Who Wii like to play: Effect of opponent on enjoyment of computer games

Emma Coppins

Supervised by: Dr. Mark Turner

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ABSTRACT

This study examined the differences in emotional expression depending on the type of opponent (computer, opponent face-to-face, opponent in a different room) and certain individual differences, when playing a computer console game. Previous research has focused on the differences a friend or a stranger can cause on different behavioural measures, but have not looked at how where the opponent is can affect behavioural and emotional measures. The present study considers how the type of, and location of the opponent may affect enjoyment and facial and verbal expression during a competitive racing game played on a video games console. Participants played a 15 minute Nintendo Wii racing game and were recorded for facial and verbal expressions as was the player's enjoyment of the situation. It was found that there was no effect of the gaming situation on enjoyment and that participants smiled and laughed more when playing against the opponent face-to-face. When playing the opponent face-to-face, the worse participants did the lower their rating of enjoyment of the gaming situation. When playing alone, the worse participants did, the more they laughed. The enjoyment of the gaming situations was consistent across the personality variables measured. The study suggests that it is not the opponent which is important in the enjoyment of computer games, but how well the participants do. The study also suggests that computer game players are no longer a stereotype but that all types of people play computer games.

KEY WORDS:	SOCIAL CONTEXT	COMPUTER GAMES	ENJOYMENT	LAUGHTER	PERSONALITY

1. Introduction

Computer games and gaming platforms have changed over the last 30 years to allow for more than just individual game play (Voida & Greenberg, 2009). Computer game platforms now offer multiplayer games for not only two people, but for thousands of people through the use of internet gaming (Cole & Griffiths, 2007). Home console gaming systems also allow many players at a time to participate in games, for example, the unique design of the Nintendo Wii allows many people to play, watch, and enjoy the social interactions the Wii can create (Voida & Greenberg, 2009).

However, research has found that even when people play computer games together, players are still socially isolated because they are communicating through a computer display screen and not interacting with each other through the use of eye contact or gestures (Zagal, Nussbaum & Rosas, 2000). De Kort and Ijsselsteijn (2008) also found that co-location does not guarantee interaction between people, and most multiplayer gaming situations have seating arrangements where players orientate away from each other.

The following review elaborates on the current knowledge of the social aspects of computer games, specifically focusing on how the type of opponent may be related to enjoyment of the gaming situation. Aspects of individual difference are also addressed to see if there are personality differences between game players across different gaming situations.

1.1 Social Context

Social interaction is a basic need of people (Weibel, Wissmath, Habegger, Steiner & Groner, 2008), and the social interactions computer gaming can offer could be a factor in explaining their popularity (Schiesel, 2008). Voida and Greenberg (2009) found that people's primary motivation to play computer games consoles is for the social interactions they allow, and that group console gaming is valued by players because of the pleasure the company of others brings.

Research has demonstrated that the social context of computer game play can affect player's reactions to the situation. The following section addresses the research in this area.

1.1.1 Emotional Expression

Emotions are believed to have three components; a physiological component, usually heart rate (Ravaja, Laarni, Kallinen, Saari, Salminen, Holopainen & Järvinen,, 2004), expressive behaviour, including facial expressions and subjective experience such as feelings of enjoyment (Ravaja, Saari, Turpeinen, Laarni, Salminen & Kivikangas, 2006). Research has looked at how computer game play can affect all of these components and Johnston, Anastasiades and Wood (1990) found that when playing a two person football video game, playing against a friend resulted in greater self-reported arousal compared to playing against a stranger, and concluded that playing against another person induces more positive emotional responses than playing alone or against a stranger.

Ravaja et al. (2006) investigated the influence the nature of an opponent has on both heart rate and facial expressions, when playing video games. In the study, Ravaja et al. (2006) measured participant's cheek muscle movement as an indicator of positive emotions and found that there was more movement of cheek muscles in participants playing against another person, compared to playing against the computer. They also found playing against a friend caused more movement of the cheek muscle compared to playing against a stranger. Ravaja et al. (2006) concluded that playing against another human creates more positive emotions and that there were reduced facial expressions when participants were playing alone because facial expressions serve as a communicative function, so there should be no need for facial expressions when playing alone.

Shahid, Krahmer and Swerts (2008) looked at the effect of social context on the emotional expression of school children whilst playing a computerized game, either in cooperative pairs or alone. The children's facial expressions, such as smiling, and bodily gestures, such as hand movements, were used as an index of emotional expression. They found that children playing the game in a pair demonstrated more facial expressions and gestures than children playing the game alone, which confirmed their hypothesis, that co-presence influences emotional expression, as children playing in pairs were more expressive than children playing individually.

Weibel, Wissmath, Habegger, Steiner and Groner (2008) looked at the effect an online, competitive game against avatars (characters) controlled by either a human or a computer, had on player's subjective experience of the game. Subjective experience was measured by players rating their overall enjoyment of the game. In the experimental design, all avatars were controlled by a computer and programmed so the participant lost the game, although participants were told they were either playing against a computer or human controlled avatar. They found that although all participants lost the game, participants who were told they were playing against a human controlled avatar reported more pleasant experiences and more enjoyment of the game than participants told they were playing a computer controlled avatar. Weibel et al. (2008) speculated that these findings may be due to people preferring if the opponent is another human, rather than a computer in competitive situations.

