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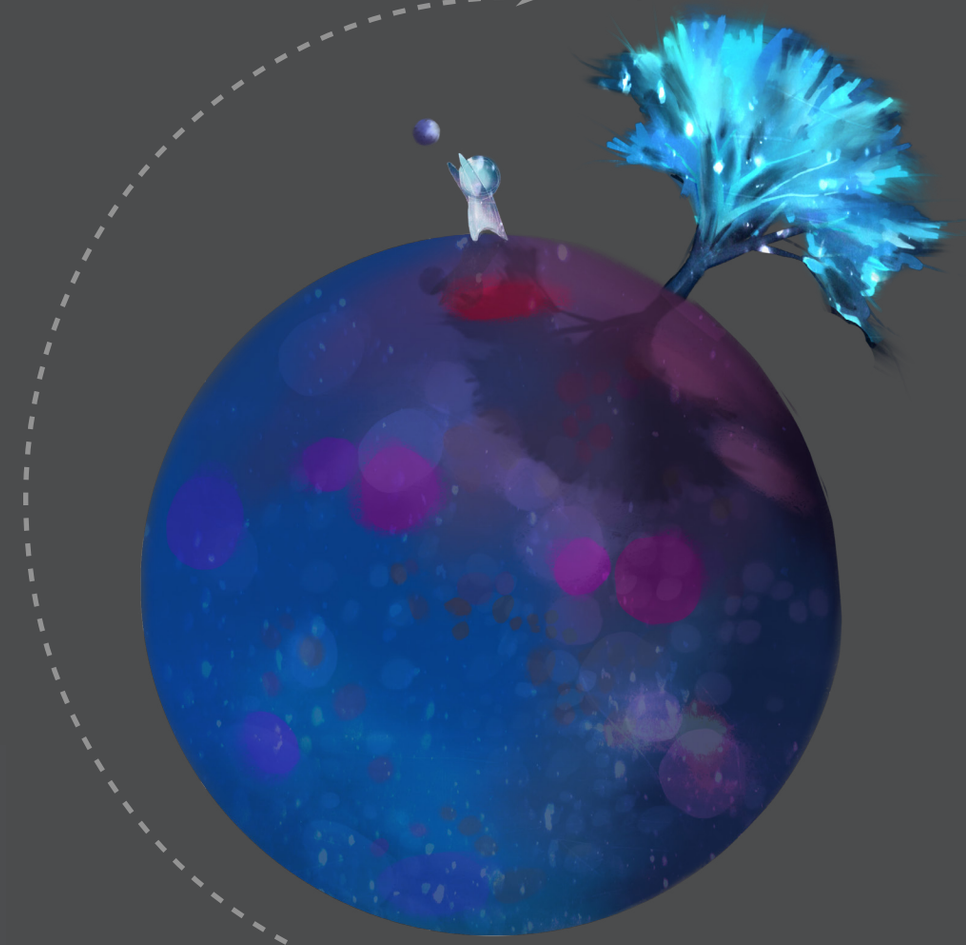

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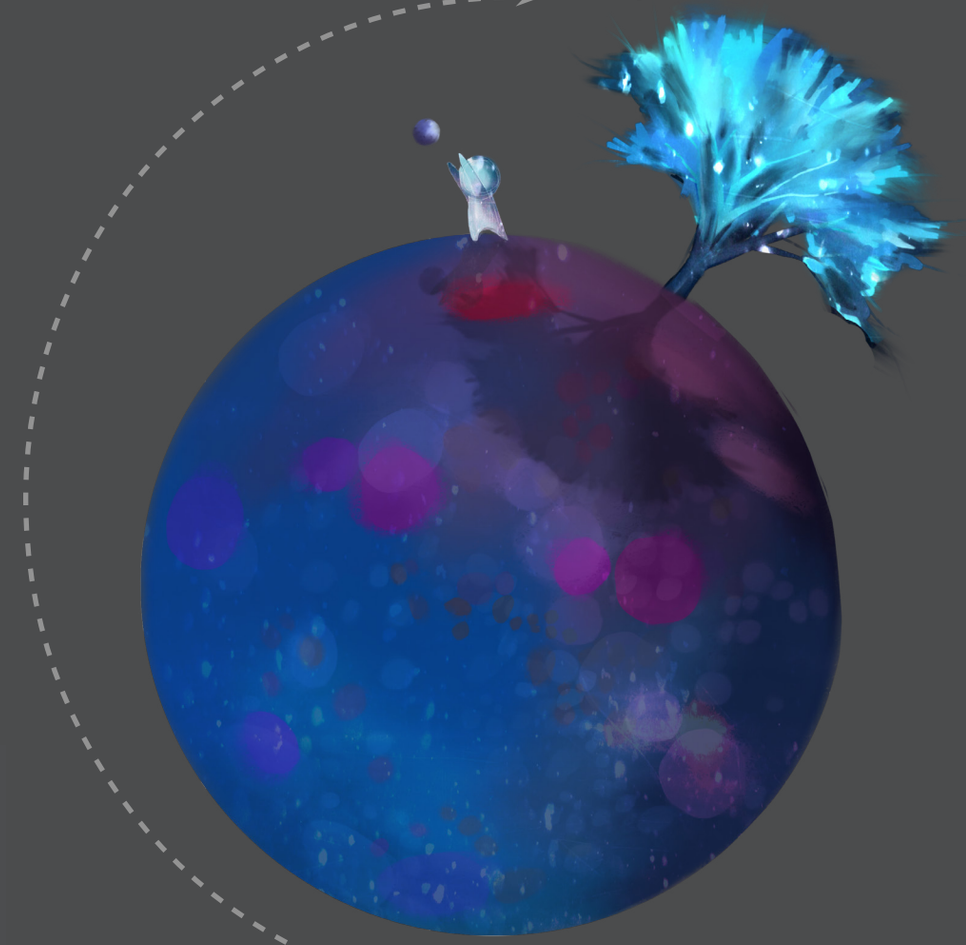

YIFAT SHAIK

STALEMATE

TRANSLATING SOCIAL DILEMMA TO COMPUTER GAME

By

YIFAT SHAIK

A thesis exhibition presented to OCAD University in partial fulfillment
of the requirements for the degree of
Master of Design
In
The Digital Future initiative

Toronto Ontario Canada May 2014

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Stalemate: translating social dilemmas into computer games

Master of Design
2014
Yifat Shaik
Digital Futures
Ontario College of Art and Design University

Originating from the desire to explore concepts relating to social interaction in play mechanics, this thesis evolved into a computer game that is based on translating economic and social dilemmas into play mechanics. Specific emphasis is put on the Prisoner Dilemma, an analysis that predicts the likelihood that individuals will cooperate or compete against each other in a given situation. Due to the separation from reality and the elimination of social norms in the environment of computer games, the Prisoner Dilemma manifests itself differently than it would in a real-life situation.
The resulting prototype is a two-player competitive computer game. Players must collect orbs while running on a revolving sphere; at the same time, however, they must be sure not to lose the game by depleting a "sun" sphere that is affected by the speed of the competition. This gives them the choice between competing, cooperating, or alternating between the two.

DEDICATIONS

I was fortunate enough to receive help and support from many people. .
I would like to thank the following individuals:
My Parents, for giving me the opportunity to pursue the dream of a master degree,
Jeff Watson, my primary advisor, for his continuing help and support,
everyone in Bento Miso specifically Henry and Jenny for giving me a place to work and for providing community support when I needed it,
Mark Sparling, for the wonderful music and sounds,
Andrew Carvalho, for all the help coding this game,
Bentley Jarvis, my secondary advisor,
the people in Stone Canoe for their great advice,
as well as my friends in Israel, Canada and anywhere else in the world for just being my friends.

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INTRODUCTION

ARTIST BACKGROUND

My love affair with computer games started a bit differently (and much later) than most gamers of my generation. I played my first computer game when I was seven years old. The Kibbutz where I attended elementary school had one working computer; kids who finished their homework and were well behaved could play "The Prince of Persia" for a while before the end of the school day. One day, I managed to get to the computer before all of the boys in the class, (who were usually the ones that played on it), and I spent a blissful hour figuring out how to pass the first level of the game. I wasn't particularly good, nor did I really have the patience to try and get better but at that point it was one of the most exciting experiences of my life.

A few years later we moved to Jerusalem. For the first few years we lived on a small street adjacent to the Hebrew University, which mostly hosted academics and their children. One of them, a personal friend, had a PC and a collection of point-and-click adventure games, (a genre that was popular in the mid 90's and that I particularly enjoyed). For three years I spent my afternoons playing computer games on my friend's computer, learning to play Dungeons & Dragons and reading fantasy books. By the time that I got into middle school we had both moved to other neighborhoods and other schools, so we lost touch with each other.. Having only my father's old Mac computer to work on and no access to PC's or to games in general, meant that for a time I abandoned gaming to pursue other interests.

Years passed; I finished high school, did my mandatory army service and started studying animation in art school. While I occasionally played flash games online, games were not exactly one of my main interests. Then, in 2008, a good friend gave me a 10 day free subscription of World of Warcraft. Thinking that a short break might be a good idea, I installed the game and started playing. Seven hours later I realized that it was 6: PM and that I had been playing the game all night long. The colorful and slightly cartoonish 3D graphics and the complex mechanics, (which echoed the point-and-click game that I loved so much as a child), struck me as revolutionary. The fact that the game also had a strong social component only added to the excitement of discovering how much gaming had changed and how much potential exists in gaming as a legitimate form of art and expression.

Playing World of Warcraft was never as exciting as it was on the first day, but for many years it was one of my favorite pastimes. It also opened the door for me to play other games and experience other mechanics. I even went back and played "The Prince of Persia". While I enjoyed those games immensely I also came to the realization that the gaming industry was stuck. Many of the games that I played seemed to reiterate the same concepts with better technology. I felt that the potential of games was not being fulfilled.

This is changing. New game distribution methods, like Steam, and the recent successes of independent labels which have introduced new concepts and mechanics into games, have rejuvenated the industry and given game creators more ways to express themselves. As a digital artist and designer, I find that games are an exciting way to express my ideas and I am finding games to be an extremely enjoyable, challenging and rewarding way to create, design and explore through new tools of self-expression.

THESIS RATIONAL AND MOTIVATION

It was while I was playing World of Warcraft that I realized that games could have other meanings than just being a form of escapist entertainment. Seeing that they are losing subscribers and trying to breathe new life into an ageing game, Blizzard (WOW creators) decided to shift the focus of the game away from battling one major villain, in order to intensify the struggle between the two main factions of the game, the Horde and the Alliance (a conflict that always existed but was previously reserved mostly for Player Vs. Player). Suddenly quests involved being part of a morally ambiguous conflict that involved planting bombs, burning your enemies' cities and more. I suppose that from a company point of view shaking up the tired formula in order to attract players to the game it is a smart move. For me it was different. Suddenly the game was coming too close to a reality I was already far too familiar with. Instead of being my escape from reality, the game was starting

to remind me too much of reality.

For me games were a form of escapism, and when reality suddenly invaded I didn't enjoy the game anymore. A person who hasn't gone through the same life experiences as me might find these kinds of narrative changes exciting, a new experience that he/she can go through in a controlled environment that provides escape from their daily routine. So how can I make someone who hasn't gone through the same life experience as I have understand something that feels more substantial than just the sensation of escapism? Can gaming perhaps be used as a way of critiquing social norms and ideas?

When game designer Brenda Brathwaite looked more critically at the games that she was playing at the time (in this case first-person shooters) she felt that she was essentially playing the same game over and over. The graphics improved but the core gameplay was the same. In response to that revelation, she abandoned digital games for nine months and solely played board games. The break eventually led her to explore the core of what games are, and raised the idea of using game mechanics to create meaningful (and often negative) emotions and eventually giving players the ability to make more meaningful choices in regards to the games that they play. These explorations led her to create the award winning board game Train, a board game that explores emotionally difficult subjects connected to the holocaust (Brathwaite, 2010).

This thesis was developed with the general concept of creating a computer game that invokes meaningful and possibly negative emotions in the players. Originally I was interested in a narrative version of the game, telling a war story using a three-screen narrative, but eventually my emphasis evolved toward a more mechanics-focused abstract project. I became interested in exploring how those kinds of interactions could be created without using narrative. By only using gameplay mechanics I focused on creating a game where the mechanics creates the message and not the narrative. The idea behind this was to explore the core concepts that differentiate games from other forms of art and how those concepts could be used to translate meaningful concepts into a game form.

METHODOLOGY AND THESIS STRUCTURE

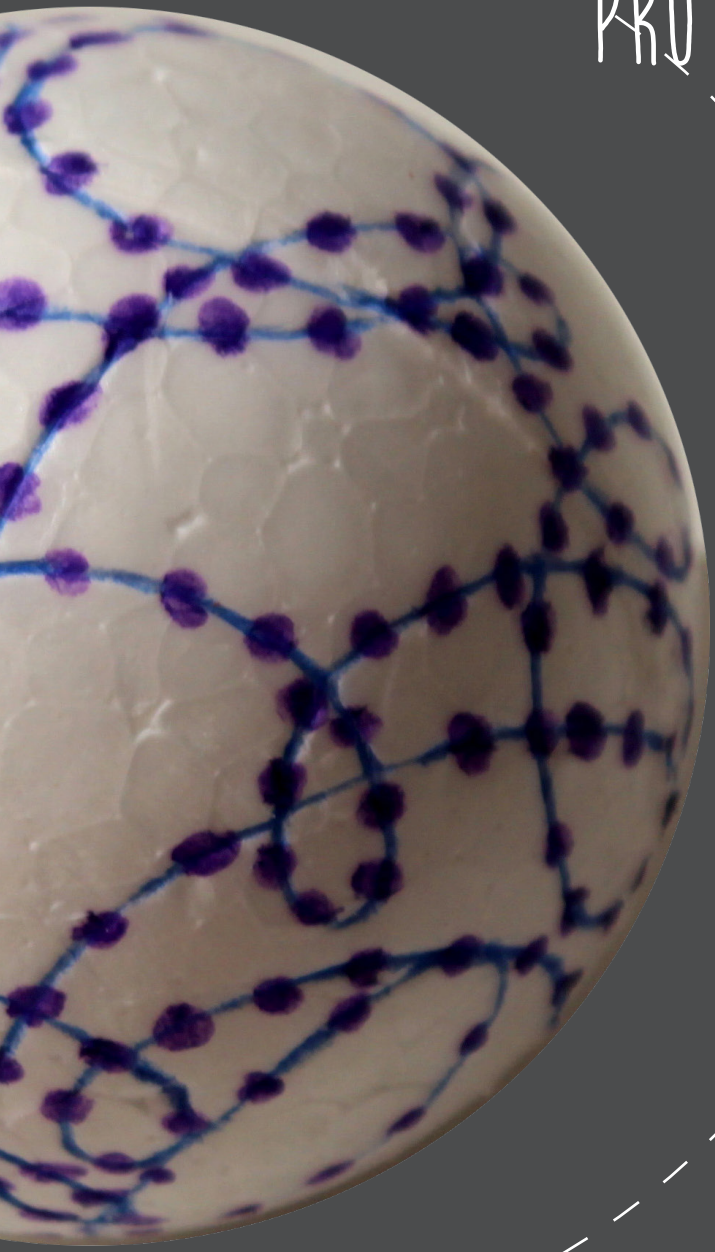
The process of creating Stalemate mostly leaned on using rapid prototyping and user testing as research tools. Starting with a general concept of what I wished to explore, I began prototyping during summer break and early fall and I eventually focussed the research in a direction that contributed to the creation of the final prototype. Over the course of the year, many quick prototypes were created and tested by my primary advisor and I; Later on (with REB approval), digital prototypes were tested on game developers in Bento Miso, (a game developers community site in Toronto). The rapid prototyping allowed me to quickly move on to new concepts and theories. The theory that emerged at a relatively advanced stage of prototyping was the exploration of Social Dilemmas (with specific attention paid to the Prisoner Dilemma) and their relation to computer games. The theoretical research eventually supplemented the prototype, helping ground the game mechanics in an overall concept and creating a reciprocal relationship between the prototype and the theory.

Due to the nature of the research, with the theory emerging from prototyping, I felt that the standard structure was less than ideal. Being that this thesis is about games, I have decided to "gamify" this thesis and give the readers the ability to jump to and from sections that might interest them more, creating a non-liner thesis reading experience. Two versions were made, – a digital version that was created using Twine and a print version that can be

read chronologically as well. If this thesis is read chronologically, the theory part will be presented after the first round of prototyping that shaped the direction of research.

This thesis is organized so that the initial prototyping process will be presented first, followed by a survey of the theoretical touchstones that emerged from the initial prototyping phase. The latter part of the thesis will focus on the continuation of the prototyping phase, the finished project and conclusion as well as reflections on the process and the project.

