



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

Research Commons

<http://researchcommons.waikato.ac.nz/>

## Research Commons at the University of Waikato

### Copyright Statement:

The digital copy of this thesis is protected by the Copyright Act 1994 (New Zealand).

The thesis may be consulted by you, provided you comply with the provisions of the Act and the following conditions of use:

- Any use you make of these documents or images must be for research or private study purposes only, and you may not make them available to any other person.
- Authors control the copyright of their thesis. You will recognise the author's right to be identified as the author of the thesis, and due acknowledgement will be made to the author where appropriate.
- You will obtain the author's permission before publishing any material from the thesis.

# **Prosocial Rewards in Competitive Games**

A thesis

submitted in partial fulfilment

of the requirements for the degree

of

***Master of Computer Graphic Design***

at

**The University of Waikato**

by

**Finn Kennedy**



THE UNIVERSITY OF  
**WAIKATO**  
*Te Whare Wānanga o Waikato*

2017

# **Abstract**

The video game industry is large, and millions of individuals and groups play competitive games every month. However, through previous research which has shown competitive games to encourage antisocial behaviour in players, an antisocial stigma has been applied to competition in games, while cooperation in games has been shown to encourage prosocial behaviour.

This research aims to find links between competitive games and prosocial rewards and show that cooperation is not the only way that games can encourage prosocial rewards. Two competitive games are developed as part of practise-led research and self-evaluated to see whether prosocial rewards were attained by players through engagement with the games, and if so, how they were attained. The intent of this research is to show that prosocial behaviour has a relationship with prosocial rewards, and to suggest how future research can improve the understanding of this relationship.

# Acknowledgements

Firstly, I give the highest praise to my supervisor Emmanuel Turner. You have given me great opportunities to develop and exhibit games, as well as help me improve my programming skills. programming skills.

I send my thanks to all members of the IVX team. I had great fun being part of the projects and practice nights we participated in together. So thank you to the following team members – Emmanuel Turner, Shannon Saw, Jianting “Eva” Hou, and Ryan Neave.

To all the lecturers and tutors at the University of Waikato who have been part of papers during my time here, I am truly grateful for the education you have provided me,

Thank you to my wonderful partner Jess for supporting me and putting up with me in the final few weeks of writing.

Finally, I apologise to my family for not seeing you all enough in the past few months. I look forward to catching up with you all again.

# 1 Table of contents

1	Chapter 1: Introduction	1
1.1	Background	2
1.2	Problem statement	5
1.3	Research question	5
1.4	Motivation	5
1.5	Scope	6
1.6	Structure of the thesis	6
2	Chapter 2: Literature review	8
2.1	Prosocial reward	8
2.2	Prosocial reward in competition	12
2.3	Prosocial rewards in games	16
2.4	Examples of prosocial rewards in games	21
2.4.1	Paragon	21
2.4.2	Destiny	22
2.4.3	League of Legends	23
2.5	Impact of strangeness and familiarity on competition in games	25
2.6	Summary	27

3	Chapter 3	30
3.1	Question	31
3.2	Methodology	31
3.2.1	Practise-led research and evaluation method	32
3.2.2	Choosing in-game rewards	33
3.2.3	Controller choice	34
3.2.4	Player count	35
3.2.5	Competitive design	35
3.2.6	Prosocial reward design	35
3.2.7	Research particulars	36
3.3	First game: Maze Racer	37
3.3.1	Choosing in-game rewards	39
3.3.2	Controller choice	40
3.3.3	Player count	42
3.3.4	Competitive design	42
3.3.5	Prosocial reward design	48
3.4	Discussion	48
3.4.1	Key successful aspects	49
3.4.2	Improvements for next game	52
3.5	Second game: Simultaneous Multi-Game	53

3.5.1	Choosing in-game rewards	54
3.5.2	Controller choice	55
3.5.3	Player count	56
3.5.4	Competitive design	56
3.5.5	Prosocial reward design	61
3.6	Discussion	61
3.6.1	Key successful aspects	61
3.6.2	Chapter question success	62
3.6.3	Improvements for next game	62
3.7	Comparing Maze Racer and Simultaneous Multi-Game	64
3.8	Conclusion	66
3.9	Summary	68
4	Chapter 4: Summary and conclusion	71
4.1	Summary	71
4.2	Discussion	75
4.3	Findings	80
4.4	Recommendations	81
4.4.1	Facilitate healthy competition	82
4.4.2	Design to reward prosocial behaviour with prosocial rewards	82
4.4.3	Design for social motivation	82

4.5	Limitations	83
4.6	Future research	83
4.6.1	Can aggression facilitate prosocial rewards during gameplay?	84
4.6.2	Are prosocial rewards in team-based competitive games comparable to the prosocial rewards in team-based sports?	84
4.6.3	Is prosocial reward attainment affected by the quality of gameplay in competitive games or only length of time played?	84
4.7	Summary and final thoughts	85
	References	86

## 2 List of figures

<i>Figure 1.</i> Maze Racer large-scale interactive display.....	35
<i>Figure 2.</i> Maze Racer gameplay screenshot showing a randomly generated maze which is displayed twice.....	36
<i>Figure 3(a) &amp; 3(b).</i> Official Guitar Hero X-plorer Controller for Xbox 360 (a), and Official Guitar Hero World Tour Drum Kit for Xbox 360 (b).....	39
<i>Figure 4.</i> Maze Racer starting screen, pink circles show the players beginning in the top left-hand corners of the maze and yellow circles show the end points at the bottom right-hand corners of the maze.....	42
<i>Figure 5.</i> Shows a player moving right, and particles projecting to the left.....	43
<i>Figure 6.</i> The opposing player's view of <i>Figure 5</i> showing the particles from their opponent's movements.....	44
<i>Figure 7.</i> A player is colliding with the maze while attempting to move right, causing the maze to flash red and tilt towards the right.....	45
<i>Figure 8(a) &amp; 8(b).</i> Match winning screen for Player One (a) and Player Two (b).....	46
<i>Figure 9.</i> Simultaneous Multi-Game large scale interactive display.....	52
<i>Figure 10.</i> Official Xbox 360 Wireless Controller.....	54
<i>Figure 11.</i> Simultaneous Multi-Game gameplay screenshot showing the Pong-style game on the left, and Connect-four-style game on the right.....	56

*Figure 12.* Simultaneous Multi-Game gameplay screenshot showing the Snake-style game on the left, and Obstacle-Course game on the right.....56

*Figure 13(a) & Figure 13(b).* Screenshot of gameplay showing that Player One has already won the game being displayed on the right (*a*), and the same but instead Player Two has won (*b*).....58

*Figure 14(a), Figure 14(b), & Figure 14(c):* Screens shown when Player One wins both matches (*a*), when Player Two wins both matches (*b*), and when both players each win one game, resulting in a draw for the match (*c*).....5

## List of tables

*Table 1.* Comparison of key aspects from Maze Racer and Simultaneous Multi-Game methodologies.....72

### **3 Chapter 1: Introduction**

Prosocial rewards are positive social interactions exchanged by individuals or groups. Competitive games are games which have individuals or groups competing against others. Previous research studies containing these two topics have not shown positive relationships between them. However, cooperation in games (when individuals work together) has been shown to produce prosocial rewards in research studies.

This thesis explores prosocial rewards and the topic's relationship with competitive games. It is attempting to show that cooperation is not the only way for individuals or groups to achieve prosocial rewards when interacting with games, and whether or not there is a positive relationship between prosocial rewards and competitive games.

This chapter begins with a brief background to games and competition within games. This chapter then briefly introduces the topics of competition in games and prosocial rewards which will be discussed and researched in this thesis. This chapter provides background information for the thesis, states the problem the thesis aims to find solutions to, the motivation behind this thesis, the specific research questions being answered in this thesis, the scope of the research, and the structure of the thesis.

### 3.1 Background

After the creation of the first arcade video game (which will from now be referred to simply as a game) machine *Computer Space* in 1971, the games industry grew over the course of six years. This growth occurred with the release of the *Magnavox Odyssey* - the first home game console - in 1972, Atari creating the *Home Pong* unit in 1975, and Atari releasing the first successful mainstream home game console - the *Atari Video Computer System* or *2600* - in 1977 (Kent, 2001, p.12-13). Over the next decade, a paradigm shift occurred, and Japan becomes the powerhouse country of the games industry. Japan's status as a powerhouse was due to Nintendo releasing several highly successful games such as *Donkey Kong*, and the release of the *Family computer* or *Famicom* in 1984. Nintendo followed up with the North American release of the rebranded *Famicom* - the *Nintendo Entertainment System* (or the *NES*) in 1985 and 1986 (Kent, 2001, p.13-14). The *NES* allowed game design to thrive with powerful hardware, and Nintendo having strict control over the distribution of game cartridges to publishers to keep the quality of games on the *NES* much higher than on previous game consoles. The games industry continued to thrive with strong competition between companies such as the battle in the North American home console market between Sega with the *Genesis* and Nintendo with the *Super Nintendo Entertainment System* beginning in 1991 (Kent, 2001, p.449). Sony entered the games industry with the first truly successful 3D-enabled game console - the *PlayStation* - in 1994 (Kent, 2001, p.504-507). Sega left the home game console market after discontinuing

their last home console - the *Dreamcast* - but Sony and Nintendo continued their dominance of the home game console market. Microsoft forced their way into the home game console market in 2001 with the release of the *Xbox*.

The *Xbox* facilitated online gaming, allowing competitive games to be easily accessible (Kent, 2001, p.584-588). The games industry today has continued to grow with Sony, Nintendo, and Microsoft still active in the home game console market and online gaming being incorporated into every console still in production.

The above history portrays how the gaming industry is now a large worldwide industry. It also shows how competition has become universal within the gaming industry and growing at a rapid pace, with millions of players playing competitive games monthly. In 2016, one of the largest competitive games - *League of Legends* (Riot Games, 2009) - was confirmed to have over 100 million monthly players, up from 67 million in 2014 (Tassi, 2016). Publisher Activision also revealed monthly their player numbers, “across all of their games, from Call of Duty to Destiny, they have 55 million monthly players” (Tassi, 2016). The gaming industry is large and competitive games are a substantial part of the industry.

Competition in games has existed almost as long as the medium itself. The first successful mainstream arcade game released in 1975 - *Pong* - was based on competition between two players (Kent, 2001, p.80-81). Players are driven by the

presence of competition, and many games throughout the medium's short history have contained aspects of competition.

Prosocial rewards are positive social exchanges between individuals or groups. Prosocial behaviour is characterised by actions which have a positive impact on social situations. This characterisation of prosocial behaviour aids in understanding why cooperation strongly ties together with prosocial behaviour in games because helping someone else in a cooperative game will likely lead to prosocial rewards exchanging between both players. However, the higher the risk perceived by an individual, the less likely they are to convey prosocial behaviour. For example, a situation has a stranger approaching someone asking to use their phone to find an address they lost. In this situation, helpfulness by the person with the phone dropped significantly, especially for men in New York City where help was given to them only 15% of the time (Bierhoff, 2002, p.18). This perceived risk/benefit relationship makes it easy to understand how competition can be seen as impeding prosocial behaviour because the risk of helping someone else, especially another player in a game without fully ascertaining the outcome, will likely outweigh any positive results and lead to selfish acts.

Competition in games has been linked with aggression during play, such as a study by Adachi & Willoughby (2011) where games with “equivalent levels of aggression when they are matched on competitiveness, difficulty and pace of action.” This aggression/competition link could be the cause of antisocial behaviour – negative social actions - games can promote to player’s, affecting

their relationships with individuals or groups in real life and blocking prosocial rewards from being exchanged. (Lianekhammy, 2015).

### **3.2 Problem statement**

The link between competition and aggression in competitors is resulting in a belief that competition promotes antisocial behaviour.

### **3.3 Research question**

The research question is:

Can competitive games facilitate prosocial behaviour and the attainment of prosocial rewards?

### **3.4 Motivation**

Competition is linked with aggression and aggression is antisocial behaviour.

However, competition does not have to be antisocial, and the negative effects can be subdued with good sportsmanship which facilitates prosocial behaviour at the conclusion of the competition.

If it can be demonstrated that prosocial rewards can be obtained through competition in games, game designers can use prosocial rewards to consider how players will respond in future competition-based games.

### **3.5 Scope**

This thesis will discuss prosocial rewards obtained through competition in games. Regarding the scope of competition, this thesis will focus specifically on two-player head-to-head scenarios. This thesis will not be discussing the effects that cooperation has on players and prosocial rewards outside of the literature review because this aspect has already been covered extensively in previous studies and literature.

Team-based competition is also out of the scope of this thesis. This means no competition that contains teams (groups of more than one individual) competing against other teams will be discussed outside of the literature review. This decision to exclude any form of cooperative competition is to maintain the focus on competition's effects on prosocial rewards.

### **3.6 Structure of the thesis**

Chapter 2 is a literature review which examines relationships between key traits of games and competition to discover opportunities where prosocial rewards can be facilitated by competition and attained through competition. Chapter 3 uses

practise-led research (see 3.2.1) to develop two games to answer a research question aiming to aid in answering the thesis research question (see 1.3). Chapter 3 also includes the methodology of the game development and discussions on the success of the games in answering the research question. Chapter 4 concludes the research with a summary of the research from Chapter 2 and Chapter 3. Chapter 4 then leads to an exploration of the research in the form of a discussion, the findings of the research, recommendations formed by the research, and an exploration of where further research is needed.

## 4 Chapter 2: Literature review

Reviewing previous research and literature relating to games, prosocial behaviour, and prosocial reward gives insight into what conclusions previous studies have discovered about these topics. This chapter explores prosocial reward as a topic to aid in understanding, then apply prosocial rewards to the topics of competition and games to explore the relationship they have with prosocial rewards.

### 4.1 Prosocial reward

Prosocial behaviour is actions performed by an individual or group which facilitate prosocial rewards. Prosocial rewards are varied, but all feed into positive social interactions. This section will explore prosocial behaviour, as well as different forms of prosocial reward and how cooperation has typically been associated with prosocial behaviours and prosocial rewards.

