Increasing Player Coupling in an Asymmetric Racing Game

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ABSTRACT

Asymmetric games create unique and engaging player experiences that can draw together players from multiple demographics. But maintaining a strong level of interaction between different player roles poses a challenge, which is exacerbated in competitive games. This paper seeks to find solutions to this problem in the context of *RaceTrap*, a competitive asymmetric racing game. RaceTrap combines card-playing and racing elements, where one player uses cards to create obstacles and the other tries to avoid these obstacles while driving in Virtual Reality. We address the central challenge of *coupling*, or maintaining a high level of awareness and interaction between the roles. The paper reviews existing approaches to coupling in asymmetric cooperative games, and highlights the needs for an improved coupling in competitive asymmetric games. We present features implemented in RaceTrap to improve coupling. These solutions highlight the importance of coupling in the emerging field of asymmetric games.

CCS CONCEPTS

• **Applied computing** → **Computer games**; • **Human-centered computing** → *Virtual reality*.

KEYWORDS

asymmetric games; coupling; player experience; multiplayer; competitive games

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1 INTRODUCTION

Asymmetric games, characterized by players adopting differing roles with varied abilities and available actions, have gained attention in the field of game design for their potential to create novel player experiences and unite diverse player demographics [11, 12]. Friends and family with different talents or preferences, who may never otherwise get the chance to play together, can share an experience that blends two traditionally disparate genres. For example, in "Beam Me 'Round Scotty" [9], one player uses a game controller to kill enemies while navigating a level, while the other player uses a mouse-based interface to aid the first player; in *Frozen Treasure Hunter* [17], one player pedals a bicycle to move a character, while another uses physical swatting motions to fend off enemy attacks.

However, asymmetry in gameplay also presents challenges, particularly in maintaining tightly-coupled interaction between players, which is essential for an engaging multiplayer game. The current body of research provides some insights into effective solutions for these challenges in cooperative asymmetric games, but is limited for *competitive* asymmetric games. This paper helps to fill this gap through the presentation of *RaceTrap*, a competitive asymmetric racing game.

RaceTrap offers a unique fusion of racing and card-playing elements, creating a gameplay experience in which one player drives a racing car in a dynamic, unpredictable environment, while another player uses cards to modify the race track, adding obstacles and changing racing conditions. The Driver uses a virtual reality headset to see the track from a first-person perspective, while the Designer views the entire track from a top-down perspective. Given these differing perspectives, tasks, and hardware, our central design challenge was to establish and maintain a high degree of interaction between players based on awareness of the other player's actions and state, a concept known as "coupling". Within *RaceTrap*, this coupling was achieved by expanding the ways that each player could hinder each other's progress, and expanding how the players can keep track of one another throughout play.

In this paper, we first present existing research related to our design challenges. We then present the design of *RaceTrap*, and explain the two roles players take on. Subsequently, we discuss the design strategies implemented to enhance coupling in *RaceTrap*, informed by a player-centered design approach involving iterative play-testing and feedback. We also briefly discuss future plans to balance the number of actions between the roles and how this will impact the players' level of engagement and sense of competition.

Figure 1: A Driver in *RaceTrap* avoiding a series of Gnomes, placed by the Designer.

Finally, we present our findings and draw conclusions from our exploration in the emerging field of asymmetric game design.

2 RELATED WORK

Asymmetric games allow people to play together in different ways, whether through different controls, different views of the game world, or different tasks. This affords play between people who have different preferred play styles [10, 12] or physical abilities [6, 11], and can extend the quality and longevity of a single player's experience through different ways of playing the game. The degree to which these games are asymmetric can vary greatly. Class-based competitive games (like Valve's *Team Fortress 2* [16] and Riot's *League of Legends* [4]) provide a modest level of asymmetry, as all players have similar controls and objectives. Specific classes can have different roles and abilities, but players on either team can select from the same classes.

More novel asymmetric games (like Steel Crate's *Keep Talking and Nobody Explodes* [5] and Piece of Cake Studios *HackTag* [13]) provide a fully asymmetric experience. In *Keep Talking and Nobody Explodes*, one player is a Defuser that needs to try to disable a bomb, and must verbally relay the bomb's puzzles to the Experts, who can instruct the Defuser on how to complete the puzzles. In *HackTag*, one player takes on the role of a secret agent, using stealth and precision to remain undetected, while the other plays as a hacker, aiding the secret agent by sabotaging and infiltrating computer systems. These games feature two different types of player with vastly different controls, in a situation that encourages working together in a collaborative fashion. Competition in asymmetric games is also worthy of exploration; however, competition may not necessarily lead to the close collaboration that can emerge through collaborative gameplay [8].

