

The Effect of “Co-Pilot” Mode on Player Enjoyment in  
Cooperative Local Multiplayer Games.

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Research Paper

Innovation & Professional Practice (DES505)

## Intro:

### Context:

Microsoft's "Co-Pilot" mode which was released in a patch for the console, "Xbox One" (Microsoft Corporation, 2017) allows for the re-mapping of a game's controls to multiple controllers, allowing for multiple players to control a game simultaneously. For example, allowing one player to move the character of a game while another controls the



Figure 1- An example of how a game's controls could be mapped to multiple controllers

interactions. This feature is predominantly used for the use of helping players overcome challenges they cannot solve themselves, for example, if a younger player is having difficulties with an in-game puzzle; another player can take the controls and complete the challenge for them.

This however is not the only use for "Co-Pilot" mode as there is great potential for the technology to be further utilized as a means of creating new and interesting local cooperative multiplayer experiences. As mentioned in the web series "Extra Credits" (Extra Credits, 2017), mapping the controls of a game to multiple controllers in concept is a brilliant idea when playing with a younger player as it allows them a chance to play, however, also stated is that this method of control would not be very usable and would result in performing more poorly at the game as opposed to playing alone.

Control schemes by nature must be intuitive and simple to understand in order for a player to not get confused and frustrated with the game. The research paper *Measuring the Impact of Game Controllers on Player Experience in FPS Games* (Gerling et al, 2011) explores this problem by getting participants to play a First Person Shooter game using both a mouse and keyboard and a PlayStation 3 controller. Both player experience and game usability issues were compared when using both control schemes. Although participants stated that they felt more challenged by the game if they were not using their preferred control scheme, they also showed positive reactions towards the game which remained high during play sessions. As the paper states, this suggests that if a certain level of usability is kept, a change of controls does not lead to a significant decrease in a player's experience of the game.

This is a key point towards the use of "Co-Pilot" mode in a cooperative local multiplayer game. If the control scheme can be used and created in such a way that is both non-intrusive and maintains a level of usability, it can lead to fun and exciting local multiplayer experiences.

## Cooperative local multiplayer games

In recent years there has been a resurgence of local multiplayer cooperative games. An example of a recent multiplayer game is Hazelight Studio's *A Way Out* (Electronic Arts, 2018) which has no single player option and must be played with a partner, where each player takes control of a convict trying to escape prison.



Figure 2- Hazelight Studio's *A Way Out*.

A cooperative multiplayer game. Shows split screen when played locally and online. Both players see's each other's actions, allows for cooperation and coordination.

Players must coordinate and cooperate to solve puzzles and escape. Or Bit Loom's *PHOGS* (Bit Loom, 2017) where two players

must use a single controller to control a two headed dog with each player controlling one of the heads to navigate levels and solve puzzles.

Although an unusual control scheme, it is not an unheard of method to control a game. These two games and their unique methods of cooperative play demonstrate a desire for the industry to revisit local cooperative multiplayer games. This is evident not just in the release of these games but also the methods as to which some players are interacting with their local multiplayer games.



Figure 3- Bit Loom's *PHOGS*

A local Cooperative multiplayer game. Two Players using the same controller to play the same game.

*Brothers: A Tale of Two Sons* (505 Games, 2013) focuses on controlling the aforementioned brothers; two separate characters on a single controller.

Each side of the controller controls one of the brothers using the thumb sticks to move each of the brothers and the triggers to interact with the game world. Although not a unique control scheme or how the game was intended to be played, the game has spawned various players to try and play the game with a friend with each player controlling one of the brothers. An example of this can be found on the popular YouTube series *Game Grumps* (Game Grumps, 2013). Although not the initial design of the game, it has raised questions about interesting game types that could be created with this style of play in mind; for example the previously mentioned *PHOGS*.

**Research Aim:**

This project explores a similar concept as “Co-Pilot” mode to see what benefits it could bring to local multiplayer experiences as a whole, should similar technologies be created and used on a broader scale and how beneficial “Co-Pilot” mode is for players that are looking for a unique game idea using a unique control scheme.

Alongside this, the goal of this project is to establish if a game can be created based around this control scheme and how enjoyable that game would be, which version of controls should it use (single controller or multiple) and if an enjoyable and useable experience can be created based around “Co-Pilot” mode.

## Method:

In order to gather relevant information on a game based on “Co-Pilot” mode and which genres, control schemes, controls; split between movement and interactions between players, etc. are best for “Co-Pilot” mode an experiment had to be conducted. It was critical to understand what aspects of “Co-Pilot” mode were enjoyable, usable and could be used to create a game and which parts should be avoided.

Initial testing was conducted using a PlayStation (Sony Corporation, 1994) emulator for three games as the software allowed for the controls of a game to be re-mapped to multiple controllers and Steam (Valve Corporation, 2003) for the fourth game, these games were used for the initial data gathering part of the experiment. Three PlayStation games were chosen for the experiment, *Crash Bandicoot: Warped* (Sony Computer Entertainment, 1998), *Croc: Legend of the Gobbos* (Fox Interactive, 1997) and *Resident Evil 3: Nemesis* (Capcom, 1999). These three games were chosen in part due to availability, however ultimately proved beneficial due to their control schemes; 3D movement platformer (Crash), Tank control movement (Controls in a Video Game that don’t allow you to turn and move forward at the same time, much like a tank) platformer (croc) followed by fixed camera angles and tank controls (Resident Evil 3).

These games in unison helped bridge a gap between each other from simple movement controls to more complex movement. This would help ease the participants into more difficult gameplay and controls during testing.

The games were played using the two controller method where each participant would make use of their own controller, (one for movement, one for interactions and combat). Alongside these three PlayStation Games, a fourth game was used; *Brothers: A Tale of Two Sons* (505 Games, 2013). This game used the single controller method where the two



Figure 4- *Brothers: A Tale of Two Sons*. Using each Brother to perform different tasks and controls to solve puzzles.

participants had to share a single controller, with each participant holding one half of the controller (Control stick and a trigger each). As mentioned, various players have adopted this form of play for *Brothers: A Tale of Two Sons* in order to play with a friend. As this was an already established form of play for this game, the single controller option was perfect to test with this game. Alongside this the controls of the game naturally split evenly between two players; each brother is controlled using a control stick and one of the gamepads triggers.

How each games controls were split between participants can be found in appendix 4.

Testers were asked to play each game, either completing the first stage or playing up to a certain point, this was to retrieve as much data from the experiment as possible. With initial pilot testing of the experiment, a mistake was made where participants were asked to play the first section of *Brothers: A Tale of Two Sons*. This led to insufficient data as this section of the game was too short. This mistake was amended in later testing by getting the participants to play to a further point in the game.

During these play sessions participants were encouraged to voice any thoughts they had on the game, their partner, the control scheme or anything that came to mind with relevance to the experiment. They were also encouraged to swap roles (Movement and Interactions) if they wished to, as this would help gather clear information on which was the preferred role.

In the research paper *Understanding and Evaluating Cooperative Games* (Aghabeigi et al, 2010), the researchers discovered that player behaviour and patterns can be exhibited when playing cooperative games. Such patterns include *Shared Goals* which is a pattern that forces players to work together and *Complementarity* where both players play different character roles to complement each other's abilities within the game. This pattern for example would be more commonly found in *Brothers: A Tale of Two Sons* as the game's design relies on the brothers working together in order to solve puzzles. Alongside this the researchers created Cooperative Performance Metrics (CPM). These metrics are associated with observable events within a play session such as, *Laughter or excitement, worked out strategies* and *Got in each other's way*. The goal of the researcher's experiments was to establish which design patterns had a major impact on the aforementioned metrics.

Expanding on Aghabeigi's research, metrics for observing patterns directed towards the controls of a game had to be created, Cooperative Co-Pilot Performance Metrics (CCPPM's). Similar to CPMs, these metrics would help point out which control schemes, and mechanics directed towards the controls would be a benefit to use for a game designed "Co-Pilot" mode and which would only lead to frustration. During play sessions notes were taken on CPMs that were exhibited during play along with CCPPM's.

A description of the CPMs and CCPPMs that were used in this experiment can be found in appendix 3 and the checklist of these can be found in appendix 2.

Whenever a participant showed one of these CPM's (Laughter or Excitement Together) or CCPPM's (Laughter towards controls) a tally would be added to that particular event. Alongside this, the time taken to complete each game was marked; this was to help establish how frequently CPM's or CCPPM's would occur. These tallies would help determine which games, mechanics and control scheme would be most beneficial to be used for a game built around the technology of "Co-Pilot" mode.

After each play session, both participants were asked to fill out a short questionnaire which would gather information on how much they enjoyed the experiment, how well they think they performed and if they would enjoy a game built around the control scheme of “Co-Pilot” mode. Both qualitative and quantitative data has been gathered from these questionnaires to help clearly define the best version of “Co-Pilot” mode. This was also to help gather information on such things as; is “Co-Pilot” mode better suited to “Causal” or “Avid” gamers, is there a preference between being player one (Movement) or player two (Interactions). All of this information was gathered in the hopes of creating a game based on “Co-Pilot” mode and using the best elements from the initial experiment to make the best possible game for the control scheme.