Prosocial rewards are social rewards which are mutually beneficial to social relationships. Relationships between individuals or groups leads to the desire for an improved understanding of one another, where “intimacy and connection are perhaps the most fundamental and profound rewards of relating to others”. (Gere *et al*, 2013, p.963). Social interactions can be perceived as either rewarding or threatening which will either have positive or negative ramifications on a relationship. However “reward is a significant motivator in relationships over and

above threat.” (Gere *et al*, 2013, p.963). Prosocial rewards are perceived similarly to how non-social rewards such as monetary gain, where an individual or group will naturally aim to behave in a way which they anticipate will lead to a reward or avoid “negative and aversive events such as punishments. (Kohls *et al*, 2013).

Buss and Hogan (1983) categorised prosocial reward into process and content social rewards. Process social rewards are rewards that result from ordinary social activity and exchanges. Content social rewards are prosocial responses during social activities and exchanges.

Process social rewards are passive rewards which are created from social environments and social situations such as the presence of others, the attention of others, and responsivity (Buss & Hogan, 1983). There is an optimal amount of each process social reward, where too much or too little can cause negative effects such as antisocial behaviour (Buss & Hogan, 1983). For example, regarding the process social reward of being in the presence of others, the complete absence of others is detrimental to the effect of the prosocial reward. Also, the opposite is also detrimental where “the presence of too many others, [...] results in crowding, insufficient personal space, and no privacy” (Buss & Hogan, 1983, p.554). In other words, there is a balance in every process social reward which optimises the effectiveness of the prosocial reward.

Content social rewards are social responses which positively enhance a relationship or rapport (empathy within a relationship). Examples are affection,

sympathy, and praise (Buss & Hogan, 1983, p.554). All content social rewards can be scored on a linear scale where the optimal amount is always more, as opposed to process social rewards when quantities that are too large are detrimental. (Buss & Hogan, 1983). While more substantial content social rewards always result in better results, the opposite results in highly negative results (Buss & Hogan, 1983). Examples of both ends of the scale are praise and criticism, and sympathy and disdain (Buss & Hogan, 1983).

Prosocial rewards can be linked to the social motivation held by an individual or group. Social motivation “can be described as an individual’s propensity to obtain social rewards (e.g., approval by others), and to avoid social punishment” (Kohls *et al*, 2013). Rewards are also the result of trust felt in a relationship - “when people trust their partner, they have confidence that their partner will be responsive to their needs” (Gere *et al*, 2013, p.962). Trust facilitates attachment to a relationship, which factors whether the stakeholders in the relationship perceive future rewards from their involvement and development of the relationship. If prosocial or non-social rewards are not perceived to be gained from the relationship, stakeholders will exhibit “lower dedication to their relationships because they felt that their relationships provided fewer rewards” and feel less incentivised to commit to furthering the relationship (Gere *et al*, 2013, p.967).

Prosocial behaviour is behaviour displayed by an individual or group which aids or benefits another individual or group. “Helping is usually perceived as positive behavior” (Stürmer & Snyder, 2009, p.106) and *help* is the basis of most prosocial

behaviour. When an individual helps another person, they are performing an action which benefits the other person. Prosocial behaviour can also be understood as a way to give content social rewards to others.

The difference between prosocial behaviour and prosocial rewards is that prosocial rewards are the result of performing prosocial behaviour such as helping. If an individual helps someone else or treats them with respect during a social interaction and if the recipient responds in a similarly positive manner, then both individuals experience prosocial rewards as a rapport which positively boosts the relationship between the two. “Cooperative and helping behavior, for instance, contributes to establishing a positive, academically relevant interaction” (Florić & Ninković, 2013, p.180).

Help is more likely to be given to others when the helper perceives a low risk of or downsides to the helper. This is because the helper does not feel threatened by the situation and need only exert a small amount of effort. An example of prosocial behaviour demonstrating help can be found in Bierhoff’s book titled *Prosocial Behaviour* (Bierhoff, 2002), where an early study had a person drop their glove two metres away from a passerby. The person dropping the glove would make it obvious they dropped the glove but would act as if they did not notice. 72% of all simulations ended with a passerby drawing attention to the person who dropped the glove or picking it up to give back to the person. The test demonstrates that humans exhibit prosocial behaviour when the situation little risk to themselves is perceived and where little effort required (Bierhoff, 2002, p.18).

Different age groups vary in their willingness to display prosocial behaviour and give prosocial rewards. A study by Kwak and Huettel (2016) ended with results which suggest “children and adolescents weigh charity reward relatively more than self reward compared to adults.” Children place greater value in prosocial rewards due to “increased sensitivity to social outcomes that in turn leads to (prosocial) behaviours such as donating to charity” (Kwak & Huettel, 2016).

Help facilitates the concept of cooperation. Cooperation is where multiple individuals “have positively interdependent goals; wherein the goals are linked in such a way that the probability of a person’s goal attainment is positively linked with the probability of another obtaining his goal.” (Waddell & Peng 2014). If two individuals are helping each other with the aim of achieving a unified goal, they are cooperating. Cooperation occurs when there is the facilitation of one another's progress for the common goal (Waddell, 2014).

In summary, prosocial rewards are positive social stimulations. Prosocial rewards can fit into two different categories – process social rewards and content social rewards. However, all prosocial rewards end with a positive boost to a relationship between two or more individuals through increased attachment to the relationship. Prosocial behaviour is performed actions which prosocially aid (another person other than the actionee) and leads to prosocial rewards.

Individuals are more likely to behave prosocially if the situation is non-threatening and requires little effort on their part.

## 4.2 Prosocial reward in competition

This section explores the topic of competition, and the link competition has with aggression in competitors. This section explores competition, cooperation, the prosocial rewards that competition facilitates, and demonstrates that the competition/aggression relationship might not be harmful regarding prosocial rewards.

Competition arises when players compete for a common goal and impede one-another's progress (Anderson & Morrow, 1995, p.1029). When asked to think about competition, humans “spontaneously think about aggressive behaviours, negative emotions, and conflict” (Anderson & Morrow, 1995, p.1029).

Competition encourages the player to protect themselves from harm by limiting prosocial behaviour, making the player less helpful to others (Bierhoff, 2002, p.18).

The link between competition and aggression occurs because “the contestants block each other’s attempts to reach the disputed goal” (Anderson & Morrow, 1995, p.1021). Their perception of the competitive situation causes the competitor to “naturally behave in ways that produce ill feelings, arguments, and (occasionally) physical conflicts”(Anderson, & Morrow, 1995, p.1021). This behaviour is considered antisocial behaviour. A study by Adachi & Willoughby (2011) found that games with equivalent “competitiveness, difficulty and pace of

action” produced levels of aggression which were equal in each game. (Adachi & Willoughby, 2011). The different games had drastically different attributes including setting, age rating, and level of violence (either high levels or none) which suggests that competition is the major cause of aggression in the games (Adachi & Willoughby, 2011).

This competition/aggression relationship contrasts with cooperation and prosocial behaviour. Where competition has a disputed goal, cooperation is working towards a mutually beneficial goal and “allows for reciprocity - someone is being nice to me, so I will be nice to them” (Lewis-Evans, 2017). Cooperation is about individuals or groups working together to achieve a unified goal, which facilitates prosocial behaviour and content social rewards.

Despite the link between competition and aggression, competition can foster prosocial behaviour leading to rewards - which the following paragraphs will discuss.

Healthy competition in sport (where rivals endow honour) leads to fierce competition which “can engender respect as well as passion. Whatever antagonism exists is balanced by awareness that the two opponents need each other as integral halves in the contest” (McCollum, 2012).

Healthy competition can be categorised under process social reward as it follows the description of the category in *Social rewards and personality* (Buss &

Hogan,1983). As long as the competition is healthy, its presence creates a social environment due to the honour and respect the players have for each other in creating the competition.

Content social rewards can be given and received by players - allies and opponents - after competition concludes. Ricky Ponting – a former international cricket sportsman - wrote in his autobiography (*Ponting: at the close of play*, 2013) that good sportsmanship was embedded into his values when he was a child by being around the local Mawbray Eagles cricket team. The team played aggressively while on the field, however, they “always sought to be friendly with the opposition once the game was done. Most times, that mateship was reciprocated and if it was not, we knew who the losers were.” (Armstrong & Ponting, 2013, p.21). Their aggression was part of their passion for the game where they championed winning, but at the same time “the men set the standard and they said ‘no matter what happens on the field you shake hands and you have a beer after the game’.” (Armstrong & Ponting, 2013, p.21). The content social rewards were given and received because of good sportsmanship after the competition completion.

Experiencing competition while others are present (as competitors or spectators) can cause those competing to perform better. This is because competition can cause those competing to free “nervous energy that cannot be released when competing alone” (Maguire, 2013, p.50). This extra effort by the competitor could be due to the inclusion of process social rewards introduced by extra competitors

or spectators. For example - “a two-person “soccer” video game elicited higher HR reactivity compared to a “squash practice” video game against a machine, suggesting that the social–competitive situation related to the former game results in increased arousal” (Kallinen, Ravaja, Saari, Salminen, & Laarni, 2006, p.345).

In competition, aggression can also heighten the intensity of the competition and have positive consequences. Aggression in sport can push players to the edge of emotions such as “pleasure and pain, confidence and fear” (Pringle, 2009, p.229), which in turn affects the player by producing “desire to play and enhanced feelings of social connectedness” (Pringle, 2009, p.229). In sports, aggression can be used strategically if controlled correctly by the player because “aggression is a viable means of achieving success in sport.” (Widmeyer, 1984, p.83).

In summary, competition can be linked with aggression. However, aggressive actions during competition - whether it be part of a game plan or a reaction to an action from another player - can have prosocial rewards provided the actions after the event demonstrate honour and good sportsmanship. Prosocial behaviour after the competition concludes can form positive relationships between opponents. The prosocial reward stems from a mutual respect. Competitors also perform better with more individuals present during the competition, which could be due to the presence of process social rewards.

### 4.3 Prosocial rewards in games

Games are the sum of multiple aspects which all contribute to the social behaviour produced by the player during and after they play the game. This section will explore different aspects of games, especially the ways that players engage with games which lead to where prosocial rewards can be achieved. This section will also explore rewards in games to help understand where prosocial rewards fit into the different categories of rewards achieved from games.

The player engages with a game through gameplay. The way that a player approaches their engagement in a game leads to “instances of gameplay that comment reflectively on, ironise, satirise, or otherwise engage critically and speculatively with the serious activities of life are available through the entertainment that games provide.” (Crogan, 2011, p.160).

In-game rewards are feedback to the player. In a presentation at the Game Developers Conference (Lewis-Evans, 2017) the speaker covers how rewards are manipulated to encourage play by the players in games through eliciting dopamine from feedback. In games, rewards are the result of autonomous actions by the player and culminate into a response. The example Lewis-Evans (2017) uses for response is the sound and visuals displayed when a player collects a coin - “they link together in a performative way when playing the game and give you progress - they have been associated, and they give you a reward” (Lewis-Evans, 2017).

The concept is that the player will respond to the idea of obtaining the reward and perform actions which they believe will achieve the reward.

There are different ways that in-game rewards can be awarded. In-game rewards can be awarded at the following ratios and intervals:

Fixed ratio - where the player knows they will receive a reward by doing a fixed number of actions. Fixed intervals - where the reward has a set time or time frame when it can be achieved. Variable ratio - effectively gambling whether or not a specific reward will be achieved. And variable intervals - where the player does not know when the reward will be achieved (Lewis-Evans, 2017).

Out of all these in-game reward achievement methods, fixed intervals elicit the most consistent reward to the player because they have an easily-perceivable path to a known reward. However, variable ratio elicits the highest response from the player because the random generation of the reward surprises the player when the reward is achieved. The next variable ratio reward then elicits further play from the player - because they do not know when the next reward will be achieved. (Lewis-Evans, 2017).

In-game rewards are achieved due to the motivation of the player. This motivation is fueled by either intrinsic or extrinsic motives.

Intrinsic motivation is the feeling a player has when playing a game. If the game feels satisfying to the player, it results in the player receiving an intrinsic in-game

reward. Lewis-Evans (2017) explained that “there are games that just feel satisfying to play, that the action of just moving a controller or mouse feels impactful and immersive” (Lewis-Evans, 2017). The feedback the player receives from playing the game is intrinsically rewarding. Intrinsic motivation can lead to results-based rewards such as winning, for example – in a racing game where “players race through cities against other gamers and must violate traffic rules to win.” (Morton, 2009, p.1401).

Extrinsic motivation exists where the player is wanting to gain a tangible reward related to the game such as item-based rewards. For example - players completing a mission to “obtain money, items or experience to level up” (Kang, 2015).

Extrinsic motivation is “driven by the goal of obtaining work rewards or outcomes such as money, power, or recognition” (Fang, Kong, Kwok, 2011).

No matter the type of in-game reward, the actual reward must be equal to the level of effort required to obtain the reward. In a game with quest-based gameplay such as a role-playing game, “if the reward of the quest is not sufficient for players’ endeavour, they may feel unfairness and abandon the quest. To maintain a player’s interest in the game, the game designer should make well-balanced rewards for every quest” (Kang, 2015). This concept fits into the representativeness heuristic which is “the more time, cost, effort you put into an activity, there is a basic expectation that you get more reward for it” (Lewis-Evans, 2017). The rewards are given to the player through feedback - both extrinsic and extrinsic - need to strike a balance, so the player does not feel

under-rewarded, or - equally as important - over-rewarded for the action or task completed.

Cooperation through gameplay facilitates prosocial behaviour amongst players. Cooperation is a form of process social reward, as cooperation provides a situation that encourages content social rewards. Cooperation naturally facilitates prosocial rewards exchanging between players because of the player's instinct to judge the impact their current actions will have in their future (Bierhoff, 2002, p.18). Player thoughts experienced when asked about cooperation are "friendly behaviours, pleasant emotions, and working together" (Anderson, & Morrow, 1995, p.1029). Cooperation can calm players and produce positive thoughts in their minds. (Anderson, & Morrow, 1995, p.1029).

There is a balance to obtaining optimal prosocial rewards from cooperation. For example - when players play games cooperatively they benefit from playing specifically with friends as opposed to strangers because the act increases "engagement in a task, feelings of spatial presence, and a more positive emotional response compared to playing with a stranger or a computer." (Peng & Waddell, 2014).

Cooperation during gameplay encourages reciprocity amongst players, where "someone is being nice to me, so I will be nice to them." (Lewis-Evans, 2017). Reciprocity would be categorised under content social rewards because it is a

positive response to the player action, and could both intrinsically and extrinsically motivate players in the game to achieve in-game rewards.

