Encouraging players to communicate and coordinate with asymmetric roles and shared limited resources

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Abstract

Video games are powerful tools for exploring human emotion and behavior. This study examines how games can encourage players to coordinate and strategize in a cooperative action play. We want to understand what communication patterns arise, and how players make decisions together when managing shared in-game currency under pressure. Then we want to see how we can reinforce this experience by updating our design. For the methodology it was mixed methods using open-ended survey questions, focus groups, recording of the playtest (screen and audio) and a PX survey (miniPXI + TAG) to determine if the experience is achieving its goal. The responses were analyzed using open coding and determining the communication patterns and how this changes depending on the in-game situation.

Keywords: HCI, Player Experience, Communication, Negotiation, Video Games

1. Introduction

For this study we created a multiplayer game for 2 players to simulate a scenario where the users are escaping from the debt collectors (enemies). This game targets young adults and friends or partners, with the objective of exploring how the management of shared financial resources shapes coordination and strategic decision-making between players. By simulating financial interactions within a controlled environment, the game aims to provide insights into how shared resource management and asymmetric roles encourage players to communicate and work together.

1.1. Debt Rush

DebtRush is a co-op action game where you have to manage finances with your partner by making financial decisions together while defeating enemies. You and your partner took out a loan for your dream business together but it flopped, now you are pursued by the debt collector and have to escape! The game features two players with asymmetric abilities. Player1 (P1) character is an offensive character with weapons as guns and equipment items, and Player2 (P2) controls a supportive character, with a shield and a variety of support abilities such as leaving a

mine and baiting the enemy to trigger it. The setting is in a 3D city space with a top down view where the players have free movement in all directions around. When the players are together they will share the same camera but when they are alone, the camera will split for each player so they would have autonomy during the playthrough just as shown in Figure 1. They would need to defeat the debt collectors and reach the escape point together.

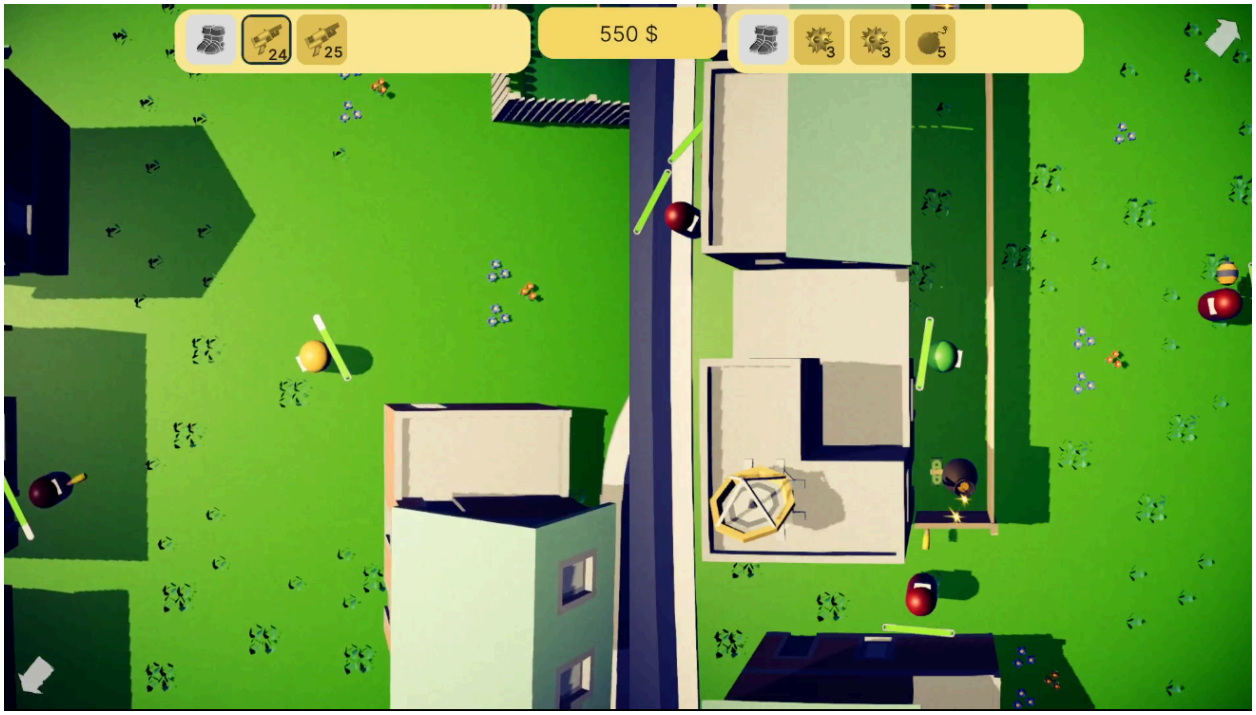


Figure 1. *Both players encounter enemies across the map.*

The game targets to test the negotiation and decision-making skills of the players in a hectic environment. For this, the players have a shared pool of money for both of them, so they should communicate in different phases of the game to determine their actions and their best tactic to survive. Each player would have their common goal and personal goal, so we want each player to think how they are approaching the gameplay and how their partner is approaching it. If they are communicating their thoughts, being secretive, or if they have their own motivation.Since each type of objective has a reward, we would only know the truth about the players motivation at the end of the level.