PROCESS AND PROTOTYPING



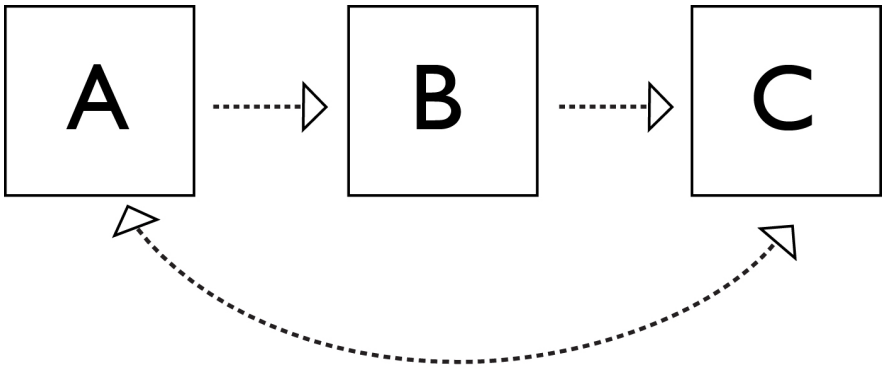
EXPLORING CONCEPTS

INITIAL PROTOTYPE IDEA

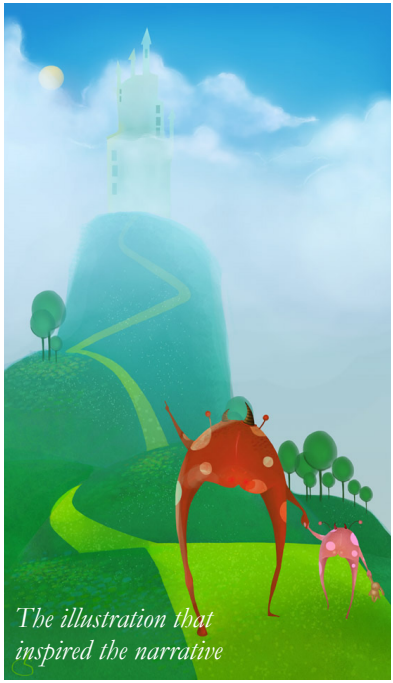
Early prototype development was influenced by the work of the animator Paul Drissen and his use of frame deconstruction to tell a non-liner narrative. In his animated shorts, The Boy who saw the Iceberg (2000), The End of the World in 4 Seasons (1995) and On Land, at Sea & in the Air (1980), Drissen splits the frame into several individual frames, each with its own unique narrative. These narratives merge and separate sporadically at different points in the overall narrative of the films and are used to create a more complex interpretation of the narratives. .

Split screen storytelling was central to the initial development of "Stalemate". The original idea was to create a three-screen game, each screen showing a different point-of-view of the same event, with the players affecting the whole system by interacting with each screen individually.

A diagram of the possible simple interaction between the screens



After the initial concept was established, I searched for a narrative that would fit with this format construct. An older drawing (shown on the left) proved to be an inspiration as the narrative that emerged involved a Monster, a King and a castle. Later, the idea of a forest that feeds on conflict was added and an overall narrative was created. This narrative included a political/social side that was partly based on my personal views regarding war and conflict.



The illustration that inspired the narrative

What emerged from this narrative was a concept for a three-screened real-time strategy game, involving three factions fighting over the control of an island:

1. The Humans: a group of people trying to protect the castle from the monsters that they perceive as a treat.

The Monsters: originally a farmer community trying to protect their village from the humans invading their territory.

2. The Trees: a sentient forest whose only goal is that more bloodshed will occur in order for them to grow bigger and stronger.

GAME MECHANICS

After the narrative framework was created, I started to establish the overall game mechanics. In order to avoid an excessively complex learning curve for the player, I decided to ground the mechanics in established kinds of gameplay. While different gameplay mechanics were considered, it became obvious early on that a strategy game would be the best fit with the ideas that I wanted to explore at the time[1]. Once that was established, I started figuring out the relationship between the screens – how each screen would work, which character/building/resources each side would have, and how they might affect each other.

Figure 1 illustrated that the current gameplay was just too complicated to be realistically finished for the final thesis presentation. As a result, I decided to significantly simplify the prototype before moving on to the paper prototype. Keeping the idea of presenting the negative aspects of conflict, the narrative was drastically simplified. The new narrative had two warring factions – the humans and the monsters, as well as a third faction (the trees) who gained strength ("grew") as the conflict worsened. The player objective was to keep the balance between peace and war in the island. If the conflict on the island gets more intense, the trees grow too big and the forest consumes the island and if the island is too peaceful then the trees start dying and the islands' inhabitants lose their nutritional source (the trees).

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1. A At one point there was a plan to have completely different mechanics on each screen, but that was quickly abandoned because of how complex it was to make.

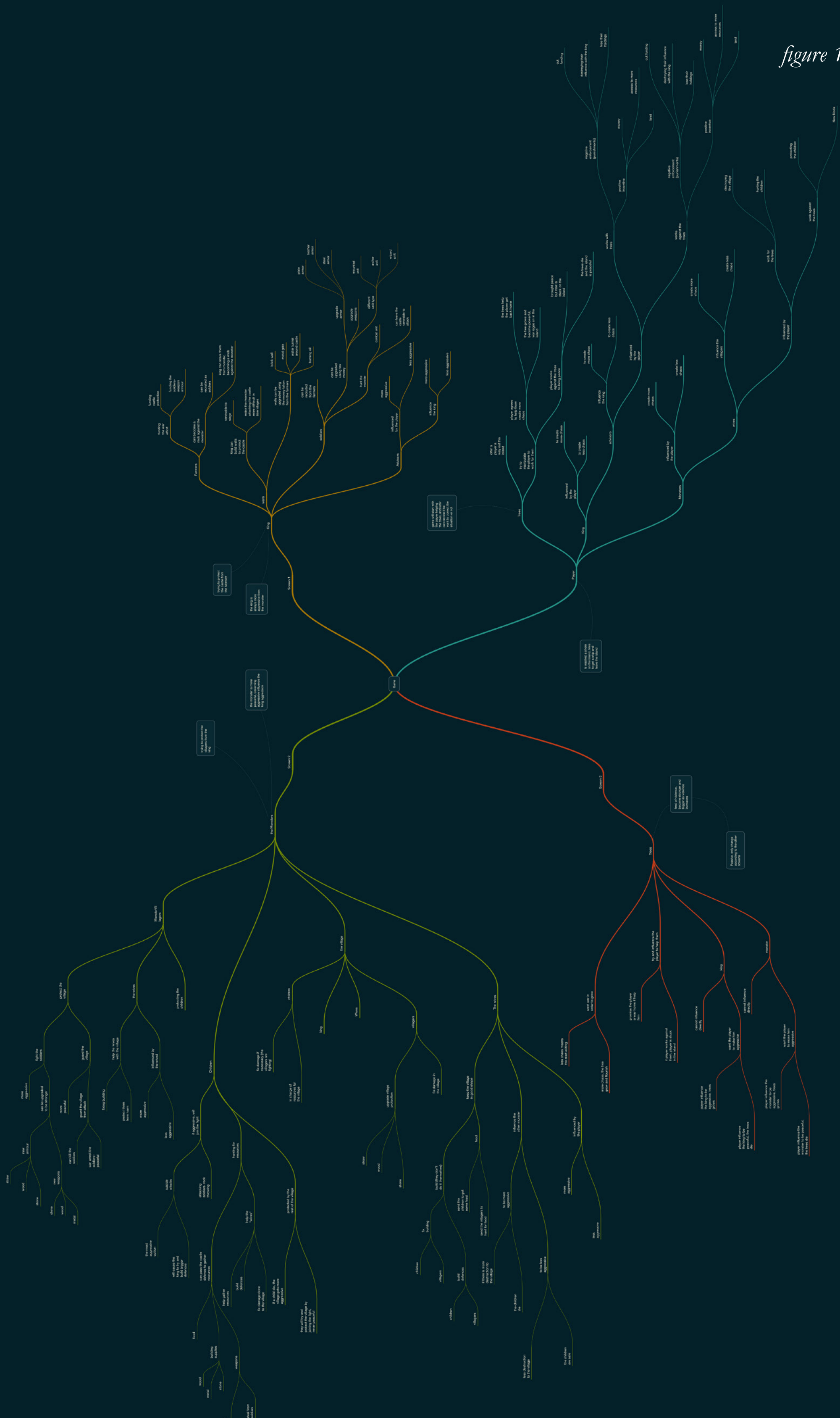


figure 1

FIRST PAPER PROTOTYPE

BOARD GAME RESEARCH

The next phase of prototyping was to create a simple board game based paper prototype, this allowed me to quickly test some of the mechanics and iterate the game before I started a digital version that would be harder to fix. In order to create an effective paper prototype, I needed to understand how to translate digital game mechanics into a paper-based game. Examining elements of several commercial board games, mostly cooperative, as well as strategy games that were following a similar theme as the game prototype that I was creating achieved this.

Elements examined include:

1. Game arrangement: board design, cards and types of cards, use of cubes etc.
2. Basic game rules
3. Rules that are common with other similar board games
4. Variation to the gameplay (is there more than one way to play the game)

Five games were examined:

- **Risk**: a competitive strategy game where players "combat" each other

in order to control the territories on the game board. Risk is considered to be one of the most well known strategy board games, (which was the main reason it was chosen).

- **Pandemic**: a cooperative strategy game that requires the players to work together in order to save the world from deadly diseases. The players lose if they lose control of the disease and win if they manage to eliminate the threat of a worldwide pandemic.
- **Battlestar Gallactica**, the board game: based on the successful sci-fi television series. The game is a team based cooperative game with a twist. The players don't know which team the other players are in, with each team having a separate objective (like finding earth). Players must try to reach their team objective while finding out who from the other players they can trust, as well as which ones are on the other team and have a separate objective.
- **Forbidden Island**: a cooperative game, were the players need to work together in order to find four treasures before the island they are on sinks.
- **Game of Thrones**: a 2-player card strategy game. Each player plays a different house (Stark or Lannister) vying for control of the kingdom.

While playing the games, a few common attributes were apparent. Those attributes became the guide for the future paper prototype.

1. Each turn the players had a limited number of actions that he/she could perform before their turns ended and another players' turn began.

2. In cooperative games it was common that each character was unique, with unique abilities.

3. The use of different sets of cards, with each set having different actions and uses in the game.

4. Each game had elements of resource management with some sort of an available resource that could be used in a limited capacity.

5. Board game arrangement: each game offered a different board game arrangement, from very simple (Game of Thrones) to extremely complicated (Battlestar Gallactica). This didn't necessarily reflect the complexity of the game.

6. Limited or no use of the dice.

PAPER PROTOTYPE

The paper prototype that was created was built to be a completely playable board game version of what will eventually be a fully computerized game. Rules and game board arrangement can be seen in the appendix.

REVALUATION

After creating the above mentioned board game prototype, it became evident that the current version of the game – while a playable game – was not a good one. The game was missing a few crucial elements of gaming: it was just not fun, nor was it challenging. I also felt that this current game iteration did not accomplish what I set out to do when I started planning this thesis.

Those problems arose from several issues. The main problem was that there wasn't a real core mechanic to the game, but rather a few mechanics, which made it too confusing for the player. This created a game that was just too complicated to play and required the player to manage too many factors in order to successfully play the game. Secondly it wasn't clear what the player's goals were (keeping the balance) and why the players try to keep the balance instead of just tipping the scale to one side or another.

The feeling was that trying to find a solution to those crucial problems was more complicated than starting fresh. Since I was still in the early stages of prototyping and had been working prior to the start of the school year, I had no problem scrapping the current paper prototype and starting a new one. I also decided that some of the theory that I was exploring might be hindering me from creating the game that I was interested in making. I decided

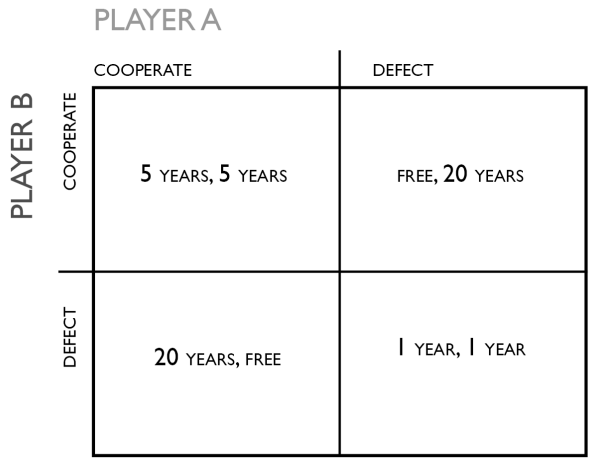
to roll back some of the ideas that I was exploring and explore other ideas that might interest me. While I did keep some of the initial ideas, moving on to the second paper prototype, most of the work that was done before was scrapped and a new idea connected to the Prisoner Dilemma and cooperation in gaming was explored.


PRISONER
DILEMMA

INTRODUCTION TO THE PRISONER DILEMMA

Originated in 1950 by RAND Corporation scientists Merrill Flood and Melvin Dreshe, and later formalized by Albert W. Tucker, the Prisoner Dilemma is the best-known noncooperative[2], nonzero-sum[3] strategy game in "game theory" (Nalebuff, 2008). The Prisoner Dilemma is an important paradigm used in economics, political science, biology, social science and psychology to analyse a wide variety of situations that require strategic thinking (Holt & Capra, 2000; Castronova, 2003). It is part of a number of social dilemmas, which that try to emulate situations in which selfish and rational behaviors are at odds with the collective group interests (Capraro, 2013). Social dilemmas have often been studied by giving groups of people conflicting choices between the general good and the cost to the individual (Glance, 1994).

The traditional two-player version of the game is as follows: The two players who committed a crime are locked down in separate rooms at the police station. Neither one of the players knows what is happening in the other room. The prosecutor makes the following offer to each of the players, "if you confess and agree to testify, and the other player doesn't confess you will be set free. If you both confess, you both be sentenced to a five years term in prison. If you do not confess, while the other player does, you will receive the maximum prison sentence whereas the other player will be set free. If neither one of you confess, you will both get a minimum sentence of one year (Jackson, 2011)." The "dilemma" facing the player is that rationally he would be better off confessing than remaining silent. But on the other hand, if both players confess the outcome would be worse than if they both remained silent (Kuhn, 2007).



In a dominant strategy[4] game like the prisoner Dilemma, each player has one strict dominant strategy to choose – to confess (to defect) (Jackson, 2011). Each player evaluates the probability of another player abandoning collective interests in order to follow his own private interests. This evaluation is defined by the player who calculates the balance between the incentive that is offered and the risk the player will encounter if he deviates from the collective (Capraro, 2013). Knowing that, game theory controversially[5] predicts that in a one-shot[6] Prisoner Dilemma game, the player will always choose the self-interest model and defect; even if it means that he is risking the chances of receiving a lower payoff than if he cooperate. This provides researchers the opportunity to examine human's self-interest behaviour (Frank, 1993).

The dilemma illustrates the conflicting views between seeing yourself as part of a group or pursuing a rational self-interest as an individual. A group

that pursues rational self-interest may end up worse off than a group whose members act contrary to rational self-interest (Nalebuff, 2008). The dilemma simplicity can be a useful tool for analyzing the evolution of cooperation and competition (aggression), because it captures the relationship between payoffs toward types of behaviours (Fogel, 1995).

---

2. Noncooperative game theory refers to model in which players are assumed to behave selfishly (Jackson, 2011)

3. The benefit to one player does not imply similar loses to the other

4. The dominate strategy is the one that produce the highest payoff for the player

5. Standard game theory assumes that people are motivated by self-interests rationality, in certain dilemmas its predictions can be quite accurate, but in many other games (like games that require bargaining) its prediction can be way off track (Wilkinson, 2008).

6. A game that is only played once with the same players

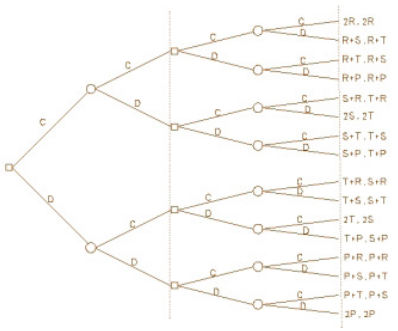
ITERATION OF THE PRISONER DILEMMA

While it is predicted that in a one-shot game involving the Prisoner Dilemma players will ultimately chose to defect, the results become less predictable in iterated versions of the game. The iteration allows for more complex situations to be analyzed by eliminating the existing dominant strategies (Wilkinson, 2008).[7]

FINITE AND INFINITE ITERATIONS

In reality, most scenarios that mirror the Prisoner Dilemma are versions of repeated plays of the Prisoner Dilemma. In those iterations there is a continuous interaction between the two competitors, who can change their decisions at regular intervals (Wilkinson, 2008).

Some versions of those the games have a finite number of plays, in which the end of the game can be foreseen and the players receive information on the result of each stage. In those iterations players who defect in one round can be "punished" for defecting in subsequent rounds and those who cooperate can be "rewarded" for it. In this case the dominant strategy for self-interest players is no longer obvious (Kuhn, 2007). The self-interest rational result in this case, is a series of continuous continues defections. A rational player will reason that they cannot be punished in the last play, and so they can defect in the last turn (making the last move a one-shot Prisoner Dilemma). Assessing that the other players are also rational players, and will also defect in the last turn, the player will reason that in order to benefit more he should



defect in in the next-to-last turn and so on, eventually creating a situation where the a player defects in each turn. In reality, the result is the exact opposite. Simulations of the Prisoner Dilemma conducted by several researchers over the years, have not yielded endless defection but rather they have shown player tendency to cooperate with each other (Fogel, 1995). If the players' belief is that the second player might pursue "irrational" strategy, and not choose continuous defection, it might seem to him rational to choose to cooperate as well (Kuhn, 2007).