Despite the various ways in which players can achieve prosocial rewards, “game systems, mostly unintentionally, reward antisocial behaviour.” (Lewis-Evans, 2015). Prosocial behaviour during competitive games “usually goes unrecognised, unrewarded, and is sometimes even punished.” (Lewis-Evans, 2015).

If a game naturally encourages antisocial behaviour in players, it can be mitigated by introducing a punishment system. Instead of rewarding prosocial behaviour, the game can punish players who behave antisocially, this is known as the deterrent effect (Lewis-Evans, 2015).

#### **4.4 Examples of prosocial rewards in games**

Despite games link to anti-social behaviour, there are counter examples where games have prosocial rewards. The following paragraphs will explore examples of the applying prosocial reward in games.

The games used as examples are not two player head-to-head competitive games and are all team-based competitive games. This is due to a lack of examples of two player head-to-head competitive games which facilitate prosocial rewards. However, these example games are still useful for showing that competition and prosocial rewards can both exist within a game.

#### **4.4.1 Paragon**

The game Paragon (Epic Games, Inc, 2016) is a team-based competitive multiplayer online battle arena game.

In Paragon, there exists a system called the Master Challenge System. Master Challenges are fixed ratio in-game rewards tied to the Hero characters that players control during gameplay. The player must complete a set number of tasks to gain the reward. The player is extrinsically motivated to gain the reward because the reward provides a boost to the experience the player gains when they compete in the game. However, if multiple players on the same team all have these Master Challenge rewards activated, then the experience boost is applied to every player on the team - meaning that every player is helping and benefiting from each other. This is an example of cooperation (a process social reward) leading to reciprocity (a content social reward) which are both examples of prosocial rewards.

#### **4.4.2 Destiny**

Destiny (Bungie, Inc, 2014) is a competitive first-person shooter game. The game has an emphasis on extrinsically motivating the player with in-game rewards. These in-game rewards are loot-drops that contain equipment for the player to equip such as armour and weapons.

One example of prosocial reward in Destiny is the use of the Super. Every player in Destiny has an ability known as a Super, which is a powerful action the player must fully charge before they can use. Supers are different for each player, for example, Supers can deal heavy damage, give the player temporary invincibility, or revive the player if they die. Supers are intrinsically motivating to the player due to their sheer power which fuels the player with immense satisfaction from utilising an effective Super. Game developer Bungie added a clever effect to player Supers where the more effectively they utilise their ability, the more Orbs which are generated from the player's Super use. These Orbs can be gathered by the player's allies at which point they decrease the cooldown timer (the fixed interval) for their next Super.

What Bungie has done is mix several rewards together. Destiny automatically helps the player's allies through the design of the Orbs generated from the Super. The player is intrinsically motivated to maximise a number of orbs through smart use of their Super due to the satisfaction they get from the feedback the game is giving them. These Orbs help the player's allies by allowing them to use their Super quicker, which also leads to the player using their Super quicker from collecting Orbs from their ally's Super. This feedback loop of continuously helping each other fuels content social rewards because the players cooperate as a team.

### **4.4.3 League of Legends**

League of Legends (Riot Games, 2009) is a team-based competitive multiplayer online battle arena game. Game developer Riot Games employed and invested in a behaviour team. Former Lead Designer of Social Systems at Riot Games, Jeffrey Lin, explained the goal of the behaviour team in a Game Developers Conference presentation (2014). Their goal is to promote sportsmanship and make it “the path of least resistance” (Lin, 2014). The behaviour team aims to “create better match chemistry, reform or remove negative influences, shield players from negative behaviour, incentivize positive behaviour, foster and celebrate a culture of sportsmanship” (Lin, 2014).

They aim to achieve this by first mapping out the journey the player is taken on from first entering a pre-match lobby, competing in the match, and into the next pre-match lobby. From this map, the behaviour team aims to optimise the player experience to encourage prosocial behaviour. Each player has an honour rating, which is increased or decreased based on ratings given by allies during competitive matches. If the player receives too many negative ratings, they will be put through a tribunal system and presented a tribunal reform card. The tribunal reform card will give the player feedback on why they have received the card and inform them of the punishment they have received (either a warning or a 3-14 day ban). If a player does not receive any negative ratings during a fixed interval, they receive in-game rewards such as character skins.

What Riot Games has done with their robust player experience is create an environment that encourages prosocial behaviour leading to prosocial rewards. Instances of players exhibiting antonyms of content social rewards - such as criticism instead of praise - are punished, and the player responsible for the behaviour is given feedback on their actions informing them of their antisocial behaviour. This gives the player extrinsic motivation to behave prosocially in the future to ensure their in-game experience is not hindered in the future. Extrinsic motivation also compels the player to discontinue behaving antisocially through in-game rewards being given at fixed intervals for not receiving negative ratings. Through discouraging and punishing antisocial behaviour while simultaneously encouraging and rewarding prosocial behaviour, the incentive for players to give and receive content social rewards increases.

In summary, Paragon and Destiny show that mutual benefits can be tied to game mechanics by encouraging prosocial behaviour on the player's behalf. League of Legends shows that by creating an experience which makes exhibiting prosocial behaviour the easiest path at every stage, exhibiting prosocial behaviour becomes the goal in the player's mind.

## **4.5 Impact of strangeness and familiarity on competition in games**

Understanding how aspects of games affect competition aids in understanding how competition affects prosocial rewards in games. This section explores the link that strangeness and familiarity have with competition in games through the impact on game controllers and gameplay.

Familiarity is the feeling of recognition from repeated exposure (Charlton & Starkey, 2013, p.122) while strangeness is the lack of recognition.

Controllers are how we interact with games. The design and ergonomics of a game controller directly relate to how prosocial behaviour is produced.

Controllers have many forms of input designed for the player's hands, the most common being the standard button with a binary on and off state. The standard button may be limited in how it can be used in a game, but "it is possible to map a single button to a complex, nuanced, sensitive response from the game." (Swink, 2009, p.109). This means that standard buttons can encourage unique player skill through the familiarity and simplicity of standard buttons without using complex or strange controller inputs such as triggers or thumbsticks.

Controller inputs directly affect player skill because when an inexperienced player begins playing a new game, they “will feel inept, clumsy and disoriented” (Swink, 2009, p.20). This is the feeling of strangeness. Even though the controls of a game are objectively identical to every player, “each player will start at a slightly different skill level depending on past experience and natural aptitude” (Swink, 2009, p.20). A player may feel familiar with the controls of a game if they have previous exposure to the exact game or similar use of the controls in another game. An inexperienced player can feel more welcomed a game if the controls are easy to comprehend. “Intuitive controls appear to enhance game enjoyment and preferences by facilitating players’ experiences of in-game competence, and in some game contexts, in-game autonomy” (Ryan, Rigby, & Przybylski, 2006, p.361).

Players thrive off improving their competency skills in games. This is in part due to “relations between autonomy and competence satisfactions in solitary game play” (Ryan, Rigby, & Przybylski, 2006, p.361). If the player perceives that their skills in the game are improving through their autonomous input, they will feel satisfaction which motivates them to continue playing. Players who continue to improve exhibit “more positive outcomes, helping again to explain why, for some people, games may provide a source of pleasure and perhaps restoration” (Ryan, Rigby, & Przybylski, 2006, p.361)

Because of player skill and possibilities with various controller inputs, we can match different variables to produce different levels of familiarity and strangeness

for the gameplay experience. A large skill ceiling is when a game gives a player room for self-improving their skills at the game. If the player wishes to improve their skills at the game, they will play more and increase their chances of playing with or against a previous player.

The skill ceiling of a game and encouraging long term engagement in players encourages prosocial behaviour which leads to prosocial rewards. This is because of the player's "choices made today not only determine the outcome of this move, but can also influence the later choices" (Axelrod, 2006, p.12). Players place value in the future because it can "cast a shadow back upon the present and thereby affect the current strategic situation" (Axelrod, 2006, p.12) and this results in them treating other players - whether they be opponents or allies - with respect through the use of prosocial behaviour.

In summary, in-game rewards can fit into different categories and must be equivalent to the effort required by the player. Controller design and inputs create avenues for introducing prosocial rewards and their implementation in games influences the skill ceiling of the game. High skill ceilings encourage prosocial reward because it increases the time that players can play the game to improve their skills, which increases the chances of encountering a previous opponent or ally. If the skill ceiling encourages in-game rewards along the journey, this will also encourage players drive to play and increase their skills to achieve the in-game rewards, in turn increasing avenues for prosocial rewards to be gained.

## 4.6 Summary

Prosocial rewards are stimulating prosocial encounters or the results of a prosocial encounter. They can be either process social rewards or content social rewards, and in both categories, there is an optimal level to prosocial rewards which can be achieved. Prosocial rewards lead to higher attachment levels in a relationship with all stakeholders and also act as incentives to pursue a further commitment to a relationship if more prosocial rewards can be achieved.

Prosocial behaviour by an individual is behaviour which aims to benefit another individual or group. Prosocial rewards are the result of prosocial behaviour and the reward is the development of a rapport - leading to a strengthened relationship between two or more individuals involved in the prosocial behaviour.

Competition creates prosocial rewards by the actions of the players immediately after the competition. The players involved may feel aggressive emotions or use aggression as a deliberate tactic during the competition, but after the competition concludes prosocial behaviour is shown by the players due to the respect they feel for each other and in honour of the competition. Because prosocial behaviour leads to prosocial rewards, the rewards are achieved after the competition concludes.

Games encourage prosocial behaviour through the implementation of in-game rewards. Games encourage players to improve their skills through intrinsic

motivation and in-game rewards aim to extrinsically motivate players to continue playing the game. Continued play increases the chances of encountering another player multiple times which leads to players behaving prosocially due to the player placing value in future consequences. Due to this continued play, the player will be rewarded with in-game rewards which lead to prosocial rewards.

Cooperation has been shown to facilitate prosocial behaviour and rewards. Despite the antisocial stigma of competition, there appears to be scope to explore prosocial rewards in competitive games. Competitive games are also being developed to push players towards competing in a respectful way which facilitates prosocial behaviour and rewards. The use of punishment for antisocial behaviour, extrinsic rewards for prolonged prosocial behaviour, and game mechanics which are prosocial, all lead to a positive framework built around the competition which drives the game.

## 5 Chapter 3: Practise-led research

This chapter examines prosocial rewards from competitive games using practise-led research. Practise-led research encourages exploration and reflection on theory through practical work. Moreover, so the intent of this study is to discover insights that will inform other practitioners.

The practical component of this research is the production of two games. This chapter states the question - related to the thesis research question - that these games will attempt to answer. The methodology for this study, and in particular some background to practise-led research, is explained and then the key areas that need to be addressed in the development of the games. The first game is described and then evaluated, and this evaluation guides the production of the second game. Then the second game is described and evaluated. The chapter concludes with a comparison of both games, discussion of insights gained and then the research question is directly addressed.

A study by (Gere *et al*, 2013, p.967) found that prosocial rewards can be facilitated through cooperation due to player actions being influenced by the effect on their future. Player's enjoy improving their skills, and a skill ceiling is made higher when strangeness is introduced (see 2.5). Examples from sport (see 2.2) show that competition can lead to prosocial rewards if it is healthy competition.

Combining these findings is how the chapter question is made. By using a high skill ceiling from strangeness to encourage longer play sessions from players in competitive games, can similar prosocial rewards from cooperation be facilitated in healthy competition?

## **5.1 Question**

The research question this chapter will attempt to answer is:

Can prosocial rewards be attained by players in two player competitive games when strangeness is used to create a high skill ceiling?

Strangeness is the term given to the concept (see 2.5), where players without experience with a type of gameplay or controller input had a lower skill level than players with experience. The idea behind strangeness in this chapter is to develop a game which has a high skill ceiling, to see the effect of a high skill ceiling on prosocial reward attainment.

## **5.2 Methodology**

This section outlines the methodology used during the development of two games for this thesis. Firstly, this section explains practise-led research. Key aspects of the methodology will be explained to increase the understanding as to why they were the focus during the development of the two games. These key aspects of the methodology decide what in-game rewards will be targeted in the game, how the

games will be controlled, how many players the game will have, how competition will be designed and developed, and what prosocial rewards will be targeted in the games. Finally, there is a discussion of the how the research was conducted.

### **5.2.1 Practise-led research and evaluation method**

Practise-led research is a form of research where “the work of art actually drives the research” (Arnold, Beasley, Hecq, Novitz, 2014). This form of research is about “finding an approach to create and understand” (Arnold, Beasley, Hecq, Novitz, 2014) artistic endeavours, and ensure they can be incorporated into the “tradition of scholarly research.” (Arnold, Beasley, Hecq, Novitz, 2014).

Practise-led research can begin with “developing a question you want to investigate, it does not have to be the traditional research question” (Beasley, 2014) and then reflecting on the research. Reflection can be in the form of reflection-on-action, where the actions of a task are reflected on as part of an evaluation to build an understanding as to why certain outcomes occurred (Schon, 1984). Reflection-on-action “tends to focus interactively on the outcomes of action, the action itself, and the intuitive knowing implicit in the action” (Schon, 1984). Through this reflection comes evaluation.

Evaluation can come in the form of self-evaluation, where practitioners perform the evaluation rather than of other participants. Self-evaluation can form part of practise-led research. This is because “the personal experience of the artist as a

researcher has been stressed as an integral part of the research which has led to several self-reflexive research projects, in which artists/researchers use their own experience as part of their research.” (Rutten, 2016 p.299-306). This self-evaluation forms findings from the research.

The research in this chapter will consist entirely of self-evaluating practise-led research to produce findings (see 4.3). The experiences we have as researchers during the development and exhibition of the games in this chapter will be self-evaluated following the aspects explained below. This self-evaluation will be of our experiences during the practise-led research. The practise-led research will be arranged into sections 3.3 and 3.5 of this chapter, and the self-evaluation will be discussed in sections 3.4 and 3.6 of this chapter. Both the practise-led research and self-evaluation will inform the comparison of the games (see 3.7).

## **5.2.2 Choosing in-game rewards**

Deciding on which in-game rewards to target is the first step because (as shown in *Examples of prosocial rewards in games*, Chapter 2) prosocial rewards and in-game rewards can share a relationship with one another. Deciding what in-game rewards to target helps to form estimations of what prosocial rewards could result from the chosen in-game rewards.