When focusing on creating a competitive asymmetric game experience, designers need to ensure that each role provides interesting and meaningful tasks and interactions. If a given role has too many tasks to perform, it may be overwhelming, while if a role has too few tasks, then players' enjoyment may be impacted by their lack of control over the results of the game [14]. Finally, roles should be tightly coupled, leading players to feel connected to each other in the game [9].

Figure 2: Two players playing a game of *RaceTrap*. One player manipulates the track on a desktop computer, while the other drives a car around the track using a VR headset.

In collaborative asymmetric games where the players are separated by differing hardware and perspectives, coupling between roles can be enhanced through visual and audio communication cues [2, 12]. This approach is not immediately applicable to competitive games, however, where opponents do not explicitly communicate with each other.

To improve coupling in competitive games, we need to determine what interactions are most effective at positively impacting the player's experience of the game. We draw inspiration from game orchestration techniques, where a player can take on personas that inhibit the progress of another player [7]. One of these personas, known simply as the "villain", involves the orchestrating player preventing their target from progressing by creating obstacles or removing features in order to stop the flow of the game.

3 RACETRAP

RaceTrap is an asymmetric two-player game in which players can choose between two distinct and competing roles: the Driver and the Designer. Each role presents its own set of gameplay mechanics and features, ensuring a distinct experience for both players. *RaceTrap* engages the Driver and the Designer in an ongoing tug of war-style battle. Specifically, the Driver's goal is to finish the track within a given time, and the Designer's goal is to prevent the Driver from doing so. Let's take a closer look at the gameplay and features of each role.

3.1 Driver

The Driver is tasked with beating the clock on a constantly evolving race track. To emerge victorious in a round, the Driver must

Figure 3: The Driver's view of the game, viewing the track in Virtual Reality from the cockpit of the car.

Figure 4: The Driver's view of the customization screen in the Pitstop

Figure 5: An example of a handful of cards, each with its own costs and effects.

Figure 6: The Designer timing the firing of a Cannon to hit the Driver and send them spinning off course.

complete three laps within a given time limit. However, accomplishing this feat becomes increasingly difficult as the Designer plays cards to manipulate the Driver's vehicle and to add new items and obstacles to the track. The Driver experiences the game in virtual reality (VR) and uses a standard game controller (Figure 2). The Driver experiences the effects of the obstacles firsthand, as shown in (Figure 3). The control scheme is designed to be accessible and easy to learn, targeting younger audiences, fans of previous racing games, and VR enthusiasts.

3.2 Designer

Conversely, the Designer assumes the role of the antagonist, aiming to thwart the Driver's progress by strategically playing cards. (Figure 5). These cards come in the form of items (such as cannons [Figure 6], ramps or boost pads) and spells (such as reducing the Driver's timer or making traps stronger). The Designer's perspective is a top-down view of the entire track (shown in Figures 5 and 6), allowing them to plan their traps. The Designer plays using a mouse and keyboard (Figure 2), which caters to seasoned card game players or a more mature audience that enjoys strategic gameplay.

Both roles in *RaceTrap* offer intuitive and quick-to-learn controls, allowing players to dive right into the action. However, mastering each role presents a considerable challenge, providing players with endless possibilities for experimentation and strategic gameplay. This aspect of the game encourages players to explore both sides and fully experience the diverse gameplay mechanics *RaceTrap* has to offer.

4 INCREASING COUPLING BETWEEN PLAYERS

Adapting the definition of Tang et al. [15], we define coupling between two game players as the manner in which players are involved and occupied with each others' play. Coupling captures the ways in which players see and are affected by other players' actions, and their awareness of other players' state and intentions. Coupling can be *weak* (players mainly do their own thing) or *tight* (players are engaged in close and continuous interaction.)

Tight coupling is important in competitive action games, as it allows players to engage closely with their competitor. In games as simple as Pong [1], players maintain awareness of their opponent's position and reaction to the ball, and in games as complex as Fortnite [3], a battle royale shooter, players seek to gain awareness of other players' locations and actions, and engage in a flurry of activity together when in combat.