2. Background

Cooperative Gaming has been around since a long time and one can trace its origin back to the Arcade era, where the first video game to feature co-op play dates back to 1973, with Atari's arcade video game Pong Doubles, which was a tennis doubles version of their hit arcade game Pong (1972). Another major hit in Arcade gaming for co-op games was Guitar Hero Arcade,

released by Konomi and Activision, which was a co-op rhythm game which allowed players to work together to complete a song of their choosing or could also fight each other in the battle mode for a higher score.

Co-op soon expanded to console gaming, although due to technical limitations of needing increased graphics required for simultaneous co-op games hindered its growth in initial stages. With the rise of the NES consoles, and games like Contra, Metal Slug series, etc. the expansion of the co-op games portfolio widened. With the release of Nintendo 64, having four controller ports started to become a standard feature in consoles. As moving forward, as larger multiplayer games became feasible, so did the co-op games.

In PC gaming, with the release of Doom in 1993, it was a breakthrough in network gaming. It allowed up to four players to play together, by playing on separate computers over a LAN. Later on we could see developments in co-op games in many different genres of gaming. Games like Gears of War, Halo 3: ODST, Call of Duty: World at War, etc. took onto starting a trend of co-op wave-based survival game mode in FPS games. RPGs, inspired from Dungeons and Dragons, were also a classic example of table top co-op games. Later with advances in technology and computing and network gaming, lead to much larger titles to become popular like Diablo, WoW, etc.

Resource management is a common concept in co-op games. For example, managing a team among two players in a RTS game, like StarCraft, will often have to draw off resources from the same pool to build and upgrade their units and buildings. Other games might have a very simple resource sharing system, like in Contra, when out of spare life, one can steal a life from the other player, so both of them get to play together. These mechanics require some kind of teamwork and agreement to perform well.

Over the years there has been much research on these types of games and to see its effect on players. One such example would be Badatala et al. (2016), where they explore behavioral effects on teamwork and team performance on middle high school students who played cooperative and competitive games. They studied these effects by randomly assigning participants to one of the three research groups: no video game playing, cooperative video game playing and competitive video game playing. Later they created a Prisoner's Dilemma game to see how these students choose to play with their assigned partners, cooperatively or competitively, and to test whether the video game skills of teamwork and team performance extends beyond the context of video games. They discovered that the effects of video games were prevalent among the participants and the results had significant differences in scores based on the groups they were assigned.

3. Literature Review

To have this said teamwork and team performance in game context, the players require some in-game interactions and communications. The Verheijen et al. (2019) study emphasizes the importance of the interaction during gaming more so than the mode of play. They observed co-op gameplay to have more positive behavior and prosocial effects among adolescents. However, they also observed that while the interactions were more positive, there was an increase in negative, dominant, submissive behaviors, and a greater imbalance of power. They studied these effects by playing a racing video game either in solitary, competitively, or cooperatively (randomly). The observers coded participants' behavior during the gaming sessions, while some other qualities of friendship and prosocial behaviors were measured afterwards.

Of course, with whom you are playing matters in such a social context. These extensive literatures often tie cooperation to friendship and competition with aggression. Wadell and Peng (2014) examined these effects on playing with a friend vs. playing with a stranger. They observed that social interactions during game play influence subsequent behaviors; however the differences between friends and strangers gameplay are slight. Although they suggested that these results have limitations due to the difficulty in finding a sufficiently violent video game that offered co-located competitive and cooperative modes of play.

Designers have also been observed to use asymmetry in their games to create a sense of connectedness and invoke a social presence among its players. Examples of games that use this concept are Clandestine, Keep Talking and Nobody Explodes, etc. John and Mark (2019) explores the player experience in such asymmetric co-op structure and compares it with co-op games and also the degrees of designed interdependence within such asymmetric structure. For this, they developed their own custom prototype game Beam Me 'Round Scotty! 2. They observed that experiences such as social presence, connectedness, immersion, and behavioral engagement were higher in asymmetric play than symmetric play. These were also observed to be higher in tightly-coupled asymmetric play than loosely-coupled. This study reflects on the need for the designers to consider both emergent co-op and designed interdependence.