The research suggests that people enjoy gaming situations in which the opponent is human, rather than computer controlled, and that a human opponent causes people to have greater differences in arousal and facial expressions.

The differences observed in emotional expression and enjoyment may not just be due to the type of opponent, there may also be individual factors contributing to the observed differences.

1.2 Individual Differences

Research has found that individual differences cause some people to enjoy video games more than others (Vorderer, Hartmann & Klimmt, 2006). This section focuses on some of the individual differences which may affect the enjoyment of computer games.

1.2.1 Competition

Competition is defined as a situation in which an individual's successful achievement of their goals requires the opponent to not achieve their goals (Johnson, Marayuma, Johnson, Nelson & Skon, 1981). Sommer (1995) found that competitiveness is a multidimensional construct, consisting of; achievement motivation, social competition and formal competition. Achievement motivation is a measure of individual motivation to improve and perform (McClelland, 1961) and differs to competition, as achievement motivation focuses on the individual whereas competition involves comparisons with others (Sommer, 1995). Social competition involves individuals

challenging themselves in an effort to prove their determination (Deci & Ryan, 1991), while formal competition involves situations with winners and losers.

Competition can arise from the standard format of many games, where a user competes against another person resulting in some form of competition. Most of the research to date has focused on competition as a state which arises from the games interactivity (Vorderer et al., 2006). There has been little research into competition as a personality trait and how this may differ across gaming situations.

Although, Gibb, Bailey, Lambirth and Wilson (1983) did look at how achievement motivation in females may differ depending on video game experience. They found that females with longer experience scored higher in achievement motivation than females with less experience of playing video games. Gibb et al. (1983) concluded that video games may appeal to individuals with certain personality traits and that aspects of games that allow for expression of these personality traits may attract people to the game.

However, competition is only one aspect of personality, so there may be other aspects of personality that need to be considered in relation to computer gaming.

1.2.2 Personality

There are many personality traits that have been investigated in relation to computer game play including introversion (Douse & McManus, 1993) and sensation seeking (Holbrook, Chestnut, Oliva & Greenleaf, 1984). Douse and McManus (1993) found that players of computer based fantasy games were significantly more introverted than non-fantasy game players, and that other aspects of fantasy game player's personalities, such as shyness and anxiety, also differed from non-fantasy game players. Douse and McManus (1993) concluded that players of fantasy games differ in personality from the population average and generalized these findings to say that anyone who has a particular hobby will differ in personality from the population average as certain activities appeal to people with certain personality types.

The Big 5 Personality Traits are used to integrate and represent hundreds of different ways people describe personality (John & Srivastava 1999). However, computer game studies have yet to look at how all five traits may interact with video games. There is another aspect of personality somewhat overlooked by the Big 5 but that is important in relation to computer gaming; self-esteem.

1.2.3 Self-esteem

Self-esteem is defined as the degree to which one values oneself in terms of high or low worth (Reber & Reber, 2001, p.g. 661). The nature of computer game play can have either a positive or negative impact on self worth, often through mastery of the game. Dominick (1984) found a negative relationship with self-esteem and amount of time spent each week playing arcade video games in boys. The findings suggested that as the amount of time spent playing arcade games increased, self-worth decreased, and it was suggested this may be due to boys substituting social relationships with arcade games (Dominick, 1984). Colwell and Payne (2000) also

found that self-esteem in boys was negatively related to frequency of computer game play, but that success in game play may raise self-esteem.

Research has focused on the relationship between individual differences and computer gaming and has demonstrated that computer games seem to appeal to particular personality types. Research has somewhat overlooked how this may affect the enjoyment of different computer gaming situations and the different opponents people may play.

1.3 The Present Study

The present study was designed to examine the effects that social context and personality have on the enjoyment of a gaming situation. Given recent developments in computer games consoles that allow for greater social interaction, and considering previous research which has demonstrated that people prefer playing against human controlled opponents, this study will address the impact different opponents have on enjoyment of computer console gaming by addressing the following questions:

1. Does the enjoyment of a gaming situation, as measured by reported enjoyment, differ depending on the type of opponent, where the opponent is either a computer or a human, either in the same room or a different room?

Previous research has identified that a human opponent causes differences in emotional responses but has not considered if this occurs in people who have met the opponent but cannot see or interact with the opponent. By looking at the effects of a human opponent in a different room, the study aims to see if the enjoyment of the gaming situation is the same as when the player and the opponent are in the same room.

2. Does the type of opponent affect emotional expression, demonstrated by differences in facial and verbal expressions, during the gaming situation?

As Ravaja et al. (2004) found, emotional response patterns are a more powerful indicator of the enjoyment of a game than the players rating how good the game is, so emotional expressions will also be used as an indicator of enjoyment.

Research has also demonstrated that computer games appeal to certain personality traits, although this has not been investigated in relation to emotional expression. Therefore this study will address the following questions:

1. Does competition as a personality trait affect enjoyment of, and emotional expression during, different gaming situations?
2. Are there any effects of the Big 5 Personality Traits on enjoyment of, and emotional expression during, different gaming situations?
3. Does self-esteem affect enjoyment of, and emotional expression during, different gaming situations?