Targeting intrinsically motivated rewards can lead to the player's finding satisfaction in gameplay. If a player finds the gameplay satisfying, the player will be motivated to continue playing.

Choosing rewards to target will ease answering the Chapter 3 research question by allowing exploration of a closed question to the research: were these prosocial rewards given or felt by the players? The answer will either be yes or no.

### **5.2.3 Controller choice**

The controller is how players provide input to the game, and so the choice of controller affects how likely it is that the player finds the controls of the game familiar or not.

Controllers can have multiple types of inputs, which means that the chosen controller must have inputs that fulfil the requirements of the game. Using a linear input on a controller such as a standard button (the button is either in an *on* or *off* state) will increase the chances of familiarity for the player. Using an analogue input on a controller (an input with several states sending variable data to the game, such as a trigger input) can introduce interesting gameplay options and add a level of finesse to the skill ceiling of the game. No matter the choice of controls, it must be balanced with the gameplay, the skill ceiling, and length of play-time expected of the game.

Controller choice contributes to answering the chapter research question by allowing an opportunity to introduce strangeness into the game. Strangeness is where the skill ceiling of the game can be increased. The controller choice could also attempt to add balance to the overall strangeness of the game by using familiar inputs if the gameplay concept is where the strangeness is chosen to be introduced.

#### **5.2.4 Player count**

This study focuses only on two player head-to-head competition. This means that the player count for both games will always be two. This provides constant in the study which aids during the comparison of the two games (see 3.7). The games will also be able to be polished to one competitive experience.

#### **5.2.5 Competitive design**

Both games will be developed with competition in mind for every feature of the design. The games need to have effective distinctions between the information that is relevant to each player because the players need to focus on the information that is relevant to the competition.

Gameplay should facilitate prosocial reward through competition. Depending on the rewards chosen, each game will need to facilitate the effectiveness of in-game rewards which result in prosocial rewards. Competition should be healthy

competition to ensure the competition does not conflict with the prosocial reward acquisition by the players.

### **5.2.6 Prosocial reward design**

With both competition and prosocial rewards in mind, the design of the games needs to facilitate the relationship between the two focus topics holistically. The specific prosocial rewards being targeted in each game will be decided on during the design of both games (see 3.3.5 & 3.5.5).

### **5.2.7 Research particulars**

The following research involved the production of two works, created and publicly exhibited in 2016. The works were produced by the IVX Collective<sup>1</sup>, (of which I am a member and had significant input on the design, production and display of the works). The contributors were: Finn Kennedy (myself), Emmanuel Turner, Jianting “Eva” Hou, and Shannon Saw. I will outline my personal contributions in the description of each piece.

---

<sup>1</sup> <http://ivx.org.nz>

### 5.3 First game: Maze Racer



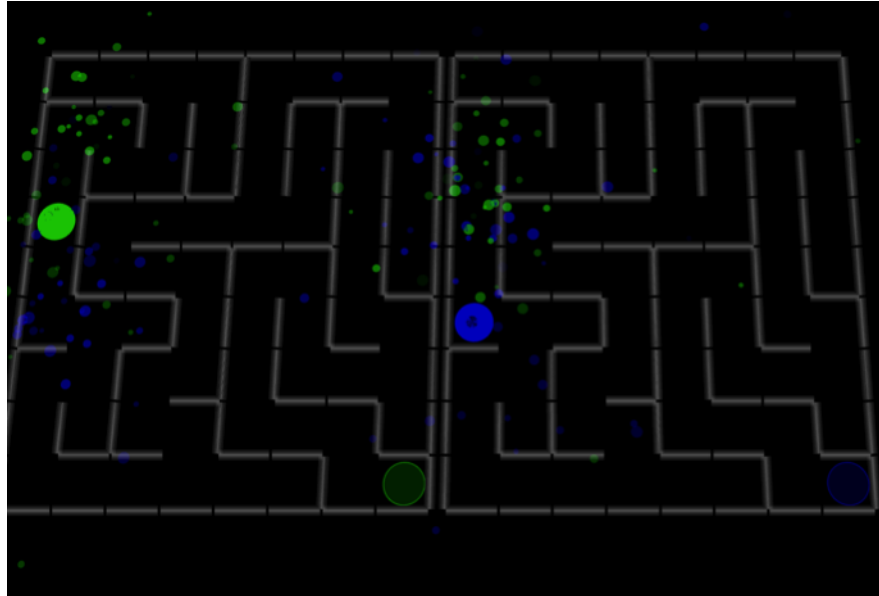
*Figure 1.* Maze Racer large-scale interactive display. Author's image. (2016)

Maze Racer<sup>2</sup> is a two-player competitive maze game where two players compete to finish a randomly generated maze before their opponent. The following section will explain how the methodology in the previous section was applied to the development of Maze Racer, as well as a discussion of the game's results, followed by an evaluation of the chapter question, and highlighting improvements for the consequent game.

---

<sup>2</sup> [http://ivx.org.nz/portfolio\\_category/portfolio/](http://ivx.org.nz/portfolio_category/portfolio/)

Maze Racer (see *Figure 1*) is a two-player competitive maze game where two players compete to finish a randomly generated maze before their opponent. The game is controlled by two contrasting controllers, which were used to fit the criteria of strangeness in the game.



*Figure 2.* Maze Racer gameplay screenshot showing a randomly generated maze which is displayed twice. Author's image. (2016)

The maze is randomly generated, with two identical copies of the maze on both the left and right-hand sides of the game screen (see *Figure 2*). This concept fits the criteria because the design was completed with the aim of ensuring that the player knew that this game is a competition between two players.

The primary contributors to Simultaneous Multi-Game are Finn Kennedy (myself), and Emmanuel Turner. My contributions to Maze Racer are

conceptualising the concept of the game, planning the game, designing the gameplay, designing the look and feel of the game, designing the game controls and implementing the controllers, playtesting the game.

Maze Racer was displayed as part of the *Computer Graphic Design Open Day 2016* Exhibition at The University of Waikato on the 13th of May 2016, as well as the *Zero-One 2 Dadata* Exhibition at Creative Waikato from the 3rd of August 2016 - 12th of August 2016.

Maze Racer will be explained in detail, following the sections introduced in the methodology.

### **5.3.1 Choosing in-game rewards**

The in-game reward Maze Racer focuses on is intrinsic motivation through satisfaction felt by the player from gameplay (see 2.3). Satisfaction felt by the player is a result of them improving at the game which then leads to playing for longer.

Prosocial rewards are expected to be the result of the in-game intrinsic motivation felt by the players leading to repeat matches against the same opponent. The prosocial rewards resulting from the player's intrinsic motivation will also theoretically lead to social motivation. After playing for intrinsic motivation,

receiving prosocial rewards, this gives the player social motivation to continue playing to experience more prosocial rewards.

### 5.3.2 Controller choice



*Figure 3(a) & 3(b)*. Official Guitar Hero X-plorer Controller for Xbox 360 *(a)*, and Official Guitar Hero World Tour Drum Kit for Xbox 360 *(b)*. Author's images. (2017)

Maze Racer is controlled using Guitar Hero controllers. One is the Official Guitar Hero X-plorer Controller for Xbox 360 (see *Figure 3(a)*). This controller's inputs consist of 5 coloured standard buttons on the neck of the controller, just below the head, a strum-bar, a whammy bar. The other controller is the Official Guitar Hero World Tour Drum Kit for Xbox 360, pictured in (see *figure 3(b)*). This controller's main inputs are two cymbals and three drum pads, which all act the same as a standard button input when struck.

These two controllers for player input were selected for the following reasons.

The two controllers are different from each other in their shape and input. The two players will identify with either one of the controllers, and their preference may be challenged by the other player's personal preference. This increases the chances of unique social challenges being produced by the player's experience with the game.

Using these controllers to move through a maze is strange and unfamiliar. The gameplay of navigating through the maze is too quick and too familiar if using a set of standard directional buttons. With buttons labelled *up*, *down*, *left*, and *right* players will either be familiar with the controls or have a more direct understanding of how the buttons will affect the game. Forcing the player to use these two unconventional controllers for movement introduces a level of strangeness to the gameplay.

This increased difficulty and complexity greatly increase the skill ceiling for the game. By increasing the skill ceiling the game has, the player has more room to improve their skills. If the gameplay is intrinsically motivating to the player, this means they will want to continue to play the game, to improve their skills. This increases time spent with the residual social aspects of playing the strictly two-player game.

The input method, shape, and way the player holds the controller are all distinct from each other. This creates an imbalance in the intrinsic motivation the players

have about the controllers. The two controllers have contrasting tactile input and will likely be very strange to most players.

For the guitar controller, four of the five coloured buttons are used for movement. They are easy to understand because they are linear buttons that simply require being pressed to activate. However, the buttons are arranged in a straight

horizontal line. This creates strangeness for the player because they will have to operate directional input using buttons that do not represent the desired direction.

For the drum controller, the three drum pads and one of the two cymbals are used for movement. The directional movement inputs are mapped pragmatically to the drum controller, with *left* and *right* being mapped to the logical pads. While up and down are also mapped to the logical pad and cymbal. The mapping of directional movement to the drum controller creates familiarity as the directional inputs are easy for the player to understand. However, the input method the player uses to interact with the controller is distinct and potentially foreign in comparison to the guitar controller.

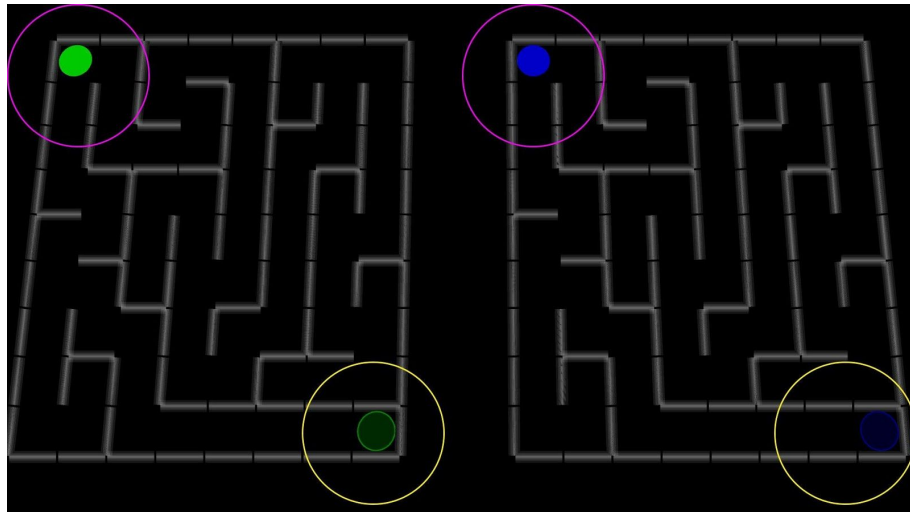
In summary, the asymmetry between the two controllers is balanced. The guitar controller has a familiar input method but strange mapping, while the drum controller has a strange input but familiar mapping. This creates an interesting mix of autonomous intrinsic motivation for the player to master two controllers for one game.

### 5.3.3 Player count

Maze Racer is a head-to-head two player game.

### 5.3.4 Competitive design

Maze Racer is focused on two players competing to finish a maze before their opponent. To facilitate the competition, several design features are implemented.

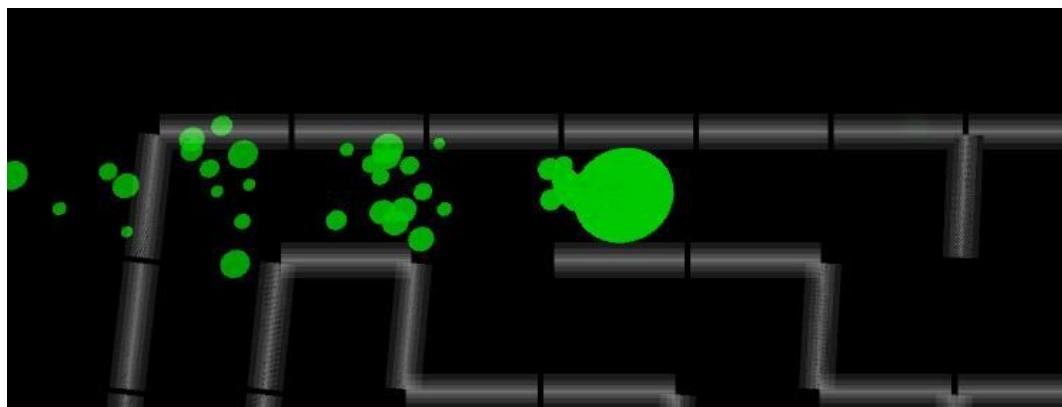


*Figure 4.* Maze Racer starting screen, pink circles show the players beginning in the top left-hand corners of the maze and yellow circles show the end points at the bottom right-hand corners of the maze. Author's image. (2017)

The maze is a random generation based on a grid size which is scalable. The player *start* and *end* points remain constant - the top left-hand corner and bottom right-hand corner respectively (see *Figure 4*). This allows active, repeated plays where the player can rapidly learn to map out the correct path from start to finish.

The players are distinct colours. One player is blue; the other is green. The end points (see *Figure 4*) are also colour coordinated to the player to give extra guidance to the player. The idea is that the end points are slightly-transparent replicas of the player avatars, to imply that the player must place their avatar into the slightly-transparent end point to complete the maze.

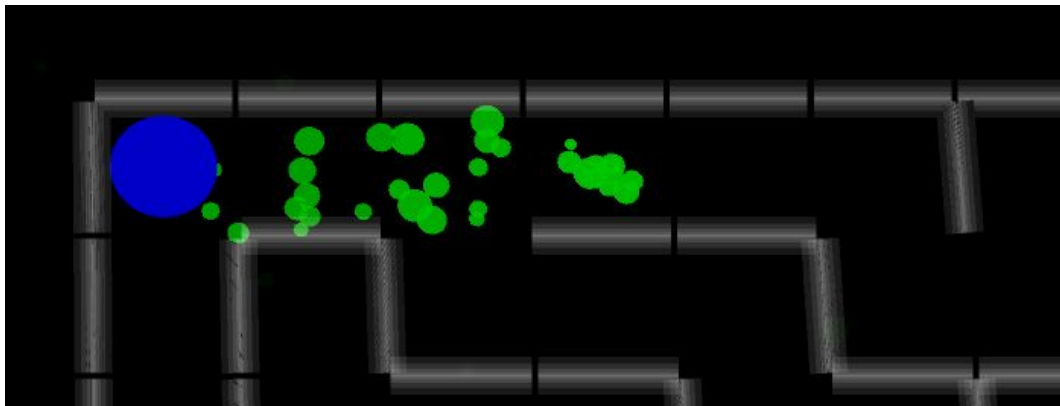
The maze is displayed twice, one side for each player. Both mazes displayed are identical. The reason it was decided to display the maze twice is that this prevents the players from confusing their player avatar with their opponents. The players also stand on the side that corresponds with the maze for their avatar to aid in their understanding as to which maze each player should be viewing. During play-testing when only one maze was rendered, players confusing their avatar was a problem that occurred and leads to frustration.