Delivering all these experiences in a synergy could be a difficult task, which will feel lacklustered if done poorly. It is important that the players' and developers' perceived and intended experiences align. Nyblom, O. (2023) case study examined how those experiences aligned and how they can be used as guidelines during the design and development process. For this purpose, they used a game Coridden, which was underdevelopment at that point by a small independent studio. Coridden is an action-packed RPG which has a strong co-op focus allowing up to four players to play together. The result of their study suggested that some of the intended player experiences were fulfilled, some needed a little improvement, and some were not. Although it helped to provide insights about using this study as a framework and guidelines that could be considered during the design and development process.

A lot of these studies examine the effect of cooperative and competitive gameplay on players but in separate occurrences. Wadell and Peng (2014) suggested a lack of game portfolio that leverages co-located cooperative and competitive modes of play. This inspired us to create a game called Debt Rush, which incorporates all these exciting player experiences of a cooperative game like, shared resource pool management, asymmetric coupling player roles, cooperative and competitive gameplay rolled into one, igniting exciting in-game conversations about negotiating said resources, etc. Our aim with this game is to explore designing a game to create and reinforce such dynamics.

4. Annotated Bibliography

1. **Badatala, A., Leddo, J., Islam, A., Patel, K., & Surapaneni, P. (2016).** The effects of playing cooperative and competitive video games on teamwork and team performance. *International Journal of Humanities and Social Science Research, 2*(12), 24-28.

    This paper's findings suggest that cooperative play supported teamwork and competitive play impaired it. That provides a baseline for our game Debt Rush. It complicates things by mixing both modes. This paper supports our research into co-op vs. competitive dynamics. This paper gives us a framework to develop on the "competition within cooperation" pillar.

2. **Verheijen, G. P., Stoltz, S. E. M. J., van den Berg, Y. H. M., & Cillessen, A. H. N. (2019).** The influence of competitive and cooperative video games on behavior during play and friendship quality in adolescence. *Computers in Human Behavior, 91*, 297-304.

    This study plays a foundational role in our research. Its findings note that co-op play has been observed to have both positive and negative effects on the players. Negative effects include dominant, submissive roles, and an imbalance of power. This is something that we would like to study through and potentially invoke through Debt Rush, using high-pressure negotiation and asymmetric roles.

3. **Waddell, J., & Peng, W. (2014).** Does it matter with whom you slay? The effects of competition, cooperation and relationship type among video game players. *Computers in Human Behavior, 38*, 331–338.

    This paper focuses on the effect of cooperative and competitive games on strangers and friends. This is evidently relevant to our recruitment plan of using pairs who know each other (friends or romantic partners). It will help us analyze how pre-existing relationship dynamics might influence in-game financial negotiations.

4. **Harris, J., & Hancock, M. (2019).** To Asymmetry and Beyond! Improving Social Connectedness by Increasing Designed Interdependence in Cooperative Play. In *Proceedings of the 2019 CHI Conference on Human Factors in Computing Systems (CHI '19)*. Association for Computing Machinery, New York, NY, USA, Paper 433, 1–13.

    This is a core study for our design. The authors used a similar approach to understand their study principles. They developed a game called Beam Me ‘Round, Scotty! and they examined their “designed interdependence” and observed that it increases social connectedness. This justifies our design to make the asymmetric roles in Debt Rush more tightly coupled and reliant on verbal communication.

5. **Harris, J., Hancock, M., & Scott, S. (2015).** Leveraging Asymmetries in Multiplayer Games: Investigating Design Elements of Interdependent Play. In *Proceedings of the 2015 Annual Symposium on Computer-Human Interaction in Play (CHI Play '15)*. Association for Computing Machinery, New York, NY, USA, 350–359.

    This provides the initial design framework for developing Beam Me ‘Round, Scotty! and explores ideas on how to generate “degrees of interdependence”. This would be useful for balancing Debt Rush, in order to make it challenging but not potentially frustrating.

6. **Nyblom, O. (2023).** *A case study examining the intended and perceived player experiences in a co-op action RPG game* (Thesis). Linköping University, Department of Computer and Information Science.

    This is a thesis case study that provides direct methodological frameworks that could help us deliver our desired player experience. It compares the intended player experience with the perceived player experience from playtests. We will adopt similar methods, using our PX survey and interviews to validate if our design hits perfectly to the players.

7. **Ziyi, H. (2023).** Research on the Effects of Cooperation in Multiplayer Games on Players Behavior. In *Proceedings of the International Conference on Social Psychology and Humanity Studies*.