2. Method

2.1 Participants and Design

Participants were 51 undergraduates (14 male, 37 female), from the University of Portsmouth. All participants were psychology students, 45 of whom were given credit toward their course for participating in the study. The participants ranged from 18 to 44 years of age (M= 19.43, SD= 3.65). Of those who took part, 70.6% had played the game used in the study before and 6.1% used the games console used in the study on a regular basis (once or more times per week). 72.5% of the participants played computer games on a regular basis (once or times per week).

The study consisted of three conditions with participants being randomly allocated to one of these conditions (an independent groups design). The three conditions involved playing a computer game alone, playing against a stranger face to face or playing against a stranger they could not see.

A confederate participant was used for the two conditions which involved collaborative play. The same confederate was used for the entire study. The confederate was a 21 year old male, recruited by the researcher, with a high level of skill at the game used. He was a University of Portsmouth student who had no connection with, or knew, any of the participants. The confederate participant was instructed on the procedure and also instructed to attempt to win against the participants each time he played them in both the face to face condition and the non-face to face condition. This was to try to ensure a consistency of outcome between conditions.

2.2 Materials

The materials used during the study are described here, including the computer games console and game used, the set up of the experimental laboratory, and all of the questionnaires used.

2.2.1 Video Console Game

In the study, a Nintendo Wii console, two standard Nintendo Wii controllers and Super Mario Cart Nintendo Wii game were used (Nintendo Co., Ltd., Kyoto, Japan).
The game used in the study was the Mario Kart, car racing game, consisting of a series of different tracks with different obstacles that could be collected by the player to give them advantages in the race. Twelve vehicles are included in the race so the participant could finish in any position from first to twelfth. The game was played in either single or two-player mode. In single player mode, the game takes up the whole screen and the aim is to race against 11 other characters controlled by the games console. In the two-player mode, each player has one half of the screen, either the top or bottom half, and the aim of the game is to race not only against the other 10 characters controlled by the games console but also to race against the other who is also controlling a character.

2.2.2 Observational Measures

The lab used in this experiment was a large observation site in the University of Portsmouth Psychology Department consisting of one main test room, a smaller side

test room and a control room behind one-way glass. From the control room, the researcher could see into the main test room to observe what was going on, but the participant could not see through to the observation room. In the control room there were 2 monitors connected to two cameras in the large test room and a T.V and DVD player to record the video camera footage of participant's facial expressions.

Participant's facial expressions were recorded throughout all test trials yielding approximately 13 hours of video data. These recordings were subsequently coded for the number of occurrences of 12 different facial expressions and verbal expressions (see Table 1).

Table 1.
Table of types of expressions with descriptions for coding of the participants facial expressions.

Expression Type	Description
Open-Mouth Smile	A smile where the mouth is open
Closed-Mouth Smile	A smile where the mouth remains closed
Mouth Pout	The lips are pursed together so they push out. Can be for positive or negative reasons
Open-mouth Protest	The mouth is opened in a sign of annoyance or objection
Tongue Protrusion	The tongue is stuck partially or fully out or the lips are licked with the tongue
Mouth Twitch	Any other movement of the mouth not mentioned above, including; the corners of the mouth turn downwards in a sad smile, the mouth is generally fidgety or moved.
Grimace	Something happens so the participant is not happy and scrunches the face up or recoils.
Head Shaking	Participant moves head from side to side; can be for negative reasons, disagreement or frustration.
"Tut"	Participant makes a "tut" noise
Swearing	Participant swears either out loud or under their breath (includes extreme and mild swearing and cursing)
Speech	Any other words spoken, or noises made, either out loud or under the breath
Laughing	Participant laughs in any form, out loud or silently

2.2.3 Questionnaire Measures

A set of questionnaires was completed by each participant consisting of the Competitive Attitude Survey (CAS) developed by Sommer (1995), the 10 item Big 5 Inventory (BFI-10) developed by Rammstedt and John (2007) and Rosenberg's (1965) Self-Esteem Scale (SES).

2.2.3.1 CAS

The Competitive Attitude Survey (Sommer, 1995) consists of three subscales; achievement motivation, social competition and formal competition. Achievement motivation (AM) is a measure of individual motivation to perform and improve, social competition (SC) is an indication of determination; and formal competition (FC) is a focus on outcomes, such as winning. Each of the three subscales consisted of four questions and were scored independently to give a separate total for each subscale. Responses to each scale were given on a 5-point Likert scale with a higher score indicating a greater tendency towards competitiveness (e.g. a greater score on the FC scale indicates the person has a greater focus on the outcome of the competitive situation). The range of scores for each subscale is from 4 to 20. An example question from the AM subscale of the CAS is given below:

	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
I tend to be hard driving in everything I do	☐	☐	☐	☐	☐