The questionnaire can be found in appendix 1.

## Results:

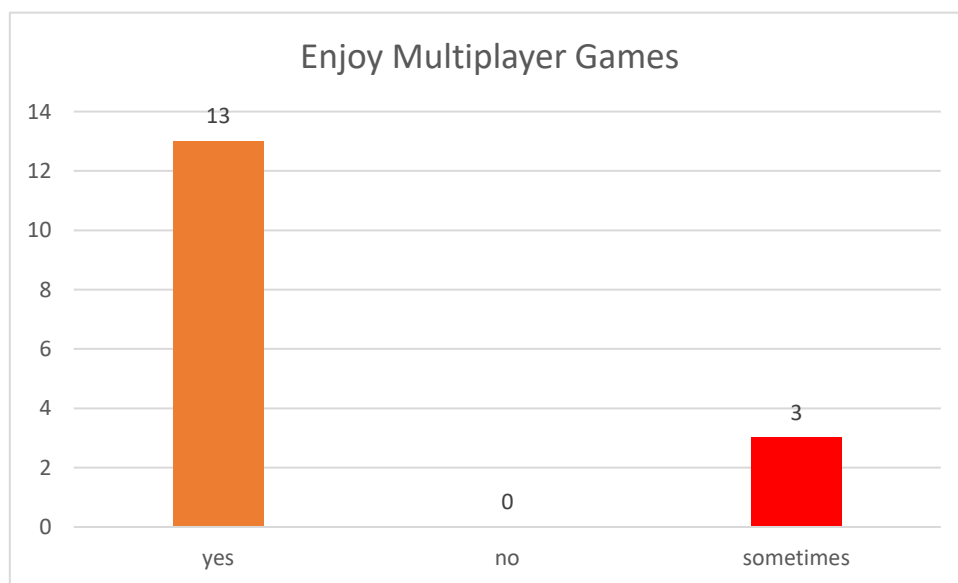
### Overview:

The results of this projects testing are presented as both quantitative data and qualitative data through the numerical ratings given for each question answered in the questionnaire and additional information gathered through the CPM/CCPPM checklist and additional thoughts and notes given by participants at the end of the questionnaire.

### Questionnaire Results:

For the testing of this project, 16 participants were selected, with participants taking part in pairs.

Each participant was asked to fill out a short questionnaire after all four games were played, first question asked participants if they enjoyed multiplayer games (Question 1). This was used to help form a connection between the enjoyment of multiplayer games and if a cooperative local multiplayer game featuring “Co-Pilot” would appeal to the participant (Question 9).



*Figure 5 - "Do you Enjoy Multiplayer games?  
13 out of 16 participants noted that they do enjoy playing multiplayer games*



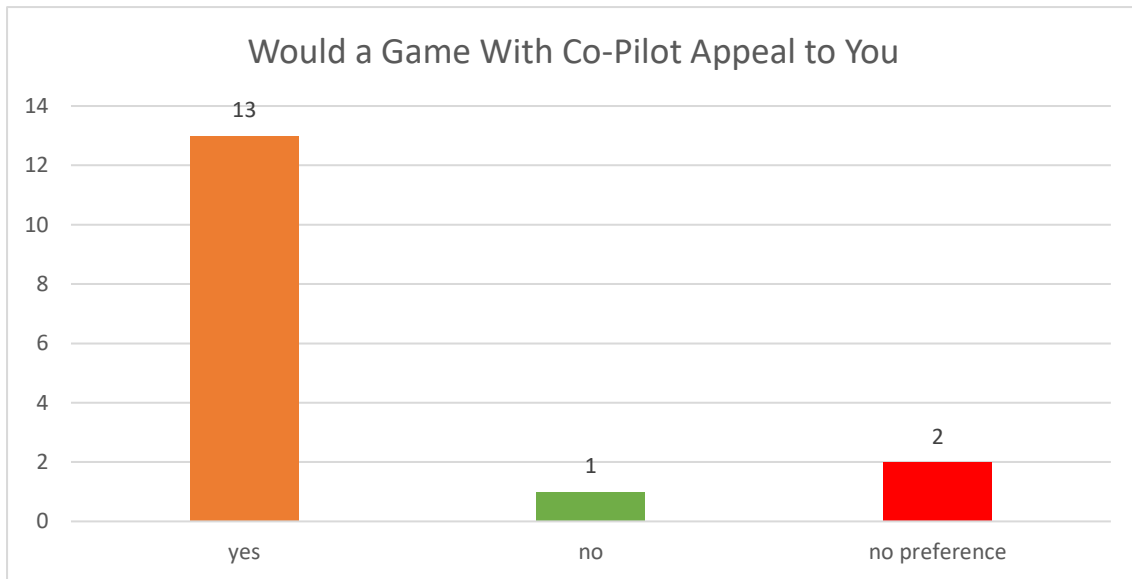


Figure 6 - "Would a local multiplayer game built and designed around the control scheme of "Co-Pilot" mode appeal to you?"

The second question of the questionnaire asked participants how often they would play video games a week. This was to help form a demographic for "Casual" and "Avid" gamers to try and find a link between enjoyment towards "Co-Pilot" mode and how often a participant would play games.

Number of Hours	0 to 5 Hours:	5 to 10 Hours:	Over 10 Hours
Number of Participants	4	3	9

Table 1 number of hours a week

Although participants were chosen at random, the majority of participants can be described as "Avid" gamers.

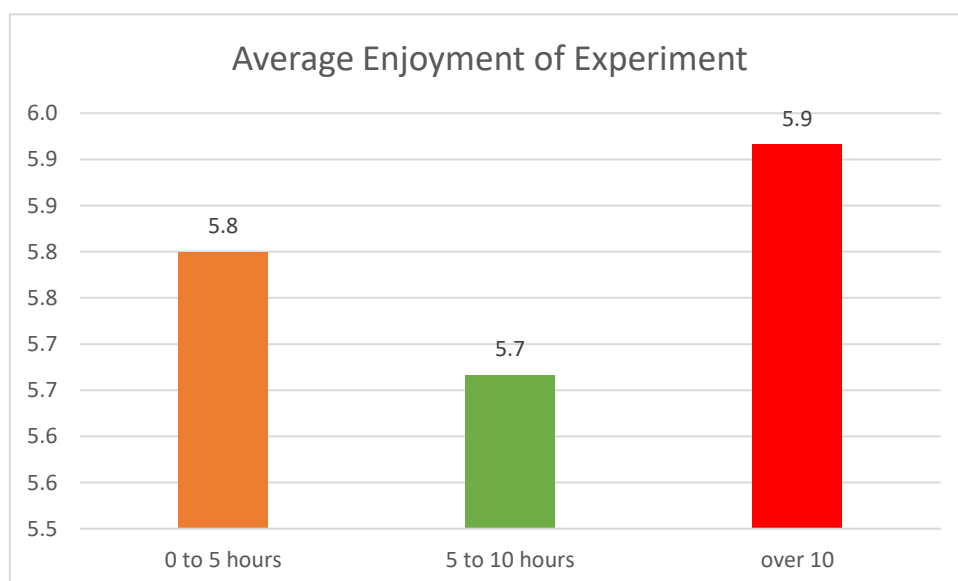


Figure 7- Question 3 of the questionnaire: "On a scale of one to seven, how much did you enjoy the experiment overall?"

In order to clearly define which control scheme was the preferred option to use for an application to be created using “Co-Pilot” mode, questions 4 and 5 asked participants how much they enjoyed using each control scheme. (Question 4: Single controller, Question 5: Two controllers).