    This study discusses the effects of cooperation mechanisms specifically in the context of games that have limited resources. Its findings suggest that in such cases, it builds trust and reciprocity. This is applicable and related to what we are doing as Debt Rush also has players that have to handle limited ammos, money, abilities, etc. We would like to observe that whether the shared pool invokes a

feeling of trust, or the presence of individual objectives hinder that specific player experience.

8. **Mekler, E. D., Bopp, J. A., Tuch, A. N., & Opwis, K. (2014).** A systematic review of quantitative studies on the enjoyment of digital games. In *Proceedings of the 2014 CHI conference on Human factors in computing systems (CHI '14)*. 2255–2264.

   This study reviews how enjoyment is measured systematically. It entails how players define enjoyment in various games. This paper is important for our PX survey and will help us in differentiating fun-frustration and design frustration, former being the desired part of challenge and later being a usability problem.

9. **Fiebelkorn, N., Clark, B., Sung, K. (2018).** Would Gamers Collaborate Given the Opportunity? *Proceedings of the 13th International Conference on the Foundations of Digital Games, 1–4.*

   This paper focuses on understanding how players cooperate with each other and what game design approaches are useful to create situations to engage them. This is helpful for our game design and using a framework to understand better the dynamics that could emerge between the software and the players.

10. **Barreteau, O. (2003).** The joint use of role-playing games and models regarding negotiation processes. *Journal of Artificial Societies and Social Simulation, 6*(2).

    This is a very old paper, but still relevant to our study. It focuses on negotiation processes and behavioral patterns using role-playing games to understand it, which is something that validates our game's design to study such complex human behaviors.

11. **Pais, P., Gonçalves, D., Reis, D., Godinho, J. C. N., Morais, J. F., Piçarra, M., Trindade, P., Alexandrovsky, D., Gerling, K., Guerreiro, J., & Rodrigues, A. (2024).** A Living Framework for Understanding Cooperative Games. *Proceedings of the 2024 CHI Conference on Human Factors in Computing Systems, 1–17.*

    This paper focuses on exploring the Living Framework for Cooperative Games (LFCG), a framework derived from a multi-step systematic analysis of 129 cooperative games with contributions of eleven researchers. Using LFCG we can analyse, ideate and understand cooperative games. This would help us in the research and understanding how other games have been designed through the lens of this framework.

12. **Tepponen, N., Bhatnagar, P., Väkevä, J., & Hämäläinen, P. (2025).** Towards Understanding Waiting in Video Games. *Proc. ACM Hum.-Comput. Interact., 9(6).*

This study approaches understanding waiting in games. Such as the emotions, the reasons and the benefits. Since we are focusing on 2-player action games there also should be moments where the players should wait, or could be used to create and design personal objectives around waiting. Reading and understanding this paper would let us experiment and explore how waiting could be used as a tool of game design.

13. **Beres, N. A., & Klarkowski, M. (2025).** Killing with Kindness: The Influence of Spectator Presence and Tone on Performance in Competitive Video Games. *Proc. ACM Hum.-Comput. Interact., 9(6).*

    This paper researches the phenomenon of feeling pressured when observed. This focuses on our research to help us understand this phenomenon and how we can manage it or take into consideration when we are designing games for more than one player.

14. **Croissant, M., Schofield, G., & McCall, C. (2023).** Emotion Design for Video Games: A Framework for Affective Interactivity. *ACM Games, 1(3), 19:1-19:24.*

    This paper explores how to evocate emotions through the game. This framework would help us understand how to target the player with a specific emotion during an experience to have engagement between the player profile and the game system .

15. **Foch, C., & Kirman, B. (2022).** "The game doesn't judge you": Game designers' perspectives on implementing failure in video games. *Proceedings of the 17th International Conference on the Foundations of Digital Games, 1–13.*

    This paper sees failure not as a punishment but as a building block for the player to understand that it's a natural part of the process. We want to have a video game experience that keeps the player engaged and challenged. This paper would give us the framework and tools to achieve a design that makes the player keep trying the game loop and get a mastery over the system.

16. **Haider, A., Harteveld, C., Johnson, D., Birk, M. V., Mandryk, R. L., Seif El-Nasr, M., Nacke, L. E., Gerling, K., & Vanden Abeele, V. (2022).** miniPXI: Development and Validation of an Eleven-Item Measure of the Player Experience Inventory. *Proc. ACM Hum.-Comput. Interact.*, 6(CHI PLAY), 244:1-244:26.

This paper gives us the miniPXI to research the player experience of digital games. The miniPXI is an 11 item survey and it's being used in the survey to understand if the player receiving the experience is intended.