Infinite iterations refer to repetitive game of the Prisoner Dilemma that continues infinitely. It is considered a way to model a series of interactions in which the participants have no reason to think that the current interaction is the last one (Kuhn, 2007). While it is difficult to really surmise specific strategies in such iterations, the infinite Prisoner Dilemma is a condition for the emergence of stable mutual cooperation. Since the player cannot be sure when the last interaction will take place, defection will be more likely punished, which makes it the irrational choice for the player (Axelrod, 1984).

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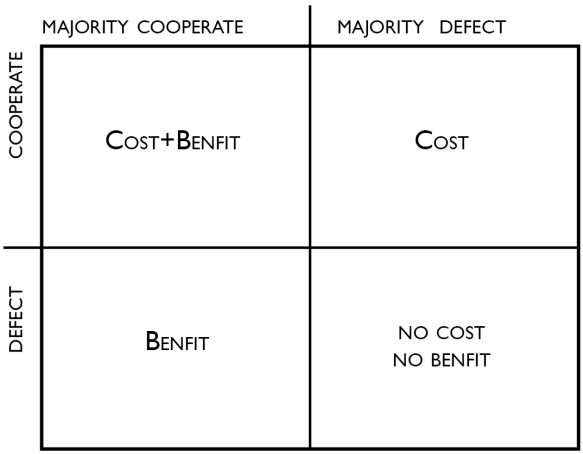
7. I will only present the iteration that are relevant for this thesis

MULTIPLY PLAYERS

While the Prisoner Dilemma is presented as a two-player game, it is translatable into a (multiply-players) multiple-players game. Most researchers who maintain that the Prisoner Dilemma is an important demonstration of the issue of human morality, point to the basic structure of the game as it is reflected in larger groups (Kuhn, 2007). In a multiplayer Prisoner Dilemma game, particularly in a one-off game, the rational self-interest strategy is to defect and the likelihood of a player defecting is increased. The situation is commonly viewed as being similar to the structure of the "tragedy of the commons" (Wilkinson, 2008).

Coined and popularised by Garret Hardin, the "tragedy of the commons" is as follows: In a pasture commonly shared by a group of farmers, each farmer will seek to maximize his gain by adding more animals to his herd. The problem is that there is a threshold to how many animals can herd in the pasture. Passing that threshold renders the pasture unsuitable for herd grazing. (Hardin, 1968).

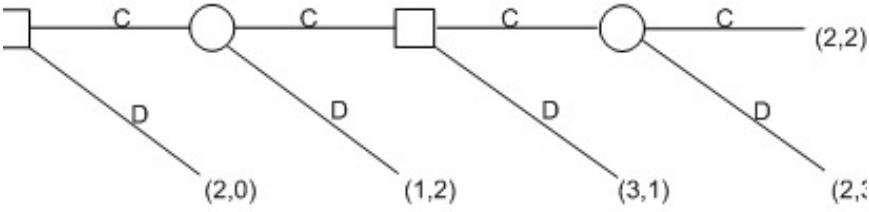


The temptation in this game is to gain the benefit without the cost; the worst-case situation is receiving the cost without receiving any benefit (a player cooperates while the rest defect) (Kuhn, 2007). When an individual realizes that the cost of cooperating exceeds his benefits, he will rationally choose to defect and become a "free rider". Given that other individuals face the same choice, all the members of the group will defect. This results in that no common good is produced and all the members of the group are not as well off as they could be (Glance, 1994). Such situations are monitored and prevented by punishing defectors, and in order to benefit the player has to defect before the others do and before his own defection is detected (Wilkinson, 2008).

CENTIPEDE

A sequential game is one that involves two players in a fixed repeated number of moves that result in a reduced payoff in every turn. It is also considered to be a trust game, since the players benefit from trusting (to some extant) the other players in every turn (Wilkinson, 2008).

The game is as follows: a stack of one dollar bills lies on a table. Players take turns taking money from the stack; one or two bills each turn. The game ends when the stack runs out or when one of the players defects (takes two bills). Both players keep what they have taken up to that point (Kuhn, 2007). Using the backward induction argument[8], the dominant strategy appears to be that the players will defect on the first turn – the dominant strategy in the



last move is to defect, players knowing that will because they are also rational that the other players will do the same and will defect in the turn before last, and so on up until the first turn. In practice, research conducted by McKelvey and Palfrey found that the Centipede game tends to unravel only toward the last turn (Wilkinson, 2008).

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8. Backward induction is a process of reasoning backwards in time, from the end of a problem or situation, to determine what is the optional actions

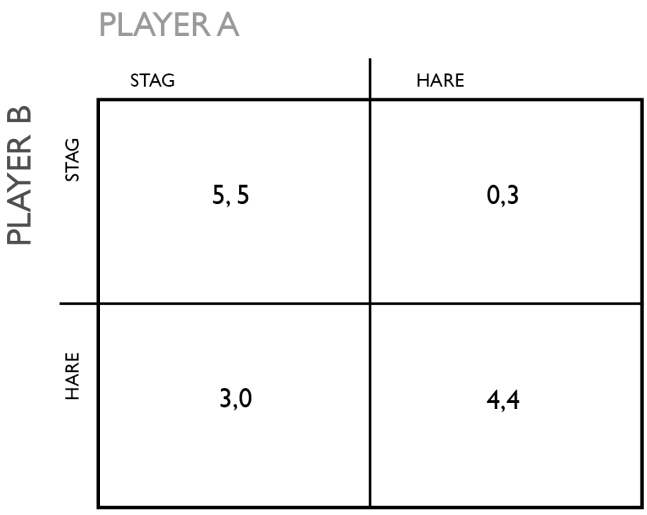
ASYNCHRONOUS MOVES

Iteration where the choice in each turn is not done in a synchronous manner, but rather one player makes his choice and the second player moves conditionally to the move of the first player. If the first player cooperates, then the second player cooperates as well; if the first player defects, then the second defects as well (Kuhn, 2007).

THE STAG HUNT

The Stag Hunt is a version of the Prisoner Dilemma where the payoff is modified so that the players will reach equilibrium[9]. By slightly changing the payoff structure of the Prisoner Dilemma, making the reward payoff exceed the temptation of defecting, we get a game where mutual defections as well as mutual cooperation are equilibrated. In other words, the player's payoff is higher when they choose the same actions than when they choose different actions (Kuhn, 2007).

Originating from a passage in Jean Jacques Rousseau's Discourse on Inequality (Spaniel, 2014) the dilemma is as follows: two hunters (the players) must choose between hunting a stag and looking for hares. Succeeding in hunting the stag will require the effort of both hunters, but there is a high chance of catching the hare if only one player hunts for it. If one hunter looks for the stag and the other "betrays" him and looks for the hare, then the first hunter will go hungry, and so the best replay in this case is for the first hunter to look for the hare as well. Both hunters looking for the stag produces the best resulting equilibrium, but both players looking for hares will also create an attractive equilibrium. Only the result of one player looking for the stag and one player looking for the hare will punish the players (Jackson, 2011). The Stag Hunt becomes a dilemma when the rational course dictates that both players have to choose the inferior equilibrium - searching for hares (Kuhn, 2007).



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9. The Nash Equilibrium is a choice of strategies for each player, where if any one player changes their strategy while the others do not, they cannot improve their standing. The problem with the Prisoner's Dilemma is that the only Nash equilibrium is the one where they both defect, which is not the best result that they can reach (Spaniel, 2014).

STRATEGIES

The iterated Prisoner dilemma version, specifically the infinite iteration, leads to the discussion about the strategies that players deploy in order to (decided) decide whether they cooperate or (defects) defect. The interest in iterated versions of the Prisoner Dilemma accelerated after Robert Axelrods' influential publication The Evolution of Cooperation (Kuhn, 2007). Axelrod invited experts in game theory to submit computer programs for a digital Prisoner Dilemma tournament (Axelrod, 1984). The programs sent to Axelrod were played in a round-robin competition in which all players were pitted against each of the other players, against themselves and against a random Prisoner Dilemma game. The data from each tournament was analyzed in order to see which strategy would do best in repeated interaction of the Prisoner Dilemma. (Fogel, 1995).

The result indicated that the strategy of Tit for Tat, a simple reciprocity strategy that involves cooperating in the first turn and then doing whatever the other player did on the previous move, was the most successful strategy. The analysis revealed four properties which tend to make a strategy successful: avoidance of unnecessary conflict by cooperating as long as the other player does (nice), strong negative reaction to uncalled-for defection by the other player (retaliatory), ultimately forgiving defecting player (forgiving) and a clear predictable behavior that allows the other player to recognize and adapt to your patterns and action (clear) (Axelrod, 1984). Several years after the first

publication in a survey of the result above, Axelrod and Dion, chronicled several modifications of the Tit for Tat strategy. While the Tit for Tat was very successful in a regular prisoner Dilemma game, it left no room for the idea that players are subject to errors of execution and perception, creating imperfect Tit for Tat strategies. (Kuhn, 2007).

In 1993, Nowak and Sigmund identified a new evolutionary strategy that was as simple as Tit for Tat but outperformed it – the Pavlov Strategy, also known as "win-stay/lose-shift." The players repeat their behaviors from the last round, if it was successful (either a player betrayed and the opponent cooperated or they both cooperated), player changes his behavior if lost in the last turn (Macy, 1995). Each move in Pavlovian strategy is built on the calculation of the entire history of previous moves of both players[10], and so the player can easily calculate his next move by tracking the current probability of cooperation and payoff (Kuhn, 2007).

There are two reasons why Pavlov seems to outperform Tit for Tat: it seems to be more resistant to the "echo affects", a cycle of a retaliatory accusation. Pavlov strategy also thrives in unconditionally cooperative strategies. Still, Pavlov has some critical weakness – it is more vulnerable to being exploited by unconditionally aggressive strategies and, more critically, it is a backward-looking, reactionary strategy rather than a forward-looking proactive strategy. This can lead to a "satisficing" result, or a result that only tries to get a satisfactory result instead of striving for the best result (Macy, 1995).

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10. Unlike Tit for Tat that only refers to moves from the last turn

CONDITIONS FOR COOPERATION

How does cooperation emerge in the Prisoner dilemma? How can we connect it to how cooperation emerges in our society? Human altruism is defined as being a costly act that grants benefit (economic, social etc.) to other individuals. An interaction between selfish and altruistic individuals is an important part of our understanding of human cooperation (Fehr, 2003). As seen before, the rational choice that players can make in the Prisoner Dilemma is defection, so how does cooperation emerge in social dilemmas? In order to create cooperation between players, several rules must be observed: repeated iteration of the situation tends to promote cooperative attitudes, small groups are more likely to secure voluntary cooperation, a strong leader who will benefit from cooperation, communication between participants and a system of punishments for defectors and rewards for cooperation (Nalebuff, 2008) (Glance, 1994). I will expand on several of those points.

Cooperation emerges in a repeated, indefinite (or at least unknown) number of turns. In a one-shot game, two selfish players will be both tempted to choose defection since that action does better no matter what action the other player takes. If the game is played in a known, finite number of times, the player will still have no incentive to cooperate[11] but if the players interact in an indefinite number of times the players will not be sure when the last

interaction is going to take place. Knowing that they will be dealing with each other again and again, cooperation will become the rational choice (Axelrod, 1984). The cooperation rate is much higher if the players know that there is a possibility of meeting the same partner again in future turns, and as such repetition becomes an essential part of creating cooperation (Fehr, 2003). Over the years, several experiments[12] have shown that cooperation is possible even in one-shot social dilemmas, which implies that the rate of cooperation can depends on the payoff each player receives in the game. The observation of cooperation in a one-shot dilemma possibly suggests that the origin of cooperation lies in human nature (Capraro, 2013).

In order for cooperation to start in the first place, there must be a small cluster of individuals who adopt some form of "nice" strategy of cooperating in the first turn and discriminate between those who respond to cooperation and those who do not (Axelrod, 1984). In a population with a clear majority of cooperating players, a small minority of selfish individuals can be sufficient to break up a cooperative society (Fehr, 2003). An individual can conclude that the effect of his action (defect or cooperate) will be less influential as the group will get bigger. In large groups, an individual will cooperate if his calculation shows that the payoff from cooperating is larger than the payoff from defecting. When the entire group is cooperating the player will expect that future gain will compensate for future loses, but if the number of cooperating individuals falls below a certain threshold, the expected loses rule out cooperation and the player defects. For large groups overall cooperation becomes unsustainable, the negative consequences for defection become very small and the potential defection payoff more enticing, which causes the deterrent to defect to vanish (Glance, 1994). A key element of enforcing social norms and cooperation is to punish the norm violators, not for what they did to the punisher but what they did to the other members of the group. Enforcing cooperation in a group involves the punishment of norm violators by those that are not necessarily affected by the violations (Frank, 1993). Punishment will not work unless cheating can be detected and punished. This is easier to arrange in smaller, closed groups (Capraro, 2013). It's not just punishing the defectors, but also rewarding the individuals who do cooperate that enforces cooperation. Individual contribution increases if the expected contribution from other group members increases as well. Higher expectation about other

players' cooperation can increase the amount of contribution that each individual makes (Frank, 1993).

Reputation can also become a deterrent to defection among individuals. Humans are very attentive to possibilities of individual reputation forming and the behaviour rewarding aspect of it. When given the opportunity to gain reputation for being generous cooperation rates increase dramatically. The same can be said about negative reputation, acquiring negative reputation is used as a deterrent against defection and cheating (Frank, 1993).

To summarize, in order for cooperation to evolve, it needs to start with small group clusters that practice a "nice" strategy that encourages cooperation. Once cooperation is established, using must stabilize norms, a repercussion based system of punishment and reward, and repeated interactions. Cooperation does not necessarily have to be built on trust, but it is rather about whether the conditions are ripe for players to build a stable cooperative pattern (Axelrod, 1984).

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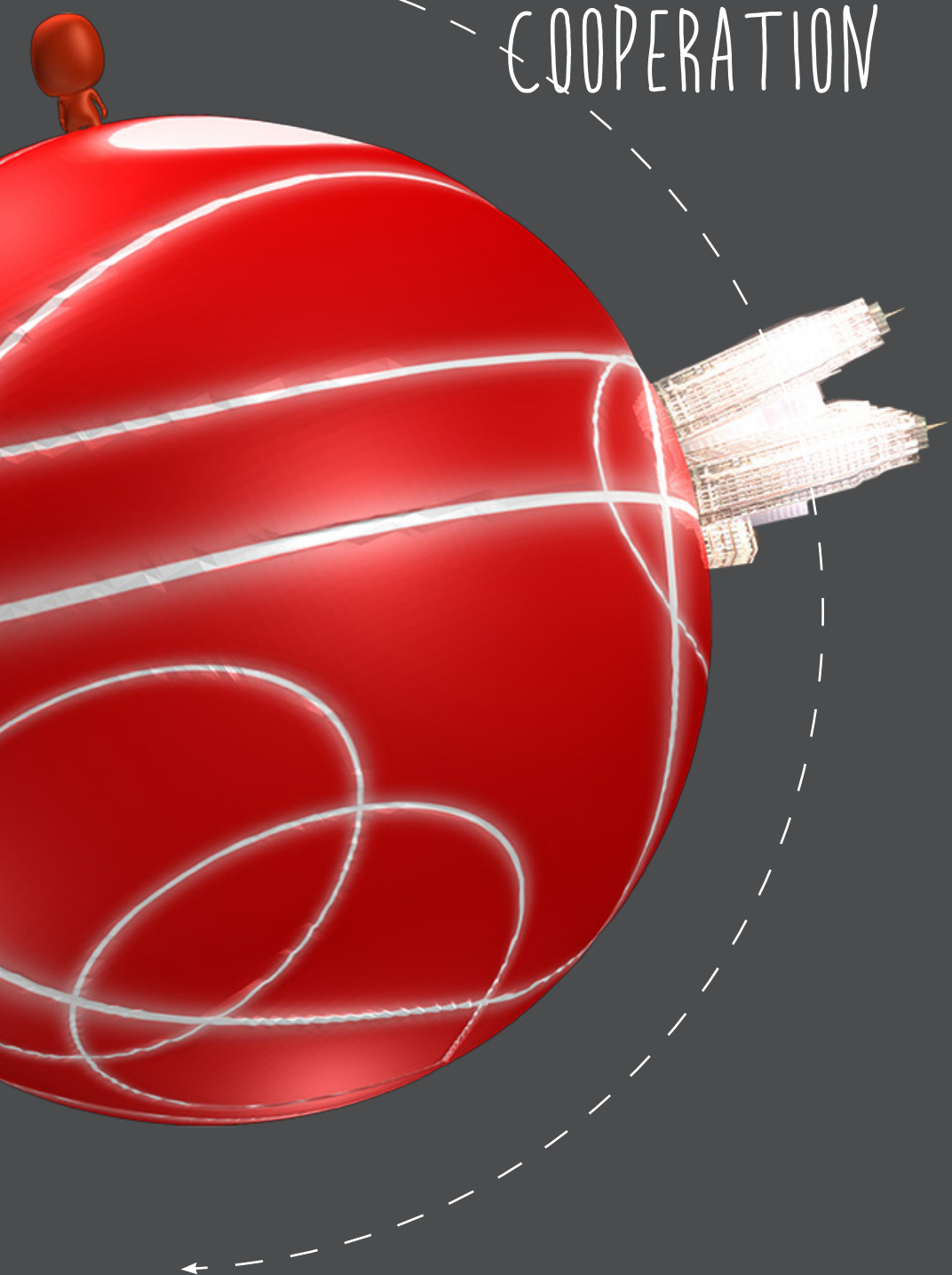
11. See finite iteration of the prisoner Dilemma
12. For example: Isaac M, Walker J (1988), Goeree J, Holt C (20021)

GAMING AND COOPERATION



INTRODUCTION SOCIAL GAMES

Social games can refer to several different types of games. Some would even say that all games are inherently social because they all include elements that require either social interaction or behaviour that society regards as anti-social. For the sake of this thesis, social games will refer to games that have a meaningful in-game social interaction. While the social in-game structure was coded and designed by the creators of the games, it is the active interpretation of the players who engage with this structure that creates the meaningful social engagement (Simon, 2009). Specifically this section of the thesis will mostly refer to Multi User Domains (MUDs) and Massively Multi Online Role Playing Games (MMORPG) as the main focus of research and the connection between games and social dilemma. While the thesis prototype doesn't fall under the categories of either MUDs or MMMORPG, it is a tactic/strategy game. Their strong social components are used in order to understand how players interact in a game environment, and how a concepts like the Prisoner's Dilemma manifests itself in them.

