Approval Sheet

The Design Research Seminar Project titled “Analyzing the sequence of social interactions in multiplayer board games for children” by Shikha Verma (Roll Number 176330005) is approved for partial fulfillment of the requirement for the degree of ‘Masters in Design’ in Interaction Design at the Industrial Design Centre, Indian Institute of Technology, Bombay.

Supervisor

Analyzing the sequence of social interactions in multiplayer board games for children.

Abstract. Several studies have aimed to improve player experience in multiplayer games. Social interaction between players is one such parameter that impacts player engagement and experience. Studying social interactions in the context of board games is particularly relevant as they allow for more processes such as awareness, monitoring, mimicry, reinforcement, verbal and non-verbal communication to take place between players. Several studies in the past have attempted to capture and analyze social interactions, these studies primarily focused on different themes such as cooperation, and competition within digital games. Our study attempted to analyze temporality based social interactions through the sequence of interactions. We playtested two educational board games with two groups of children in a school setting. For this, we created observation metrics to categorize and analyze social interactions, and validated them through user responses. Our observations show that the sequence of social interactions influence player experiences. We also identified game mechanics in both games that influenced interactions between players.

1 Introduction

Several research studies have been done on parameters that can improve player experience and engagement [1]. Social interactions that occur during social play, are those interactions where the behaviour of one player become the stimulus for the behaviour of another player [2]. Social interactions are one of the parameters that significantly influence game play and player experience [3]. Studies have also shown that social interactions affect player motivation, and learning [2,4].

Social interaction between players is shaped by the social context of games [5,6]. There is a difference in the social context of co-located games such as board games and other mediated games [6]. This social context of board games allows for more interaction processes such as awareness, monitoring, mimicry, reinforcement, verbal and non-verbal communication to take place between players [6]. This makes it relevant to study social interactions in the context of board games.

There are many factors that affect social interaction. However, the existing literature on how these factors, and which of their sub-dimensions, affect social interactions is unclear [5]. Previous studies of player interactions have been classified through various dimensions such as spatial or temporal [7]. Zagal et al. [8] insists on the inclusion of temporality within game analysis to understand how actions and events may influence each other. They further, also proposed a temporal category to analyze game design patterns. These studies have considered the duration of interactions, and not the effect of their sequences. In this paper we propose an empirical study to

analyze the sequence of social interactions within board games to understand whether they influence player experiences.

2 Research Design

We referenced previous studies on social interactions which entailed frameworks, patterns and research design methodologies [2,5,7,9]. These studies provided us relevant considerations for our research design. We have detailed these in the further sections of our paper.
Games for social play are heavily influenced by factors such as player composition, game mechanics and characteristics of the game environment [5]. Social interactions themselves can be internally or externally derived. Internally derived interactions are caused due to 'game rules and design patterns' and externally derived interactions 'emerge from the players and the social playing context outside the game, which includes aspects like the relationship between players and their current mood' [3]. These varying factors need to be considered while analyzing social interactions within games.
We used a 2×2 Latin Square for playtesting with 8 children (4 males and 4 females) in groups of 2. Thus we could compare player interactions between the games, to account for any variation between them. The number of games and participants chosen for the experiment was kept limited in order to accomodate for participant drop outs.

2.1 Choosing participants

We had to ensure that the participants possessed uniform knowledge and skills to play the games, hence we chose school children as our participants. All the participants were 8 years of age and studied in the same class in a Hindi medium school. The games were tested in their school setting during free school hours, this provided a controlled set up for playtesting.

2.2 Choosing games

We decided to opt for educational games over entertainment games, in the hope that the children also benefit from being a part of the study. We identified ten off the shelf multiplayer educational board games designed for ages 8 and above. We then thoroughly played the games and shortlisted some games on the basis of the level of difficulty and time taken to play them. From these shortlisted games, we finally chose two games which used distinct game mechanics.

The chosen games along with their description is given below:

- Foxed, a strategy based multiplication game that uses cards and tokens

- Discover India, a geography based game where players learn about the location of cities within India.

2.3 Method

The playtesting began with a quick individual survey. This survey assessed the children's gaming experience. Based on this, mix gendered groups of 2 F and 2 M were created with one member from each group having more gaming experience than the other. Play testing sessions were videotaped and then analysed. Initial 5–10 minutes were spent in explaining the game rules to them. This was followed by a one turn demo play by each player. Participants were then asked if they had doubts or questions. Play sessions started once the participants were ready. After the play sessions, the children were individually asked some qualitative questions on their play experience. Post that, 10 minutes were spent in switching over to the next set of participants.

