

# Chores Are Fun: Understanding Social Play in Board Games for Digital Tabletop Game Design

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## ABSTRACT

When designing tabletop digital games, designers often draw inspiration from board games because of their similarities (e.g., spatial structure, social setting, and physical interaction). As part of our tabletop handheld augmented reality (THAR) games research, in which computer graphics content is rendered and registered on top of the players' view of the physical world, we are motivated to understand how social play unfolds in board games with the purpose of informing design decisions for THAR games.

In this paper we report an empirical study of recorded video from a series of board game play sessions. We present five categories of social interactions based on how each interaction is initiated, among which we believe that the category of “chores” (interactions arising from the bookkeeping activities required to maintain and update game state) provides opportunities and support for four other kinds of social interaction, namely, “*Reflection on Gameplay*” (reacting to and reflecting on gameplay *after* a move); “*Strategies*” (deciding how to play *before* a move); “*Out-of-game*” (reacting to and talking about out-of-game subjects); and “*Game itself*” (commenting on and reacting to the game as an artifact of interest). We note that “chores” in board games (e.g. waiting for a turn, rule learning and enforcement, maneuvering physical objects), which at first appear to be merely functional, are critical for supporting players' engagement with each other. Although most of these chores can be automated using technology, we argue that this is often not the best choice when designing social interactions with digital media. Based on our experience with THAR games, we discuss several design choices related to “chores”. To understand the connection between game design elements and social experience, we apply Interaction Ritual (IR) theory from micro-sociology to interpret our data.

## Keywords

Co-located social play, board games, tabletop handheld augmented reality interface, empirical study.

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**Figure 1:** Similar settings of digital tabletop games (left) and traditional board games (right). (Left). “*The Eye of Judgment*” gameplay in a living room (Courtesy of Ben Kuchera). (Right). “*Magic: The Gathering*” gameplay at Pro Tour San Diego (The computer screen was just for score keeping) (Courtesy of Alexander Shearer).

## INTRODUCTION

With the development of tabletop technology and associated interface paradigms (e.g. handheld augmented reality, multi-touch surfaces, tangible interfaces, etc.), it is now possible to design games that take advantage of physical objects in a shared physical-digital tabletop space. Such games have been developed in both academia (e.g. *False Prophets* (Mandryk and Maranan 2002), the *STARS platform for tabletop games* (Magerkurth et al. 2004)) and industry (e.g. *The Eye of Judgment* (Sony Computer Entertainment 2007) (Figure 1, left), *InviZimals* ((Sony Computer Entertainment 2010)). Tabletop interfaces, as one type of “reality-based interface”, leverage the “*naïve physics, bodily, environmental, and social awareness & skills*” of the players (Jacob et al. 2008). This new style of interaction raises questions for game designers and researchers, such as how best to leverage these existing human skills during gameplay, and how to design the games that enhance social-physical experiences that players enjoy?

One approach to answering these questions is to examine the player experience in existing media that combine physical and social interactions, such as board games, that have evolved over thousands of years. As shown in Figure 1, the commercially available tabletop augmented reality game, *The Eye of Judgment*, clearly inherits much of its structure and layout from a lineage of traditional fantasy card games, like *Magic: The Gathering* (Garfield 1993). Indeed, much of the prior work in the tabletop computing area has acknowledged that “*the unbroken success of old-fashioned board games clearly relates to the social situation associated with them*” (Magerkurth et al. 2004), and design elements of board games have been analyzed and extracted (Zagal et al. 2006; Mandryk and Maranan 2002; Andersen et al. 2004) for the purpose of designing digital games. However, the empirical data that may have been used to contribute to inspiring digital tabletop games is sparse in the academic research, with a few exceptions (Woods 2010, Fine 2002). This empirical perspective can be fruitful because it bridges the artifact of the game and the player experience by examining the moment-to-moment interactions that players adopt and adapt.

In this paper, we report the findings from a video analysis of the social play experience of board games. These findings enrich our understanding of the diversity and emergent nature of social play. Moreover, this paper looks into social actions in magnified detail to understand the foundations for players to interact with each other, such as discussing

strategies, negotiating outcomes, expressing themselves and making jokes out of the gameplay. For the purpose of designing digital tabletop games, we analyze how design elements of board games contribute to the social play experience, and provide design suggestions that translate these elements from a paper-based medium to the new medium of tabletop augmented reality games.

The main research method used in this work is qualitative video analysis. Based on 262 minutes of videotaped gameplay that included groups of 4-8 players, we extracted, transcribed and categorized social events during gameplay. To understand how these social events contribute to overall social play enjoyment, we adopt the theory of “Interaction Ritual” (IR theory) from micro-sociology, which examines interactions between members of small groups with the aim of explaining how and why certain events are considered meaningful or important to the group. Five categories emerged from the data analysis:

**Chores** - interactions arising from activities needed to maintain or update game state

**Reflection on gameplay** - reacting to or reflecting on gameplay *after* a move

**Strategies** - discussion play *before* a move

**Out-of-game** - talking about topics outside of the game

**Game itself** - commenting on the game as an artifact

While the other four categories of social interactions have been mentioned more or less in the literature (Nielsen and Looser 2005; Seif et al. 2010; Zagal et al. 2000), the social interactions involved in “chores” emerge as an interesting type with a variety of related behaviors. “Chores” refer to the *work* necessary to make the *play* happen in these non-digital games. Players need to update and maintain the game status manually, taking care of rule enforcement and other forms of bookkeeping. We focus on this category because removing such chores is one of the most obvious things computerization of games affords the designer, but removing all chores removes a rich source of social interaction. We have seen this tendency in both commercial digital games and in our own design experience, whether working on our own projects (Huynh et al. 2009; Xu et al. 2008) or teaching students to make tabletop augmented reality games (Barba et al. 2009).