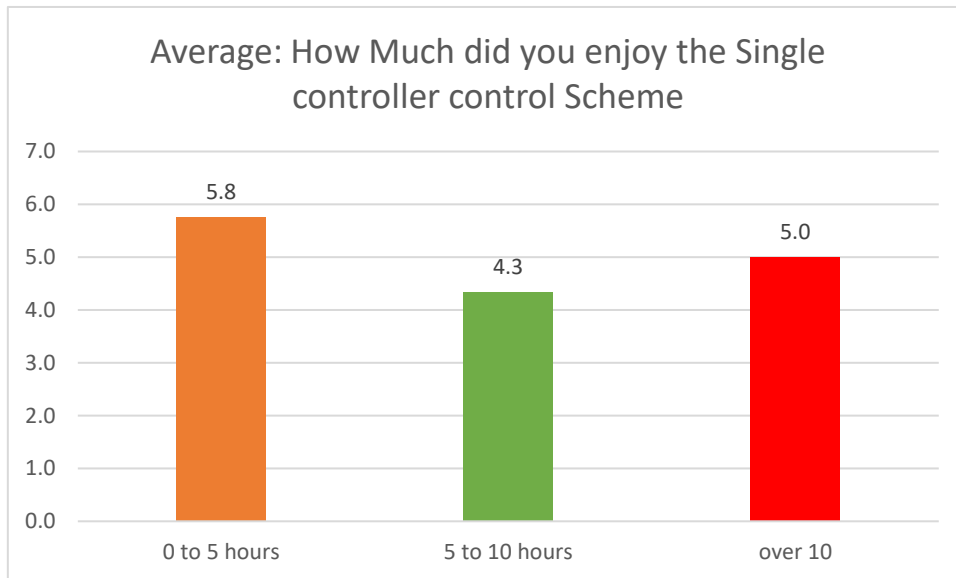


Figure 8 - An average of how much participants enjoyed using a Single Controller

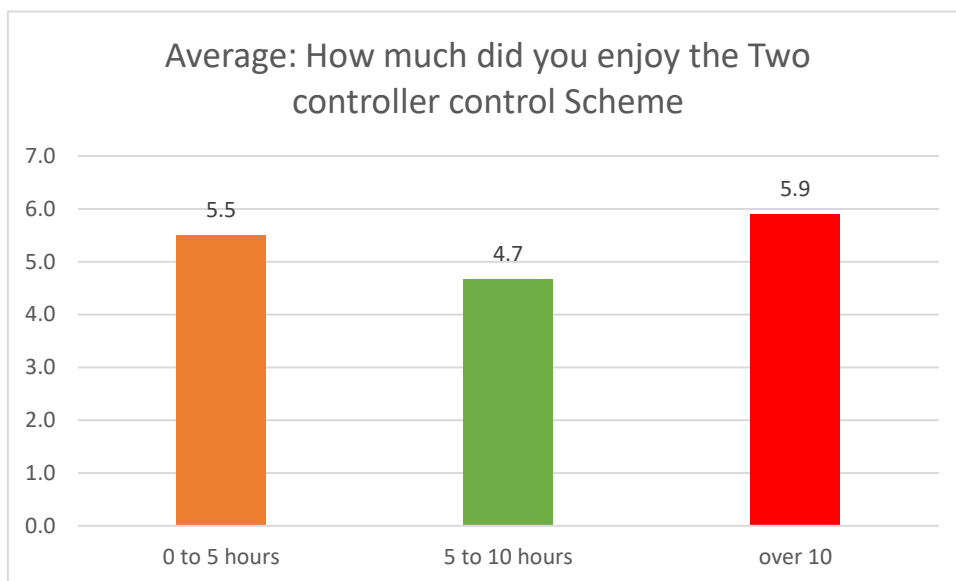


Figure 9- An Average of how much participants enjoyed using two Controllers

From these results there is no clear distinction between which control scheme is the preferred option. However, due to additional information gathered at the end of each questionnaire which asks participants to give any additional thoughts on the project; clear preferences for which game genres, control schemes and more was gathered alongside this statistical analysis of each control scheme has shown a preference towards a specific control scheme.

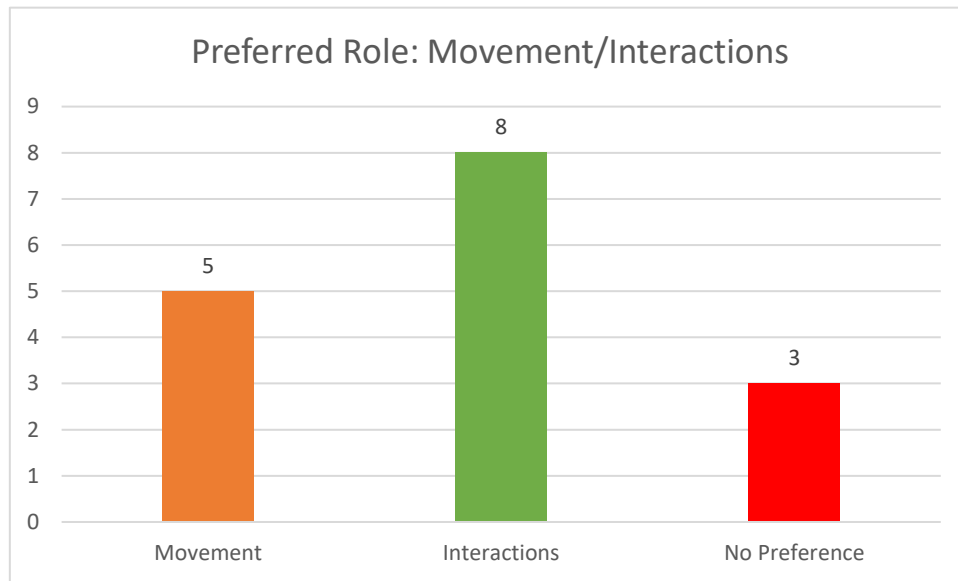


Figure 10 - Question 8- "Which did you prefer playing as?"

Although information from the questionnaire as to which control scheme was the preferred option is unclear, it is clear from figure 10 that the majority of players preferred playing the role of interactions (attacking, interacting with objects and jumping). This could be due to the interactions role having more of an impact on the game itself or simply due to there being more to do. Due to this, if an application was to be created based on "Co-Pilot" mode then the roles would have to be balanced in such a way that both players are having a clear impact on the game.

### CPM/ CCPPM Checklist Results:

In order to gather information on which games and by extension, which mechanics, genres of game, camera angle, control scheme etc. would be most enjoyable in an application created around “Co-Pilot” mode a checklist of Cooperative Performance Metrics (CPM) (Aghabeigi et al, 2010) and Cooperative Co-Pilot Performance Metrics (CCPPM) was created and used during play sessions. Whenever a participant would exhibit a specific behaviour such as laughing or voicing discomfort towards the controls, a tally was marked next to its respected CPM or CCPPM.

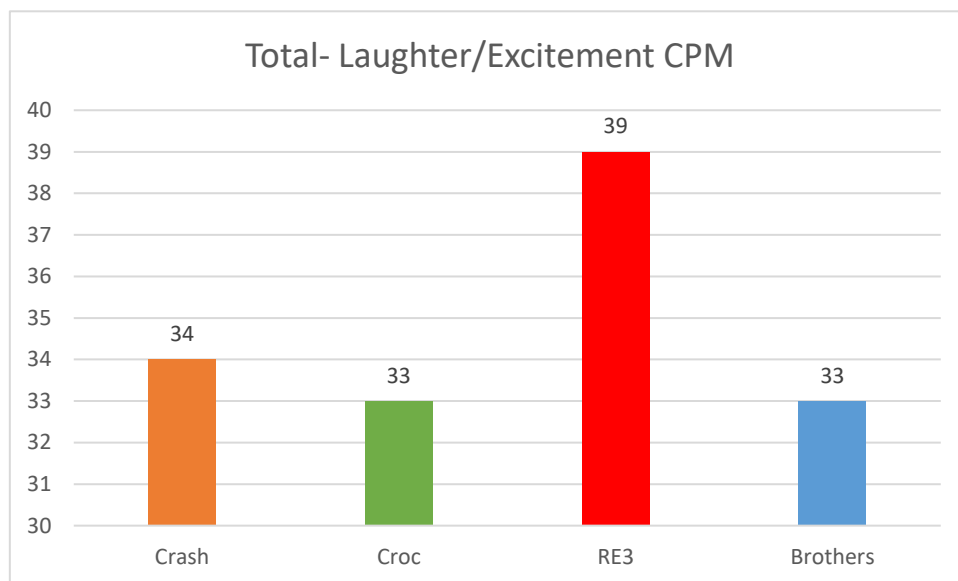


Figure 11- CPM "Laughter and Excitement Together"

Each game exhibited a large number of instances of laughter and excitement, demonstrating that “Co-Pilot” mode can be an enjoyable experience in the confines of local cooperative multiplayer games.

*Resident Evil 3: Nemesis* (Capcom, 1999) is consistently the highest rating game for positive CPM's (Laughter/ Excitement, Worked out strategies and Global strategies).

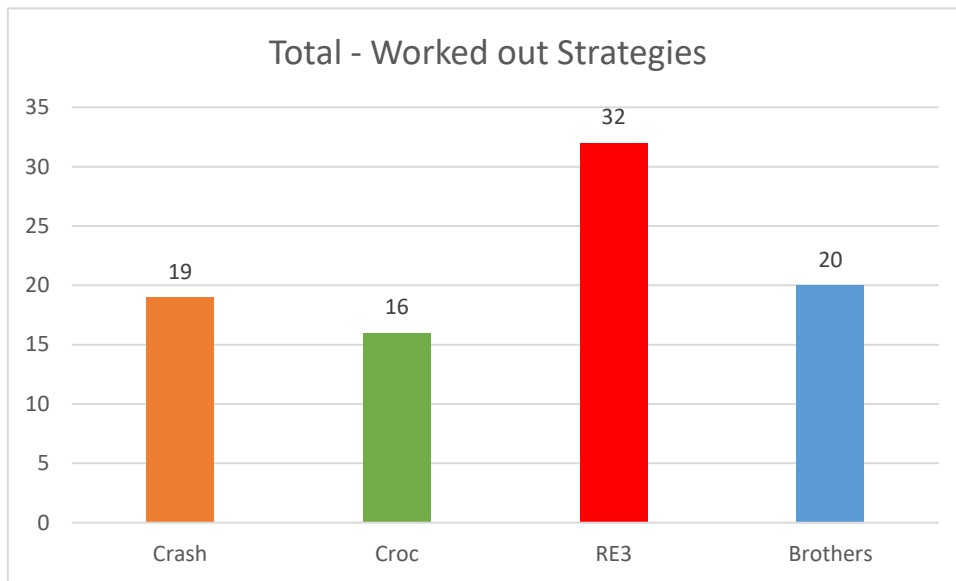


Figure 12- CPM "Worked out Strategies"