2.2.3.2 BFI-10

The 10-item Big 5 Inventory developed by Rammstedt and John (2006) is an abbreviated version of the original Big 5 Inventory. The Big 5 Inventory measures 5 personality dimensions; extraversion, neuroticism, openness to experience, conscientiousness and agreeableness. Extraversion is one extreme of a scale, with introversion at the opposite extreme. Extraversion includes traits such as being enthusiastic and talkative. Neuroticism is the extreme to emotional stability and includes traits such as anxiousness, nervousness and worry. Openness to experience is an indicator of curiosity and intelligence, with the opposite being closed-mindedness. Conscientiousness indicates organization and thoroughness with the opposite being lack of direction. Agreeableness includes traits such as sympathy and kindness, with the opposite being antagonism (John & Srivastava, 1999). The 5 personality measures are scored independently of each other with two questions per personality dimension. The scoring is done on a 5-point Likert scale with 5 of the questions having reversed scoring, such that the possible scores for each dimension ranges from 2 to 10. A greater score indicates the person is more predisposed to that personality trait, with a lowers score indicating a predisposition to the trait at the opposite extreme. An example of one of the questions from the Big 5 Inventory:

I see myself as someone who ....

	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
Tends to be lazy	1	2	3	4	5

2.2.3.3 SES

Rosenberg’s Self-Esteem Scale (1965) in the present study was adapted to be scored on a 5 point scale to keep continuity with the other questionnaires. The SES measures a person's overall evaluation of their worthiness (Pullmann & Allik 2000). There are 5 positively phrased and 5 negatively phrased items on the scale, which

are scored such that a greater score indicates a greater level of self-esteem, and a higher feeling of self-worth, with the range of scores going from 10-50. An example of one of the questions from Rosenberg's SES is given below:

	Disagree strongly	Disagree a little	Neither agree nor disagree	Agree a little	Agree strongly
I take a positive attitude toward myself	1	2	3	4	5

2.2.3.4 Computer Game Experience

A further questionnaire was developed by the researcher consisting of questions about the participant's demographic characteristics including age, sex and previous experience and use of computer games consoles. The questionnaire asked questions relating to what games consoles are used by participants, how often, and with whom. The participants also rated their enjoyment of game playing experience during the experiment with open-ended questions also being used for participants to write an explanation of their feelings. Questions relating to the enjoyment of the gaming experience were rated on a 5-point Likert scale with the range of scores going from 1 to 5, with a greater score indicating greater enjoyment.

Ratings of the type of game consoles and frequency of play were also completed on a Likert scale with the lowest points given to the least amount of game play per console. For example, never having played the console before was given a point of 0 and playing daily was given a point of 1. The scoring for the entire question was combined to give an overall game playing experience score. The possible score range was 0 to 63 and an example of a question is given below:

	None before	Rarely	Once a week	3-4 times a week	Daily
Xbox 360	☐	☐	☐	☐	☐

Questions relating to who participants usually play against, and how often were done on a 5-point scale with the lowest points awarded for the least amount of time. Responses were sought for amount of time for play alone, against friends, against family, against housemates and against strangers. Each response was scored separately to give five scores ranging from 0 to 4. An example of one of the questions is given below:

	Never before	Rarely	Once a week	3-4 times a week	Daily
Alone	☐	☐	☐	☐	☐

2.3 Procedure

2.3.1 Alone Condition

When arriving at the observation suite, participants were asked to read and sign an informed consent form. The participants then completed the 3 questionnaires, which took about 10 minute's altogether, although there was no time limit for completion. The participant was then briefed verbally with standardized instructions. These consisted of; instructions on how to use the Wii remote controller and what buttons to use, the set up of the game and races, and what the participant had to do. The participants were also told that the study was looking at competition and game playing.

The participant was then given a practice race to ensure their understanding and familiarization with the controller and game. The researcher left the testing room at this point and went to the observation suite, video cameras were checked for correct placing and adjusted as necessary to ensure recording of the participants face during the test condition. The practice race took an average of three and half minutes to be completed. Once the practice race had been completed the researcher re-entered the testing room to set up the test races and informed the participant to begin the four test races. The researcher returned to the observation and recording of the participant was started at this point. The position the participant came in each race was also recorded and after the four races had been completed, the overall position the participant came in the game was also recorded. The four races took around 14 minutes to be completed although each race could vary in the time it took to be completed depending on the ability of the game player.

The final questionnaire was then completed by the participant concerning their demographics, enjoyment of the game and who they believed they were playing, either another person, the computer or unsure. A debriefing sheet was given to them which they were asked to read. Once the participant had read the debriefing sheet they were asked if they had any questions and then informed they would be assigned their credits and that they could leave. From arriving at the laboratory to completing the final questionnaire the whole experiment took between thirty and forty five minutes per participant.

2.3.2 Participant vs. Confederate (face-to-face) Condition

The procedure for this condition was similar to the procedure for the alone condition, except that the confederate participant was already present before the true participant arrived. The confederate and true participant were introduced to each other and the confederate participant was taken into another room whilst the true participant completed the informed consent form and questionnaires. The confederate participant was then brought back into the testing room and the procedure continued as above. Once the races were completed the confederate participant was then taken into another room and the real participant finished the study.