Multiplayers online games have become a popular subject of investigation ever since social and cultural science researchers started studying the Internet. While most of the early research was done on text based multiplayers games (MUDs) there has been an increase in the number of publications that are

dedicated to multiplayer game with a graphic user interface and a large number of players playing simultaneously (Kolo & Baur, 2004).

MUDs or Multi-User Domain or Multi User Dungeon, constitute a digital text based virtual reality environment where multiple players might be logged in and interacting with each other. These games consist mostly of text interaction, which involves role-playing, world creation and elements of competitive interaction (Mortensen, 2002). These are programs that use network connections from multiple simultaneous users that create a shared database. Users browse and manipulate the database from inside shared "rooms", where they can see and manipulate the objects that are in it, interacting with the objects and people in the rooms and moving between the rooms via "exists" that connect them (Curtis & Nichols, 1993). MUDs and MMORPG are similar in the way that they incorporate role-playing and multi-players systems, but differ in that MUDs are text-based only and lack visual representation of world (Cole & Griffiths, 2007).

Massively Multiplayer online role-playing games (MMORPGs) are highly advanced and graphic based, with a fully developed multiplayer universe that lets players create their own individual character (Cole & Griffiths, 2007). Currently, several million people have accounts in massive multiplayer games. These environments allow people to undertake various tasks; from hunting to socializing to exploring to living a full and rich virtual life (Castronova, 2003). MMORPGs provide a setting in which users can immerse themselves in a virtual environment and interact with each other on a daily basis through character avatars. Researchers suggest that the gameplay inside those worlds is enhanced because the players use them as arenas in which to explore social relationships (Cole & Griffiths, 2007). MMORPGs seem to appeal to many players because of their general ability to cater to many different kinds of play style (Yee, 2006).

REPRESENTATION OF SELF

The way that players represent themselves in reality changes when they go online, using the internet's anonymity in order to create a new identity or in order to amplify it. The concept of identity ('self') is one of the most important questions in studies dealing with humans beings in Western Culture. The changes, the complexity and erosion of identity that are common in our culture today, they allow people to create and shape their own 'self' by interacting with virtual worlds (Filiciak, 2003). In his seminal work, the Presentation of Self in Everyday Life, Goffman uses metaphors taken from drama and theatre in order to analyse how individuals perform, in order to project a desirable image (a desirable version of the 'self'). People are actors and when they are on the "front stage" they are conscious about how they are being observed by the audience (the rest of the world) and will perform according to certain rules and social conventions. The actor performances would be different "backstage", where no performance is necessary. Goffman argues that people's performance is a means for self-preservation, a way to present to the world an impression that it is correct and enhanced. In addition to the impression that we are trying to convey, Goffman also used the metaphor of a 'mask' - a face that we can put on ourselves in order to bring forth certain aspects of the personality and hide others (Bullingham & Vasconcelos, 2013).

Modern time witnesses the emergence of a new way to present the 'self' – online social interaction. Online environments provide people with the ability to perform and present different identities, with the added benefit of concealing aspects of the offline world and embellishing the online world (Bullingham & Vasconcelos, 2013). Baudrillard, and other postmodernists, emphasize that we live in a world where the boundary between the real and the fictional is disappearing and a new reality "hyperreality" is emerging. Since our reality has become fluid, we do not have to keep only one true 'self' (Filiciak, 2003).

The game "avatar" takes the role of the presentation of the player self and the other. The 'self' is tied to the player through the physical interface (keyboard for example), and throughout the result of the players' action on the avatar (the avatar getting killed for example). The avatar is also the 'other', an agent of a digital agency that is limited by the player actions (Rehak, 2003). Avatars have allowed users to emphasize and minimalize certain aspects of their behaviour and appearance. Allowing people the ability to create their self-presentation, choosing what parts of themselves that they bring to the foreground (front stage) and which ones stay in the background (back stage) (Bullingham & Vasconcelos, 2013).

There are several vital elements for creating a connection between the player and the avatar; player identifying with the avatar, control of the avatar through a physical object, rules that govern the virtual play world and extra elements (like sounds) that add to the immersion and breakdowns and reestablishment of player's identification with the avatar through the destruction (death) of the avatar[13]. The camera can also play a role in players' immersion with the 'self' on the screen, a first person view (or third person view) camera that closely follows the avatar and is controlled by the player input. Controlling what the camera sees and where it points gives the player another point of immersion for identifying with the avatar (Rehak, 2003).

MMORPGs exemplify the new human ability to choose how they wish to present their 'selves' in a virtual world. The first steps of playing MMORPG involve choosing the look of your avatar, the players' representative in the virtual space. The player is free to choose, within the confines of the virtual reality, the avatars' gender, appearance, profession and physical features (Filiciak, 2003). The virtual worlds' anonymity also allows players to adopt 'identity tourism', the ability to choose a gender and/or race that is different from the one to

which the player was born , to inhabit a different skin. The players also have the option to create several personas, alts, each inhabiting a different aspect of the 'self' that they wish to portray[14]. It is unfortunate that players tend to conform to societys' norms, and choose ideals of North American beauty; young, thin and white (Bullingham & Vasconcelos, 2013). The chosen avatar develops while the player is acting in the game universe. The avatars get better equipment, more money, more experience and raise their profile among their game world peers, creating a virtual world that follows real life conventions and allows the players to participate in a fully realised reality (Filiciak, 2003).

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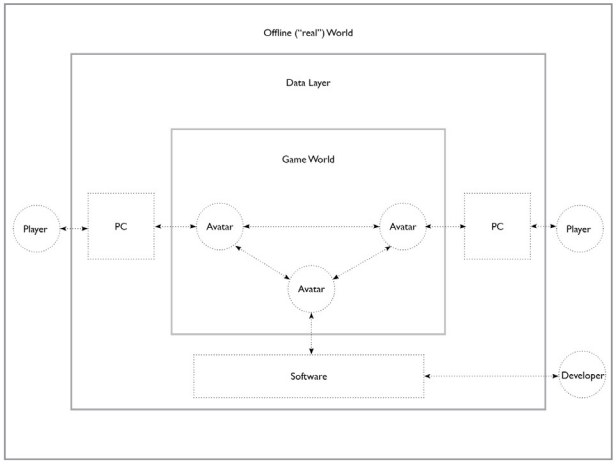
13. n interesting read about the concept of "death" and "mortality" in a virtual game world can be found in: Klastrup, L. (2006, June). Death matters: understanding gameworld experiences. In Proceedings of the 2006 ACM SIGCHI international conference on Advances in computer entertainment technology (p. 29). ACM.

14.Players tend to have a few alts, but generally only use one avatar as their main avatar

PLAYERS BEHAVIOUR IN GAMES

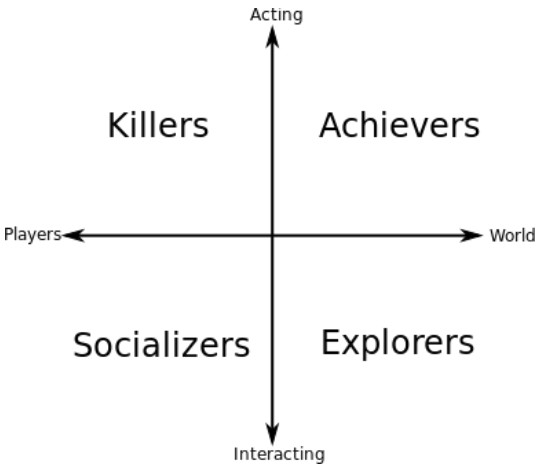
Players' differences in the ways that they present themselves online, contrast with the way that they would represent themselves in reality, creating different game behavioural patterns. Peoples' behaviour in a game environment is often much different from the way that they would behave in reality. Games give us the licence to engage in aggressive behaviours like creating a conflict and preventing others from reaching their goals. Behaviours that would have been considered rude in reality are recast as playful behaviours and can be considered pleasant and sociable in the game environment (Juul, 2013).



Online game interaction can be separated into three distinctive layers. TThe first one is the offline world ("the real

world"), the world of developers, players and administrators of the game. The second level is the world of the data, where all the information of the game world and the player is stored and mediated. The last layer is the online world with the game imagery, topology and dynamics. In researching the dynamics between the players and their avatars, it is useful to observe the connection between those layers (Kolo & Baur, 2004).

RiRichard Bartle famously separated MUDs players into four categories based on their playing preferences. The players' different playing styles affect the balance and interaction of the game. A smart MUDs administrator will seek to balance the interactions between the players and the virtual world around them.



The player's categories are as follows:

1. The Achiever ("Diamonds"): their The Achiever's main goal is points, or gathering and raising in levels. Achievers are interested in "acting" in the "world". For them the game world is an environment in which they can fully immerse themselves. The point of playing is to master the game.
2. 1. The Explorer ("Spades"): The Explorer's main goal is to expose and explore the inner workings of the game. Explorers are interested in "interacting" with the "world". For them, the main goal of the game is the sense of wonder they gain from immersion in the virtual world.
3. 2. The Socialiser ("Hearts"): Socialisers are interested in people and interacting with people in the game. The game is merely a backdrop to inter-player relationships, empathising with players and getting to know them. They are interested in "interacting" with the "players". Thus, their goal in playing a game is human interaction.
4. 3. The Killer ("Clubs"): The Killer's goal is to wield power over other players and generally cause them distress. They are interested in "acting" with "players". Killers wish to display their superiority over other players,

interfering with other players' goals (Bartle, 1996).

While Bartles' player categorization became has become very popular, it has never been empirically tested. Specifically, there is no proof for his assumption that one preference of for a type of play suppresses excludes all other types of play. There is also no empirical proof that the four player types are independent types. Based on Bartles' player types, a survey on the motivations of MMORPG players playing MMORPG revealed three main motivational components with and ten different motivational subcomponents (Yee, 2006).

MOTIVATION TO PLAY ONLINE GAMES

Achievement	**Social**	**Immersion**
Advancement	Socializing	Discovery
Mechanics	Relationship	Role-Playing
Competition	Teamwork	Customization
		Escapism

Other researchers, such as Utz and Bekhtina, explored other types of players and their motivations. Utz examined aspects of virtual friendships, and found four different player types in online games:

1. Role-Players, who are interested in role-playing;
2. Gamers, who are interested in having an adventure in a game world;
3. Virtuals, who are interested in online meetings and socializing; and
4. Skeptics, who are disuninterested in most aspects of online gaming and rarely play. Bekhtina also identified four basic motivations for playing computer games: (1) curiosity, (2) cognitive stimulation, (3) enjoyment of a different lifestyle in a virtual environment, and (4) recreational entertainment (Cole & Griffiths, 2007).

SOCIAL DILEMMAS IN COMPUTER GAMES

The differences in player behaviour in a game environment may affect the outcomes of social dilemmas in games. Online multiplayer games illustrate a number of social dilemmas that can be understood, and possibly resolved, using knowledge obtained from studying real-life communities (Smith, 2007). Multiplayer games have the ability to create a real, absorbing world, where players can simulate real life actions and create a social and economic culture that is equivalent to reality and will potentially affect it in the future (Castronova, 2003). Multiplayer role-playing games are unique in that, unlike single-player games, they require people to join in and play with others competitively and cooperatively. MMORPGs can serve as an arena where we can observe mechanisms and interactions that are increasingly echoing our non-virtual lives (Filiciak, 2003).

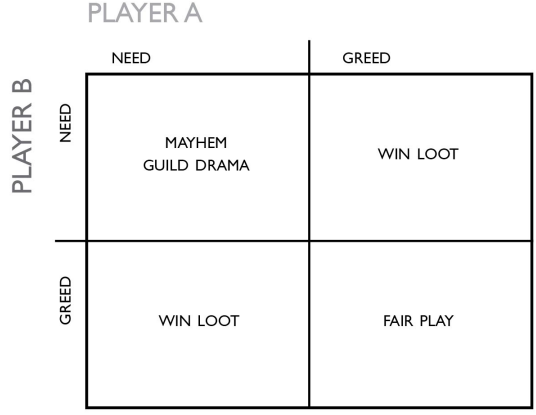
The discussion of social dilemmas in gaming is generally centered on the concepts of cheating and grief play. Cheating can come in different forms – in the code level, where a player who is versed in programming can modify the code to subvert the rules of the game developers[15]. The second form of cheating is a form of in-game cheating where the player exploits game mechanics in order to achieve an advantage over other players. "Grief play" refers to deviant and destructive behaviour that may not be illegal, but can create an

unpleasant gaming environment for other players (Smith, 2007)[16].

In single-player games, everything about the game is under the control of the developer. The developer makes all the rules, controls all the details and carefully crafts them in order to create an enjoyable gaming experience. The concept of "cheating" in single-player games is not only acceptable but is encouraged. By creating cheat codes developers and players create ways to tailor the game experience to the level of difficulty that the player desires (Ludgate, 2011). One of the most well known examples is Blizzard's Diablo 1, one of the first commercially successful games, which became synonymous with the affects that cheating had on the playing experience. In a survey conducted in 1997 by Games Domain[17], 35% of Diablo players admitted having cheated in the game. More interestingly, 89% of the "cheaters" stated that they would have preferred not to be able to cheat in the game (Smith, 2007)[18].

The situation is different in MMORPGs, where cheating and other anti-social behaviour are frowned upon. MMORPGs do not have cheat codes or mods; any slight deviation from the rules can create chaos in the game world (Ludgate, 2011). Multiplayer games display a game world version of the "tragedy of the common"; they involve situations and dynamics where individuals might enjoy the benefits of the collective but without contributing to it. A cheating player will destroy the balance of game, and will create a situation of unfair competition among players. The social dilemma in this case is that the temptation to cheat might override the collective good. In computer games, the collective good is the enjoyment of the game by the other players (Smith, 2007).

A good example of a social dilemma, (and specifically the Prisoner Dilemma), in MMORPGs is the issue of "ninja looting" in the World of Warcraft loot distribution system. The system allows players to choose either "Need" which will guarantee the player receiving the loot, or "Greed" which shows your an interest in the loot but doesn't guarantee that



a player will obtain it (Madigan, 2010).

Unsurprisingly, the solution for cheating (defecting) in online games might be similar to the way that cooperation evolves in real-life social dilemmas. Two solutions are proposed: The first is similar to the solution with which Hardin sympathised with, the creation of a third neutral party (government) that will monitor player behaviours. This function is usually fulfilled by game admins, who monitor and receive reports on inappropriate behaviour, and game developers, who modify rules and mechanics (Smith, 2007). Game developers can change the game mechanics, potentially with severe effects on players' playing styles, without notifying the players. Many of those games have active message boards, where players frequently visit and loudly complain about the changes that were implemented. The result is that the political structure of virtual worlds consists of a group of all-powerful executives and a mob of angry devotees (Castronova, 2003). Not all changes and administration take the form of negative punishment. For example, in the highly competitive League of Legends, which gained a reputation for its unpleasant player community and interaction, recent changes implement a system that rewards good behaviour among players. The honour system was implemented in order to create positive reinforcement among players, in the hope that this new mechanics will eventually introduce a more positive and cooperative environment in a competitive multiplayer game (Madigan, 2013).

The second solution proposes in-game player policing based on the cooperative nature of such games. In general, online, a multiplayer game tends to promote cooperation between players. In an experiment conducted on cooperative and non-cooperative version of violent computer games, it was observed that players that play cooperative games tend to employ a tit-for-tat strategy while dealing with other players, and are less likely to defect in a simple one-shot Prisoner Dilemma simulation (R, A, M, A, E, & J, 2012).

The most pervasive measure that allows the player to affect the social interaction in the virtual world is the existence of the guilds (or clans). The guilds system functions as an in-game solution for social dilemmas of virtual multiplayer worlds. The guilds are an elaborate in-game institute that serves a variety of functions for its members. The functions change according to the guild members' level of involvement in the guild; the more involved they are the more benefits they receive and the more commitments they have.

They divide the player population into players who you can trust (other guild members), and serves as a function of verifying the trustfulness of the guild members. Breaking the guild trust will result in the player being kicked out of the guild. With the players representing guilds they are also pressured to act appropriately toward other guilds and players, containing inappropriate behaviour in the game and acting as a sort of in-game policing body (Smith, 2007)..