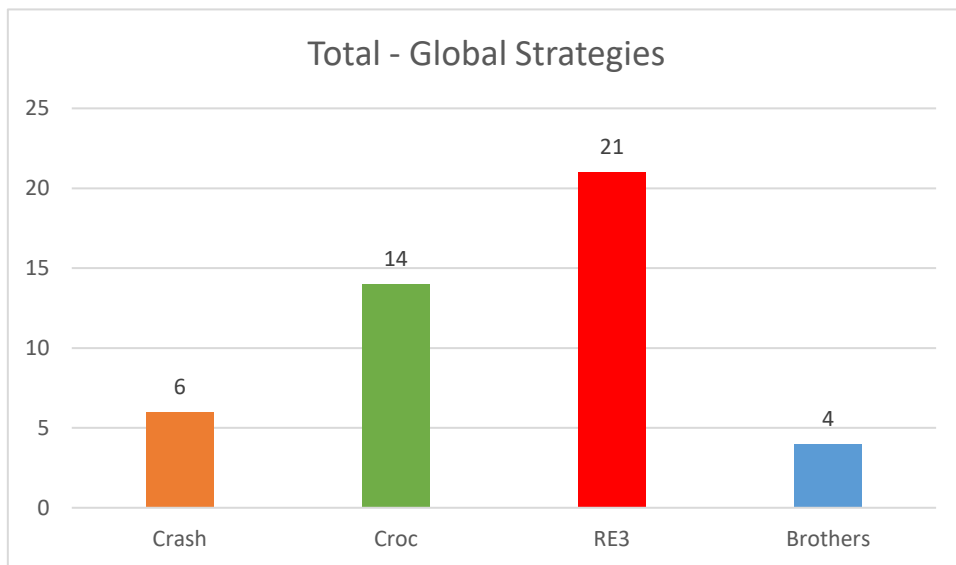


Figure 13- CPM "Global Strategies"

Alongside this *Resident Evil 3 Nemesis* also showed high results for the CPM's (Helped Each Other and Waited for Each Other). It is believe due to the nature of the game, puzzle solving, awkward controls, being attacked by enemies and item management all encourage participants to talk to each other more often and thus form better strategies and work cooperatively in order to survive the game.

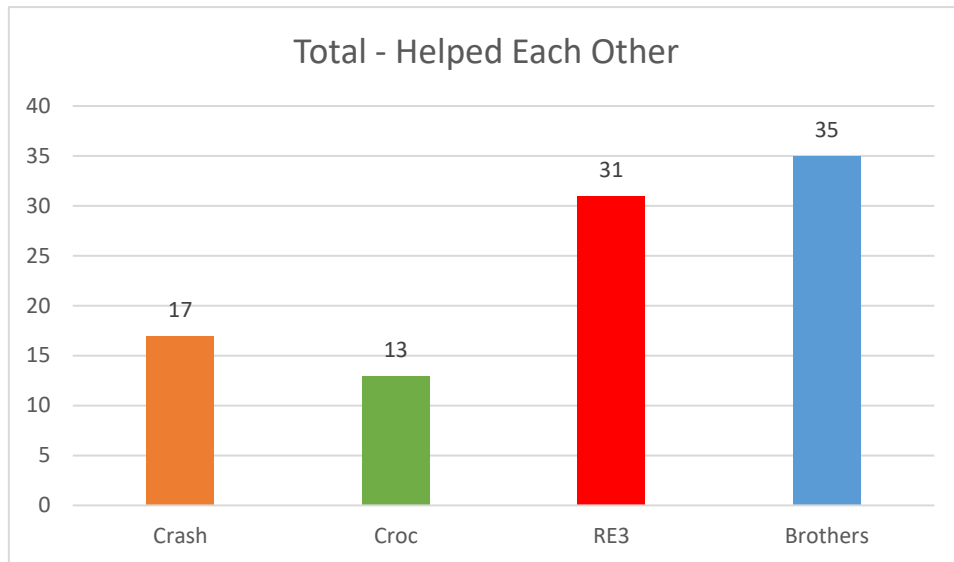


Figure 14- CPM "Helped Each Other"

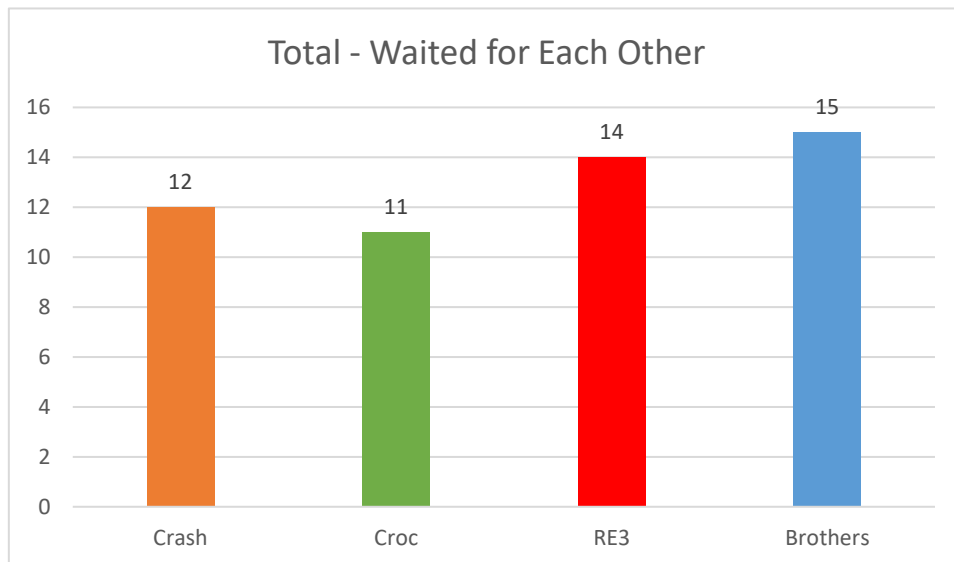


Figure 15- CPM "Waited for Each Other"

Both *Resident Evil 3: Nemesis* and *Croc: Legend of the Gobbos* (Fox Interactive, 1997) feature "Tank control" style of movement systems in their game's and limited camera control. However *Croc* performed much more poorly in terms of positive CPMs and in fact exhibited the most negative CPMs and CCPMs such as (Got in Each Other's Way, Voicing Discomfort and Frustration towards Controls (Which *Resident Evil 3* also shares)). It is hypothesised that this is due to the style of game that these "Tank Controls" are used in. For a survival Horror game where the characters movements enhance the players fright and panic towards monsters, but the same controls when used for a platformer where the player much make precision jumping, leads to frustration and discomfort of the game.

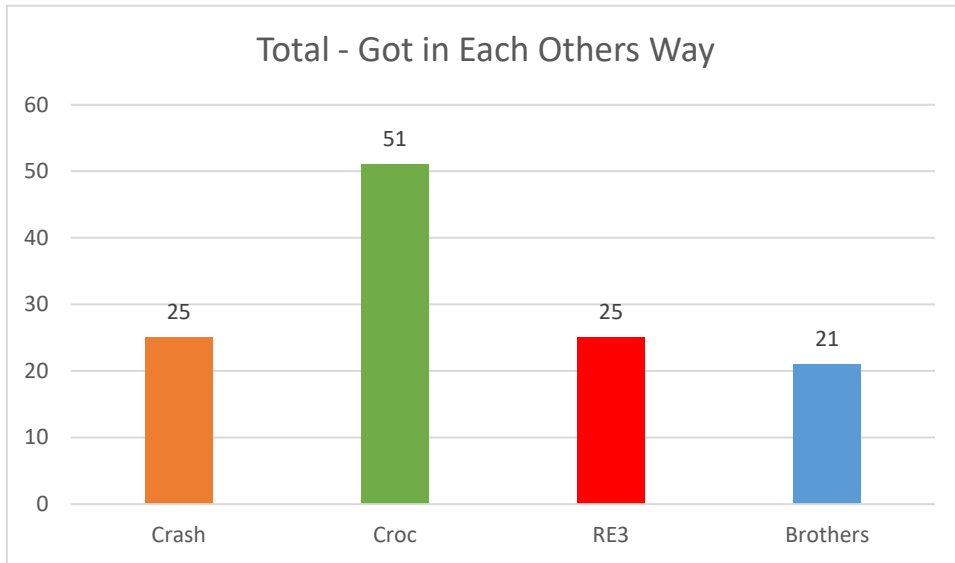


Figure 16- CPM "Got in Each Other's Way"