2.3.3 Participant vs. Confederate (not face-to-face) Condition

The procedure for this condition was the same as the participant vs. confederate face-to-face condition except that the confederate participant remained in the adjoining room throughout the whole experiment, from where they competed in the game. The true participant and confederate participant were introduced at the

beginning of the study before the confederate was taken into the adjoining room for the duration of the study.

A validation check, to ensure participants in this condition believed they were playing against the unseen confederate, was calculated. It showed a significant result (x^2(4, n=51)= 40.635, p=.000) which suggests that although the participants could not see their opponent during the game play, they did believe that they were playing against another person.

Results

The results consist of three sections; [1] the effect of the type of opponent on the gaming experience; [2] the effect of individual differences on the gaming experience and; [3] the effect of other variables related to the gaming experience and previous gaming experience. In each of the three sections, the effects of the variables are investigated in relation to subjective experience and measures of facial and verbal expressions.

3.1 Effect of the Gaming Context

The first aim of the study was to investigate if social context has an effect on enjoyment of gaming situations. This was evaluated by exploring participants subjective and behaviour responses either in a gaming situation alone, a gaming situation where the opponent was in the same room or a gaming situation where the opponent was in a different room. Enjoyment of the gaming situation was recorded as a subjective rating and facial and verbal expressions.

3.1.1 Enjoyment

Table 1 shows the mean score and standard deviation of the participants rating of enjoyment of the game playing situation. Across the three conditions, enjoyment ratings of the game playing situation tended to be highest for the condition when the opponent was unseen (M= 4.24, SD= 0.83). The lowest rating of enjoyment was given in the condition when the opponent was playing against them in the same room (M= 3.76, SD= 0.83), although the differences in enjoyment ratings were not statistically significant ($F(2, 48) = 1.754$, p = .184 n.s., η^2= .068).

Table 1.
Means and standard deviations of subjective rating of enjoyment of the gaming situation for participants in each of the three conditions.

	M	*SD*
Alone	4.18	0.73
Face to Face with Opponent	3.76	0.83
Against Opponent Unseen	4.24	0.83

3.1.2 Facial and Verbal Expressions

Across the three conditions, the participant's facial and verbal expressions were recorded. A multivariate analysis of variance (MANOVA) for the effect of the condition on expressions was calculated which suggested no combined effect of the 12 dependent variables (expressions) between individuals, (Multivariate F(28, 70) = 1.19, p= .274 n.s. Wilk's Lambda = .459). However, Huberty and Morris (1989, p.g. 307) suggest that the use of MANOVA tests is unnecessary and that the use of multiple analysis of variance (ANOVA) is appropriate for empirical research. Therefore the univariate analysis for the breakdown of each facial and verbal expression was explored. Table 2 shows the mean number of the 12 different facial and verbal responses and the univariate analysis comparing each of the three conditions.

The effect of the condition on the expression of open smiles was significant, $F(2, 48) = 6.33$, $p = .004$, $\eta^2 = .21$. The univariate analyses shows that for expression of open smiles, the greatest number tended to occur in the condition where the opponent was in the same room as the participant (M= 8.53, SD= 4.99). The next greatest expression of open smiles was in the condition where the opponent was in a different room to the participant (M= 4.76, SD= 5.74), and expression of open smiles was least in the condition where they played the game alone (M= 2.76, SD= 3.35).

The effect of the condition on the number of times the participant laughed was also significant, $F(2, 48) = 4.02$, $p = .024$, $\eta^2 = .14$. Across the three conditions, the number of times the participant laughed was highest in the condition where the opponent was in the same room (M= 5.47, SD= 5.80), followed by the condition where the opponent was unseen (M= 2.88, SD= 4.71). The least number of times the participant laughed was in the condition in which they played alone (M= 1.18, SD= 1.81).

No other significant differences between conditions were found for the 10 other facial or verbal expressions.

Table 2
Means, standard deviations and the results of *t* test analyses of facial and verbal expressions across the three conditions.

	Alone		F to F with opponent		Unseen opponent				
	M	*SD*	*M*	*SD*	*M*	*SD*	*F*	*p*	η^2
Open Smile	2.76	3.35	8.53	4.99	4.76	5.74	6.33	.004	0.209
Closed Smile	2.59	4.84	3.88	3.12	4.47	4.77	0.85	.435 n.s.	0.034
Mouth Pout	1.94	3.44	1.59	2.74	2.71	3.77	0.50	.612 n.s.	0.020
Open Mouth Protest	3.24	4.41	3.29	4.41	3.82	3.75	0.10	.904 n.s.	0.004
Tongue Protrusion	4.41	6.53	3.82	5.03	6.00	9.46	0.41	.666 n.s.	0.017
Mouth Twitch	12.00	8.91	14.06	8.16	12.29	6.87	0.33	.722 n.s.	0.013
Grimace	7.06	8.20	6.29	4.67	9.18	7.64	0.77	.468 n.s.	0.031
Head Shake	1.76	4.51	0.29	0.59	1.53	4.67	0.75	.478 n.s.	0.030
“Tut”	1.82	2.70	1.00	1.41	0.88	1.41	1.19	.313 n.s.	0.047
Swearing	0.35	0.86	1.65	2.47	1.06	1.82	2.11	.133 n.s.	0.081
Speech	4.65	8.43	11.06	11.22	5.00	5.92	2.86	.067 n.s.	0.106
Laughter	1.18	1.81	5.47	5.80	2.88	4.71	4.02	0.024	0.144

3.2 Effect of Individual Differences

To investigate the influence of individual differences on participants experience of the gaming situation, measures of self-esteem, the Big 5 Personality Traits and competitiveness variables (achievement, social competition and formal competition) were examined in relation to subjective enjoyment of the gaming situation and facial and verbal expressions.