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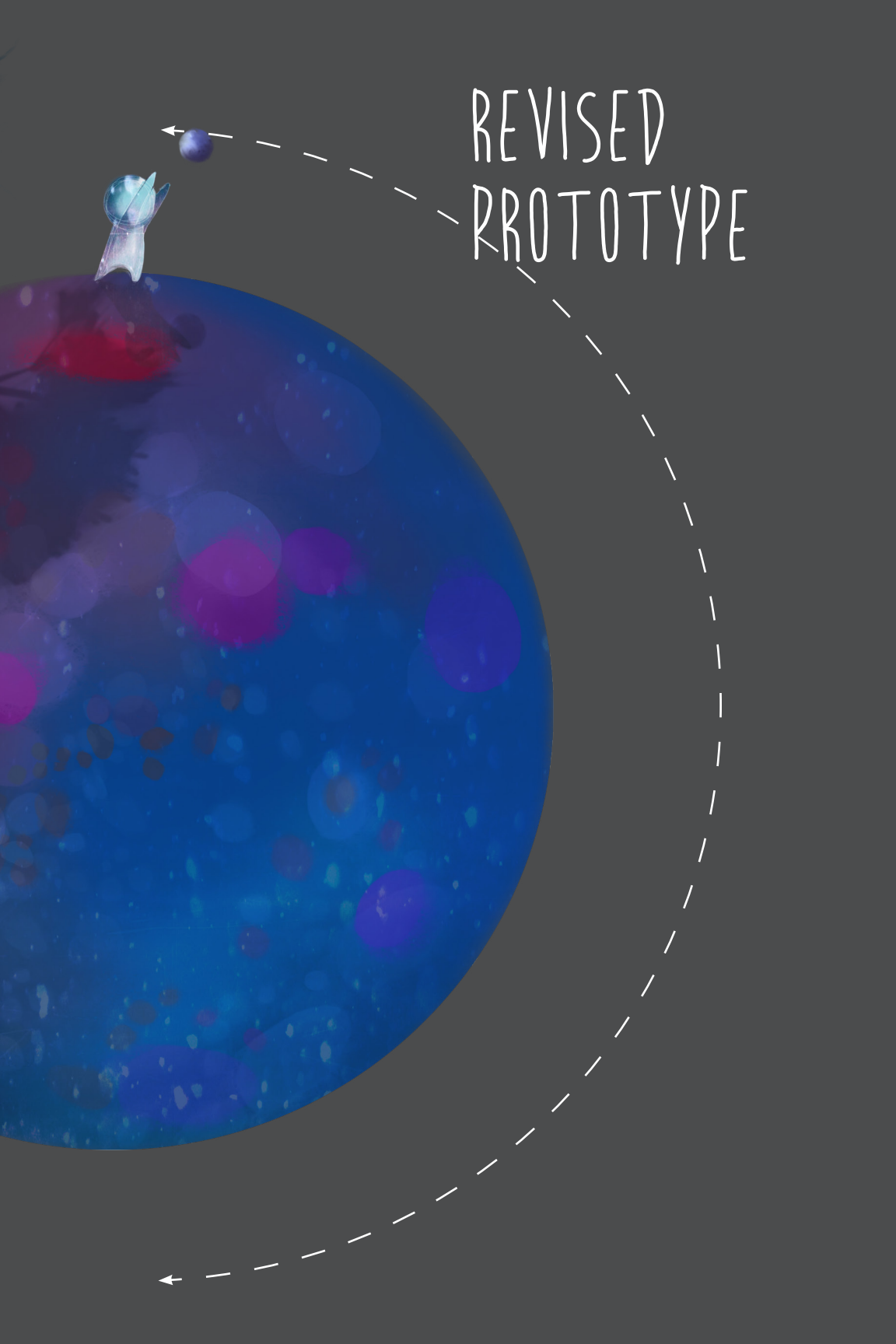
15. players who log in the game accepts an End User License Agreement that strongly limits their rights to affects events in the real world (Castronova, 2003)

16. For example players "camping" near a player avatar "body" waiting to kill him the moment he resurrects. A perfectly legal action in the game rules, but an action that might cause the "camped" player distress and distract from his enjoyment of the game.

17. a game magazine

18. This can be described as an example of a one-shot Prisoner Dilemma, the rational thing to do is to defect (cheat), but cooperating (not cheating) would have made the game more enjoyable.


REVISED
PROTOTYPE

BOARD GAME PROTOTYPE

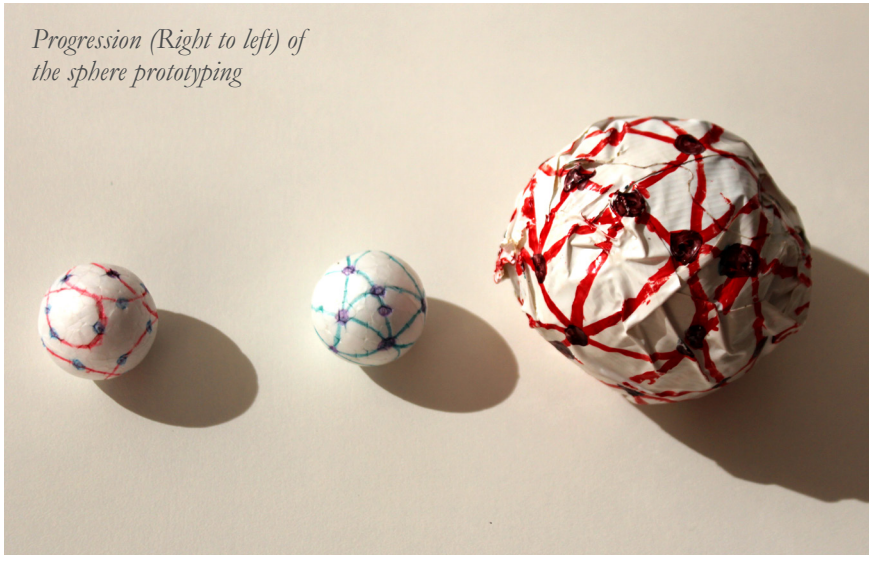
Once it appeared that the game prototype, in its current form, wasn't working I started working on a new board game prototype. Several mechanics that were used in the original prototype; such as the three-screen division, the racing element and resource management, became the base for the new board game prototype. Ideas generated from the Prisoner Dilemma were also implemented, mostly as a concept for creating a game where players need to cooperate and compete against each other. The Prisoner Dilemma was a concept that used some of the ideas that I wanted to explore in the former prototype, but was less specific to one situation. This gave me more freedom and allowed my to explore my desire to create a game that deals with the social realities of conflict, but with the option to focus the research the core of human conflict and cooperation instead of dealing with one specific conflict (the middle eastern conflict). While the Prisoner Dilemma on the surface was relatively simple concept, the interaction it presented can be used to create a game the try to mimic real life social interaction and situations of conflict/cooperation.

The new paper prototype was a simple two player racing game, with the players competing over collecting objects from a limited pool of resources. Instructions and game board arrangements can be found in the appendix. While the idea had some potential, that specific board game iteration was not

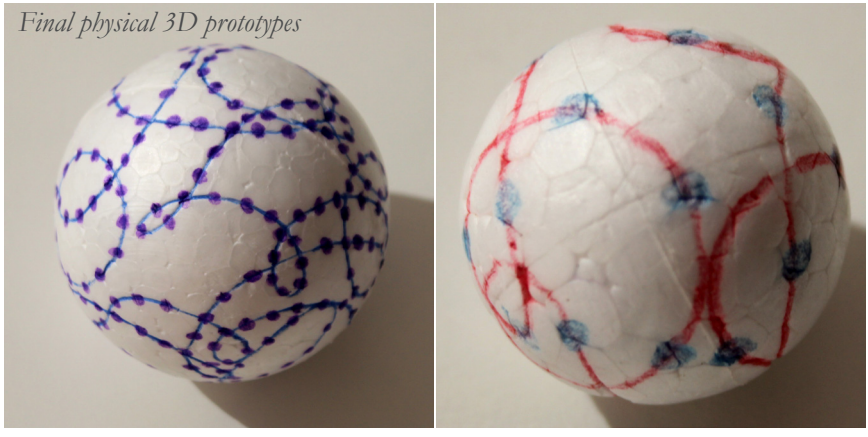
a playable game at this point. After a quick testing session, several problems were identified; the game was based too much on chance and not on the players' skills, the current mechanics were too simple and it wasn't clear if the strategy part of managing resources worked in the existing format. I did like the idea of the players following pre-determined paths, collecting resources while trying to keep the balance between collecting too many resources and winning the game and decided to keep those for future prototypes.

MOVING TO A 3D MODEL

In order to free myself from the boundaries that I kept setting and with the thought that to final prototype would be in 3D, I moved away from the earlier flat surface prototype and started experimenting with other dimensions. Staying with the racing on paths motif that was created in previous prototypes, I started testing with that concept on 3D objects - cubes, spheres



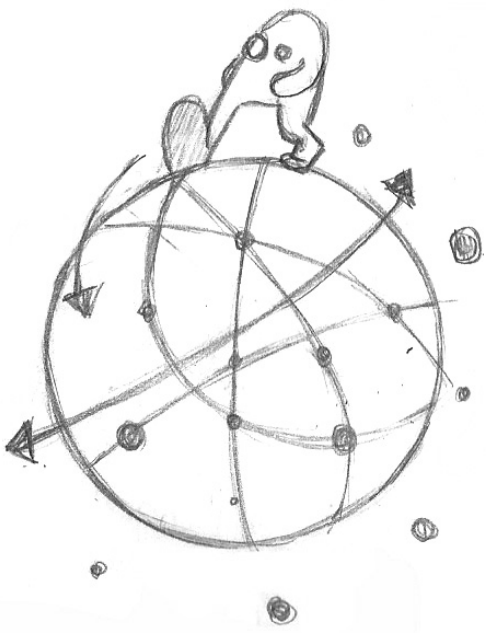
Progression (Right to left) of the sphere prototyping



Final physical 3D prototypes

and triangles. Eventually I found that spheres were the ideal shape for what I wanted to do. They allowed me the most freedom to play with the shape in a 3d environment, while keeping the physical mechanics realistic enough that the player learning curve would not be too difficult. The idea of rotating a sphere in empty space became one of the main mechanics utilized in the final prototype. This created a mechanic in which players have the ability to control the sphere rotation, direction and speed.

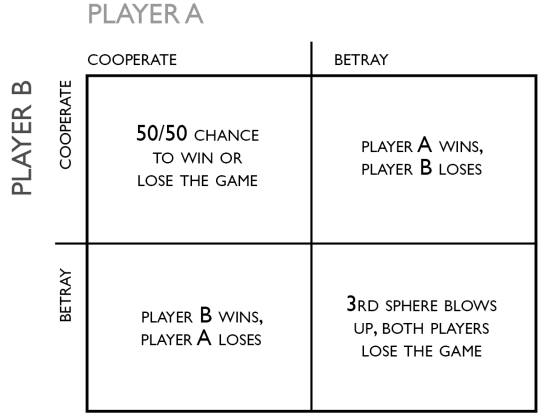
The player avatar will run on the paths on the sphere collecting small "Light Orbs", while competing against another player with similar objectives. The player movement will control the rotation, the speed and the size of the sphere. In short, what was created was a race between two players utilizing the sphere shape, size and rotation in order to create a bigger challenge for the players. .



Sketch of the basic sphere mechanics

CONNECTING TO THE PRISONER DILEMMA

Once the competitive elements and the sphere mechanics were set, the cooperative and resource management elements of the game (that were introduced as the resource board in the board game paper prototype) were implemented. The prisoner dilemma proved to be good preliminary concept in order to start developing a meaningful interaction between the players, forcing them into a situation where they are competing against each other but also have to cooperate with each other.



This interaction was done by introducing a third sphere into the game. The concept was that the players' orb collecting affects the third sphere, depleting it to the point that it can completely disappear resulting in the players losing the game. The spheres' depleting is accomplished by controlling the speed of the spheres'

rotation, the faster the player runs on the sphere the more collectible orbs spawn, increasing the chance to win but also increasing the chance of losing the game. Keeping the rotation speed slower raises the chance of the competitor winning the game but lowers the chance that the third sphere will disappear[19]. The players must decided if they wish to cooperate, and decrease their chances of winning or to defect, increasing their chances of winning but raising their chances of losing the game.

The hope was that, while playing, players would develop a relationship that echoes the interaction that can result in Prisoner Dilemma scenarios. I was especially interested in how it coincides with players' behaviour in the game environment. Would the result be different than in real-life Prisoner Dilemma situations? Can we extrapolate from it how social behaviour in games and reality differ from each other? It was important for it not to be too obvious that the Prisoner Dilemma was the inspiration behind the game interaction, mostly in order to encourage natural playing behaviour, which could be instrumental for the research connected to this prototype.[19]

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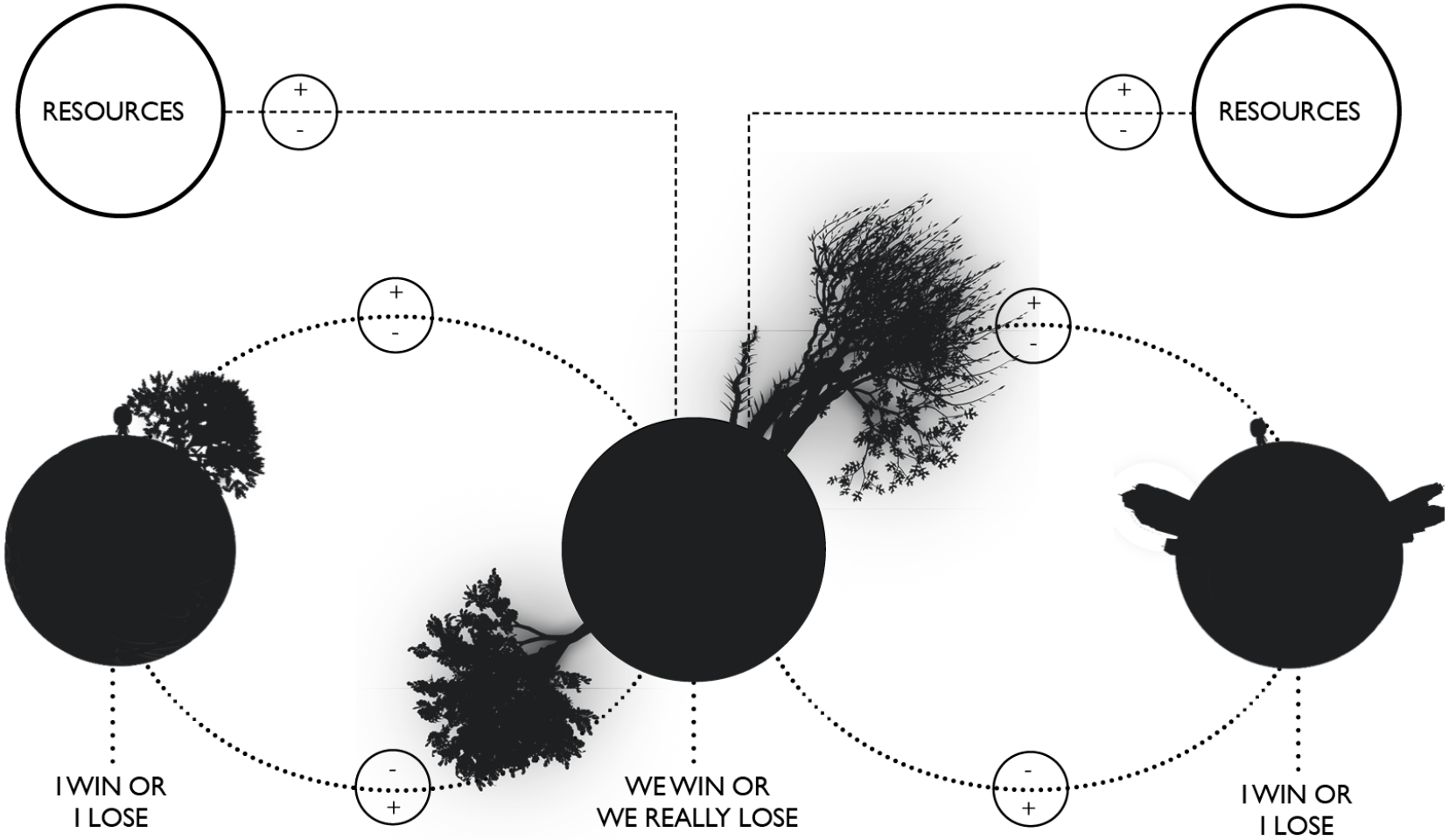
19. I've decided to change the defection payoff to the players from the original Prisoner Dilemma payoff; this was done from the perspectives that having the original payoff will created an overly complicated win/lose mechanics and will create a far too complex learning curve. This might be addressed in future iterations.


RESOURCES
+
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RESOURCES
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+
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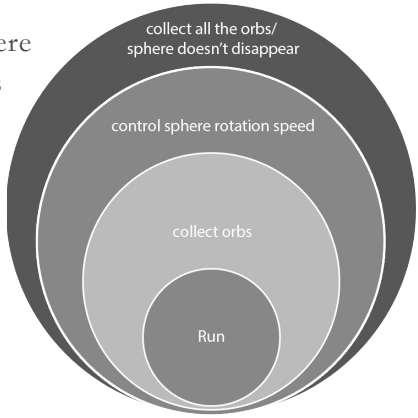
I WIN OR
I LOSE
WE WIN OR
WE REALLY LOSE
I WIN OR
I LOSE

FINALIZING THE MECHANICS

Combining all the mechanics resulted in the following game: a timed, 3-screen game, in which two of the screens show players competing against each other by running on a spinning sphere and collecting small light orbs. The rotational direction and speed of the sphere are controlled by the arrow keys. The more a player turns, the faster the sphere rotates (similar to running on a barrel floating on water) and the more new collectible orbs spawn. The space bar slows down the rotation of the sphere and lowers the orbs re-spawning rates. The player who collects the most orbs wins, but the catch is that the orbs are sustaining the sphere in the 3rd screen. Collecting the orbs too quickly will deplete the 3rd screen sphere completely; this will cause all of the players to lose the game. In order to avoid losing the game, players will have to alternate between competing against each other over the orbs, and making sure that they are not collecting them too fast.