Fig. 1. Play set up

3 Instruments of Analysis

There are several means, such as questionnaires and surveys that are used to capture player interactions and experiences. These methods rely heavily on the user's ability to articulate their experience, and cannot be used during game play [8]. In order to measure social interactions, we had to investigate how they can be recorded and analyzed during gameplay. Observations is one of the means to do so. Some researchers have created observation schemes to capture social interactions in the

specific context of their studies. Bromley et al. [10] made a tool to capture social interactions during game play which includes metrics such as shared awareness, requesting information, shared history, shared success, shared failure, team optimization, trash talk, and self-indulgence. Seif El-Nasr et al. [11] came up with cooperative performance metrics which includes parameters such as laughter or excitement together, worked out strategies, helping, global strategies, waited for each other, and got in each other's way. Further, [5] combined some observation metrics proposed by [6] and [7], and added new ones such as , to analyze social interactions in co-located multiplayer games. The metrics used by [10], [11] and [6] in their studies were referenced to create initial set of observation metrics contextual to multiplayer board games. We then watched the recorded play sessions to examine if the metrics fit the context of our study. Upon examination, we added new categories such as rivalry, anxiousness, asking to hurry, distracted and doubting/complaining.

Category	**Description**	**Type**
Enjoying	Laughing, expressing fun or pleasure, showing enjoyment due to game events	previous
Shared awareness	Exchanging information about the game's state, current game events, or the presently performed action	previous
Helping	Prompting moves, offering help, asking for help	revised
Rival	Expressing show signs of competition	new
Planning next moves	Looking into their own cards, memorizing	new
Mocking	Teasing, insulting another player	new
Anxious	If the player looks like they're user pressure while performing actions in the game	new
Asking to hurry	Verbally asking the player to hurry for their moves	new
Doubting/complaining	Verbally complaining about player/players to other players/the moderator or to oneself.	new
Distracted	Looking elsewhere, fidgeting	new

Fig. 2. Observation metrics along with their description.

4 Observations and Findings

We created an analysis sheet with the observation categories in a single column and player turns (TA,TB,TC,TD) in consecutive rows. The player turns were also annotated with game events. Whenever we observed an instance of interaction between players, we marked the players (A,B,C,D) in the cell corresponding to the interaction category and player turn. These interactions were listed sequentially. An example of the following is shown below.

Enjoying									D		A,C								A,B		C,D,A
shared awarness	DC									DC		DC			A,D			CA				
helping		A	DC				A	B				DC					D					
rival																						
planning next moves						D							A,B								B	
Mocking																						
anxious																						
asking to hurry/waiting							A									D						
doubting/complaining				A,C																		
distracted						C																
5 turns	TA	TB	TC	TD	TA	TB	TC				TD	TA	TB	TC					TD	TA	TB	TC		

Fig. 3. Analysis sheet

We also transcribed user responses to qualitative questions on gaming experience for the two games. The user responses helped to corroborate our observations for validation. We compared the sequence of interactions between both the games, and player groups. We also looked at the overall social interactions that occurred for specific game events in all the play sessions. We have listed our key observations below from our study:

4.1 Shared awareness and enjoyment

While analysing the sequence of interactions between players, we found recurring observations of shared awareness and enjoyment being followed by each other. In shared awareness the players discussed the state of the game or a recently performed player action. In addition to this, the players also discussed their own moves. In one of the play sessions, which had the highest instances of player enjoyment, the players reflected on the moves that were causing other players to win or lose the game. We can hypothesize through this, that either shared awareness lead to player enjoyment or player enjoyment led to shared awareness for the player groups. We suggest that this can be probed further.

4.2 Help in both games

The players were observed helping each other in both the games. The same interaction of helping another player was received differently by the players in the same group

for both the games. Players helped each other in two cases; first, in the Foxed game, to decide which number cards to multiply and place the token on. Second, in bonus turn of the DOI game to guess the latitude and longitude of a location site. The outcome of helping another player in both the games was different. In the Foxed game, helping a fellow player reduced the overall waiting time. In the DOI game, helping a player in the bonus round saved them from paying a hefty penalty. In the Foxed game, participants from the same group helped each other frequently. They also showed signs that they enjoyed the game following the same. However in the DOI game, helping another player led to to doubting and complaining by fellow players. The interaction of helping another player was received differently in both the games as it led to different outcomes i.e reducing the waiting time in one versus possibly saving another player from losing in another. Hence the difference in social interactions can be attributed to the respective game mechanisms.

4.3 Player involvement in each other's turns

Players in the DOI game had more involvement in each other's turn than they did in the Foxed game. In the Foxed game, the players held the multiplication cards with them at all times. Hence the players were observed memorizing tables, looking at their cards and number tiles, to plan their next move. There were also instances where players announced their moves before hand, during another player's turn. In the DOI game, the players could only plan their move, after they picked a site card during their turn. Hence the players were observed plotting the location of the site card.

5 Conclusion

In this paper, we playtested two educational multiplayer board games amongst children to study whether the sequence of social interactions affect player experience. We also identified game mechanics which influenced their social interactions.
There is evidence in our study, that suggests that shared awareness amongst players can lead to more enjoyment. We also observed that both player groups attempted to manipulate game rules in their second game play. Hence we can conclude from these observations that the sequence of social interactions influence player experience. Through our analysis we found mechanics within the two games that elicited social interactions between the players. For instance game mechanisms for spending wait time influenced player involvement in each other's turns differently in both games.

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