*Figure 5.* Shows a player moving right, and particles projecting to the left.

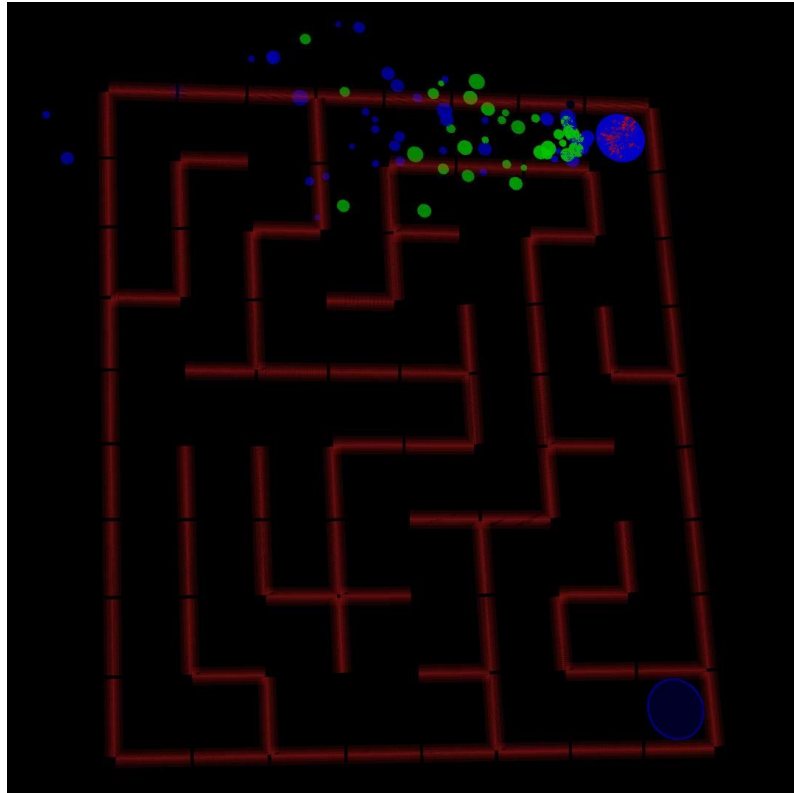
Author's image. (2017)

Particles corresponding to the player colour are being projected in the direction opposite to the avatar movement (see *Figure 5*). The particle system began development as part of increasing the in-game reward of feedback. When the player sees the particles, they are given feedback that they are moving, which is intrinsically motivating. The aim is to ensure the game is simply engaging to play to encourage repeat attempts. This will also potentially give the competition a visceral feel by giving the player positive visual feedback.



*Figure 6.* The opposing player's view of *Figure 5* showing the particles from their opponent's movements. Author's image. (2017)

The particles from both players are present in both mazes (see *Figure 6*). This was done to indicate the presence of the player's opponent and encourage competition through this presence. This also means that neither player needs to look away from their own maze and at their opponent's maze to see where their opponent is in comparison to them.

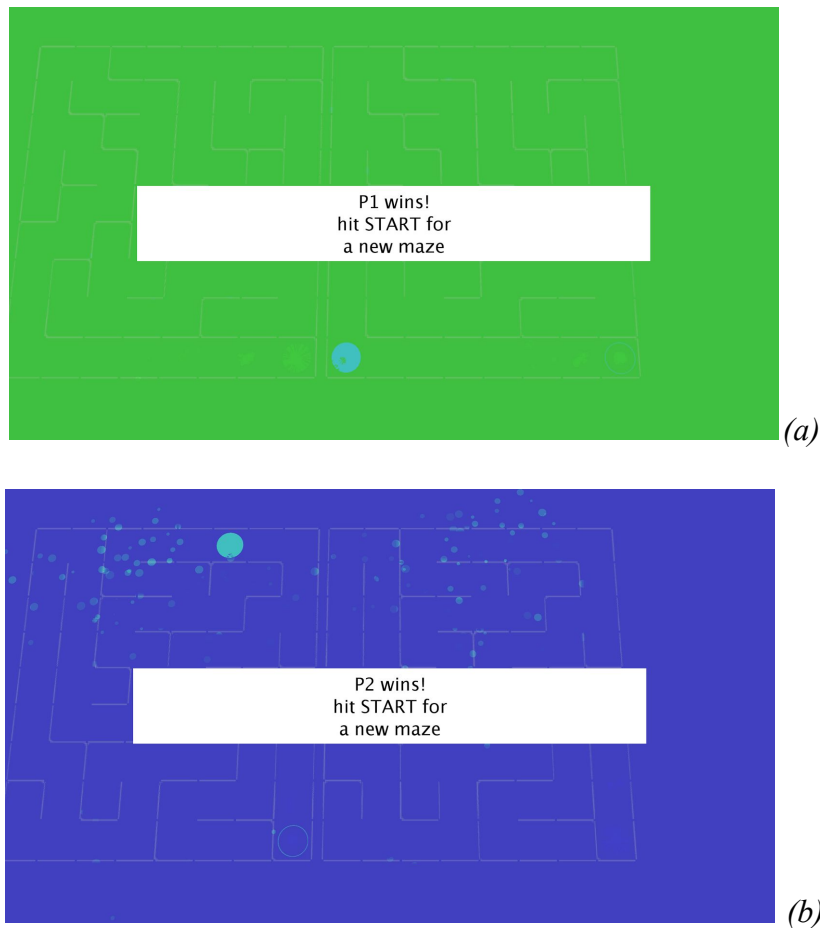


*Figure 7.* A player is colliding with the maze while attempting to move right, causing the maze to flash red and tilt towards the right. Author's image. (2017)

The game gives negative feedback to the player when they move their avatar in a direction which collides with a wall. When the collision is made, the player's maze will flash red and physically bump briefly in the direction that the player's avatar was attempting to move in (see *Figure 7*). This emulates the feeling of physical resistance into the virtual space and is inspired by pinball machines being bumped. This negative visual feedback contrasts with the positive visual feedback to ensure the player knows that they are making correct or incorrect movements.

The positive and negative visual feedback synergises with creating intrinsic motivation through improving player skills. The negative visual feedback allows

the players to know that they are not playing well, and the positive visual feedback rewards them with satisfaction. While the players gradually improve their skills, they should be seeing less negative visual feedback which will increase the satisfaction of increasing their skills.



*Figure 8(a) & 8(b).* Match winning screen for Player One (a) and Player Two (b).

Author's image. (2017)

When a player wins a match in Maze Racer, the screen will state the player whom won, and a slightly-transparent tint will cover the screen (see *Figure 8(a) & (b)*). The colour of the tint is colour coordinated to the colour of the winning player.

### **5.3.5 Prosocial reward design**

Lengthier periods of time the player spends playing a game encourages prosocial behaviour due to players valuing the consequences of their current actions on the future. Based on the related work (see 2.1), Maze Racer aims to encourage prosocial rewards in the following forms:

The presence of others is a process social reward in which the act of simply being around others is socially stimulating to an individual. Maze Racer will be displayed in a public space where any individual or group passing by can play. This invokes the presence of others. This social environment facilitates social interactions which create the presence of process social rewards.

Respecting the importance of the opponent is a prosocial behaviour exhibited after competition concludes. This specific prosocial behaviour leads to content social rewards. The specific content social rewards that Maze Racer is targeting are praise and sympathy. Praise will result from the skill levels displayed by players either showing improvement or competency, where a player will praise their opponent for their skill during gameplay. Sympathy will result from players constantly losing or losing close matches, where a player will portray sympathy for their opponent.

## **5.4 Discussion**

This section discusses the success of Maze Racer regarding answering the chapter question. Regarding competition, Maze racer was a success. Regarding prosocial rewards, the game had some success. This discussion will examine key aspects of Maze Racer that contributed to the game's success and shortcomings. Aspects for improvement for the next project will also be proposed.

### **5.4.1 Key successful aspects**

Competition aided in producing intrinsic motivation in the players. During the development of Maze Racer, the game was uninteresting regarding gameplay with only one player. The addition of the second player immediately increased the satisfaction of the gameplay. With one player, solving the maze was uninteresting even while using either of the two Guitar Hero controllers. The second player introduced competition to the puzzle-solving and immediately the presence was felt. The competition also increased intrinsic motivation through victory - beating an opponent was more enjoyable for the player.

Because the game has higher intrinsic motivation while two players are competing, respect between the players was introduced. This is because both players knew that without the other player, the game lacked competition and had substantially lower intrinsic motivation. It was not enjoyable or engaging for players without competition, and the players understood this, which lead to a

rapport. The players receiving prosocial rewards did result in the players wanting more prosocial rewards which lead to social motivation to continue to play with their opponent.

With the knowledge that competition facilitates the success of the in-game rewards that the prosocial rewards relied on, it created a need for a high level of competition. The following paragraphs will show how the level of competition in Maze Racer was increased.

During development, originally only one maze was displayed. When both players were competing on a single maze, it regularly created confusion between the two players. One player might have lost thinking they were winning or wondered why their player avatar was moving in a different direction to their controller inputs.

This was because they confused their opponent's player avatar for their own.

When players were given their own maze to view during gameplay, the confusion disappeared.

One issue that arose from fixing the avatar confusion issue was that the competition was subdued. This was because players were not receiving feedback as to where their opponent was in the maze. The losing player was often surprised when their opponent won because they did not know their opponent was ahead.

This issue was solved by the inclusion of the particle trails left behind the players. A player's movement was mirrored by particles projecting outwards. The particles

were the same colour as the respective player avatar. To solve the issue of subdued competition, the particles for both players were displayed in both instances of the maze. This meant that each player can estimate where their opponent is located in the maze. However, since each instance of the maze only displays one player avatar, there is no confusion as to which avatar each player is controlling.

Another design choice that increased the competition was the choice of controllers. The controllers were successful because they added a layer of complexity and challenge to the puzzle-solving of the maze. While the competition between players was felt, the controllers were able to disrupt the player's efforts to navigate in their desired directions. This was not viewed as a negative because the players were able to overcome the disruption through repeated attempts at the game. The more time they played, the better their skills became - and so the controllers were able to impact the intrinsic motivation of the game positively.

This section summarises how Maze Racer successfully contributed to answering the chapter question.

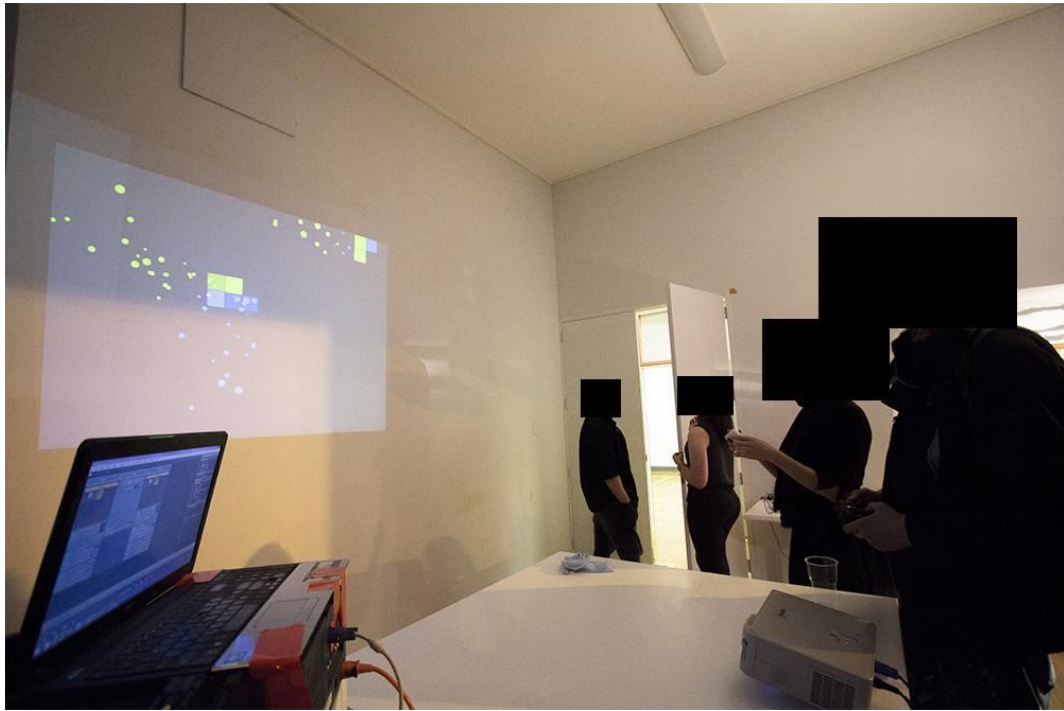
The in-game rewards are chosen to target in Maze Racer resulted in prosocial rewards. The focus on creating a game that was enjoyable and engaging for the player resulted in gameplay that was intrinsically motivating. Creating intrinsic

motivation for the player was the focus for Maze Racer, and this resulted in the following prosocial rewards - the *presence of others*, *praise*, and *honour*.

#### **5.4.2 Improvements for next game**

The controller choice did positively benefit the need for a high level of competition, but it simultaneously had the impact of creating a skill ceiling that may have been dispiriting to some players who found the level of strangeness too substantial. This leads to the next game likely flipping the familiarity and strangeness paradigm by having familiar controls, and strange gameplay design. This will allow the opportunity for unforeseen benefits or hindrances not experienced in Maze Racer.

## 5.5 Second game: Simultaneous Multi-Game



*Figure 9.* Simultaneous Multi-Game large scale interactive display. Author's image. (2017)

Simultaneous Multi-Game<sup>3</sup> is a two-player competitive game where two players control two games at the same time using one controller each. The aim is to be the winner of both games to win the match. This section will explore the application of the methodology to the development of Simultaneous Multi-Game, as well as a discussion evaluating the game, followed by an evaluation of the game about the chapter question, and finally providing improvements for any future games.

