The Ludum Platform: Exploring the impact of game design on prosocial behavior in children's digital play

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ABSTRACT

This study investigates how specific game mechanics in digital play influence prosocial behavior in children, focusing on resource sharing under varying levels of perceived risk. Using a custom-designed video game, The Ludum Detector, researchers controlled game mechanics to measure how children weigh costs and benefits in decision-making. Forty-six 8-year-olds (23 boys, 23 girls) participated as part of a larger project, encountering donation prompts after completing levels with high, medium, or low perceived risk. Preliminary findings reveal that children shared fewer resources in higher-risk conditions, even when not in a competitive or cooperative context, with significant differences between high- and low-risk and medium- and low-risk scenarios. No differences in behavior were observed between sexes. These results suggest that perceived personal risk strongly influences prosocial decisions, providing insights for designing digital games and educational tools that foster cooperation, empathy, and generosity in children.

Keywords

Prosocial behavior, helping, sharing, children, social mechanics, game design

INTRODUCTION

Custom designed games have been increasingly used in research settings to measure perception and cognition (Boot, 2015; Green and Bavelier, 2003; Ventura et al., 2013; Wiley et al., 2021); however, there is still a limited understanding of which game mechanics are most effective for observing specific cognitive processes. Gaining insight into how different mechanics influence the expression of particular behaviors can help researchers design games that more precisely target and measure those abilities. Additionally, this understanding can inform efforts to use games not just to

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observe specific behaviors but to encourage those behaviors—promoting the development of desired abilities through gameplay. A growing body of evidence supports the idea that games can teach a range of skills and competencies (Bassanelli et al., 2022; Passmore & Holder, 2014; Quwaider et al., 2019). By clarifying which mechanics prompt the desired behavioral outcomes, both educational and research-oriented game designers can create experiences that better align with their intended results.

With The Ludum Platform, we focus on measuring positive behavioral outcomes and treat digital games as social spaces with flexible designs and dynamic player interactions that influence prosocial behavior. The results presented here focus on mechanics that impact perceived risk; how players weigh the possible costs and benefits of their actions within the game, influenced by the mechanics and social interactions designed into the gameplay.

METHOD

The data set includes 8-year-old children (*N*=46; mean age 8.48, *SD*=0.27), 23 boys and 23 girls, who visited the lab and participated in an experiment using the *Ludum Detector* game. The methods and protocols of the study were conducted in accordance with the standards specified in the 1964 Declaration of Helsinki and approved by the local ethics committee, the Swedish Ethical Review Authority.

The Ludum Platform was designed in the Unity Engine to follow a gameplay loop that provided participants multiple opportunities to share resources under various risk conditions. The game begins with an introductory screen that informs the participant that they are “Player 1” and they are playing with “Player 2.” In actuality, there is no Player 2 and the fictitious player’s score is fixed. The participant is told that the object of the game is to earn 100 coins by progressing through 5 levels. Players use a first person avatar to navigate a room filled with geometric obstacles and collect an amount of rings that correlates to the level number they are completing. After collecting the rings, they must deposit them in a designated area, and press a large red button that unlocks a portal that allows players to proceed to the next level (see Figure 1). Participants are informed that the faster they clear each room, the more coins they earn; however, the number of coins earned after each level is fixed and is not impacted by player performance. After completing each level, a "waiting for Player 2" message appears, implying that Player 2 is taking longer to complete the level and will subsequently earn fewer coins. When both players' coins are displayed, Player 2 consistently scores behind Player 1. After completing the second, third, and fourth rooms, participants were presented with a donation prompt. They were told that Player 2 was facing difficulty earning coins, and they were given an opportunity to share coins with Player 2 (see Figure 2).

Figure 1. *The Ludum Platform* level 3 room. Image displays gold rings, red completion button, and randomly generated geometric obstacles.

Figure 2. The sharing prompt presented to the participants with fixed donation amounts. Translation: “Player 2 is having difficulties. Would you like to share some of your coins to help them?”.

Each prompt created a scenario with a different donation risk. The high-risk prompt occurred after the second level when the participant's score was 67 and Player 2’s score was 42. The participant had three more levels to clear, with no guarantee of reaching 100 coins. The medium-risk prompt occurred after the third level when the participant's score was 98 and Player 2's score was 66. The participant was close to their goal of 100 and had two rooms remaining. The low-risk prompt occurred after the fourth level when the participant's score was 124 and Player 2's score was 87. The participant was not at risk of losing the game and still had one level to earn points.