17. **Harteveld, C., Kleinman, E., Rizzo, P., Schouten, D., Nguyen, T. H., Liberty, S., Kimbrough, W., Fombelle, P., & El-Nasr, M. S. (2019).** Teamwork and adaptation in games (TAG): A survey to gauge teamwork. *Proceedings of the 14th International Conference on the Foundations of Digital Games*, 1–12.

This paper gives us the TAG survey to research the player's dynamic and how they approach challenges in digital games. It assesses Situation Assesment (SA). Plan Formulation (PF), Plan Execution (PE) and Team Learning (TL). It also contains Open ended questions for the survey, which will be helpful to understand the player's intention and they would have the chance to communicate any feedback they want to share.

5. Ludography

- **Atari, Inc. (1973).** *Pong Doubles* [Arcade game]. Atari, Inc.
  Pong Doubles was one of the first co-op arcade games that established the co-located shared screen experience. Our game Debt Rush adopts its basic design format of local multiplayer from this game.
- **Konami. (1987).** *Contra* (Arcade version) [Video game]. Konami.
  Contra is a classic example of a co-op game. It integrated an idea of basic resource management of sharing or stealing lives from a partner. This game also lines up well with the concept of designed interdependence.
- **id Software. (1993).** *Doom* (PC version) [Video game]. id Software.
  Doom was a major breakthrough for network multiplayer gaming, which allowed four players to play cooperatively on LAN. It set the standard for co-op action games, which is also the genre of Debt Rush.
- **DMA Design. (1999).** *Grand Theft Auto 2* (PC version) [Video game]. Rockstar Games.
  One of our major inspirations for the game's art is GTA 2. It is also a top-down 3D perspective in a chaotic urban environment with a chaotic criminal-on-the-run vibe.
- **Konami. (2009).** *Guitar Hero Arcade* [Arcade game]. Raw Thrills.
  This game was a major co-op arcade hit. It demonstrated two successful game modes: cooperative (playing a song together) and competitive (battling for high score) game modes.
- **Steel Crate Games. (2015).** *Keep Talking and Nobody Explodes* (PC version) [Video game]. Steel Crate Games.
  This game is one of the games that leveraged asymmetry and designed interdependence near perfectly. In this game one player has an information manual that the other player needs, which forces verbal communication under

time pressure. We have adopted a similar kind of asymmetric roles design for the players in Debt Rush as well.

- **Studio MDHR. (2015).** *Cuphead* (PC version) [Video game]. Studio MDHR.
  This game makes 2 players cooperative against challenging bosses and levels that always keep the player engaged. It's one of the action parts of the inspiration for DebtRush to understand the pattern of the enemies, dodge their attacks and defeat the enemies all at the same time.
- **Hazelight Studios. (2021).** *It Takes Two* (PC version) [Video game]. Electronic Arts.
  Another key inspiration for Debt Rush's core-gameplay structure is this game. It proved a wide market for games like this and demonstrated ideas like synchronized problem-solving and asymmetry. We also adopted its split screen camera design for when players separate far apart.

6. Method

RQ: How to encourage players to communicate and coordinate through designing a co-op game with asymmetric roles and shared limited resources?

This study uses an exploratory mixed-methods design to evaluate the player experience of Debt Rush and identify areas for design improvement. Participants were people who knew each other, whether friends or partners. The subjects were in pairs since this is a multiplayer videogame so each playtest would consist of 2 persons.

6.1. Participants

We recruited n = 8 participants (4 pairs) from Northeastern University. All players had prior experience with video games, and we recruited players with different relationship dynamics – Close Friends, Couples/Partners.

6.2. Procedure

For the Hardware playtest we used our laptop with Windows. For software it used the Unity build of the Debt Rush prototype, and also OBS Studio for screen recording. The location was the Game Design Lab at Northeastern or at the home of the participants.

For the procedure, we explained to the participants the study and we obtained their consent. The playtest session was around 15 minutes with the screen recorded. Then, the participants did the PXI + TAG survey which took around 15 minutes. Finally, we did a focus group with both players to ask for feedback and debrief if they had any other questions about the design, which took around 20 minutes.

6.3. Measures

This study uses a **mixed qualitative and observational approach** to evaluate both **player experience (PX)** and **game usability**. The players gave us feedback on their experience through a PXI + TAG survey. To understand the player's perception of the game and their thought process, we conducted a focus **group at the end of the session**. To assess the game clarity and playability, we conducted **screen recordings of gameplay sessions** to observe usability challenges in real time. This approach allows us to connect players' reported perceptions with what they actually did in game.

6.3.1. Screen Recording

We recorded the playtest, screen and audio, with OBS Studio to store, analyze and understand the communications patterns between the players as a qualitative method. This allowed us to gather insights of the mental process of how the communication happens and how they approach the common or personal objectives.