---

<sup>3</sup> [http://ivx.org.nz/portfolio\\_category/portfolio/](http://ivx.org.nz/portfolio_category/portfolio/)

Simultaneous Multi-Game (see *Figure 9*) consists of two players competing to win at two games simultaneously. Players control the game using two *Official Xbox 360 Wireless Controllers* (see 3.5.2) with each player using one controller. The projection on the wall in (see *Figure 5*) shows the game being played, with two different games being played simultaneously.

The primary contributors to Simultaneous Multi-Game are Finn Kennedy (myself), Emmanuel Turner, Shannon Saw, and Jianting “Eva” Hou. My contributions to Simultaneous Multi-Game are conceptualising the concept of the game, planning the game, designing the gameplay, designing the look and feel of the game, designing the game controls and implementing the controllers, playtesting the game, and developing the obstacle course game (see 3.5.4).

Simultaneous Multi-Game was displayed as part of the *BYOB Bring Your Own Beamer 3* exhibition at the Waikato Institute of Technology on the 22nd of September 2016.

### **5.5.1 Choosing in-game rewards**

The in-game rewards in Simultaneous Multi-Game will focus on the same in-game rewards as Maze Racer. This will keep the targeted in-game rewards constant and allow for easier comparisons between the games (see 3.7).

### 5.5.2 Controller choice



*Figure 10.* Official Xbox 360 Wireless Controller. Author's image. (2017)

As discussed earlier in the *Improvements for next game* section for Maze Racer, the controller choice would fit the role of familiarity for the next game.

Simultaneous Multi-Game will use the *Official Xbox 360 Wireless Controller* (see *Figure 10*) as the controllers for both players. These controllers have several varying inputs - two asymmetrical analogue sticks, four face buttons, a directional-pad, two bumpers, and two triggers. This large number of inputs allows flexibility in combinations of diverse inputs, as well as the option to strip the controls down to remedial-level inputs.

These controllers can also serve to fill the level of familiarity necessary to contrast with the strangeness of the Guitar Hero controllers in Maze Racer.

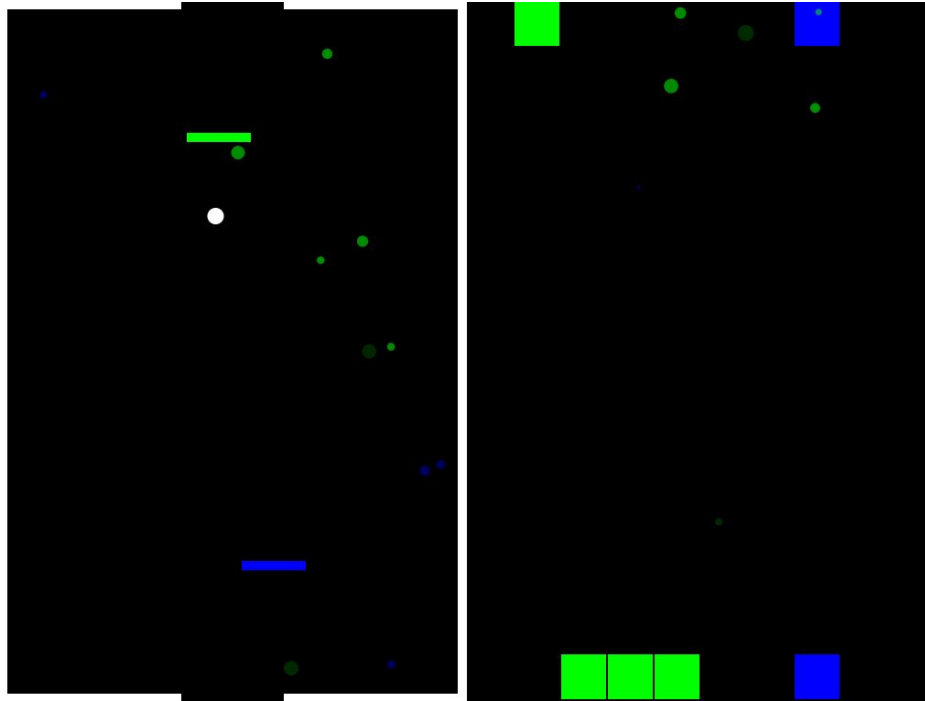
### **5.5.3 Player count**

Simultaneous Multi-Game is a head-to-head two player game.

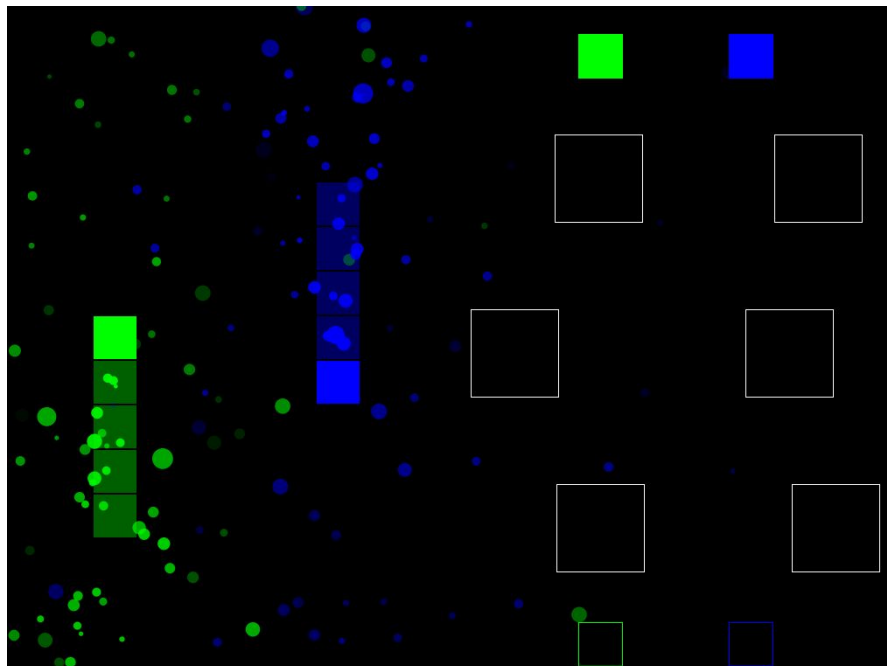
### **5.5.4 Competitive design**

Simultaneous Multi-Game follows the same methodology as Maze Racer regarding competitive design. The reason for this decision is to allow comparisons between the two games in the conclusion of this chapter. If Simultaneous Multi-Game produces similar or identical prosocial rewards as Maze Racer, this could highlight a specific relationship competition has with prosocial rewards.

Simultaneous Multi-Game aims to follow on from the competition developed in Maze Racer. The game screen aims to show a distinction between players using the same blue and green colouring for players as in Maze Racer. The game screen shows two different games at the same time. These two games are controlled by the same inputs as using one input will affect each game differently but simultaneously.



*Figure 11.* Simultaneous Multi-Game gameplay screenshot showing the Pong-style game on the left, and Connect-four-style game on the right. Author's image. (2017)



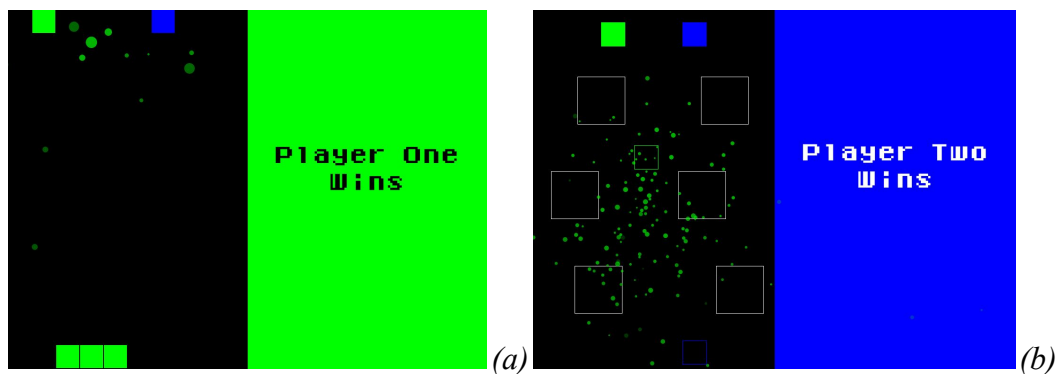
*Figure 12.* Simultaneous Multi-Game gameplay screenshot showing the Snake-style game on the left, and Obstacle-Course game on the right. Author's image. (2017)

There are four potential games for Simultaneous Multi-Game, and two randomly chosen games are selected for each match. The first is a *Pong-style* game - where each player controls a paddle and must deflect a ball to stop it passing into their scoring zone (see *Figure 11*). The second is an obstacle course game - where each player begins at the bottom of the screen and must reach the finishing square at the top dodging the obstacles along the way (see *Figure 12*). The third is a *snake-style* game - where moving increases the length of the player's snake avatar, and each player must avoid hitting the side of the opposition's avatar (see *Figure 12*). The fourth game is a *connect four-style* game - where the player controls an avatar at the top of the screen and sends blocks to the bottom of the screen to connect four of their own coloured blocks before their opponent (see *Figure 11*).

The reasoning behind using four games is to increase the skill ceiling of the game. Having four games to learn is more complex than learning one, and having to learn two games simultaneously adds to the high skill ceiling. Because the controllers are now more familiar than Maze Racer's Guitar Hero controllers, this helps to increase the skill ceiling that the controller choice in Simultaneous Multi-Game reduced.

These four games are chosen to implement into Simultaneous Multi-Game because they could be easily described to the players. Each game played

individually is simple, and that offsets the complexity of playing two games simultaneously. The games needed some measure of recognisability to ensure the players could quickly learn the controls. Because the concept of Simultaneous Multi-Game is stranger than Maze Racer, these decisions to balance the complexity were used. Using games with efficient descriptions aims to balance the strangeness to a level that is not too strange.



*Figure 13(a) & Figure 13(b).* Screenshot of gameplay showing that Player One has already won the game being displayed on the right (a), and the same but instead Player Two has won (b). Author's images. (2017)

Winning games in Simultaneous Multi-Game show different screens throughout a match. If a player wins one of the two games, that game's side of the screen will be disabled, and a screen stating who won that game will appear (see *Figure 13(a) & (b)*). This is done to give the players feedback as to the progression of the match. Players will also know that they now only have to focus on one game instead of two.



*Figure 14(a), Figure 14(b), & Figure 14(c):* Screens shown when Player One wins both matches (a), when Player Two wins both matches (b), and when both players each win one game, resulting in a draw for the match (c). Author's images.

(2017)

Once both games in a match have been won by either player, a screen stating the result of the match will display (see *Figure 14(a), 14(b), & 14(c)*). This concludes the match and the winner is revealed, or a draw occurs (when both players win

one game each). The screens are colour coordinated to the winning player to aid in identifying the winner. If a draw occurs, then the screen is yellow which was chosen as a neutral colour to reflect the nature of the draw.

### **5.5.5 Prosocial reward design**

Simultaneous Multi-Game aims to reinforce the results of Maze Racer by targeting identical prosocial rewards. The variables of changing the controllers for familiarity purposes and creating strange gameplay will be able to potentially aid in linking the relationship between prosocial rewards and competition. By targeting the same prosocial rewards and having the same player count, it allows both Maze Racer and Simultaneous Multi-Game to be compared (see 3.7).

## **5.6 Discussion**

This section will subjectively discuss the success of Simultaneous Multi-Game regarding answering the chapter question. This discussion will examine key aspects of Simultaneous Multi-Game that contributed to the game's success and shortcomings. Aspects for improvement for the next project will also be theorised.

### **5.6.1 Key successful aspects**

The focus on two players in Simultaneous Multi-Game was carried over from Maze Racer, and this worked well. The game was designed always to require two players for competition to be present, even if only one player attempted to play the

game. If one player attempted to play the game, there would still be two avatars present in each game. This meant that the player would need to invite another individual to play the game to get the intrinsic motivation to continue playing.

### **5.6.2 Chapter question success**

Simultaneous Multi-Game was only somewhat successful regarding the chapter aims. The competition levels were lower than Maze Racer - likely due to the issues highlighted in the next section - and so were the prosocial rewards. The targeted prosocial rewards were not successfully achieved, and this could suggest a link with the lower competition. However, the research is only one practice-led exploration and thus insufficient to confirm this link.

### **5.6.3 Improvements for next game**

While Maze Racer was successful in creating competition, Simultaneous Multi-Game was less successful regarding creating competition. The concept of the game was too strange in some cases. The games were easy to explain, but hard to understand for players during matches. The snake, connect four, and obstacle games were the most difficult because the visuals used were hard to understand due to a lack of feedback among the chaos of controlling two games simultaneously. Players needed several matches to understand the concept of the game fully. Even after grasping a competent understanding of the concept, the

technique employed by most players was to focus on one game at a time instead of attempting to make movements which affect both games strategically.

These issues highlighted above served to leave players appreciating the concept but not engaging as highly with the game when compared to Maze Racer engagement. The skill ceiling was much higher than Maze Racer, but also the beginning skill level requirement was too high. This led to an imbalance in the competition levels between Maze Racer and Simultaneous Multi-Game - where Maze Racer's skill ceiling and beginning skill level requirement were both low, whereas they were both high in Simultaneous Multi-Game.

In-game rewards can lead to prosocial rewards and vice versa. The scope of the thesis limited the in-game rewards that could be incorporated into both games, and so intrinsic motivation was the pragmatic choice for integration and targeting in both games. Intrinsic motivation - being motivated by satisfaction - worked well in both games because it synergised with the prosocial rewards both games were targeting. The prosocial rewards and intrinsic motivation synergised and facilitated one another, creating social motivation.

To improve this imbalance of competition between the two games, the balance of the familiarity and strangeness in Simultaneous Multi-Game needs to be pushed in the direction of familiarity.