4.1 The Challenge and Motivation for Increasing Coupling in Asymmetric Games

Tight coupling is particularly important in competitive asymmetric games. The players' different hardware, perspectives, and tasks can make it difficult to couple their experiences smoothly as it can lead to players being unaware of their opponent's actions, or unable to see the effects of their own actions. However, greater coupling in a multiplayer game is what creates a more fun and engaging experience [9]. This motivated us to examine strategies for increasing coupling in *RaceTrap*.

In the original form of the game, the methods of interaction between players were limited. The Designer was able to see the Driver racing, and could either place obstacles on the track the Driver was currently racing on, or place obstacles on the track for the next round. This meant the Designer was able to spend time placing obstacles on an empty track the Driver wouldn't see until the next round. The Driver would be able to see the obstacles being placed and built on their own track, and had to incorporate them into their strategy to get around the track safely; however, they otherwise had no real interaction with the Designer. Early playtesting revealed that this initial weak coupling negatively impacted enjoyment of the game.

4.2 Iterative Design of Tighter Coupling

In order to improve *RaceTrap's* gameplay experience, we engaged in iterative cycles of playtesting and redesign. Much of this iteration focused on increasing coupling between the two roles.

We now present specific examples of enhancements to the game.

Removed Future Tracks - Through the iterations of playtesting and feedback from players, we found one of the biggest sources of confusion in the game arose from the switching between the present and future tracks when placing items. The players found this unintuitive, and preferred placing items on the track where the Driver was already racing. This change helped both the Driver and the Designer feel an increased sense of coupling. The Driver is always able to see the outcome of the Designer's actions immediately, and the Designer is always able to see the Driver as they navigate the track.

Added Designer Model - The Designer can always keep tabs on the Driver's location from their top-down perspective, but in early iterations of the game, the Driver would never know where the Designer was. This disconnected the Driver from the Designer, because they had no way to keep track of what the Designer was looking at or doing. We addressed this by giving the Designer a player model in the form of a gnome god named "Gnod" (Figure 7). This increased the Driver's awareness of the Designer by showing the Designer's position in world space.

Linked Card Draw to Driver Performance - In early versions of the game, Designers were able to play their cards quickly, which often led to an empty hand. Since cards were only drawn at the start of each round, this left the Designer with nothing to do. In an effort to address this issue as well as increase the coupling between players we introduced floating boxes to the track, which, if hit by the Driver, would disappear and cause the Designer to draw a card. This served to further connect the players, as the power of the Designer became more linked to the skill of the Driver at avoiding these obstacles. The Designer is now encouraged to place these draw boxes strategically in order to maximize their card draws.

Figure 7: The player model for "Gnod", which represents where the Designer is currently looking.

Overhauled Designer Resources - Initially, the game tried to couple the players' actions by linking the Designer's cards to the round timer for the Driver. When the Designer played a card, it added to the Driver's time limit to offset the advantage of placing obstacles. However, playtesting showed that this approach was hard to understand and did not effectively connect the players. The Designer would play cards rapidly and without strategy, because they viewed the timer as an abstract resource. This led to balancing issues since the Designer's starting hand could be played instantly regardless of how powerful the cards were, leading to a lack of engagement for the Designer.

To address these issues, a new resource system called Devotion was introduced. Now, playing cards requires the Designer to spend an amount of Devotion points relative to the power of the card. They are able to hold a maximum of 10 Devotion points at a time, and these points slowly accumulate over time. Designers can also obtain Devotion through Martyrs, creatures that can be placed on the track by the Designer. If the Driver hits a Martyr, the Designer instantly gains Devotion, meaning the Driver's decisions have an immediate impact on the Designer's play.

This encourages the Designers to play strategically, as they can't play cards until they have enough Devotion, preventing the rapid and low-thought card play seen previously. Devotion improved the gameplay experience by slowing down the Designers, promoting more intentional decision-making. It also balanced the Designer's resource management, preventing them from being left with nothing to do but watch the Driver. Overall, the introduction of the Devotion system increased coupling between the players by creating a more engaging and strategic gameplay dynamic where the Driver has further influence on the Designer's playing ability.