The finalized game mechanics were arranged in a simple diagram that presents the core game interaction. This was done in order to make sure that the overall game mechanics and interactions all work together. [20]

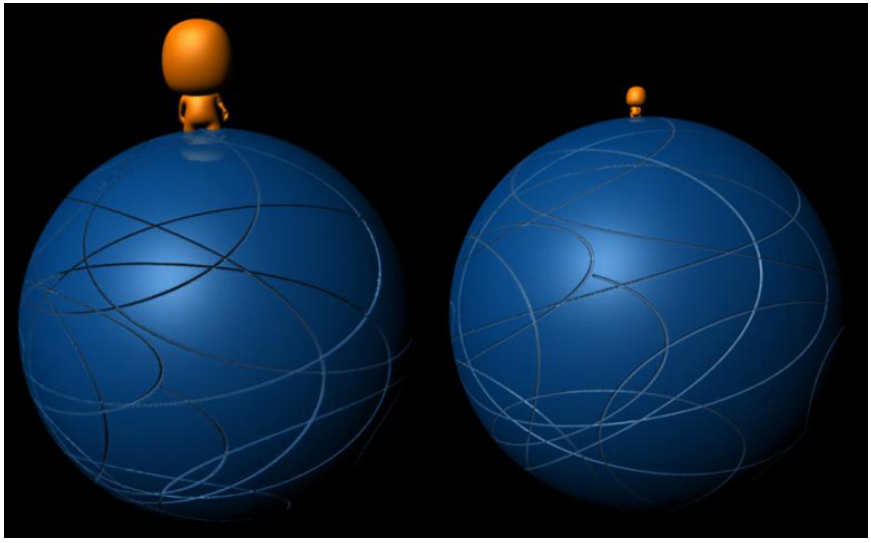


20. The diagram modal is based on: http://www.funstormgames.com/blog/2012/06/designing-around-a-core-mechanic. The inner circle represent the game core mechanic (the most frequent interaction), the second circle represent the secondary less frequent mechanic, the third circle represent the game progression mechanic and the other shell is "Hero Journey" which puts all the inner layers in context. (Kim, 2012)

ANIMATED DIGITAL MOCK-UPS

Once the game mechanics were established, I moved to experiment with them using a digital 3D animated mock-up in order to observe how the mechanics (specifically the sphere rotation) work in movement, it was also an opportunity to tests some early design concepts for the final prototype. Two different prototype tests were made, both of them created in Maya in the span of a few hours.

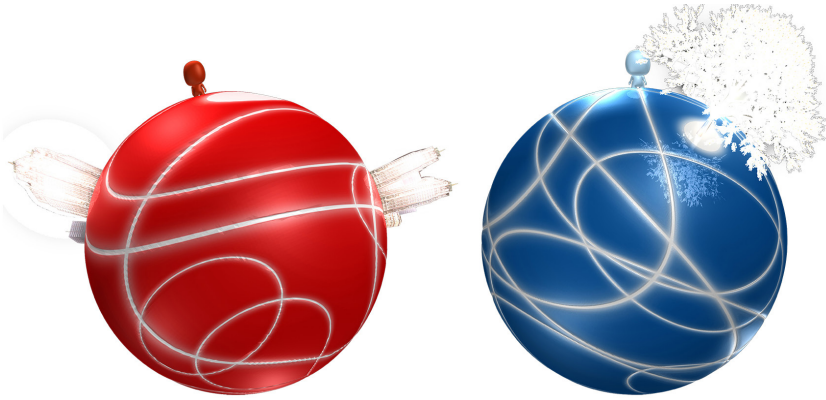
The first test was created in order to assess the spheres' movements, change in rotation speed, direction movement and visualization of the player avatars' movement on the sphere. It was also an opportunity to translate the initial design concepts from the physical sphere prototype to a digital sphere and to figure out the player avatar size in relation to the sphere.



Examples of two 3D digital tests that were done, the version with the much smaller player avatar was eventually chosen as the preferred size

The second animated 3D prototype was created in order to visualize the interaction between the three spheres. Special attention was paid to the effects on the third sphere by the actions conducted by the players on the other spheres. The preliminary game aesthetics were also established in this test, by taking the design done in the earlier test and refining it.

Video of second sphere mechanics:
http://youtu.be/3UhT34G4GXA

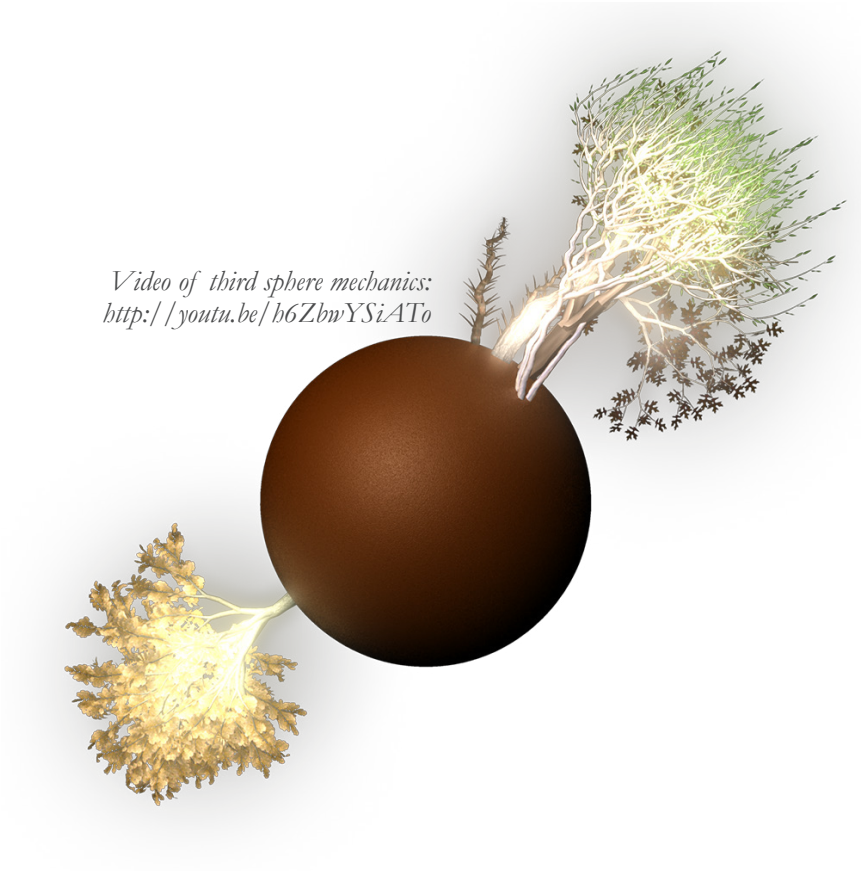


Video of second sphere mechanics:
http://youtu.be/3UhT34G4GXA

Several conclusions and suggestions arose after presenting the animated tests in front of the class earlier this year. The main issue was that the game in its current format might be a bit too fast, which might cause the player to simply not care if the third screen is depleted because they will win before it happens. The main interaction had to be refined before moving on to prototyping in Unity. The plan was to change the ending of the competition from a game that ends when all of the orbs are collected, to a timed game; this also changed the orbs' function- from a limited number of orbs to orbs that re-spawn depending on the rotation speed.

The design, even in its still in early phases, was well received with the exception of the design of the third sphere. It seemed to be not as well thought out and refined as the rest of the designs and will need some serious revisions while moving to the next prototype. Several other suggestions were made that will be considered for future iterations. Those included some extra mechanics, like using the trees and the building for replenishing the third sphere, with

having the players' own sphere being depleted while playing and using physical controllers instead of a keyboard.



Video of third sphere mechanics: http://youtu.be/h6ZbwYSiATo

FIRST DIGITAL PROTOTYPE

The first Unity based prototype served two purposes: creating the mechanics of the individual sphere and translating the 3D design into the Unity Game engine. It was essential that the individual sphere mechanics be set in place, which will allow me to create a quick iteration of the other spheres based on the mechanics that was set.

Prior to the first user testing, the following mechanics were implemented:

- Basic sphere gravity was set, allowing the player avatar to walk on the sphere without falling off.
- Keyboard input (arrow keys) was implemented in order to control the direction of the sphere rotation.
- The sphere rotation speed changes according to the keyboard input – arrow keys increase rotation speed and the space key decreases rotation speed.
- Players can gather collectibles ("the orbs") that are positioned around the sphere.
- Two different cameras where created – a static camera that follows the sphere, and a more dynamic camera that follows the player avatar

The Cameras that were tested, the static camera and the dynamic camera (from the left)

USER TESTING

The user testing was conducted at the beginning of January during "Game with Friends" in the Bento Miso collaborative workspace. Four people were tested with about 10 minutes for each test, with each camera being tested separately. The testing process had players playing the game for a while; with me occasionally asking guided questions about certain aspects of the game. Observation played a major role during the testing especially when it came to players managing the control, how quickly they figured out the sphere rotation mechanics (if they did) and their reactions to the mechanics that were not implemented yet. Using those two methods analyzed the parts of the game that were working and the parts that were not as successful, eliminate them or change them and re-test. The results of the testing can be seen in the appendix.

REVISIONS

The result of the user testing indicated that, before continuing with prototyping, it was advisable to rethink several of the mechanics that were in place during the testing. The main problem seemed to be with the camera mechanics: Both cameras that were tested caused problems for the players. A new solution was devised, which involved creating a new camera that will have the angle of the static camera but with the ability to see all sides of the sphere by following it.

The second evident problem was that the sphere axis controls were not intuitive to the player; this was mostly due to the fact that the sphere always rotated on the X axis and did not update its rotational position after the arrow keys were pressed. The way that the character was modeled did not help, as there was very little difference in the way that the character looked in the front and the way that it looked from the back. This confused the players, since they were not sure what direction the character was moving in. Solving that problem would mostly involve texturing the character model to make this clear. The rate of acceleration and deceleration also proved to be a problem, particularly when the sphere speed was too high and could not be slowed.

Several other conclusions were reached in creating the prototype and studying testers' reactions. The competitive element in the prototype tested

was too simple and could prove uninteresting to the players; adding other factors (like obstacles and special collectibles) could create a more challenging and interesting competition between the players. Coupled with the difficulty, in terms of programming, of having the avatar walk on the pre-determined paths on the sphere[21], I decided to eliminate the current path based design and move toward a more planet/ space based visuals. It was also suggested that there should be better feedback for the collectible orbs.

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21. The pathfinding tools, which are built for this propose do not work very well on spherical shapes being built mostly for flat surfaces.

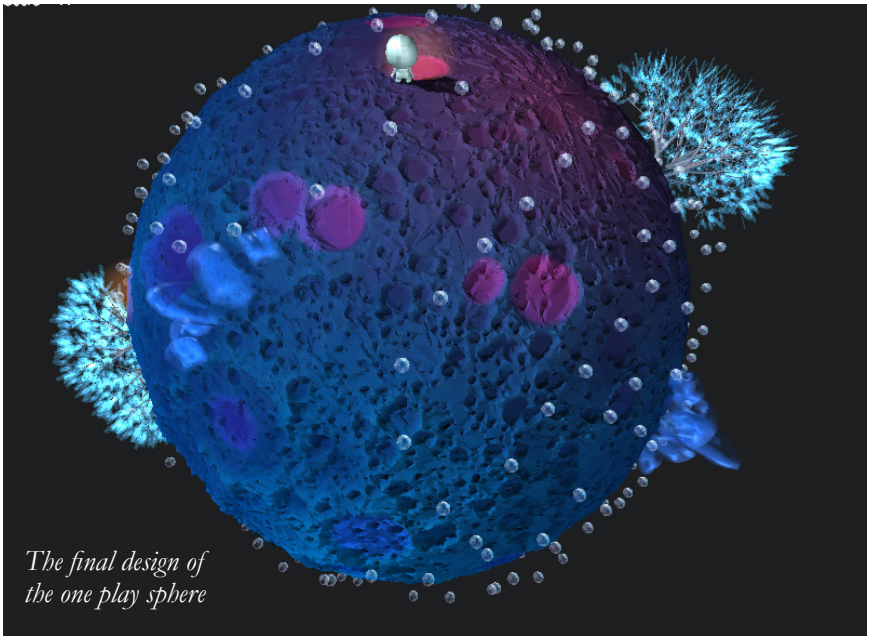
SECOND DIGITAL PROTOTYPE

The result of the first user testing indicated that the sphere mechanics required some substantial changes. The first concern that had to be addressed was the camera position and the player control of the sphere rotation axis.

The camera solution was relatively simple. Parenting the camera to the player model, gave me the possibility of having to have the camera position far enough away for the players to see the full sphere and yet not cause the player avatar to disappear while running on different sides of the sphere. The camera solution also improved the players' player's perception of the sphere control, knowing Knowing exactly where the avatar was positioned in relation to the world seemed to give the player a greater sense of control over on the sphere. In the first prototype, once the sphere rotated in the direction of one of the axis, it did not update its rotation direction but rather continued rotating on the X axis. This was revised extensively, and in the new prototype the sphere rotation axis follows the players key board input. The slowing and speeding up of the sphere was also changed. , and now Now, the space bar slows down the sphere considerably to the point of completely stopping the sphere.

In the last user testing it became clear that the initial idea of having the player avatar running on a pre-determined path will be very difficult to create and will not necessarily fulfil any purpose. The solution was that instead of

using pathways, a sort of obstacle course (that includes tress, rocks, grass etc...), would be added. Being that the paths were no longer needed it was also an opportunity to re-examine and change the current game aesthetics. Taking inspiration from Le Petit Prince, which was often referenced in regards to the game aesthetics, I decided to give the game a more space like feeling and give the spheres the appearance of stars. The new design used Maya displacement mapping, Maya paint affects, moon textures and Unity pre-made shaders to



The final design of the one play sphere

create a design that is based on the concept of creating a colorful childrens' book inspired planet and space.

While the main player sphere mechanics were done, several mechanics that were connected to the "obstacles" were not implemented at this time, mostly because I felt that it was more important to implement the third sphere mechanics and the interaction between the spheres first. Continuing with the space theme and considering the concept of the player collecting the orbs results in depleting the third sphere, I thought that representing the third sphere as a sun would fit with the overall concept of the game and would conceptually tie everything together. For the upcoming test, simple interaction that was based on keyboard inputs was established – using the arrow keys will make

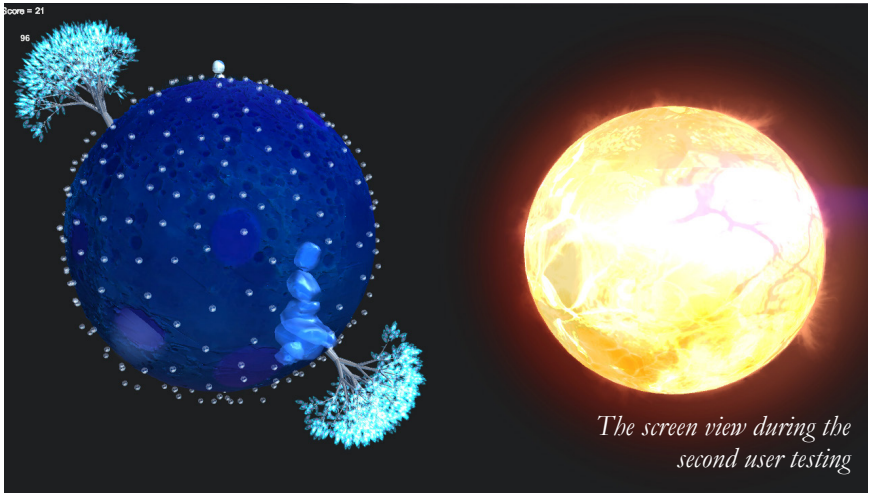
the "sun" shrink, the space key will make it grow back, a game over screen appears once the sphere shrinks too much.

USER TESTING

The second user testing, conducted on February 17th in the Bento Miso collaborative space, included an almost complete version of the one player sphere and the simple interaction with the Third sphere. In terms of the player sphere, I was testing the player control of the rotation axis and speed, as well as the collecting mechanics, the teleportation and some simple UI. At that point the orbs' re-spawning mechanics, and the specific mechanics connected to the obstacles (trees, rocks etc.), were not yet completed, and thus were not tested. The interaction of the third sphere[23] with the player sphere was established, including keyboard input controlling the sphere scale size and a fail screen to indicate that the sphere was becoming too small.

Four people were tested: each test lasted around 10 minutes, with the game timer set to two minutes. The results can be seen in the appendix.

Like the earlier tests, the testing itself was a combination of a few questions



The screen view during the second user testing

asked by me (mostly focusing on the rotational control of the sphere), players' comments during gameplay, and mostly observation of player behaviour during gameplay. Results from those three methods were collected, and conclusions

were drawn about the elements that were working well, those that needed more work or rethinking, and those that could be eliminated.