6.3.2. Semi-structured interviews

This research used semi-structured interviews as the qualitative method. Through these interviews, we gathered insights from the design, their decision and their motivation of the actions during the playthrough. The semi-structured approach is ideal for this study because it allows flexibility to adjust questions based on participants' responses, enabling deeper exploration of their thoughts or the design. We asked about the participant's background experience, how related they are to co-operative games, what their playstyle and feedback related to their experience.

6.3.3. Player Experience Inventory (mPXI) + Teamwork and Adaptability in Games (TAG) Survey

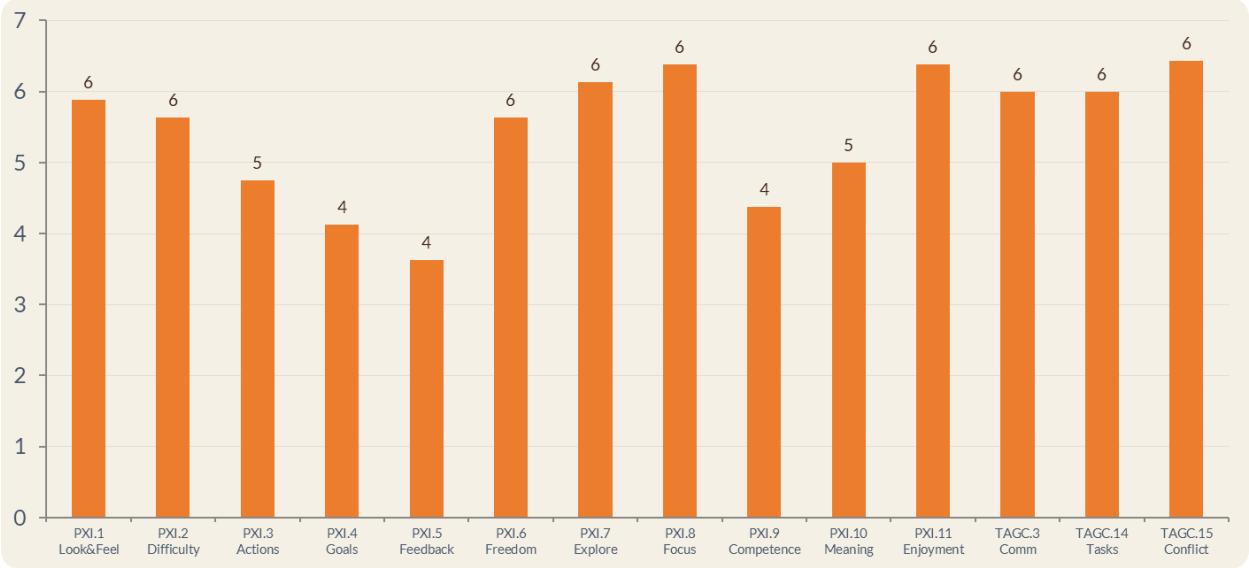
For the PXI instrument (Harteveld, C et al, 2019) we used an eleven-item variant questionnaire to assert and validate the following items: **Audiovisual Appeal, Challenge, Ease of Control, Clarity of Goals, Progress Feedback, Autonomy, Curiosity, Immersion, Mastery, Meaning and Enjoyment** and adding questions from the Adaptability in Games (TAG) survey (Harteveld, C et al, 2019) to understand: **Situation Assessment (SA)**, **Plan Formulation (PF)** and **Plan Execution (PE).** This gave insights of the experience of the players to understand the design of the game and what are the areas that need improvements. This was our quantitative method, each question would be measured in a Likert Scale from 1-7 and there would be a mix between Closed and Open questions. The Closed questions are from the TAG survey and are the ones that end with an O in their code.

The survey is as follow:

PXI.1	I liked the look and feel of the game.
PXI.2	The game was not too easy and not too hard to play.
PXI.3	EC_1 It was easy to know how to perform actions in the game.
PXI.4	The goals of the game were clear to me.
PXI.5	The game gave clear feedback on my progress towards the goals.
PXI.6	I felt free to play the game in my own way.
PXI.7	I wanted to explore how the game evolved.
PXI.8	I was fully focused on the game.
PXI.9	I felt I was good at playing this game.
PXI.10	Playing the game was meaningful to me.
PXI.11	I had a good time playing this game.
TAGC.3	My team members passed information to one another in an efficient manner.
TAGC.14	I was assigned specific tasks according to my abilities.
TAGC.15	My team tried to resolve team conflicts by negotiating.
TAGO.1	What was your team's strategy for playing Debt Rush?
TAGO.4	How did your team decide which actions to take?
TAGO.6	How did your team communicate?