## 5.7 Comparing Maze Racer and Simultaneous Multi-Game

Key aspect	Maze Racer	Simultaneous Multi-Game
<b>Choosing in-game rewards</b>	<ul style="list-style-type: none"> <li>• Intrinsic motivation</li> </ul>	<ul style="list-style-type: none"> <li>• Intrinsic motivation</li> </ul>
<b>Controller choice</b>	<ul style="list-style-type: none"> <li>• Instrument controllers</li> </ul>	<ul style="list-style-type: none"> <li>• Xbox 360 Wireless controllers</li> </ul>
<b>Player count</b>	<ul style="list-style-type: none"> <li>• Two players</li> </ul>	<ul style="list-style-type: none"> <li>• Two players</li> </ul>
<b>Competitive design</b>	<ul style="list-style-type: none"> <li>• First player to finish randomly generated maze wins</li> <li>• Colour coordination for player information</li> <li>• Maze displayed twice</li> <li>• One player avatar displayed per maze</li> <li>• Positive and negative feedback</li> </ul>	<ul style="list-style-type: none"> <li>• First player to win two randomly chosen games being displayed wins</li> <li>• Colour coordination for player information</li> <li>• Two games being displayed</li> <li>• Both player avatars displayed in both games</li> <li>• Positive feedback</li> </ul>
<b>Prosocial reward design</b>	<ul style="list-style-type: none"> <li>• Process social reward: presence of others</li> <li>• Prosocial behaviour: Respect for opponent</li> <li>• Content social rewards: praise, sympathy</li> </ul>	<ul style="list-style-type: none"> <li>• Process social reward: presence of others</li> <li>• Prosocial behaviour: Respect for opponent</li> <li>• Content social rewards: praise, sympathy</li> </ul>

*Table 1.* Comparison of key aspects from Maze Racer and Simultaneous Multi-Game methodologies. Author's table. (2017)

The table above (see *Table 1*) compares the features of Maze Racer and Simultaneous Multi-Game side-by-side following the key aspects introduced in the methodology section (see 3.2). The remainder of this section discusses the outcomes of the practise-led experience regarding these key aspects as a lead into this study's conclusions.

Table 1 shows that the key aspects of *Choosing in-game rewards*, *Player count*, and *Prosocial reward design* were kept consistent across both games. Both games had two players competing, and the games targeted the same in-game rewards and prosocial rewards. These consistent key aspects allow for the comparison of the impact that competitive design and controller choice had on the success of these key aspects.

The competitive design also shared decisions between the two games – colour coordination for player information, and positive feedback. These two decisions were kept consistent between the two games because they were initially successful in Maze Racer, so it made sense to replicate them again in Simultaneous Multi-Game.

Objectively, many of these decisions were kept consistent between both games. However, the success of the consistencies was not equal in both games. For

example, Simultaneous Multi-Game was less satisfying regarding skill improvement. The concept of the gameplay was too strange, resulting in the skill ceiling being higher than Maze Racer, but the learning curve was too high to encourage continued play.

In general, the competitive design of Simultaneous Multi-Game was less successful than Maze Racer. Not incorporating negative feedback as in Maze Racer was detrimental, it led to confusion. Both player avatars being shown in the same game screen also went against the decision to separate player avatars in Maze Racer which also increased confusion between players. No steps were taken to decrease the confusion created by going against the successes of Maze Racer's competitive design.

The unsuccessful competitive design lead to less time spent playing Simultaneous Multi-Game than Maze Racer. Despite both games objectively targeting the same prosocial rewards, the lesser time played means that prosocial reward attainment in Simultaneous Multi-Game was also less successful than in Maze Racer.

## **5.8 Conclusion**

The experience of Maze Racer and Simultaneous Multi-Game contribute to answering the chapter research question. The contribution of both will be explained in this set of conclusions.

Maze Racer and Simultaneous Multi-Game demonstrate that prosocial rewards can result from competition. The games were not enjoyable with one player playing the games, the addition of a second player created the competition which leads to players respecting the importance of each other in creating the enjoyable experience. This understanding of the role each player led to players exchanging content social rewards between each other after a match, and before the next match started. The competition also created intrinsic motivation by introducing satisfaction from victory. This was true for both Maze Racer and Simultaneous Multi-Game.

In Maze Racer, this intrinsic motivation was also increased by the strangeness introduced by the Guitar Hero controllers resulting in a high skill ceiling. Controlling Maze Racer was a skill because the experience of navigating a player avatar with the chosen Guitar Hero controllers was strange at first. By increasing their skills at controlling Maze Racer, the players found satisfaction which led to intrinsic motivation to continue to improve their skills.

Simultaneous Multi-Game had less intrinsic motivation than Maze Racer because the gameplay was too confusing early on to players, which led to players not being aware of whether their skills were improving. This is also due to the feedback from the game being difficult to interpret compared in Maze Racer, where the positive and negative visual feedback gave players richer feedback as to how well they were controlling their player avatar.

The intrinsic motivation players experienced in Maze Racer lead to longer lengths of play time than in Simultaneous Multi-Game. The length of time spent playing affected how many content social rewards were received. With the intrinsic motivation felt from Maze Racer being high, the length of time played in Maze Racer was high as well - resulting in players giving and receiving more content social rewards than obtained when playing Simultaneous Multi-Game.

Process social rewards also benefited from the length of time Maze Racer was played for. Process social rewards are passive, and as long as a group or individual is in the presence of a process social reward, they will receive it. Because the length of time spent playing Maze Racer was higher, the process social rewards of the social environment were experienced for longer. Because Simultaneous Multi-Game had a comparable social environment to Maze Racer, it is believed that the length of time spent playing the games was the difference in process social reward effectiveness between the games.

In answering the question, the strangeness present in both games did contribute to the attainment of prosocial rewards. The strangeness did create a high skill ceiling, and (as long as the intrinsic motivation was substantial enough) it increased the length of time both players had to exchange content social rewards and be exposed to social rewards.

## 5.9 Summary

Two games were developed as part of practise-led research to explore the question: “Can prosocial rewards be attained by players in two player competitive games when strangeness is used to create a high skill ceiling?” This practise-led research was self-evaluated by the researchers involved in the thesis.

The first game - Maze Racer - was a two player head-to-head competitive game which tasked two players with competing to complete a maze through using two unique Guitar Hero controllers.

The second game - Simultaneous Multi-Game - was a two player head-to-head competitive game which tasked two players with competing to win two games being played simultaneously with one controller.

Maze Racer used a high skill ceiling, satisfaction in skill improvement, and enjoyment of competition to create intrinsic motivation. Simultaneous Multi-Game used the same concepts, but was less successful and as a result, the intrinsic motivation was lower than Maze Racer.

The requirement of having two players to ensure the game was enjoyable resulted in players respecting the presence and recognising the importance of each other in creating the enjoyable experience in both games. This led to content social rewards being exchanged between players. The higher intrinsic motivation in

Maze Racer synergised with the prosocial rewards to increase the length of time players played Maze Racer compared to the lower intrinsic motivation in Simultaneous Multi-Game. This long length of play time meant more content social rewards were exchanged, and players existed in the social environment around the game longer which exposed them to process social rewards for longer than in Simultaneous Multi-Game.

Overall, the strangeness present in both games did contribute to players attaining prosocial rewards because it increased the length of time they had to exchange content social rewards and be exposed to social rewards.

## **6 Chapter 4: Summary and conclusion**

This chapter summarises and discusses Chapter 2 and Chapter 3 in the context of the research question. This discussion is then distilled into findings and from the findings, turned into recommendations are made for the benefit of other practitioners who are attempting to incorporate competition-based prosocial reward into interactive installation design games. Finally, the limitations of this research are explained, and ideas are given for future research.

### **6.1 Summary**

The purpose of this thesis was to answer the question:

“Can competitive games facilitate prosocial behaviour and the attainment of prosocial rewards?” This section will summarise the key points of the research that work towards addressing this question.

The literature review draws on themes from previous research which are outlined below:

Prosocial rewards are social rewards which are mutually beneficial to social relationships. These rewards create social motivation - where prosocial behaviour is exhibited due to the perceived notion that prosocial rewards would result from exhibiting prosocial behaviour (see 2.1).

Prosocial rewards can be categorised into two different categories: process and content social rewards (see 2.1). Process social rewards are passive rewards that are experienced by being in social situations and social environments. Content social rewards are prosocial rewards given by individuals or groups to others. They are forms of compliments or positive discussions about the individual or group they are being presented to (Buss & Hogan, 1983).

Aggression has been traditionally linked to competition (see 2.2). This is because, during the competition, competitors inhibit each other's progress towards their opponent's goal (Anderson, & Morrow, 1995, p.1029). The negative stigma of aggression means that the link aggression has to competition creates the assumption that competition is antisocial.

However, healthy competition can produce prosocial rewards through the honour and passion exchanged by the competitors (see 2.2). The aggression that arises during competition could be offset after the conclusion of the competition if the competitors exhibited content social rewards between each other. For example, as stated in Chapter 2 - Ricky Ponting described that their team played aggressively while on the field, however, they "always sought to be friendly with the opposition once the game was done. Most times, that mateship was reciprocated and if it was not, we knew who the losers were" (Armstrong & Ponting, 2013, p.21).

Cooperation is the antithesis of competition because cooperation involves individuals facilitating each other's progress towards a mutually beneficial goal. (Waddell, 2014).

Games utilise in-game rewards to encourage continued engagement from the player. The presence of extrinsic and intrinsic motivation can lead to players attaining prosocial rewards (Lewis-Evans, 2017). While games have often rewarded antisocial behaviour in the past (Lewis-Evans, 2017), games can change the trend by integrating prosocial rewards into the gameplay which is either extrinsic or intrinsically motivating. There are game developers - such as Epic Games, Bungie, and Riot Games (see 2.41, 2.42, and 2.43) - which have intentionally developed gameplay which facilitates prosocial rewards. Also, the gameplay is satisfying for the player due to their skills improving.

Players enjoy the satisfaction felt when improving their skills in games (Ryan, Rigby, & Przybylski, 2006, p.361). If the game has a large skill ceiling, it encourages long term engagement between the game and player. This long-term engagement encourages players to exhibit prosocial behaviour because of the value players place on their actions and the future consequences of their actions.

Games can facilitate prosocial rewards due to their impact on a game's skill ceiling. The skill ceiling of a game leaves room for the player to improve their skills, which the players gain satisfaction from. Provided the game encourages

prosocial behaviour leading to prosocial rewards, the larger skill ceiling increases the time that players have to exchange these prosocial rewards.

Strangeness effects the skill ceiling of a game. Experiences that players find strange can lead to higher skill ceilings. The strangeness of a game can be increased using strange gameplay design, or strange controllers.

This relationship between strangeness, skill ceiling, and time played informed the chapter 3 research question. In chapter 3, two games were developed to answer the question:

“Can prosocial rewards can be attained by players in two player competitive games when strangeness is used to create a high skill ceiling?” These two games will be summarised in the following paragraphs.

Maze Racer (see 3.3) tasked two players to compete in finishing a maze first. The game was controlled using two different controllers which introduced strangeness to the navigational gameplay. The game had a high skill ceiling because of the strangeness introduced by the controllers. The game was more engaging and enjoyable when two players were competing against each other, as opposed to one player playing alone due to the effect competition had on the intrinsic motivation to play Maze Racer. These successful decisions influenced the next game project.

Simultaneous Multi-Game (see 3.5) tasked two players to compete to win two games being played simultaneously. The game introduced strangeness and a high skill ceiling in the gameplay by having each player control two games at the same

time using one controller. The controllers were more familiar than in Maze Racer in an attempt to control the level of strangeness was introduced by playing two games simultaneously. As with Maze Racer, Simultaneous Multi-Game was more engaging and enjoyable when two players were competing against each other, as opposed to one playing alone.

## 6.2 Discussion

This discussion uses both the literature review in Chapter 2 and the game projects developed in Chapter 3 to answer the research question from Chapter 1.

The categories of process and content social rewards aided in understanding prosocial reward to competitive games. With the understanding of these two categories, it facilitated the reward choice during both Maze Racer and Simultaneous Multi-Game. The two categories facilitated the *prosocial reward design* section of the methodology by helping understand how different design choices in the games may produce different prosocial rewards. For example, the decision was made to exhibit the games in the form of large scale interactives as part of larger exhibitions - such as the *Computer Graphic Design Open Day 2016* Exhibition at The University of Waikato and *BYOB Bring Your Own Beamer 3* exhibition at the Waikato Institute of Technology. This decision was made because it would introduce process social rewards by being part of a larger social gathering. These two categories also facilitated discussion during development by giving a framework to evaluate if prosocial rewards attainment was successful.

Social motivation kept players engaged. Both games were enjoyable and engaging from the perspective of intrinsic motivation, but only if there were two competitors present. Intrinsic motivation and its need for two players present facilitated prosocial rewards by encouraging players to give prosocial rewards and behave prosocially to encourage each other to keep playing. Social motivation became a form of intrinsic motivation because receiving prosocial rewards encouraged players to play well. This resulted in two factors contributing to the intrinsic motivation felt by the players - enjoyment motivation and social motivation.

There was a positive link between competition and the enjoyment and engagement players experienced in both Maze Racer and Simultaneous Multi-Game.

Moreover, this link between competition and engagement supports McCollum's statement that there is an "awareness that the two opponents need each other as integral halves in the contest" (2012). Both games were more stimulating to players when they were competing against another player. This increase in stimulation suggests that competition can lead to longer lengths of time spent playing the game by the players.

Aggression was outside the scope of Chapter Three. While aggression was not tracked during the practice-led research, the antisocial behaviour described by the research in Chapter 2 was not experienced during gameplay or after the competition had concluded. In research on a larger scale, tracking antisocial

behaviour would be beneficial for comparing aggression with prosocial behaviour. From the research (see 2.2) it can be understood that players may feel aggression during the competition. However, if the competition is healthy and content social rewards are exhibited after the competition concludes, this emotion can be subdued when the players reflect on the healthy competition and respect the role that every competitor had in creating the competition.

In-game rewards can lead to prosocial rewards and vice versa. The scope of this thesis limited the quantity of in-game rewards that could be targeted in both games. Intrinsic motivation was the ideal in-game reward choice for targeting in both games. Intrinsic motivation - being motivated by satisfaction - worked well in both games because it synergised with the prosocial rewards both games were targeting. The prosocial rewards and intrinsic motivation synergised and facilitated one another, creating social motivation.

The length of time a game was played affected the chances of prosocial rewards being obtained. The longer players spent playing both games in Chapter 3, the more opportunities that presented themselves to give and receive content social rewards. The length of time spent playing also links to the effectiveness of process social rewards. Because process social rewards are passive and continue to be rewarding as long as individuals experience them, those playing a game can benefit from these prosocial rewards longer if they remain playing.