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23. For now on I will refer to the main spheres as the players sphere, and the third sphere as the "sun" sphere

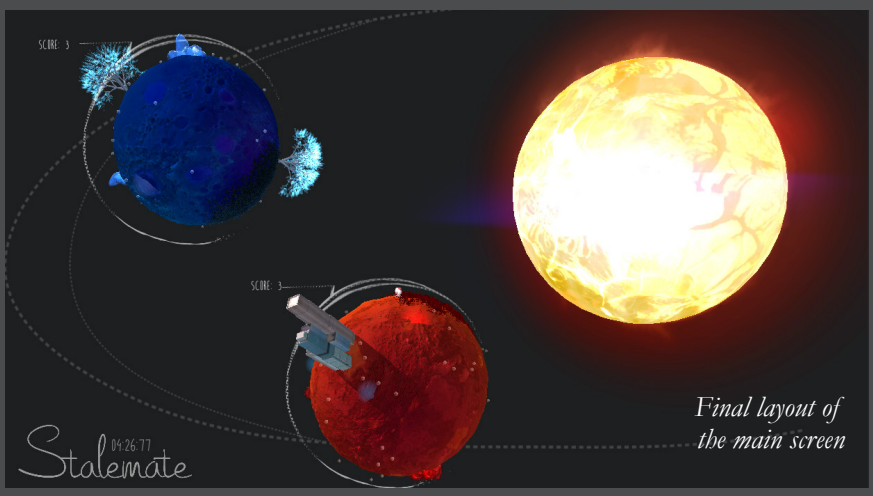
REVISIONS

In general, the reactions were more favourable than in the first test, with the reaction to the aesthetics being very favourable. The testing still highlighted two main issues that had to be addressed in the next stage of prototyping. The first was to make the controls and input control clearer to the players, because otherwise the learning process might be a bit too long and difficult for a relatively short game. The first (and less desirable) option was to create a text based tutorial/instruction page showing the players how the controllers work; the second option was to modify some of the early mechanics (e.g., changing some of the feedback) in order to create a shorter learning process. The option chosen depended mostly on the time remaining once all of the other game mechanics were set.

The second issue was that the interaction between the players and the "sun" sphere was not clear, most players either didn't notice or didn't care about the affect on the "sun" sphere. Several options were suggested; changing the color of the "sun" sphere as it gets smaller, changing the feedback from the orb collecting in order to illustrate its effects on the "sun" sphere and having the UI design illustrate more clearly the effects between the spheres. This would be addressed in the final prototype.

FINAL PROTOTYPE

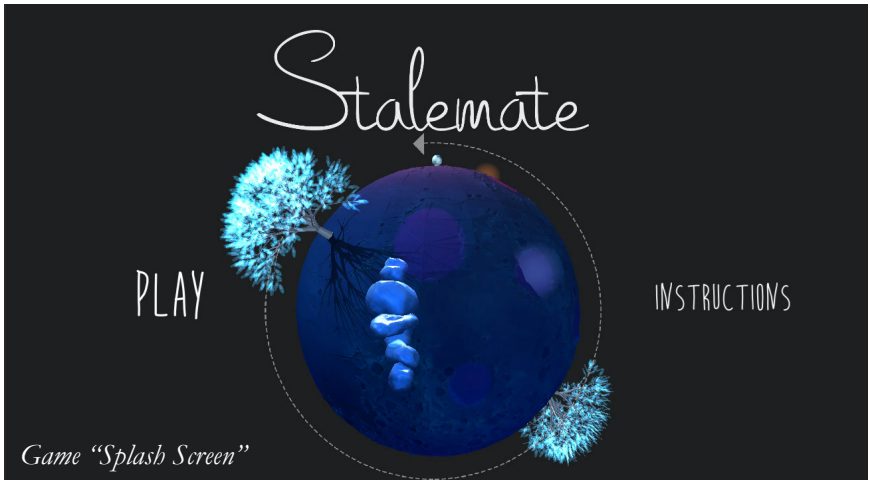
The prototype that was shown during the final graduate exhibition in April had the finalized interaction between the spheres, with the two spheres (positioned in other side of the sun emulating a solar system) affecting the sun by the speed of their rotation. The rotational speed of the sphere also affects the number of orbs re-spawning (the faster players go more orbs re-spawn) which I hoped would provide an incentive for players to want the spheres to rotate faster despite the risk of the sun getting too small and losing the game.



Final layout of the main screen

In designing the third sphere, I stayed with the original design concept from

the original 3D prototype, making the third sphere a red, city-based planet to contrast with the nature-based blue planet. This was meant to differentiate the planets enough that players would ultimately choose the planet most appealing to them. I also was curious to see whether the design affects players' playing style (e.g., red leads to more aggressive behaviour). While the final show setup ultimately did not let players choose a specific planet, in the future I hope to create a number of different planet designs that the players can choose before playing. For the UI and the secondary screens (game over screen, win screen etc.), in order not to make the game too colourful and detailed and to keep players' attention concentrated on the highly detailed spheres, a simple "flat" monochrome design was chosen to accentuate the 3D design and give the game a unique look.



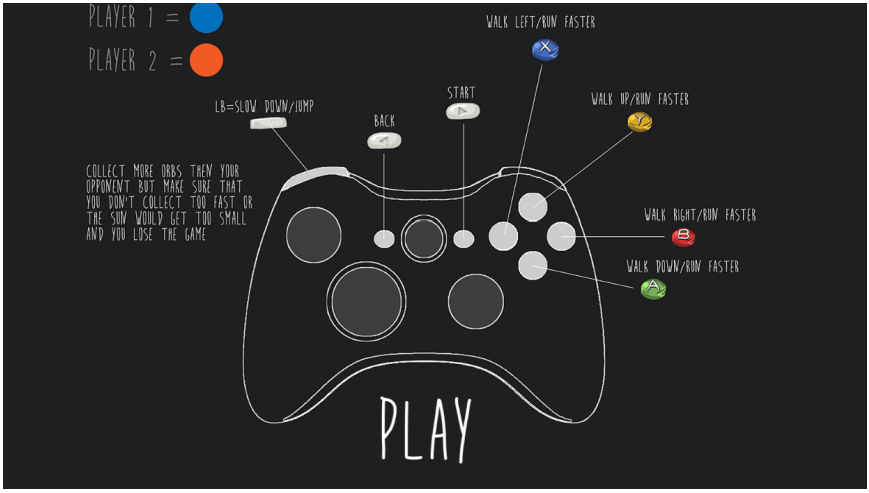
Game "Splash Screen"

Lose screen


PLAYER 1 WON
RESTART


PLAYER 2 WON
RESTART

For the purposes of the exhibition, I thought it would be difficult and not particularly enjoyable for players to use a keyboard input to play the game, and decided to use Xbox game controllers instead. While this proved a bit difficult due to the way the game was initially coded[24], eventually I managed to translate the keyboard input to the controllers. Despite a few issues with the controllers, the final result created a much more enjoyable gaming experience. I believe that, with a bit more work, the few remaining input problems can be easily remedied.



The controller inputs/ instruction page

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24. The controller axis did not respond well to the interaction between the spheres; eventually, I had to use the controller buttons to create this interaction, which proved less intuitive than using the axis to control the sphere rotation,

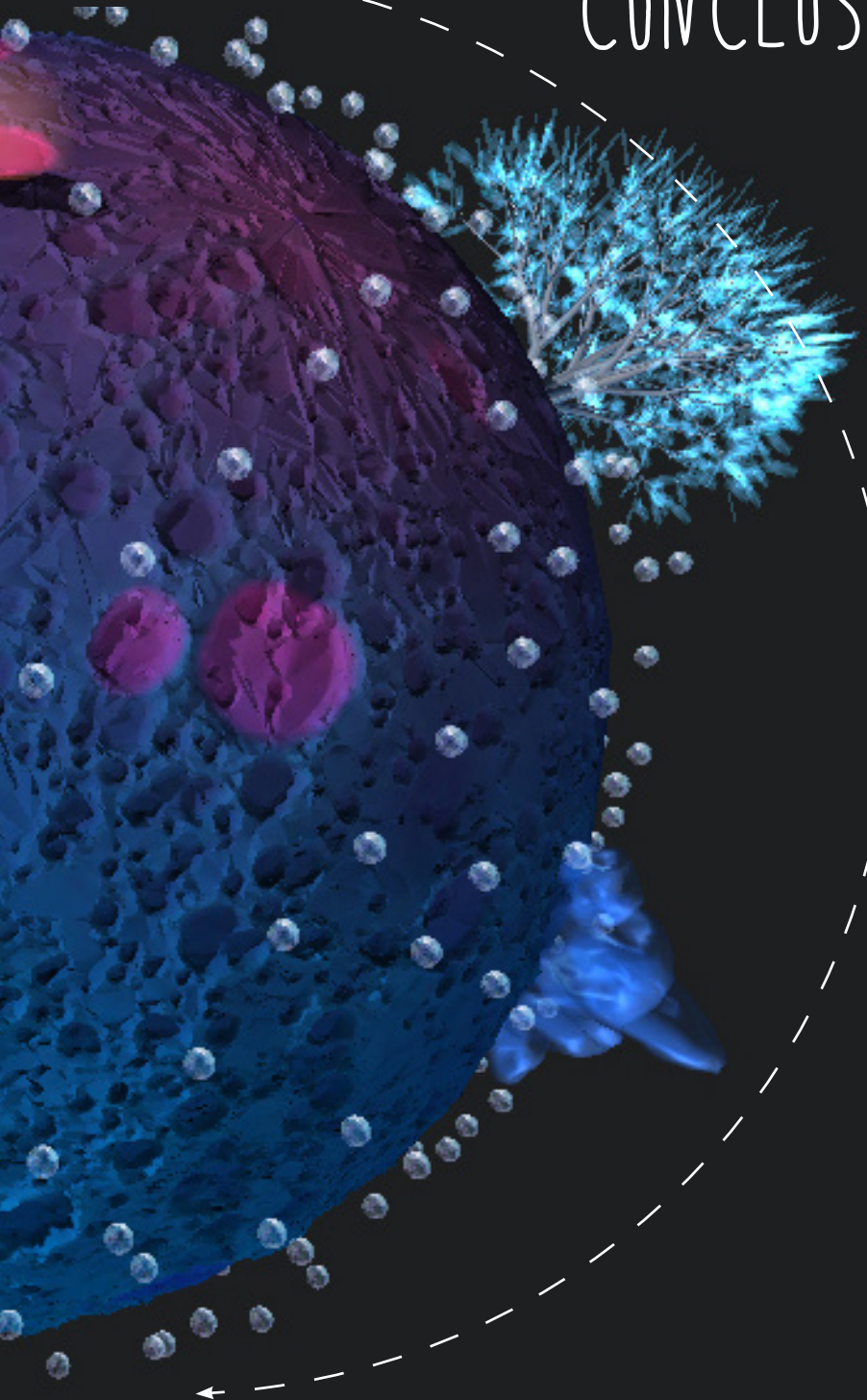
EXHIBITION

The game exhibition arrangement was done was arranged so as to encourage with the idea that I wanted people to play the game a few time and to start developing some sort of a relationship between them. This coupled Taken together with the game's strongest assets, it's visuals, presented on a large screen, the hope was to make the initial interaction with the game compelling enough that players would like to sit down and explore the game with out me being there and coercing inviting them to sit. From my observation tThis was appeared partly successful,. while Although people were attracted to the visuals, they didn't necessarily connect recognise them to as a game and choose to sit down and play.

The feedback received during the run of the show was quite interesting and rather unexpected. While adults found the learning curve of the game difficult to understand, and were often impatient about the outcome, the few children that did play it were far more amenable to losing and slowly learning the rules. In a few instances, cooperation started to emerge between players, and they started to work together in order to avoid losing. Those instances were rare, mostly due to the fact that the game was set up such that the sphere was shrinking too quickly, meaning that players lost the game too quickly. The other distinctive relationship that emerged was one in which one of the players cooperates to ensure that the sun doesn't shrink, whilst the other player defects and collect the orbs in order to guarantee a win.

I also observed that some players, despite the size of the display, were having difficulty seeing the avatar running on the sphere. Because I am planning to publish the game online, this might prove a problem to some players.

CONCLUSION



CONCLUSION

This thesis chronicles the creation of Stalemate, a computer game built around concepts from social dilemma and game theory. Stalemate is a competitive/cooperative two-player strategy game with a twist. The concept behind it was to translate "game theory" concepts into a computer game setting, with emphasis on the Prisoner Dilemma. The Prisoner Dilemma seeks to predict whether players will cooperate in a high-stakes situation: It shows why two individuals might not cooperate, how cooperation is initiated, and how it is maintained in human society. Stalemate tests players' willingness to cooperate in a competitive environment; it challenges the players both to compete against each other in order to win, and to cooperate so as not to lose the game altogether.

The players are engaged in a race against each other. The race is conducted on two separate spheres. Each player has a sphere and an avatar that runs on it, rotating the sphere while collecting little light orbs. The player with the most orbs wins the game. The main mechanics are the control of sphere rotation, direction, and speed;. The mechanics also increase the spawning of the orbs, allowing players to collect more orbs than their competitors. There is a catch: a third sphere that is affected by the actions in the other screen. Collecting the orbs deflates the third sphere, which will eventually disappear if orbs are collected too quickly. If that happens, both players lose the game. Players must make sure that they are winning against their competitors, yet still

cooperate with them in order to avoid losing the game due to the depletion of the third sphere.

The players are given the choice of playing to win, which brings with it the risk of both players losing, or of playing to avoid losing by ensuring that the third sphere does not disappear.

The thesis concept arose from my interest in using game mechanics to create a more meaningful interaction between gamers. It came from the need to show players that their actions have consequences; it was an attempt at getting away from the escapism of the gaming world. However, my concept morphed into a more abstract tactical game, which deals with ideas of human cooperation and social dilemmas.

REFLECTIONS

This has been an interesting journey. I started this thesis with very little knowledge of the process of making games, or any experience in using game engines. Prototyping proved to be a condensed introduction course to the process of making games and using the Unity 3D game engine. In this respect, it has been extremely important for my personal growth as a designer and animator, which has opened the door to a new chapter of my professional life.

In terms of accomplishing the goal of the thesis of translating the Prisoner dilemma into a computer game, it has been a mixed bag. This is mostly because, although the translation was relatively successful , several technical limitations prevented me from reaching my initial goal. My inability to set up networking in Unity forced me to abandon the original concept of having the players be unaware of each other's actions , which would be nearer to the framing of the original Prisoner Dilemma. It is also unfortunate that, due to the limitation of presenting the work in a gallery exhibition, it is not downloadable. The game (currently) would most likely function as a one-shot version of the Prisoner Dilemma, which would result in a very short game due to both players defecting. If we follow the logic behind the Prisoner Dilemma, in order for cooperation to emerge, players need to play an infinite (at least in appearance) amount of turns and build a sort of trust that leads to cooperating. While this is not strictly a failure, it is a shame that, for the duration of this thesis, the full

experience of the game will not be presented. Despite those few problems, I am satisfied with the final result. I believe that I manage to create a working, simple, visually appealing game that essentially accomplishes the goals that I set up and ultimately will be an enjoyable experience for players. Networking will also possibly solve the problem of avatar visibility and give players the ability to chose which "star" they wish to play on.

While I found the Prisoner Dilemma a compelling basis for the construction of a computer game, I have an ambivalent relationship with it as a concept that tries to quantify human morality. It comes mostly from two factors: (1) the underlying assumption of rationality and what makes a person's choice rational, and (2) the way in which the dilemma occurs in a vacuum, unlike real-life situations. It is a fitting situation for the computer gaming environment, which puts players (in most cases) in imaginary situations, and allows them, as players, to act in a way in which they would not act in real life. The Prisoner Dilemma is similar: It works well in a vacuum, but when it comes to facing the choice in real life it feels too simplistic. Despite my misgivings about the Prisoner Dilemma, it was a good basis for a game and a conversation about the ability of "play" to translate concepts and create interaction between people.

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FUTURE DIRECTION

During the graduate exhibition I presented a fully playable game prototype, moving on several options for further developments of the game that were contemplated. Limitations on time and my own coding knowledge prevented me from utilizing Unity networking options in order to achieve the original goal of having each sphere on a separate screen. This would lead to the possibility of a game in which each player isn't aware of what the other player is doing, creating a far more accurate version of a one-shot Prisoner Dilemma. A networked online game will also open the possibilities of creating an iterated version of the game, which includes a multiplayer, infinite iteration of the Prisoner Dilemma. From a research standpoint, if the results of such games could be quantified and analysed, it could prove to be a contribution to research done on the Prisoner Dilemma and other social dilemmas.

Player interactions with the final prototype indicated that several issues must be addressed before going forward. The main issue that I observed was the the game learning curve: Many of the players found the game too difficult to understand and ultimately immerse themselves in the experience. I propose to solve this by having players experiment with the mechanics, specifically the sphere rotation mechanics and the interaction with the sun, before the competitive element comes into play. Another option would be to maintain the competitive element, but introduce the interaction, especially the interaction with the sun, slowly mi,

Other possible iterations concern internal game mechanics, and changes in them that might result in different game dynamics. These include having all of the players run on the same sphere and affecting it, creating unique collectibles that will perform different functions when collected, and limiting number of the collectible orbs so that, once they have all been collected, the other players are prevented from collecting (it) them. It is possible that those mechanics would be introduced in the future at different levels of the games, allowing players to play different games that are based on the same concept.