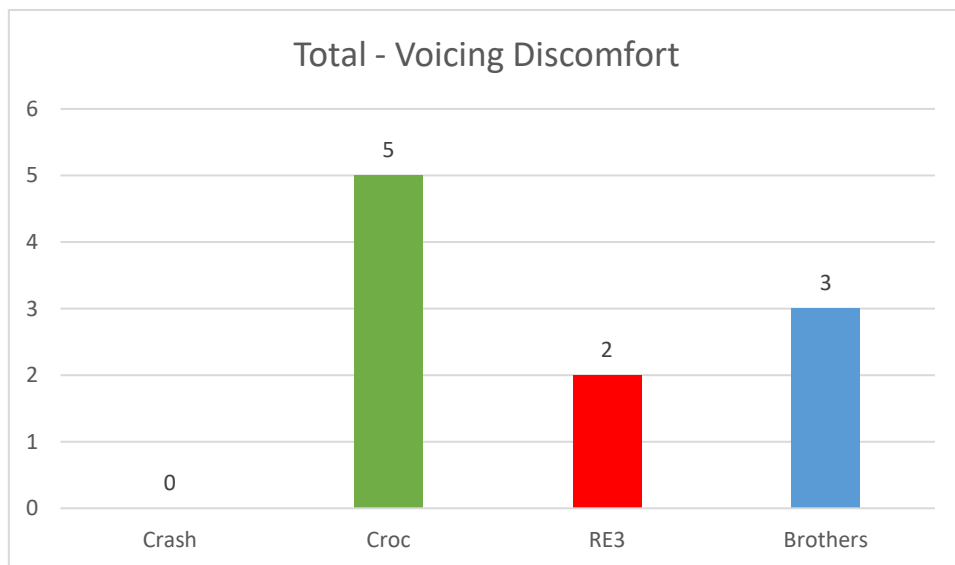


Figure 17- CCPPM "Voicing Discomfort"

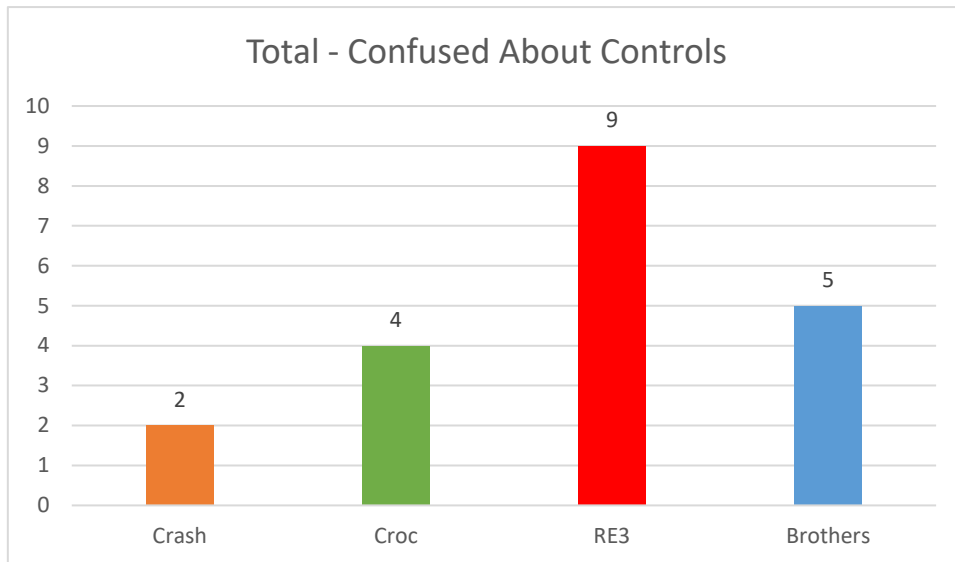


Figure 18- CCPPM "Confused about Controls"

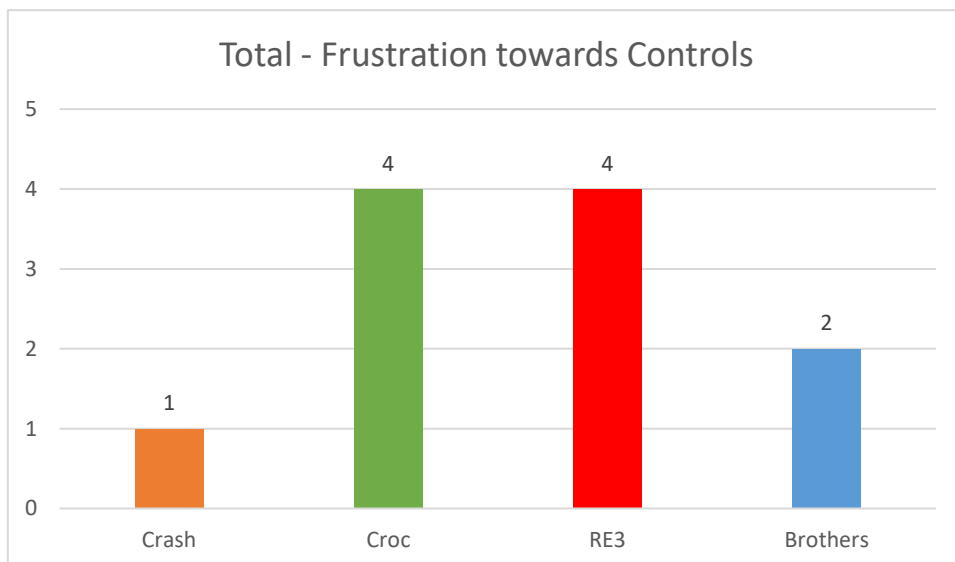


Figure 19- CCPPM "Frustration towards Controls"

As stated in the research paper *Measuring the Impact of game controllers on player experience in FPS Games* (Gerling et al, 2011), when players are given a control scheme they are not familiar with they will feel more challenged by a game; however in the study players still exhibited positive reactions during play sessions. This has been the same for this experiment in regards to *Resident Evil 3: Nemesis* specifically. As suggested in the research paper and this experiment, if a certain level of usability is kept, a change of controls is not followed by a significant decrease in a player's experience of the game.



### Qualitative Data Analysis:

At the end of the questionnaire, participants were asked to give any additional thoughts or comments on the experiment, games and control schemes. Similar to the results showing laughter and excitement, most participants stated that they enjoyed the experience. Stating that the control schemes could be confusing or frustrating to begin with but ultimately did not ruin the experience as a whole.

*“Lots of fun, required booth players to coordinate and communicate.”*

*“A bit frustrating at first, it definitely has a steep learning curve but once you really understand the controls it can be a really fun experience. Would not mind doing it again at all.”*

Many participants stated that the use of “Tank Controls” lead to frustration and was their least preferred form of character movement. These statements support the outcomes of the CCPM’s “Voicing Discomfort”, “Confused about Controls” and “Frustration towards Controls” with both *Resident Evil 3: Nemesis* and *Croc: Legend of the Gobbos* sharing the same number of instances of “frustration towards controls” as both these games feature “Tank Controls”.

*“The games featuring the ‘Tank style’ movement was a more difficult experience but, at the same time made for a more vocal, fun experience.”*

*“Croc has never been so fun and frustrating. Crash was made better from the experience.”*

These comments clearly state that games featuring “Co-Pilot” mode can be an enjoyable local cooperative multiplayer experience. If a game were to be created around the control scheme of “Co-Pilot”, extra care should be exhibited in the creation of the characters movement options. If the player character is confusing and frustrating to move it can lead to frustration.

Alongside this, common threads were noted in each of the participant’s additional comments. This was to help establish a quantitative data set that can be used alongside the qualitative data that was given.

Enjoyment	10
Cooperation	5
Frustration towards controls	11
Communication	2
Challenge	3
Movement frustration	3

Table 2 – Frequency of Trends.

This table shows the instances of common trends found in each participant’s statements. As can be seen from this table, the most dominant trends are *Enjoyment* and *Frustration towards controls*. This supports the information given by the questionnaire and supports the research paper *Measuring the Impact of game controllers on player experience in FPS Games* (Gerling et al, 2011) which states that if a level of usability is maintained, user enjoyment is not lost.

## Statistical Analysis of Controller Enjoyment:

In order to help establish which control scheme would be most beneficial to be used in a game built around “Co-Pilot” mode and which would be the most enjoyed. A comparison test was conducted on the enjoyment levels of each control scheme. As stated participants were asked to rank their enjoyment of each control scheme. This data was used in a normality test which concluded that one data set was not normally distributed meaning a Wilcoxon test would have to be conducted to see if there was a significant difference in the enjoyment level of each control scheme.

	Kolmogorov-Smirnov <sup>a</sup>			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
EnjoymentTwoControllers	.356	16	.000	.779	16	.001
EnjoymentOneController	.168	16	.200*	.923	16	.188

\*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

□

Figure 20- Normality Test for Enjoyment of each control scheme

		N	Mean Rank	Sum of Ranks
EnjoymentOneController -	Negative Ranks	10 <sup>a</sup>	5.60	56.00
EnjoymentTwoControllers	Positive Ranks	2 <sup>b</sup>	11.00	22.00
	Ties	4 <sup>c</sup>		
	Total	16		

a. EnjoymentOneController < EnjoymentTwoControllers

b. EnjoymentOneController > EnjoymentTwoControllers

c. EnjoymentOneController = EnjoymentTwoControllers

Figure 21- Wilcoxon Test for one controller and two controller control scheme

### Test Statistics<sup>a</sup>

EnjoymentOneController - EnjoymentTwoControllers	
Z	-1.366 <sup>b</sup>
Asymp. Sig. (2-tailed)	.172

a. Wilcoxon Signed Ranks Test

b. Based on positive ranks.