The Ludum Platform was specifically developed with this experimental task in mind; however, the game was designed to be flexible and includes an interface that allows researchers to manipulate elements like number of levels, score values, and donation prompts. This flexibility was pivotal as it enables researchers who do not have game development experience to iterate and manipulate the gameplay experience.

RESULTS

Results from a one-way ANOVA show that there was a significant difference in sharing behavior between the high-risk and low-risk conditions ($p = .015$). This suggests that children were less likely to share resources when they were in a high-risk situation compared to when they were in a low-risk situation (see Figure 3). A significant difference was also found between the medium-risk and low-risk conditions ($p = .002$), indicating that children shared less in the medium-risk condition compared to the low-risk condition. These results suggest that the likelihood of sharing decreases as the perceived personal risk increases. There was no significant difference in sharing behavior by sex, suggesting that boys and girls responded similarly to the risk conditions in the game.

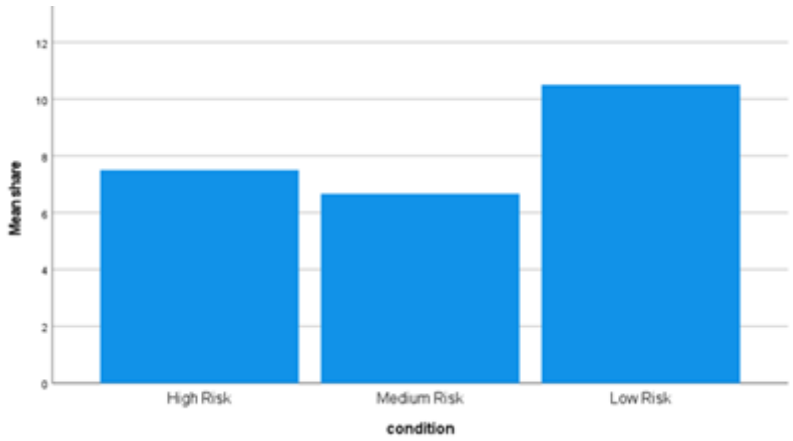

Figure 3. Average sharing of resources by children across the three risk conditions.

DISCUSSION

The findings indicate that children are sensitive to their own risk when deciding whether to share resources, prioritizing their personal needs when their ability to win the game is at stake. In low-risk scenarios, where children had sufficient resources to win, they were more willing to share with another player who was performing poorly. This highlights the influence of contextual factors, such as personal resource security, on prosocial behavior in children.

As custom-designed games become increasingly popular tools in behavioral research (Boot, 2015; Green and Bavelier, 2003; Ventura et al., 2013; Wiley et al., 2021), it is essential for researchers to develop a more nuanced understanding of which game mechanics reliably elicit specific behaviors. Our findings suggest that several mechanics can be effectively applied in studies aiming to observe sharing behavior within digital environments.

In the context of prosocial behavior, the goal often extends beyond observation of these behaviors to actively encouraging and reinforcing these actions. Recent studies on prosocial behavior (Schrier & Farber, 2021; Spinrad et al., 2018) reveal an increasing interest in how altruistic actions can be fostered in children. Research in the field of video games and behavioral change support the theory that specific game mechanics can shape behavioral outcomes (Bassanelli et al., 2022; Passmore & Holder, 2014; Quwaider et al., 2019). Our findings offer a dual contribution: they identify game mechanics that elicit sharing behavior and highlight the conditions under which children are most likely to engage in such behavior in digital settings. These insights are valuable to both researchers and game designers, bridging the gap between behavioral science and educational game design, and providing practical guidance for fostering prosocial development through gameplay.

Understanding and encouraging prosocial behavior is not only a matter of academic interest but also a practical imperative, particularly in the context of children's social and emotional development in relation to play. Games are a pervasive part of children's lives and represent a unique medium through which social norms, values, and behaviors can be modeled and reinforced. By examining how specific game mechanics influence sharing and other altruistic actions, we gain insight into how digital environments can be purposefully designed to support empathy, cooperation, and moral reasoning. The implications of this research extend to educational settings,

where games can be used to complement social-emotional learning initiatives, and to the broader landscape of digital media, where developers have the opportunity to embed ethical and developmental goals into engaging interactive experiences. Ultimately, this line of inquiry contributes to a growing understanding of how technology can be harnessed not just for entertainment, but for meaningful social impact.