While I was contemplating, during the early stages of prototyping, attempting to release the game through official channels (like Steam Greenlight), it became clear to me that the final result is less of a commercial game and more of a conceptual work, which will require more development if I do want to sell it. Being happy with the overall result, and wishing to move on to the next game project, I have decided to release the game for no charge online. .

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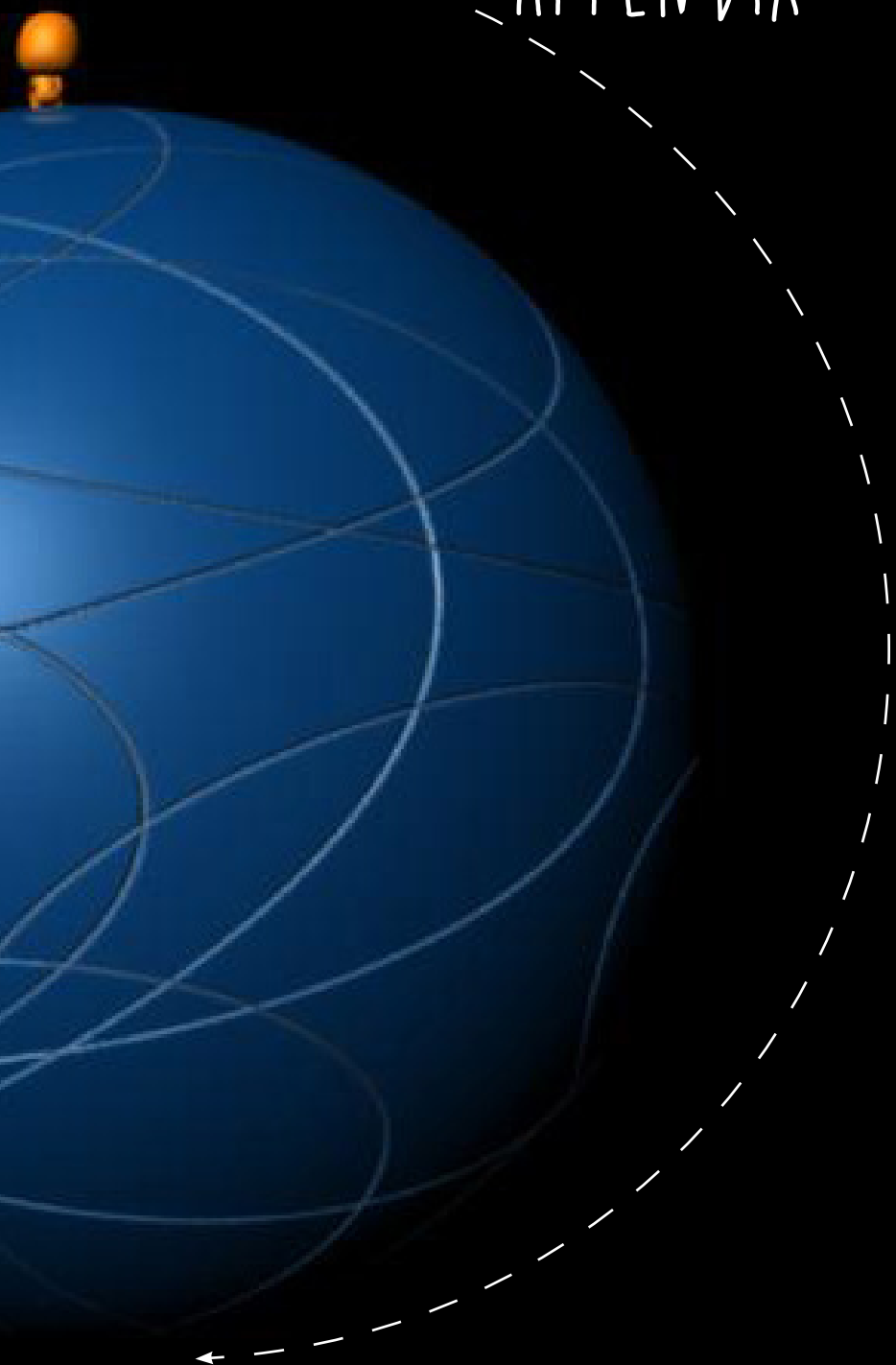
APPENDIX



COPYRIGHT AND ATTRIBUTES

All Music and Sound is copyrighted by Mark Sparling (http://sparling-soundworks.com/), and is used with permission on this project.

The player avatar model that was used came from http://www.cgmeetup.net/home/ultimate-rigs-maya-rigs-maya-character-rigs-free-maya-rigs/ modeled and rigged by by Ugur Ulvi Yetiskin (http://www.uguryetiskin.com/) and are free to use (for non-commercial use)

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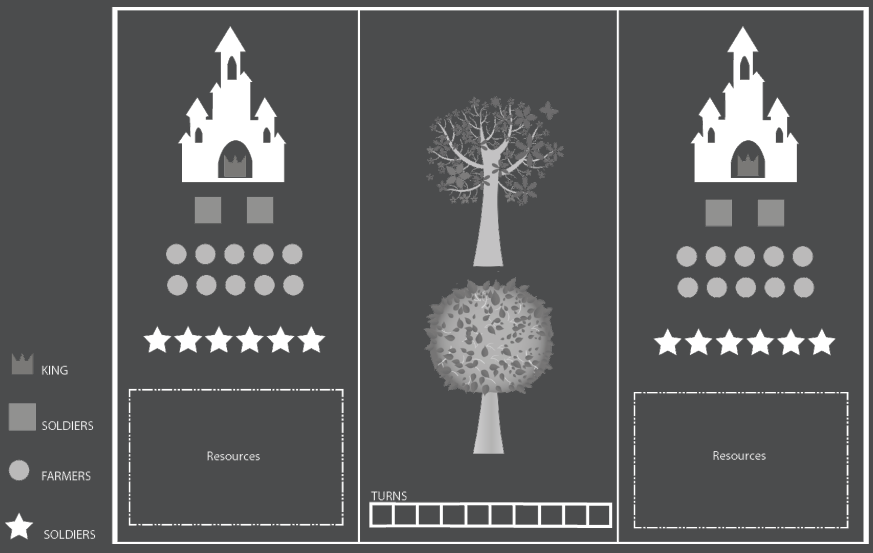
BOARD GAME INSTRUCTIONS, PROTOTYPE 1

INSTRUCTION, STALEMATE BOARD GAME:



Each side has:
1. One Castle
2. One King
3. Two Advisors
4. Six Soldiers
5. Ten Farmers
6. Resources:
- One Water (can be cut in half)
- One Stone
- Two Farm Animals
- Three Agriculture Products
- Four Wood

Other things on board:
Two dice
Trees: 1. One middle tree position
2. Three levels of decaying trees
3. Three levels of growing trees
Eleven situation cards

Game instructions:
Before you start playing, roll the dice once, and pick up a situation card according to the number that you have on the dice. Position the trees (and any other pieces on the board)

according to the instructions on the cards.

Card examples:

• A blue wall is built in Red's territory. The Red farmers cannot access their farms and houses. -2 Red agricultural product; -2 Red wood product; +2 War.

• A blue soldier was found wounded in Red territory. A red farmer found him, treated his wounds and returned him back to Blue territory. +2 peace.

• There is a water shortage in Red territory (cut the water resource in half), a Red advisor is pushing for the king to try and grab some water from Blue Territory. +1 war.

• Blue farmers contribute some wood (1 wood) to a Red farmer that lost his house in a fire. +1 peace

Each run has three actions

1. Player rolls the dice, take a card according to the number that came out.
2. The trees change according to the card instructions.
3. Each of the following actions can be played:

A. The player uses one of his soldiers in order to balance the situation.

• The soldiers can deleted up to one peace or war. Require one farm animals or two agricultural products.

• The soldiers can delete up to two peace or war. Require two stones or ½ water source.

• Once the source is used it cannot be reused.

B. The player can also decide to use the farmers in order to trade new items and create new items. The player will need wood in order to use the farmers.

• They can steal one farm animal and two agricultural products from the other kingdom in order to create stones. Will affect war (+1 war).

• They can steal one stone and two farm animals from the other kingdom in order to create water. Will affect war (+1 war).

• They can trade one farm animal and one agricultural product from the other kingdom in order to create stones. Will affect peace (+1 peace).

• They can trade one stone and two farm animals from the other kingdom in order to create water. Will affect peace (+1 peace).

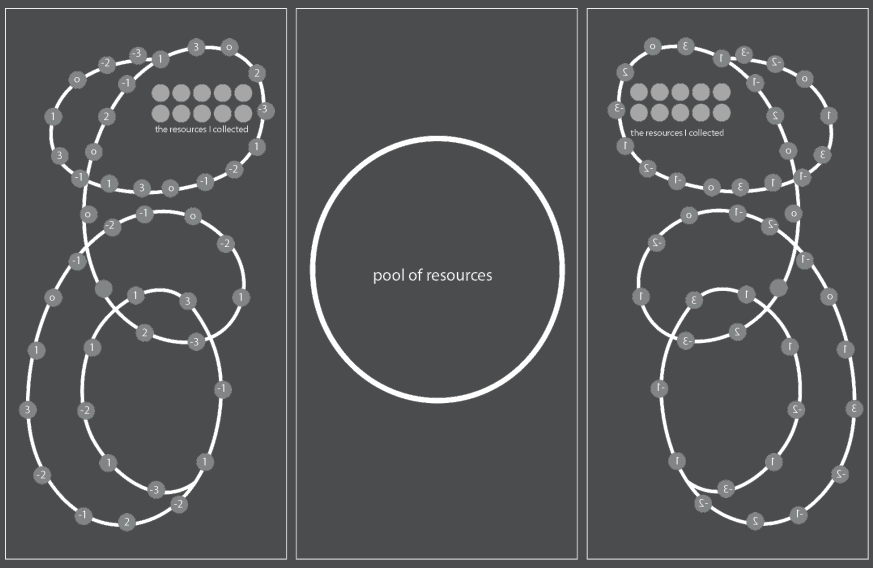
C. The players can use one of the advisors. There are two advisors, the religious advisor (the one with the cross) and the army advisor (the one with the sword).

• The religious advisor can heal your troops (you can have as much as two soldiers returning), he needs water for

that (½ water source for one soldier).
• The army advisor can motivate farmers so they can produce more stuff (get more resources)- ½ a water source give you two wood and one agriculture, one water gives you two wood, two agriculture, one animal.
D. the player can also choose to use the king. The king can do everything the other pawns can do, but with a much higher cost.

INSTRUCTION STALEMATE BOARD GAME, SECOND ITERATION

INSTRUCTIONS:



Player Board

Player Board

Each game has:
- Two boards for players
- One board for resources
- 25 resources (beads)
- 2 player pawns

On each turn:
1. Each player roll the dice and move on the path according to the number that they roll on the dice.
2. There are only 25 beads (resources) available, if the players collects more than 20 beads both players lose (they exhaust their resources) so they have to make sure they don't collect too much.
3. The player that collects more than 15 resources wins.
4. The players can move in any direction they wish to on the path, the

number on the circles they land on is how much beads they get on each turn. The players need to strategize on how to receive the most beads without reaching the limit of beads that they can collect.

1ST USER TESTING RESULTS

User #1

Static Camera:

• Problems with controlling the sphere

• Decreasing speed is too slow

• Up and down doesn't seem to be in line with the keys

Dynamic Camera

• No indication that the environments moves

• Made him dizzy

User #2

Static Camera:

• The goal is not really clear.

• Once the avatar gets to the other side of the sphere it disappears and then you have no clue what is happening until he reappears again.

• Thinks that if the avatar is stationary and only the sphere will rotate it will work better.

• Needs some feedback when collecting the orbs.

Dynamic Camera:

• Better control but the camera broke mid-way and the game had to be restarted.

User #3

Static Camera:

• Found it really challenging (not in a bad way), especially because both the character and the sphere rotates.

• It appears to only spin toward one direction (the X axis) and should rotate toward the other axis as well.

• Cannot see the other side of the sphere.

• Likes the design.

Dynamic Camera:

• Prefer this camera.

• Will make more sense if it is from further away and could be turn so you can see the other side.

• You need to press the space bars too many times in order to slow down the sphere.

User #4

Static Camera:

• Problem finding his avatar once you get to the other side of the sphere.

• The space bar doesn't seem to slow things down.

• When it gets to a very fast speed it just gets stuck in that direction.

Dynamic Camera:

• It was quite frustrating using the camera, because while it promised more control, we actually had less control over what was happening- it was hard to see which direction the sphere was rotating in.

2ND USER TESTING RESULTS

Test #1:

• Enjoyed the interaction with the "sun" sphere, especially enjoyed destroying it.

• Toward the end of the two minutes, started to get the hang of controlling the player sphere, but was lost in the beginning.

• Enjoyed the design especially of the player sphere, really enjoyed walking around it and seeing the different aspects of design.

Test #2

• The design is beautiful.

• Didn't understand the mechanics, needs some explanation of the rules.

• It took a while to understand to control the sphere.

• Didn't realize that she teleports in certain areas needs better feedback for it.

Test #3

• Couldn't figure out how the keyboard inputs affect the spheres

• Was too worried about figuring the mechanics of the player sphere to notice what was happening in the "sun" sphere.

• Had problems with figuring the rules, felt that there should be some sort of a tutorial before starting to play.

• Liked the graphics and the design.

Test #4

• Took a while to figure out how the space key affects the player sphere.

• It was very hard to get a precise control of the sphere.

• Didn't notice the score and the timer first time he played, this made him confused about the goal of the game.

• Didn't notice the "sun" sphere getting smaller, thinks that more feedback (like the sun "dying" and changing colors).

Several other observations were made during the testing:

• Unlike the former test, most testers weren't bothered by the control of the sphere not being optimised, if they did comment on it, this was because I asked for their feedback.

• Several bugs in the game were observed, most of them were unnoticed by the players. While several of them (like the scoring system not resetting) will have to be fixed, others (like the avatar hovering above the sphere in several instances) can be left for now.

• Unlike the first test, where the scoring (how many orbs the players collected) was observed; this time the players completely ignored it. It might have to do with the small very basic UI that was created for this testing, but it was still necessary to take it under consideration for next testing.

OCAD Research Ethics Board (REB)

Application for Ethical Review of Research Involving Human Participants

Reviewer Disposition

(For REB Use Only) ► File # :_____ Reviewers:_____ Due Date:_____

Decision: Accepted as is ☐ Approval Pending Revision ☐ Clarification Required ☐
Resubmission ☐ Full Review ☐ Withhold Approval ☐

Name: Yifat Shaik	**Faculty number:**
Email address: yifatshaik@gmail.com	**Program: Digital Future Master**

Please refer to the documents "OCAD Research Ethics Guidelines", which can be found at http://www.ocad.ca/research/re_policies.htm prior to completion and submission of this application.

If you have questions about or require assistance with the completion of this form, please contact the Research Office at ext. 474, or research@ocad.ca.

Return your completed application and all accompanying material **in triplicate** to the **Research Ethics Office at rm 7520, 5th floor, 205 Richmond Street, Toronto, ON.**
Please ensure all necessary items are attached prior to submission (see checklist below).
Handwritten applications will ***not*** be accepted.

No research with human participants shall commence prior to approval from the Research Ethics Board.

DOCUMENT CHECKLIST	✓ if applicable
Recruitment Materials	
• Letter of invitation	☐
• Verbal script	☐
• Telephone script	☐
• Advertisements (newspapers, posters, SONA)	☐
• Electronic correspondence guide	☐
Consent Materials	
• Consent form	☒
• Assent form for minors	☐
• Parental/3rd party consent	☐
• Transcriber confidentiality agreement	☐
Data Gathering Instruments	
• Questionnaires	☐
• Interview guides	☐
• Tests	☒
Feedback Letter	☐
Letter of Approval for research from cooperating organizations, school board(s), or other institutions	☐
Any previously approved protocol to which you refer	☐
Request for use of human tissue sample in research Please Note: this form is required for all research projects involving human tissue, bodily fluids, etc.	☐
Signed Application Form	☒

Research Ethics Board

November 5, 2013

Dear Yifat Shaik,

RE: OCADU 136 “Stalemate.”

The OCAD University Research Ethics Board has reviewed the above-named submission. The protocol and consent form dated November 5, 2013 are approved for use for the next 12 months. If the study is expected to continue beyond the expiry date (November 4, 2014) you are responsible for ensuring the study receives re-approval. Your final approval number is **2013-43.**

Before proceeding with your project, compliance with other required University approvals/certifications, institutional requirements, or governmental authorizations may be required. It is your responsibility to ensure that the ethical guidelines and approvals of those facilities or institutions are obtained and filed with the OCAD U REB prior to the initiation of any research.

If, during the course of the research, there are any serious adverse events, changes in the approved protocol or consent form or any new information that must be considered with respect to the study, these should be brought to the immediate attention of the Board.

The REB must also be notified of the completion or termination of this study and a final report provided. You must submit a final report before you graduate: the template is attached.

Best wishes for the successful completion of your project.

Yours sincerely,

Tony Kerr, Chair, OCAD U Research Ethics Board

OCAD U Research Ethics Board: rm 7520c, 205 Richmond Street W, Toronto, ON M5V 1V3
416.977.6000 x474