Figure 22- Wilcoxon Test for one controller and two controller control scheme

As the significant value from the Wilcoxon test is greater than 0.05 ( $p=0.172$ ) there is no significant difference in enjoyment levels of each control scheme.

This information shows that if a game were to be created using the “Co-Pilot” control scheme, it would not make a significant difference in terms of enjoyment which control scheme were to be used; (one controller or two).

However, to further conclude which control scheme would be the best option for a game featuring “Co-Pilot” mode an Association test had to be conducted.

Based on the information given for overall enjoyment of the experiment and the enjoyment of each control scheme an association had to be established. For this a Pearson Correlation test had to be conducted.

### Correlations

		OverallEnjoyment	EnjoymentOneController
OverallEnjoyment	Pearson Correlation	1	.488
	Sig. (2-tailed)		.055
	N	16	16
EnjoymentOneController	Pearson Correlation	.488	1
	Sig. (2-tailed)	.055	
	N	16	16

Figure 23- Correlation between Overall Enjoyment and Enjoyment of One controller

From the Pearson Correlation test the significant value is greater than 0.05 ( $p\text{ value}=0.055$ ), this means that there is no significant association between overall enjoyment of the experiment and the enjoyment of the single controller control scheme.

The same test was conducted for the two controller control scheme.

		OverallEnjoyment	EnjoymentTwoControllers
OverallEnjoyment	Pearson Correlation	1	.729**
	Sig. (2-tailed)		.001
	N	16	16
EnjoymentTwoControllers	Pearson Correlation	.729**	1
	Sig. (2-tailed)	.001	
	N	16	16

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

Figure 24- Correlation between Overall Enjoyment and Enjoyment of Two controller

For this Pearson Correlation test the significant value was found to be 0.001. This signifies that there is a significant association between overall enjoyment of the experiment and the enjoyment of the two controller control scheme. This information shows that despite comparison tests between the two control schemes, the two controller control scheme did have a significant impact on player's enjoyment of the experiment.

What should also be noted is how well participants performed during the experiment. As stated in the *Extra Credits* video *Co-Pilot Mode- Better Together- Extra Credits* (Extra Credits, 2017) although "Co-Pilot" mode could be fun to use it would affect how well a player was able to perform and would ultimately lead to players performing more poorly compared to playing a game on their own.

A Pearson's Correlation test was conducted in order to see if there was an association between overall enjoyment of the experiment and how well the participants believed they and their respective partner performed.

		OverallEnjoyment	YouPerformed
OverallEnjoyment	Pearson Correlation	1	.128
	Sig. (2-tailed)		.636
	N	16	16
YouPerformed	Pearson Correlation	.128	1
	Sig. (2-tailed)	.636	
	N	16	16

Figure 25- Correlation between Overall Enjoyment and Participant Performance.

### Correlations

		OverallEnjoyment	PartnerPerform
OverallEnjoyment	Pearson Correlation	1	.363
	Sig. (2-tailed)		.167
	N	16	16
PartnerPerform	Pearson Correlation	.363	1
	Sig. (2-tailed)	.167	
	N	16	16

Figure 26- Correlation between Overall Enjoyment and Partner Performance

For both correlation tests, testing to see if there was a significant association between how well a player performed and how much they enjoyed the experiment and overall enjoyment with how well their partner performed. The significant value for both tests were greater than 0.05. (0.636, 0.363) This means that there was no significant association between a player's overall enjoyment of the experiment and how well the participant thought they or their partner performed. These test results support the hypothesis formed from *Extra Credits* which states that despite how well the players perform using "Co-Pilot" mode, the local cooperative multiplayer experience can still be an enjoyable one.

## Discussion & Conclusion:

The aim of this project was to establish that the use of “Co-Pilot” mode in cooperative local multiplayer games can lead to an improved and enjoyable multiplayer experience. From the initial testing and results, it is clear that the use of “Co-Pilot” mode has had a positive impact on participants while testing. There are however, a number of factors that must be addressed in order to fully conclude that “Co-Pilot” mode is a viable and worthwhile technology for developers to consider when creating cooperative multiplayer games.

The main issue to address is the lack of artefact, without the inclusion of testing a game which is designed around “Co-Pilot” mode it is somewhat unclear if such a game would be enjoyable to play or would function correctly. However, as suggested in the results of the experiment 13 out of 16 participants stated that a game which featured “Co-Pilot” mode would appeal to them. Alongside this with the results of laughter and excitement being high towards each game it is clear that “Co-Pilot” mode has had a positive impact on cooperative local multiplayer.

In the paper *Measuring the Impact of game controllers on player experience in FPS Games* (Gerling et al, 2011) it states that if a certain level of usability is maintained, positive reactions to the game remain high. This has clearly been exhibited in this experiment, as shown with the high number of results with *laughter and excitement* and the low results for *frustration towards controls* and *confused about controls*.

An important aspect of these results is the few instances of negative CCPPMs towards controls. When playing a game, the player should not focus on the controller or over think the controls. The controls of a game should feel natural to use and should not be intrusive. If a player is not focusing on the controls but rather focusing on the game, the control scheme they are using is not overly frustrating or complicated to use. This shows that the use of “Co-Pilot” mode does not intrude on a player’s ability to play a game effectively or even enjoy the game.

In order for “Co-Pilot” mode to be a success, cooperation and communication is key. With most cooperative games, players must communicate on some level in order to achieve a task. This is more the case for games that have more complicated mechanics or goals. This is evident from the results for the CPM’s *Worked out Strategies*, *Helped Each Other* and *Global Strategies*. *Resident Evil 3: Nemesis* (Capcom, 1999) can be argued to have the most complex controls and goals of each game that was used in this experiment and thus exhibited the most instances of these CPMs (except *Helped Each Other* Where there was only a difference of 4 compared to *Brothers: A Tale of Two Sons* (505 Games, 2013)). This shows that a game which has more complex mechanics and controls encourages players to communicate and help each other more often. If a game were to be created based around “Co-Pilot” mode there would have to be a fine balance between creating complex mechanics that encourage communication and not making them too frustrating to understand or use in the process.

**Conclusion:**

The effect of “Co-Pilot” mode’s inclusion in local cooperative multiplayer experiences has had a positive outcome on the participants and their enjoyment of the experiment. The technology can clearly be used to enhance a gaming experience where players must cooperate and communicate to achieve complex tasks, however at the cost of player performance. It is hypothesised that a game that was designed around the use of “Co-Pilot” mode would be enjoyable and a worthwhile game design aspect for developers to explore in the future. Further investigation of the subject of “Co-Pilot” mode is required in order to discover which genre’s and mechanics work best with its inclusion. It is believed that the best options for “Co-Pilot” mode would be a game which requires a lot of communication and cooperation such as a puzzle game or a game that features puzzle and problem solving elements.

## References:

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## Appendices:

### Appendix 1: Questionnaire:

Date:	
Participant Name:	
Control Scheme:	

Disclaimer: You will not be asked to supply any personal information; you are free to leave at any time if you do not want to continue the experiment.

Purpose: To test the effects of “Co-Pilot” mode (A means of mapping the controls of a game to multiple controllers for players to play a single player game together) on player enjoyment towards local multiplayer.

You will be asked to play a series of games with a fellow participant using two different control schemes for “Co-Pilot” mode. One where each participant is given their own controller to use. And one where you will be asked to share a single controller. You are encouraged to speak with your fellow participant while playing if you wish to.

The data that is being gathered is the user’s enjoyment towards the games and the control schemes, you will be asked to fill out a simple questionnaire after the play session to gather this information. Alongside this you will be monitored during play sessions to help gather your reactions to the experiment.

Please confirm that you acknowledge the information you supply on this form will be used for data gathering and will be used in a research paper and you are willing to allow this information to be used.

Signature:

**Question 1:**

Do you enjoy Multiplayer games? (Please Tick)

Yes

No

Some Times

**Question 2:**

How often do you play video games? (Please Tick)

0 to 5 hours a week.

5 to 10 hours a week.

Over 10 hours a week.