7. Results

The majority of our participants fell into the age group of 25-34 (nearly half), followed by the 18-24 group. Upon reflection, we noticed that the participant pool was heavily skewed towards Explorers and Achievers. The following bar chart shows the average scores per question based on the 7-point Likert scale that we used for our research.



Based on the above graph, we observed that *Engagement and Enjoyment (6.38/7)* and *Teamwork and Collaboration (6.14/7)* are the highest-performing metrics of all. We could also observe a significant higher score for *Desire to Explore (6.13/7)* as a result of our Explorers and Achievers participant pools. For our initial testing, our major friction points were *Progress Feedback (3.63/7)* and *Goal Clarity (4.13/7)*. *Action Legibility (4.75/7)* and *Player Competence (4.38/7)* also trended towards the lower-middle of the scale.

Group responses from TAGO.1 and TAGO.4 also showcased a theme of "Strategy formation" where players naturally divided into roles like "protector" and "attacker" or "lurer" and "bomber". From the results of TAGO.6, and also while observing them, players displayed heavy reliance on verbal alerts for immediate threats and long-term planning for item purchasing.

The following table, ***Table 1***, presents the initial **open codes** developed from the interview and gameplay transcripts. These codes are capturing recurring ideas, perceptions, and behaviors described by participants as they reflected on their gameplay experience. Each code includes a short definition and sample quotes from participants to illustrate what they said during the interview.

Code	Sub-Code	Definition	Quotation
Challenge	Challenge Scarcity	Challenge How to make the game more difficult or interesting	"I like there's action and that it's not that easy." "we won because there were no scarcity" "this is not an easy game, I like that"
Game Design	Game Design Feedback Exploration	The design of the game What could be improved How did the player feel about it	"I like the combination of exploring and action, to find secrets and rewards for being thorough"
Gameplay Style	Playstyle Variety Stealth Dexterity	How the players approach the experience What would they like to see in the game	"He did one thing and I was in the back shooting everything it moves" "I like to do recon, kill one enemy, then hide, kill the next one" (Stealth)

			“I like weapons that does damage over time” (Poison) “Targeting is hard for me, I have to do one thing with one hand and another with the other one, I can´t”
Strategy	Mastery Understanding Strategy Trial and Error	How the players understands the game What the players did in the game	“We tried having a shield, and not having it, to see what was better” “I didn’t know how to defend him, we tried going together, hide, I tried to be the decay but that didn't work, it was better each on their own” “if this strategy doesn’t work, we tried another one, if that didn’t work, we tried the one before, now we try to do this, or this to see what comes out”
Negotiation	Negotiation Success Scarcity	How did the player feel negotiating	“We could use all the money and that was great!”
Cooperative	Cooperative Comparison, Leadership	How did the communication and partnership went during the gameplay	“We have a common objective, we are building this together” “We all know who is taking all the decisions”
Experience	Feelings Excited	What the player felt while playing	“Excited and funny” “I see myself playing this with my best friend and screaming and laughing”
Partners	Partners Sync Communication	How the player felt playing with their partner What was the relationship between the players	“I imagine playing this with my best friend and I see us having a lot of fun” “Specially with my partner, we have experience playing together” “I don’t play well with {other person}, it also depends on the person you’re playing with”

Table 1. *Open Coding*

After that, we created Axial Coding, ***Table 2***, to better understand the experience of the players and how they interact between, what would be their motivation and how they approach the system and the challenge.

Axial Coding

Axial Category	Open Code	Definition
Relationship	Partners, Cooperative, Experience	How the relationship of the players affect its experience
Fulfilled	Gameplay Style, Negotiation	How much the player feel fulfilled between playing and negotiating
Objective	GameDesign, Strategy, Challenge	About how the player approach the game and how it responds to them

Table 2. *Axial Coding*

Once we understood the player experience, we determined that the **Complementary Archetypes** was the most recurrent theme we observed in the playtest that conveyed the Axial Coding. For this, we determine how it relates to the core category in ***Table 3***.

Selective Coding

Core Category	Axial Category	Relationship
Complementary Archetypes	Relationship	When the players find their defined role within the partnership, it creates an emergent cooperative strategy.
	Fulfillment	The players experience a sense of fulfillment from having a clearly guided role which helps them contribute to the shared objective
	Objective	When the players understand the goal and how to achieve them, they have the knowledge that the game is completable.

Table 3. *Selective Coding*

Some **Complementary Archetypes** that we found were:

Leader - *One of the players took the leader role which proposes a plan and their partner agrees.*
Follower - *The other player follows the plan, gives feedback and proposes changes but it would be in a passive role.*

The **Leader** and **Follower** tuple strategy was to communicate and act on the plan. Each one of them would stay together and explore meanwhile executing the plan they have when the enemy appears. The main strategy for this tuple was for one player to bait a group of enemies while the other player targeted them to explode them with a bomb.

