition regarding competence, willingness/effort, and relatedness; while the negative touch condition showed how participants can get visibly frustrated when virtual touch happens continually after a negative outcome, such as death, occurs. These results have begun to unravel the mystery between touch and gaming, and are pointing us in the direction that touch, when used correctly can be utilized within a virtual environment to increase certain aspects of motivation and relatedness. Future research will look to corroborate these findings in other games, as well as other platforms, such as virtual reality.

Compliance with ethical standards

Conflict of interest On behalf of all authors, the corresponding author states that there is no conflict of interest.

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