**Question 3:**

On a scale of one to seven, how much did you enjoy the experiment overall? (Please Circle)

1-----2-----3-----4-----5-----6-----7

**Question 4:**

On a scale of one to seven, how much did you enjoy using the control scheme (single controller)? (Please Circle)

1-----2-----3-----4-----5-----6-----7

**Question 5:**

On a scale of one to seven, how much did you enjoy using the control scheme (two controllers)? (Please Circle)

1-----2-----3-----4-----5-----6-----7

**Question 6:**

On a scale of one to seven, how well did you think you performed during gameplay? (Please Circle)

1-----2-----3-----4-----5-----6-----7

**Question 7:**

On a scale of one to seven, how well did you think your fellow participant performed during gameplay? (Please Circle)

1-----2-----3-----4-----5-----6-----7

**Question 8:**

Which did you prefer playing as? (Please Tick)

Player 1 (Movement/ Navigation)

Player 2 (Interactions/ Combat)

No Preference

**Question 9:**

Would a local cooperative multiplayer game built and designed around the control scheme of “Co-Pilot” mode appeal to you? (Please Tick)

Yes

No

No Preference

**Question 10:**

Any other comments or thoughts:

Appendix 2: CPM/CCPPM Checklist:

**CPM Check List**

Participant's names:

Control Scheme:

**CPMs Check List**

	<b>Crash Bandicoot 3 Warped</b>	<b>Croc: legend of the Gobbos</b>	<b>Resident Evil 3 Nemesis</b>	<b>Brothers: A Tale of Two Sons.</b>
<b>Laughter Or Excitement Together</b>				
<b>Worked Out strategies</b>				
<b>Helped Each Other</b>				
<b>Global Strategies</b>				
<b>Waited for each other</b>				
<b>Got in each other's way</b>				

**CCPPMs Check List**

	<b>Crash Bandicoot 3 Warped</b>	<b>Croc: Legend of the Gobbos</b>	<b>Resident Evil 3 Nemesis</b>	<b>Metal Gear Solid</b>
<b>Voicing Discomfort</b>				
<b>Confused about Controls</b>				
<b>Laughter towards controls</b>				
<b>Frustration towards Controls</b>				
<b>Swapped Controls</b>				

**CCPPMs: Cooperative Co-Pilot Performance Metrics**

**CPMs: Cooperative Performance Metrics**

**Check List for the first four games to test using “Co-Pilot” mode. Whenever a CPM is observed it will be marked down.**

**If a game is shown to result in more negative CPMs then further investigation will be done on why this is occurring and what mechanics should not be added into the created application.**

Appendix 3: CPM/CCPPM Descriptions:

Laughter Or Excitement Together	When both participants will laugh, show excitement, show joy towards something related to the game. i.e. a funny death animation, laughing at/ with each other.
Worked Out Strategies	When participants would work together to solve an immediate problem. i.e. if players discussed how to jump past an enemy or said where to go next.
Helped Each Other	When a participant would help guide their partner or help explain how to continue in the game or help with controls. i.e. instructing their partner what they should do next.
Global Strategies	When participants would discuss long term strategies what they would enact throughout the play session. i.e. discussing that every time an enemy would appear they would run away.
Waited for Each Other	When participants would wait for their partner to be ready to perform an action. i.e. wait for their partner to be ready to attempt a platforming jump.
Got in Each Other's Way	When participants disrupted each other or caused an action that would annoy/ get in the way of their partner; on purpose or by mistake. i.e. deliberately jumping into a pit or fumbling with the controls.

Table of CPM Descriptions.

Voicing Discomfort	When one or more participants would mention the control scheme is uncomfortable to hold or use.
Confused About Controls	When one or more participants would become confused about the controls or not understanding the games actions. i.e. forgetting which button did what or forgetting some of the controls are acted out by their partner.
Laughter towards Controls	When one or more participants would show laughter or joy towards the control scheme. This could also be laughing at the controls.
Frustration towards Controls	When one or more participants show frustration towards the control scheme or how the game controls in general. i.e. dislike of the single controller option or the controls of the game itself "tank controls".
Swapped Controls	When participants would swap roles in the game, player one who is in control of movement might want to change and try interactions.

Table of CCPPM Descriptions.



## Appendix 4: Splitting of Controls:

The selected PlayStation 1 games were chosen due to their availability and range of genres from platformers, third person shooters and stealth games.

### Resident Evil 3 Nemesis:

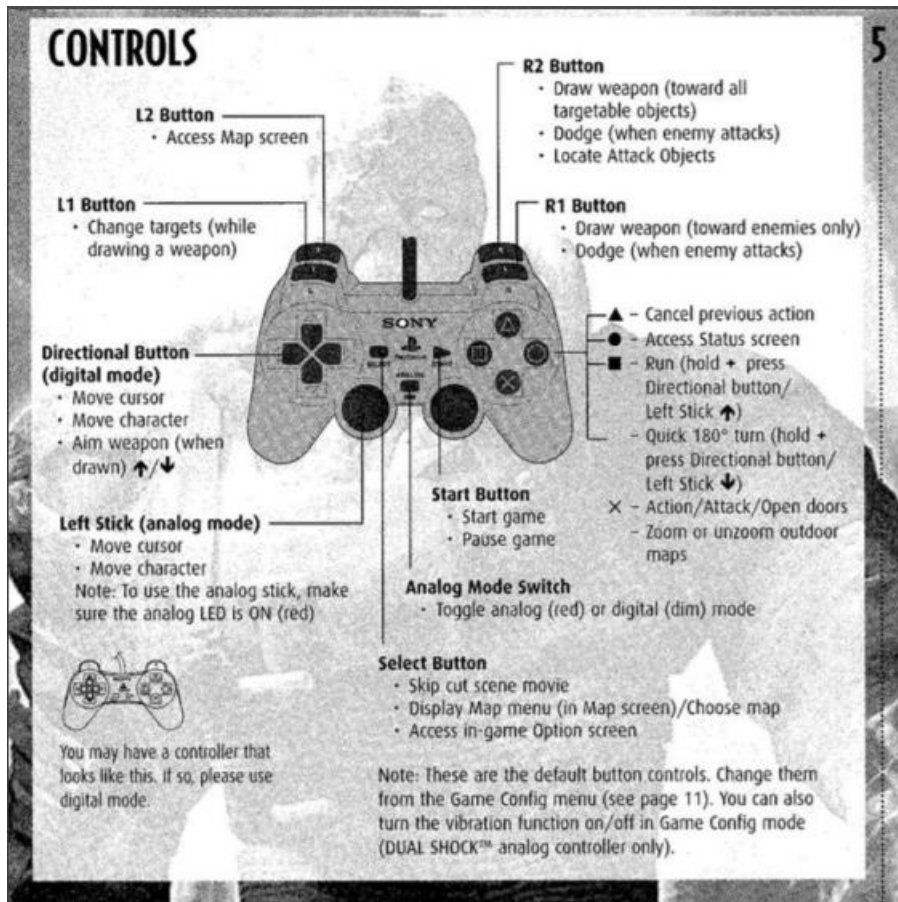


Figure 2: Resident Evil 3 Nemesis Control Scheme. Game control scheme from games booklet

- For this game the controls will be split between:
  - Movement/ navigation
  - Interaction/ combat
- Two controllers will be used for this game.
  - Due to the nature of a horror game, possible jump scares may result in the controller being tugged or shaken violently which may result in damages
  - Player 1 will control the movement and navigation (left side of the controller)
  - Player 2 will control the interaction and combat (right side of the controller)
- Some controls such as running (Square button, right side of the controller) is a movement option. This will be used as an example of players having to work together to play better. Some control roles are not limited to one side of the controller.

Metal Gear Solid:

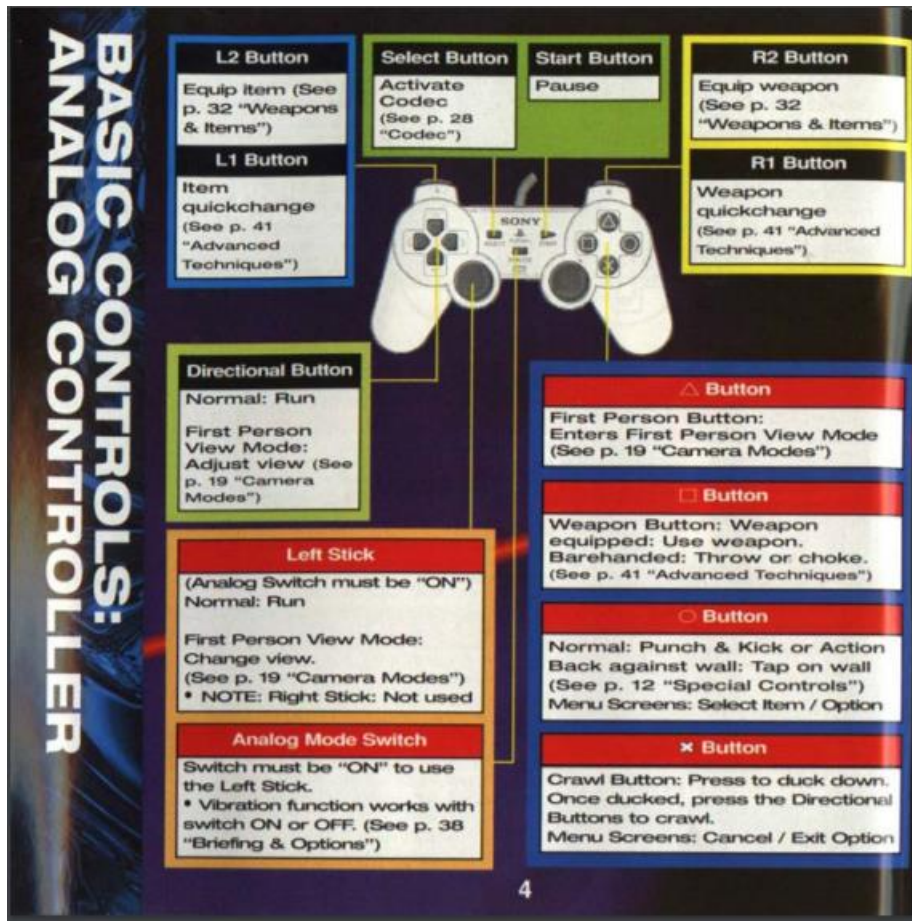


Figure 3: Metal Gear Solid Control Scheme. Game Control Scheme. Game control scheme from games booklet