Emphasized Time-Based Actions - In early versions of the game, once the Designer placed an obstacle on the track, there was no way for them to interact with it further. The obstacles would have the same effect on the Driver regardless of what the Designer was doing, which meant the Designer had little reason to monitor the Driver. We found this to be a wasted opportunity for interaction, so we instead prioritized dynamic obstacles and items that require input from the Designer. For instance, the game now provides triggered items which the Designer can activate by clicking on them, such as cannons (Figure 6) and flamethrowers.

This affords more opportunity for interaction between both player roles. Designers need to pay attention to what the Driver is doing to get the most value from their obstacles, and Drivers now need to pay attention to where the Designer is, since obstacles become more dangerous if the Designer is nearby monitoring them.

Increased Driver Agency - Previously, the Driver was motivated to complete laps as fast as possible, which made the game feel no different from playing against computer AI. We found that allowing only one player to influence the other's gameplay detracted from the multiplayer experience, and so we introduced options for the Driver to influence the Designer's gameplay as well. We gave the Driver more opportunity to hinder the Designer's strategy through choices such as avoiding Martyrs and Draw Boxes to limit the cards the Designer can play. We also created Power-Ups for the Driver, which allow them to further interact with the Designer and the world. These power-ups allow the Driver to navigate and interact with placed obstacles, such as jump effects to avoid obstacles and rockets to destroy obstacles on the track. We also added a pit-stop, which allows the Driver to upgrade and customize their car or buy Power-Ups. These modifications give the Driver a greater sense of agency, allowing them to meaningfully impact the way the Designer plays the game.

5 EXPERIENCE

The majority of the feedback we received was through play by more than 50 attendees of the 2023 Queen's University School of Computing Creative Computing Showcase. The game was well-received by most players; they found it easy to understand and found both the VR driving and card playing engaging. The most significant feedback we received was that the two track system was confusing and that they wanted to see their opponent race. After the show, we continued playtesting for several weeks to further investigate areas where coupling could be improved and arrived at the additional game mechanics listed above.

Upon implementing all of the changes listed above and engaging with further play-testing, both roles experienced a significant increase in coupling with their opponents. The Driver was able to track the Designer and their actions, protect themselves from the traps, and more easily understand and account for major changes in the game's state. The Designer was much more aware of the Driver's actions, being able to see the Driver at all times and closely monitor their actions. Each of the players now felt they were in a more balanced competition with one another, despite the difference in playstyles due to the asymmetric format of the game. This demonstrates that coupling can enhance play of a competitive asymmetric game.

5.1 Future Plans

Although coupling between roles has been improved, we believe that yet greater coupling can be accomplished in future iterations of the game. Below are concepts that would further tighten the shared experience between the different roles. These will be tested through further iterations of play-testing and refinement.

Sabotage Power-Ups - As previously discussed, we have increased coupling in-game by implementing a series of Power-Ups that allow the Driver to avoid traps, and will explore the option for Drivers to receive Power-Ups that directly attack the Designer. These could include, removing some of the Designer's cards, taking away their Devotion or temporarily blinding them.

Multiple Drivers - The game is currently designed as a head-to-head engagement, where one Designer can focus completely on one Driver. However, we are exploring a version where one Designer would manage a race between several Drivers, who would also be competing for the best time among themselves. This would allow for a new dimension of player interaction.

Inventory System - In its current state, the game stores no information between games; receiving rewards in a persistent inventory system based on in-game performance may further encourage competition. This inventory could include things like in-game currency, cosmetic items, new vehicles, and Designer cards. The implementation of this system would give the games greater stakes, as well as enhancing replayability so users have a chance to experiment further with new items.

6 CONCLUSION

In this paper, we have presented the challenges and benefits in increasing coupling between players in a competitive asymmetric multiplayer game. We have shown that it is possible to make a game where two players with vastly different perspectives, controls and goals still feel impacted by each other's decisions and actions. Most existing work in this field is based on cooperative games, driving us to discover through iterative design and testing what techniques worked well for a competitive game.

Through playtesting, we have crafted game mechanics that allow two players to feel more closely tied to each other's actions by altering the way their roles interact. The changes implemented in the game created an experience that was more enjoyable for both types of player, while maintaining competitive gameplay. Overall, this was an exciting opportunity to explore how players interact in a competitive environment, and will guide future interactions in both this game and other competitive asymmetric projects going forward.

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