3.2.1 Enjoyment

A Pearson correlation for the correlations between individual differences and the participants mean rating of enjoyment showed no significant correlations between individual difference variables and enjoyment rating were found.

3.2.2 Facial and Other Expressions

Table 3 shows the Pearson correlations for relationships between individual differences and the different facial and verbal expressions expressed by the participants. There were no significant correlations between Extraversion, Agreeableness and Openness to Experience with any of the expression measures.

A significant, positive correlation between self esteem and swearing was found ($r(n=51)= .36$, $p= .009$), which suggests that participants with increased self-worth swore more during the gaming experience. A significant, positive correlation between conscientiousness and swearing was also found ($r(n=51)= .31$, $p= .029$), which suggests that participants who are more self-disciplined swore more during the game playing situation. There was also a significant, negative correlation between neuroticism and swearing, ($r(n=51)= -.29$, $p= .042$), which suggests that participants who are less anxious tended to swear more during the game playing.

A significant, positive correlation was also found between achievement and head shaking, ($r(n=51)= .34$, $p= .015$) which suggests that the greater the participants internal aspirations to do well, the more they shook their head during the game play. A significant, positive correlation between social competition and “tut” expressions was also found ($r(n=51)= .028$, $p= .044$), which would suggest that the more determination the participant has, the more times they “tut” during the gaming situation.

Table 3.
Pearson correlation showing the relationships between other variables and expression of open smiles and laughter.

	Open Smile	Closed Smile	Pout	Protest	Tongue	Mouth Twitch	Grimace	Head Shake	"Tut"	Swear	Speech	Laugh
Self-Monitoring	-.14	-.06	.26	.14	-.06	-.07	.13	.11	.24	.11	.01	-.16
Self-Esteem	.09	-.15	.19	.16	.19	.03	-.14	-.08	.03	.36**	.26	-.07
Personality												
-Extraversion	.11	.14	.24	-.12	-.11	-.03	.02	.05	-.14	.23	.17	.07
-Agreeableness	.23	.10	-.05	.13	.16	.15	.16	-.05	-.12	.19	.04	-.02
-Conscientiousness	-.03	.19	.11	,.04	-.10	.17	-.00	.24	.25	.31*	.04	.07
-Neuroticism	.00	-.17	.00	-.05	-.12	.01	.19	.03	-.06	-.29*	.01	-.00
-Openness	-.23	.12	-.06	.11	.22	.02	.10	-.08	.17	.04	-.18	-.25
Competition												
-Achievement	-.07	-.08	.15	-.08	-.23	.36*	-.04	.34*	.10	.13	.02	-.14
-Social Competition	-.10	-.11	.14	.84**	-.14	.30*	.06	.14	.28*	.10	-.02	-.10
-Formal Competition	-.21	-.15	.11	.11	-.03	.11	-.19	-.15	.17	.16	-.12	-.24

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

3.3 Effects of Other Game Related Variables

To investigate the influence of any other game playing related variables on participants experience of the gaming situation, measures of how well the participants did in the game during the study (race position), their previous game playing experience, their preference of opponent (another person either face-to-face or via the internet, or playing alone) when playing computer games and the people they reported usually playing (friends, housemates, family, strangers or alone) were examined in relation to subjective enjoyment of the gaming situation and facial and verbal expressions.

3.3.1 Enjoyment

The relationship between game play related variables measured and the subjective enjoyment of the gaming situation was investigated using a Pearson Correlation and is shown in Table 4. A significant, negative correlation was found between the position the participant came in the race and the subjective rating of enjoyment of the gaming situation ($r(n=51)= -.42$, $p= .002$), which would suggest that the higher the position the participant came in the race (i.e. the worse the participant did), the less they enjoyed the gaming situation.

Table 4.

	Enjoyment
Played the Game Before	.21
Race Position	-.42**
Computer Experience	.21
Preference of Opponent	-.16
Whom you Usually Play	
-Alone	.05
-Housemates	.27
-Friends	.09
-Family	.07
-Strangers	.12

Pearson correlation showing the relationships between other game related variables and enjoyment of the gaming situation.

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

3.3.2 Facial and Verbal Expressions

Table 5 shows the Pearson correlation for the relationships between the game play related variables measured and the different facial and verbal expressions expressed by the participants during game play. A significant, negative correlation was found between participants who had played the game before and laughter ($r(n=51)= -.35$, $p= .013$), which would suggest that participant's who were unfamiliar with the game used in the study laughed more often. A significant, positive correlation was also found between the participants position in the race and laughter

(r(n=51)= .41, p= .003) which would suggest that if the participants did worse in the race and therefore had a worse race position, they laughed more and that participants who did better in the game and had a better race position laughed less.