- Metal Gear Solid's control scheme is rather complex and is expected to not work as well with "Co-Pilot" mode. However this will serve as a good test to see how complex a games control scheme

## Croc : Legend of The Gobbos:

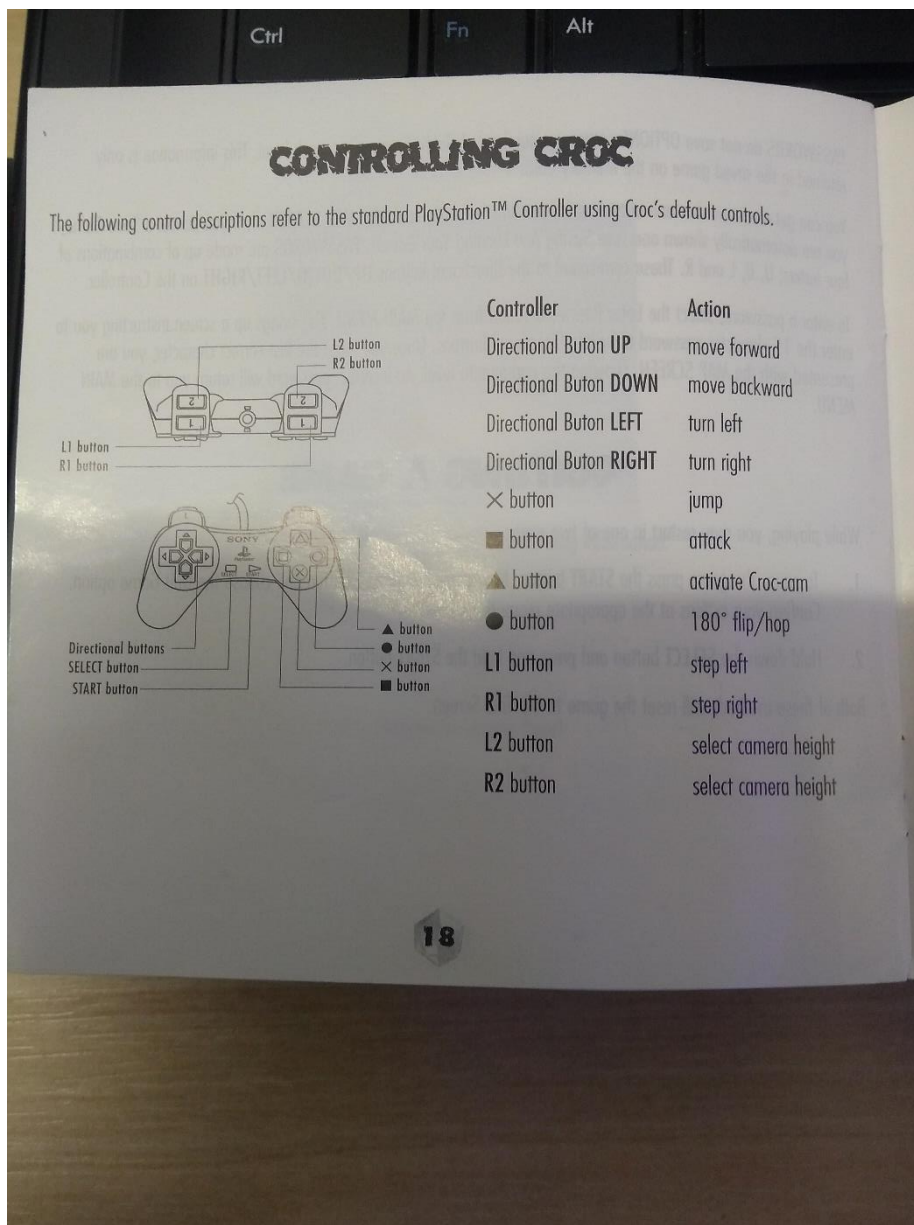


Figure 4: Croc Legend of the Gobbos. Control Scheme. Game Booklet

- Similar to Resident Evil 3 Nemesis controls will be split between
  - Movement/ Navigation
  - Interaction/ combat
- A single Controller Option will be used.
  - Player 1 will control the left side (movement)
  - Player 2 will control the right side (combat)
- As with Resident Evil 3 nemesis, some movement controls are on the right side of the controller. This will also constitute as a test for communication skills.



## Crash Bandicoot 3 Warped:

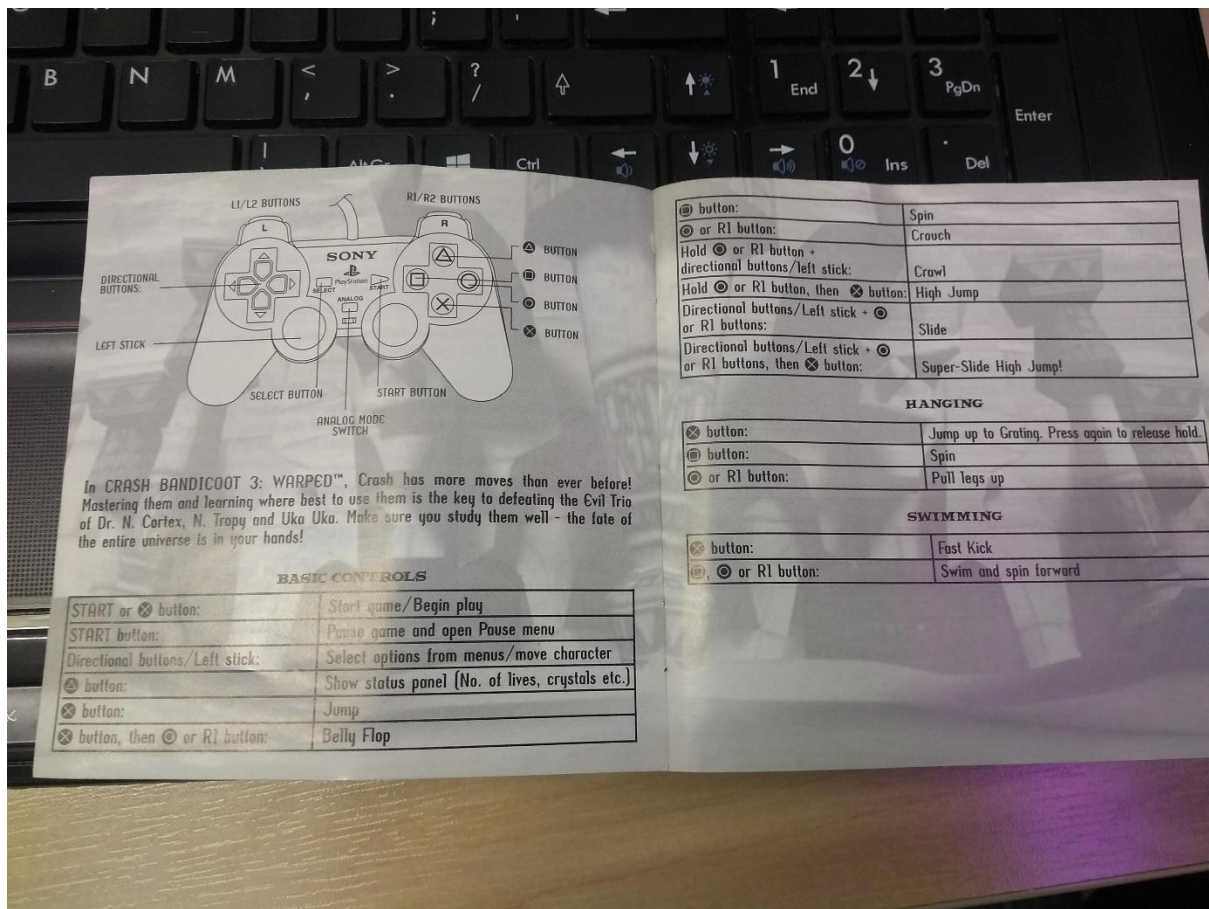


Figure 5: Crash Bandicoot 3 Warped Control scheme. Game booklet

- Controls will be split between:
  - Movement/Navigation
  - Combat and interacting
- Single controller option, similar to Croc.
  - Player 1 will control Movement (left side of controller)
  - Player 2 will control combat (right side of controller)