Chaotic *- The Chaotic archetype follows the enemies around and uses the weapons without restraint. This archetype in real life can be observed to ask for help, shouting in panic, gunning/bombing recklessly, and panicking whenever surrounded by enemies or running out of ammo/bombs.*
Strategist *- It has a plan for both players and communicates the plan. Fulfillment of the plan is not always guaranteed but this archetype is usually the calmer one out of the two.*

We could see in the strategy how the **Chaotic** Archetype runs out of ammo and asks for help from the other player when they need to. While the **Strategist** made a plan and chaotic role then followed it along after a failed initial strategy. In real life, in this moment of fast paced action, the panic enters and the Strategist steps in to calm the situation and put order in it. The main strategy for this tuple was to use the character with the shield and the other player would shoot them from a distance.

8. Discussions

A fascinating gap was observed between *Enjoyment (6.38/7)* and *Goal Clarity (4.13/7)*. While players typically experience frustration when objectives are unclear, this "enjoyable confusion" paradox likely emerged because the lack of clarity was compensated for by the participants' high *Desire to Explore (6.13/7)*, particularly among the Explorer-type players in the study. The core mechanics and the environment were strong enough to sustain players' interest and engagement in the game even when the objectives were hazy.

To tackle the feedback and competence in the game, we iterated on a version, which focussed mainly on providing players with a clear guidance, having UI upgrades to provide legible feedback, having more NPCs and actions, safe zones and encounter zones into the map, and adding more curated game map progression. An example of this can be seen in Figure 2 where keywords are highlighted in another color. This version is intended to be a counter to low scores for *Action Legibility (4.75/7)*, *Player Competence (4.38/7)*, *Progress Feedback (3.63/7)* and *Goal Clarity (4.13/7).*



Figure 2. *Keywords are highlighted in another color to emphasize in it.*

Team dynamics acted as a buffer for the lack of game-provided information. The communication pattern we observed was a role of leadership and the other player following. The player with the leadership role proposes different strategies. The second player would also give feedback and propose but it would be in a passive role. Also, these roles could swap if a situation in-game changed, like one of the players dies and the other is still alive. A higher *Teamwork* score (6.14/7) and the verbal communication bridged the gap, where players were alerting each other and deciding crucial team decisions, making their own feedback loop for the system in place.

This paper contributes by using the miniPXI and TAG survey as instruments to understand player experience and support design decisions through data. We adapted the TAG survey by selecting questions relevant to our research, allowing us to focus on the information we needed. Additionally, through open coding and qualitative analysis, we aim to provide insights on how to improve cooperative two-player games for future game design. Ziyi (2023) mentioned in his research that since each person has different expectations on how they believe others will cooperate in the game, this research helps us understand how to define the expectation and what roles arise when there's no constraint in the player when they have the autonomy to do any task.

9. Limitations and Future work

We think we would have benefitted from further playtesting, among people with different relationship dynamics(couples, friends, strangers), different gaming backgrounds, and perhaps different cultural backgrounds to get more nuanced and diverse communication patterns and strategy identification. We also felt the shop items to be a limitation, as more items could have made the game more interesting and it could have emphasised more on the negotiation dynamics in the shop phase.

In the future, we would like to carry on this work, by having more content expansion. Future plans include game balancing, adding more shop items, adding more fun and random hidden objectives (more contradicting), smarter enemies, multiple levels, and continuing the iterative process of doing playtests and incorporating feedback and updating our results and findings.

10. Conclusion

The study of Debt Rush confirms that shared resource pools and chaotic environments may induce some complex human communication and cooperative dynamics. We identified two pairs of complementary archetypes that offered insight into the dynamics of the communication between the partners. These pairs reflect recognizible patterns that arise when the partners express themselves while pursuing a shared goal, and the result of the process in which they themselves want to play the game and what role to fulfill. This captures the experience between gameplay strategy and negotiation processes.

While the quantitative results revealed significant friction regarding Progress Feedback and Goal Clarity, this did not diminish the experience, as evidenced by high Engagement and Enjoyment scores. The players heavily relied on verbal negotiation and adoption of emergent leadership roles, such as specialized "protectors" and “attackers”. Ultimately, while the game fosters a strong Teamwork and Collaboration dynamic, future development must focus on improving action legibility and system feedback to ensure that player strategies are driven by intentional choice. By bridging this gap, Debt Rush can fulfill its role as a tool for understanding how individuals thrive and negotiate within high-pressure, resource-constrained digital environments.