We have identified several mechanics that serve both as effective tools for future behavioral research, and as design elements for educational games aimed at promoting prosocial behavior in the following areas: reducing perceived risk to encourage sharing, designing prosocial feedback mechanisms, balancing competition and cooperation, and educational and social-emotional learning applications.

Reducing Perceived Risk to Encourage Sharing

The study shows that children are more likely to share resources when they perceive themselves to be in a low-risk situation. Game designers can leverage this by creating scenarios where players feel secure in their progress or resources, encouraging more cooperative behavior. For instance, games could incorporate surplus resources or safety nets to reduce the perception of personal risk during critical decision-making moments.

Designing Prosocial Feedback Mechanisms

In this study, children saw the performance of another player but were not explicitly told they were cooperating nor competing. This subtle approach encouraged players to weigh their decisions independently. Games could incorporate similar implicit feedback mechanisms, such as highlighting the struggles or needs of other players, to foster empathy and promote prosocial decision-making.

Balancing Competition and Cooperation

The results highlight the need for a balance between competitive and cooperative elements in games. Designers can utilize game mechanics that enable players to succeed individually while also offering opportunities to help others, particularly in contexts where players feel secure. For instance, bonus rewards could be tied to cooperative actions, such as sharing or aiding other players, without jeopardizing the player's own success.

Educational and Social-Emotional Learning (SEL) Applications

Games designed for SEL programs can integrate risk-free cooperative tasks to teach children about generosity and teamwork. These games can simulate low-risk environments to encourage sharing as a natural behavior, which could help children generalize these prosocial skills to real-world settings.

Incorporating these elements into game design not only enhances the educational value of games but also creates engaging experiences that promote empathy, sharing, and collaboration among young players.

Designing games for children

Developing a game with the specific intention of having young players resulted in many interesting design challenges worth discussing. Because The Ludum Platform was to be used in a controlled environment for the purpose of observing specific behaviors, it was important to control as much of the gameplay experience while still allowing for the illusion of interactivity and player agency that is characteristic of digital games. One relevant example that comes to mind is the iteration process surrounding the mechanic required to clear levels. As previously mentioned, once rings have been collected, players must press the red button and then walk through the door that opened as a result. In early tests, it became apparent that players were pressing the button, but because they were facing away from the door, did not see it open and therefore did not connect the two events nor understand that to proceed they had to pass through the door. An early solution was to turn the players so that as they push the button, they are facing in the direction of the door.

Further playtesting showed that, despite the fact that participants were now correctly positioned, many players, particularly those without much exposure to game controls, often had positioned their sight line too high or too low to see the door open. The next solution was to introduce the clear “glass” wall between where participants place the rings and the red button. In theory, this would force players to walk around the wall to have access to the button thus ensuring they were facing the right direction.

This too, proved to be ineffective with children at this age. This created two new problems as the early version of the glass wall was difficult to see and many players became frustrated when they were seemingly unable to walk through what appeared to be empty space. Additionally, if players did manage to navigate the glass wall, by looking down at the button in front of them, their sightline was again too low to see the door. The solution to the glass wall problem was to add visual features like posts and tinting to make it more obvious. The solution to the sight line dilemma was to place the section of the room where the button was located on a slightly higher platform so that the button and the door could both be within the player’s sightline.

Playtesting is a critical phase in the design of any game, but it is especially vital and uniquely complex when developing games for children. Young players often engage with digital environments in ways that adult designers do not anticipate, due to differences in motor skills, cognitive development, and familiarity with game conventions. As illustrated in the example above, even seemingly straightforward mechanics, like pressing a button to open a door, can break down if the design does not account for how children perceive and interpret visual and spatial cues. Playtesting with the target age group reveals these breakdowns in a way that adult testing cannot, helping designers uncover subtle usability issues that would otherwise go unnoticed. Best practices include observing players without interference, iteratively refining the design based on direct feedback and behavior, and avoiding assumptions about what players "should" understand. Additionally, it is crucial to consider elements like camera angles, color contrast, and affordances of in-game objects, which might be intuitive to experienced players but opaque to novices. This example underscores the importance of iterative testing, visual clarity, and the need

to design from a child's-eye view - literally and figuratively - when crafting meaningful and accessible gameplay experiences for young audiences.

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