The level of competition in a game contributes to the length of time played. In Maze Racer, the level of competition was high due to the effective distinction between player information, and the particle trails informing both players where their opponent was in the maze. Simultaneous Multi-Game had a lower level of perceived competition due to the confusion introduced by the strangeness of the game concept and gameplay. This differing level of competition in both games links to the length of time that the players spent with the game, where players spent more time playing Maze Racer compared to less time spent playing Simultaneous Multi-Game.

The strangeness introduced by the Guitar Hero controllers created a high skill ceiling in Maze Racer. Navigation became a skill which the player could improve. The controllers added another challenge for the player to the task of finishing the maze before their opponent.

Intrinsic motivation was introduced by the Guitar Hero controllers in Maze Racer because the satisfaction of improving skills was felt by the players. The use of visual aids also contributed to the intrinsic motivation, with particle effects giving the player positive feedback for their interactions. Negative feedback - when players pressed a button resulting in a move which could not be made, resulting in a flash of red and the whole maze shaking - helped show players which movements were right and what was wrong.

Competition is stimulating for players as part of the intrinsic motivation they feel. For example, Maze Racer was best enjoyed when there were two players competing against each other. The player's knowledge that their opponent was necessary to their enjoyment of the game created a need for prosocial behaviour so that they could continue to enjoy the game.

Process social rewards influenced the decision to have the games exhibited in a public environment. The environment facilitated social interactions which create the presence of process social rewards.

The length of time the players played Maze Racer for increased the opportunities to give and receive content social rewards and also increased their exposure to the process social rewards of the environment that Maze Racer was exhibited. The enjoyment of intrinsic motivation and positive feelings that prosocial rewards gave both synergised to increase the length of time of play in the players.

Simultaneous Multi-Game had similar results to Maze Racer. However, lower levels of competition resulted in a less successful game regarding answering the research question in Chapter 3.

The strangeness of playing two games simultaneously in Simultaneous Multi-Game was higher when compared to the strangeness of the Guitar Hero controllers in Maze Racer. The level of strangeness caused a large level of confusion that was not fixed during the application of the methodology from

Chapter 3. This confusion resulted in a lower level of competition when compared to Maze Racer.

The lower level of competition contributed to lower levels of intrinsic motivation felt by the players. The players did not find Simultaneous Multi-Game as satisfying regarding improving their skills at the game. The skill ceiling was higher than Maze Racer, but the learning curve for new players was too high to encourage continued play.

Players spent less time playing Simultaneous Multi-Game than playing Maze Racer. This affected the prosocial reward attainment because there was less time spent in the environment to receive process social rewards, and less time spent playing to give and receive content social rewards.

### **6.3 Findings**

The discussion in the previous section will be summarised into key findings.

There are two categories for prosocial rewards - process social reward and content social reward. Through the research in Chapter 3, prosocial rewards from both categories can be attained through playing two player head-to-head competitive games. However, the attainment of prosocial rewards must be considered during the design of the game.

There is a positive link between the length of time spent playing a two player head-to-head competitive game and prosocial reward. This positive link is shown by comparing the results of both games developed for the research, where longer play times presented more opportunities for social interactions to occur and prosocial rewards to be attained.

The length of time spent playing can be increased by the presence of in-game rewards and receiving prosocial rewards which synergise to create intrinsic motivation in the player. Intrinsic motivation encourages longer lengths of time spent playing, which - as suggested in the previous paragraph - results in more content social rewards being exchanged between players and more exposure to process social rewards.

## **6.4 Recommendations**

The following recommendations are based on the research in Chapter 2 and 3 of this thesis. These are recommendations for how to optimise prosocial rewards in two player head-to-head competitive games. The guiding motivation for the recommendations is the reflective question: “Based on a reading of the related research and having experienced the production of two games that explored competition and prosocial reward, what advice could I give to others who are attempted something similar?”

The recommendations are given first in summary in the paragraph below and then expanded upon in the following sections.

In summary, it is recommended that healthy competition is required for prosocial rewards to be produced in competitive situations. Secondly, games should be designed as to reward prosocial behaviour for facilitating prosocial rewards. Lastly, games should be designed to promote social motivation which alternatively leads to the attaining of prosocial rewards.

#### **6.4.1 Facilitate healthy competition**

Healthy competition forms the basis for prosocial rewards to be produced from the competition. No matter what occurs during the competition - such as high levels of aggression - both players respect and honour the importance of each other through content social rewards such as praise or sympathy.

#### **6.4.2 Design to reward prosocial behaviour with prosocial rewards**

Players can be encouraged to behave prosocially by creating in-game rewards or extrinsic/intrinsic motivation that require the player to exhibit prosocial behaviour. The players exhibiting prosocial behaviour will both reward other players prosocially and also expect prosocial rewards from other players.

### **6.4.3 Design for social motivation**

Social motivation is what motivates players to behave prosocially. This recommendation is linked with the previous recommendation. However, the difference is that instead of players being encouraged to behave prosocially, social motivation can become the intrinsic motivation. The game can become a link between the players because the game can act as a social situation - a process social reward - to exhibit prosocial behaviour - producing content social rewards.

## **6.5 Limitations**

The research in Chapter 3 was self-evaluated practise-led research. While no findings or recommendations stated in this thesis were formed from purposely misconstrued results, the nature of this practise-led research is that outcomes may be instructive, but are not conclusive.

The research also only applies to prosocial rewards resulting from two-player head-to-head competitive games. Care should be taken in applying the research outcomes to other forms of competition.

Both games developed in Chapter 3 were large scale interactive installations as part of public exhibitions which were viewable for a limited time. This limits the findings to apply to the exhibition environment. The results may not be reproducible in other environments, such as a home gaming setup.

## **6.6 Future research**

The following questions are related to this thesis and why future research to answer these questions is valuable.

### **6.6.1 Can aggression facilitate prosocial rewards during gameplay?**

This study accepted that competition causes aggression during game play. However, this study has examined prosocial rewards that occur once the competition has concluded and the aggression has subsided. Research into positive effects of aggression during gameplay could reveal new opportunities to create new prosocial rewards during competitive gameplay.

### **6.6.2 Are prosocial rewards in team-based competitive games comparable to the prosocial rewards in team-based sports?**

This study was limited to two player head-to-head competitive games. However, much of the literature review was based on team-based competition and the cooperation involved. The examples were from both sports and games, which suggests they are comparable to one another regarding the prosocial rewards produced from the cooperation.

### **6.6.3 Is prosocial reward attainment affected by the quality of gameplay in competitive games or only length of time played?**

Prosocial reward attainment in the game Maze Racer was higher than experienced in Simultaneous Multi-Game, and because players played Maze Racer more because the intrinsic motivation to play was higher. If Simultaneous Multi-Game had been played for an equal length of time, would the prosocial rewards attained by the players be equal? Alternatively, is the level of enjoyment and engagement present in Maze Racer a larger effect on the attainment of prosocial rewards? This is a question which would help solidify some findings that this thesis concludes with.

## **6.7 Summary and final thoughts**

This research provides two demonstrations of how two player head-to-head competitive games can reward players prosocially and encourage prosocial behaviour in what is traditionally assumed as an antisocial activity.

Intrinsic motivation works to encourage long term engagement from players. Provided the game is designed to ensure that competition is healthy and encouraging of prosocial rewards, these rewards will continue to be attained by the players during their time spent playing a game.

It is with this knowledge that further research into prosocial rewards and competition can be undertaken to discover the additional benefits to competition, and change the negative stigma associated with competitiveness.

## References

- Adachi, & Willoughby. (2011). The effect of violent video games on aggression: Is it more than just the violence? *Aggression and Violent Behavior, 16(1)*, 55-62.
- Anderson, C., & Morrow, M. (1995). Competitive Aggression without Interaction: Effects of Competitive versus Cooperative Instructions on Aggressive Behavior in Video Games. *Personality and Social Psychology Bulletin, 21(10)*, 1020-1030.
- Armstrong, G., & Ponting, R. (2013). *Ponting: at the close of play*. Sydney, Australia: HarperCollins Publishers.
- Arnold, J., Beasley, C., Hecq, D., & Novitz, J. (2014). What is Practice-led Research? [Video file]. From <https://www.youtube.com/watch?v=2909KkJBXfM>
- Arruda-Filho, Cabusas, & Dholakia. (2010). Social behavior and brand devotion among iPhone innovators. *International Journal of Information Management, 30(6)*, 475-480.
- Axelrod, R. (2006). *The Evolution of Cooperation*. New York, New York: Basic Books.
- Bierhoff, H. (2002). *Prosocial Behaviour*. East Sussex, United Kingdom: Psychology Press.
- Bungie Inc. (2014). *Destiny* [Xbox One]. Bellevue, Washington: Activision. Played September 2, 2016

- Buss, A., & Hogan, R. (1983). Social rewards and personality. *Journal of Personality and Social Psychology*, *44*(3), 553-563.
- Charlton, S., & Starkey, N. (2013). Driving on familiar roads: Automaticity and inattention blindness. *Driving on familiar roads: Automaticity and inattention blindness*, *19*, 121-133. doi:10.1016/j.trf.2013.03.008
- Crogan, P. (2011). *Gameplay mode: War, simulation, and technoculture* (N - New ed.). Minneapolis, Minnesota: University of Minnesota Press.
- Epic Games Inc. (2016). Paragon Open Beta [PC]. Cary, North Carolina: Epic Games Inc. Played September 26, 2016
- Fang, Kong, & Kwok. (2011). The effects of peer intrinsic and extrinsic motivation on MMOG game-based collaborative learning. *Information & Management*, *49*(1). From <http://www.sciencedirect.com.ezproxy.waikato.ac.nz/science/article/pii/S0378720611000929>
- Fischer, P., Greitemeyer, T., Morton, T., Kastenmüller, A., Postmes, T., Frey, D., . . . Odenwälder, J. (2009). The racing-game effect: Why do video racing games increase risk-taking inclinations? *Personality and Social Psychology Bulletin*, *35*(10), 1395-1409.
- Florić, O., & Ninković, S. (2013). The contribution of sport to prosocial behavior in youth. *New Educational Review*, *31*(1), 175-184.
- Gere, J., Macdonald, G., Joel, S., Spielmann, S., Impett, E., & Simpson, J. (2013). The Independent Contributions of Social Reward and Threat Perceptions to Romantic Commitment. *Journal of Personality and Social Psychology*, *105*(6), 961-977.

- Kallinen, K., Ravaja, N., Saari, T., Salminen, M., & Laarni, J. (2006). Phasic emotional reactions to video game events: A psychophysiological investigation. *Media Psychology, 8*(4), 343-367.  
doi:10.1207/s1532785xmep0804\_2
- Kang, S., & Kim, S. (n.d.). Quest reward optimization method for massive multiplayer online role playing games. *Telecommunication Systems, 60*(2), 327–335. doi:10.1007/s11235-015-0033-6
- Kent, S. (2001). *The ultimate history of video games : From Pong to Pokemon*. Roseville, California: Prima.
- Kohls, G., Perino, M., Taylor, J., Madva, E., Cayless, S., Troiani, V., . . . Schultz, R. (2013). The nucleus accumbens is involved in both the pursuit of social reward and the avoidance of social punishment. *Neuropsychologia, 51*(11), 2062-2069.
- Kwak, Y., & Huettel, S. (2016). Prosocial reward learning in children and adolescents. *Frontiers in Psychology*. doi:10.3389/fpsyg.2016.01539
- Lewis-Evans, B. (2015). Anti Social Behavior in Games How Can Game Design Help? [Video file]. From  
[https://www.youtube.com/watch?v=cS48AQdoi\\_I](https://www.youtube.com/watch?v=cS48AQdoi_I)
- Lewis-Evans, B. (n.d.). Throwing Out the Dopamine Shots: Reward Psychology Without the Neurotrash [Video file]. From  
<https://www.youtube.com/watch?v=xkg9ocYDLr8>
- Lianekhammy, J., & Van De Venne, J. (2015). World of Warcraft Widows: Spousal Perspectives of Online Gaming and Relationship Outcomes. *The American Journal of Family Therapy, 43*(5), 454-466.

- Lin, J. (2014). Enhancing Sportsmanship in Online Games [Video file]. From <http://www.gdcvault.com/play/1020389/Enhancing-Sportsmanship-in-Online>
- Maguire, J. (2013). *Social Sciences in Sport*. Champaign, Illinois: Human Kinetics.
- McCollum, S. (2012). Keeping School Sport Rivalries Respectful: In a Sports-Obsessed World. *Education Digest: Essential Readings Condensed for Quick Review*, 78(1), 58-62.
- Pringle, R. (2009). Defamiliarizing heavy-contact sports: A critical examination of rugby, discipline, and pleasure. *Sociology of Sport Journal*, 26(2), 211-234.
- Riot Games. (2009). League of Legends [PC]. Los Angeles, California: Riot Games. Played September 20, 2016.
- Rutten, K. (2016). Art, ethnography and practice-led research. *Critical Arts*, 30(3), 295-306.
- Ryan, R., Rigby, M., & Przybylski, C. (2006). The Motivational Pull of Video Games: A Self-Determination Theory Approach. *Motivation and Emotion*, 30(4), 347-363.
- Schon, D. (1983). *The Reflective Practitioner: How professionals think in action*. London, United Kingdom: Temple Smith.
- Stürmer, S., & Snyder, M. (2009). *The Psychology of Prosocial Behavior Group Processes, Intergroup Relations, and Helping*. Hoboken, New Jersey: Wiley.

- Swink, S. (2009). *Game feel : A game designer's guide to virtual sensation*.  
Boston, Massachusetts: Morgan Kaufmann Publishers/Elsevier.
- Tassi, P. (2016, September 13). Riot Games Reveals 'League of Legends' Has 100  
Million Monthly Players. *Forbes*. From  
<https://www.forbes.com/sites/insertcoin/2016/09/13/riot-games-reveals-league-of-legends-has-100-million-monthly-players/#11380b635aa8>
- Waddell, & Peng. (2014). Does it matter with whom you slay? The effects of  
competition, cooperation and relationship type among video game players.  
*Computers in Human Behavior*, 38, 331-338.
- Widmeyer, W., & Birch, J. (1984). Aggression in Professional Ice Hockey: A  
Strategy for Success or a Reaction to Failure? *The Journal of Psychology*,  
117(1), 77-84.