Table 5
Pearson correlation showing the relationships between the other game play related variables measured and facial and verbal expressions.

	Open Smile	Closed Smile	Pout	Protest	Tongue	Twitch	Grimace	Head Shake	"Tut"	Swear	Speech	Laugh
Played Before	-.14	.01	.06	-.10	-.26	.09	.05	.15	-.17	.01	-.18	-.35*
Race Position	.25	-.03	-.02	-.12	-.11	-.21	.28*	.23	-.05	-.13	.29*	.41**
Computer Experience	.01	-.05	-.07	.36**	-.13	.29*	-.16	-.05	.06	.01	-.07	-.15
Opponent Preferred	.10	-.26	.15	.06	.14	.20	.16	.12	.01	.19	.19	.02
Usually Play												
-Alone	.05	-.08	.10	.05	-.08	.24	-.19	-.05	.01	.14	-.04	.04
-Housemates	-.06	-.15	.13	.23	.01	.42**	-.02	-.20	.00	.13	-.17	-.29*
-Friends	.03	-.10	-.10	.28*	-.08	.29*	-.15	-.11	-.02	.13	-.11	-.07
-Family	-.12	-.12	-.18	.09	-.29*	.10	-.13	-.06	.18	-.18	-.10	-.05
-Strangers	.03	-.01	-.02	.24	-.07	.14	-.07	-.10	.03	.15	.04	.09

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

To further investigate the effect of race position on subjective enjoyment, laughter and speech, Pearson correlation coefficients were calculated for each of the three conditions; a gaming situation alone, a gaming situation where the opponent was in the same room or a gaming situation where the opponent was in a different room.

Table 6.
Pearson correlation showing relationship between race position and enjoyment and the relationship between race position and laughter, for each of the three conditions.

	Alone		F to F With Opponent		Against Unseen Opponent	
Race Position	Enjoyment -.31	Laugh .73**	Enjoyment -.63**	Laugh .39	Enjoyment -.24	Laugh .28

**. Correlation significant at the 0.01 level (2-tailed).

In the face to face condition, a significant, negative correlation between race position and enjoyment was found, ($r(n=51)= -.63$, $p= .006$), which suggests that as the participants race position increased (i.e. the participant did worse in the race), so their subjective rating of enjoyment for the gaming situation decreased. However in the alone and against an unseen opponent, no significant correlation was found between race position and enjoyment.

In addition in the condition where the participant was in the gaming situation alone, a significant, positive correlation between race position and laughter was found ($r(n=51)= .73$, $p= .001$), which suggests that as the participants race position increased (i.e. the participant did worse in the race), so they laughed more. In the condition where the participant was against an unseen opponent, no significant correlation was found between race position and enjoyment or laughter.

4. Discussion

The present study found that when playing a computer console racing game against an opponent in the same room, participants smiled and laughed more compared to when the opponent was in a different room. Laughter and open smiling was expressed least when the participant was playing the racing game alone, although participants laughed more if they did worse in the racing game when playing alone. It was also found that when playing against another person face-to-face, the worse the participants did in the game, the lower they rated their enjoyment of the experience. However, the type of opponent made no difference to the participants reported enjoyment of the game and concurrently, there was no effect of individual differences on participants reported enjoyment of the game.

Whilst playing an opponent face-to-face, the participant had someone to engage and interact with, which could explain the increased expression of open smiles and laughter, compared to when the opponent was in a different room. The presence of another person has previously been shown to increase emotional expression in children (Shahid et al. 2008) and this study has demonstrated similar effects in adults. Co-presence may increase expression for a number of reasons, however there were no differences in reported enjoyment across the gaming situations, suggesting that playing an opponent face-to-face is no more enjoyable than when

the opponent is in a different room, or a computer. It could therefore be argued that the increased smiling and laughter when the opponent was face-to-face was not due to increased enjoyment of the gaming situation.

Ravaja et al. (2006) commented that facial expressions generally demonstrate differences in emotions across situations, so it could be inferred that the increased smiling and laughing when playing an opponent face-to-face demonstrates emotions other than enjoyment. Although smiling and laughter often indicate enjoyment, they also represent happiness which, as a primary emotion, can demonstrate feelings at particular moments (Mehu, Grammerb & Dunbara, 2007). The smiles and laughter expressed by participants may demonstrate their feelings of happiness at particular moments, but upon evaluation of the whole experience, rate it as un-enjoyable.

Research has also demonstrated that in social situations, people use facial expressions to assist in social interactions (Ekman & Friesen, 1976). It may be that the use of a shared screen in computer gaming situations restricts players in their use of facial expressions (Zagal et al. 200), and so players have to use expressions that are easily communicated in these types of situations. Open smiling and laughing are obvious expressions, even when players are focused on a screen in front of them, and this may be why participants used these expressions. With regards to laughter, there have been proposals that the function of laughter is a psychological 'defence mechanism'. If people encounter a threat from something that turns out to be trivial, it is often used as a joke, or laughed about, so as to downplay its importance (Ramachandran, 1998). It may be that out of embarrassment, participants used laughter to demonstrate it was a trivial game they were playing. Interestingly the study found that the worse participants did in the game, the lower they rated their enjoyment of the game when the opponent was face-to-face. It seems to be the case that participants who did worse in the game may have used laughter as a defence mechanism, and because of this, and their poor performance, rated the situation as un-enjoyable upon evaluation.

It would appear that the presence of another person does not increase enjoyment of gaming situations as previous research has suggested (Ravaja, Saari, Salminen, Laarni, Holopainen & Järvinen, 2004), but that it is the outcome of the game that determines enjoyment of the game. However, as Ravaja et al. (2004) found, emotional response patterns can be a more accurate indicator of enjoyment of a game than subjective ratings. This may also be the case in this study, because only smiling and laughter, expressions of positive emotions, were expressed when playing an opponent face-to-face. Smiling and laughing are expressions of positive emotions, and because there were no other differences in expressions across the conditions, it could be inferred that the players were experiencing positive emotions.

It should also be considered why there was smiling and laughter when the participant was playing alone against the computer and when playing against an opponent in a different room. Ravaja et al. (2006) state that facial expressions serve as a communicative function, so people will not need to use facial expressions when playing alone. The participants may have smiled and laughed when playing an opponent in a different room because they met the opponent and know they are playing against a real person. It may be that the participant feels they are present with the opponent because of the split screen, where both players can see each

other's characters on their monitors. The participants may have been reacting and expressing in the same way they would if sharing a split screen with a person in the same room, because they can see the opponent's character, and what the opponent is doing via their character.

The study also found that when playing alone, the worse the participant did, the more they laughed. Again laughter in this context could be used as a defence mechanism by the participant to reiterate to themselves that they were only playing a trivial game. It may also be the case that this study has shown that whilst playing computer games, people do use facial and verbal expressions to outwardly express their feelings, which other studies have suggested should not happen (Ravaja et al., 2004). Playing computer games, especially when loosing, can be very frustrating for people, and the increase in laughter may be a way of releasing this frustration.

Reported enjoyment of the gaming situation was also consistent across all of the individual differences measured. This would suggest that people's individual differences and personalities do not affect their enjoyment of computer gaming situations, or who the opponent is in these situations. Previous research has often stereotyped computer game players as introverted (Douse & McManus, 1993) and with low self-esteem (Colwell & Payne, 2000), but neither these, nor any other personality traits, were found to be related to the enjoyment of the computer gaming situation. This would lead us to conclude that computer games are enjoyed by people with all types of personality trait.

It is interesting that competition had no effect on enjoyment, and having used the achievement monitoring scale, the study showed that neither winning nor losing was a factor influencing the enjoyment of the game nor was the participants determination or motivation. The game used in the study is not an overly competitive game because players can finish in any position from first to twelfth and so allows for emotional expression to be recorded in relation to trait competitiveness and not state competitiveness. However, it may be that the game, and the situation, wasn't important enough to allow for the expression of these traits in relation to enjoyment. It may also be that when regarded as a personality trait, enjoyment is not related to competition.

It was also found that differences in self-esteem had no affect on enjoyment across the different gaming situations. Self-esteem is a fixed attribute and it is only levels of self-worth that can change, so by measuring the fixed attribute, the study has shown that people's levels of self-esteem do not affect enjoyment of computer gaming situations. If self-worth had been measured before and after the participants played the game, it may have shown that if people did worse in the game, their feelings of self-worth decreased. This may have also given more evidence for the decrease in reported enjoyment when players did worse in the game.

4.1 Limitations and future directions

The current study only looked at how an opponent who was a stranger affected participant's emotional expression, although previous research has compared opponents who have either been friends or strangers to the participant (Ravaja et al. 2006). The emotional expression of participants may have been limited because the

opponent was a stranger and interactions between strangers often cause reductions in emotional expression. It may be interesting to see if these results are the same when the opponent is a friend as opposed to a stranger, especially when the opponent is in a different room.

Like previous studies, this study involved a multiplayer game played in the traditional way, where players sit next to each other, and there is little opportunity for interaction as they are focused on the television screen. The study did not address the amount of interaction between the participant and opponent, however it was found that there was an increase in smiling and laughing across the situations, but there were no differences in any other facial or verbal expressions. This would suggest that interaction is reduced due to the screen, so future studies should look at ways in which players orientation is toward each other, and how this may affect interaction and expression. Replication of this study, but changing the arrangement of the participants, for example having them stand during the game, may allow for this.

4.2 Conclusion

The present study demonstrated that the type of opponent had no effect on ratings of enjoyment of the game. It did show that playing an opponent in the same room caused greater expression of smiles and laughter than playing a computer or an opponent in a different room. In addition, when doing badly in the game, laughter is expressed more when playing alone and when playing against another person, ratings of enjoyment are lower when doing badly in the game. The results demonstrate that the opponent makes no difference to the enjoyment of the game but it would appear to be how well people do in the game that is the important factor in enjoyment. Enjoyment ratings were consistent across personality types, demonstrating that there is no particular type of person that enjoys computer games more than others.

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