As we will discuss below, we found that it is these chores that are often the seeds of meaningful interactions among the players, and these chores often form the foundation for the other four kinds of social interactions we observed. Consequently, transferring the essence of these chores into the new media of tabletop digital games may be necessary if we want to capture the social fun of board games. We apply these understandings to one type of digital tabletop game—tabletop handheld augmented reality (THAR) games, to explore several design choices that must be made when moving from non-digital to hybrid digital-physical media.

## RELATED WORK

### Tabletop Digital-Physical Games

Tabletop interfaces bridge the physical and digital world for users and bring the interactions from screen space into physical space (Magerkurth et al. 2004; 2005). In such interfaces, players directly manipulate objects on the tabletop surface to influence the digital world accordingly, and they interact with others in the shared physical-digital space by leveraging their existing social skills. The physical and social elements of the tabletop digital games have a lot in common with board games, in which the physical pieces (e.g., boards, movable tiles, tokens) are frequently incorporated. Furthermore, the

socially accommodating nature of board games is an inspiration for many tabletop games, to name a few, *Pirates!* (Björk et al. 2001), *False Prophets* (Mandryk and Maranan 2002), and *Comino* (Leitner et al. 2009).

More generally, physical aspects of board games have informed tabletop interface research. For example, tabletop display interfaces try to adopt the same orientation style found in game boards (Whalen 2003). Additionally, the design of the movable game piece (symbolic or iconic) was leveraged in the design of tabletop interfaces (Bakker et al. 2007).

Researchers have turned to board games to learn about design elements for social interaction. Zagal et al. drew several design lessons from collaborative board games for computer-based collaborative games, such as “*tension between perceived individual utility and team utility*” and “*the ability to trace payoffs back to their decisions.*” They pointed out that it was fruitful to investigate board games in-depth since computer games were often complicated and the underlining mechanics were opaque (Zagal et al. 2006). Woods pointed out that the social play experience has three inter-related components: the form of the game, the players and the play experience that emerges from this combination of factors (Woods 2010). When designers make digital tabletop games, the game form changes significantly. This paper searches the essence of effective and enjoyable social interactions from paper- or plastic- based tabletop games to inform designing with new game forms.

### **Co-located Social Play**

Salen and Zimmerman divided social play into two categories, internal and external social play (Salen and Zimmerman 2004). Internal social play refers to the social interactions derived from the gameplay; external social play is related to the existing real world roles that people carry into their gameplay. Similarly, Zagal et al. also brought up two categories of social interactions, stimulated (necessary to the game) and natural (spontaneous) (Zagal et al. 2000). This diversity of social play is discussed in (Stenros et al. 2009). Researchers have conducted empirical studies on co-located digital games (Lindley et al. 2008; Seif 2010; Szentgyorgyi et al. 2008; Voids et al. 2010;), some of which compare physical interfaces (Lindley et al. 2008) or mobile interfaces (Szentgyorgyi et al. 2008) with traditional interfaces for gaming.

There are two major kinds of data used in the above research into player experience, *reflection* and *performance*. *Reflection* includes interviews for individuals and groups of players (Voids and Greenberg 2009; Szentgyorgyi et al. 2008), while *performance* includes observation notes (Voids et al. 2010) and video analysis (Seif et al. 2010). In our work, we chose video analysis as our main data source because the detailed physical and social actions and interactions may not occur on a conscious or intentional level, and we would miss the specific nuances of the interactions if we focused solely on reflection.

### **Interaction Rituals: A Micro-sociology Perspective**

The purpose of this paper is to explore co-located social play experiences that can be achieved with both digital and non-digital media, with an eye toward applying these findings to THAR games. We acknowledge that other theoretical frameworks might highlight different aspects of the relationship between digital and non-digital tabletop games in useful ways. For example, the theory of Remediation (Bolter and Grusin 2000) could effectively explain how and why conventional forms from board games make sense for digital tabletop games, or Design Patterns and Pattern Languages (Björk and

Holopainen 2005) may inform an analysis of the relationship between game structure and patterns of play. We choose to adopt the lens of Collins' Interaction Ritual (IR) theory because it fits well with the context of co-located face-to-face interaction (Collins 2004). IR theory analyzes the ingredients and outcomes of successful social interaction despite the gaming platforms. It has been applied to understand the elementary processes that underpinned social interactions in game studies (Stromberg 2009).

Collins identifies four key ingredients for successful social interactions in his Interaction Ritual Chain model: *bodily co-presence* (physically assembling in the same space); *barrier to outsiders* (a sense of who is taking part and who is excluded); *mutual focus of attention* (awareness of each other's attention, focusing on a common object); and *synchronization* (common mood or emotional experience) (Collins 2004). Collins used social games as an example of rituals in which game mechanics, rules, and setup have "been tinkered with over the years in order to make it 'a better game'—which is to say, to provide moments of collective emotion." Informed by IR theory, we analyze board/card games and explore how those game design elements influence players' social behaviors.

## METHOD

### Selection of Board Game Titles

We picked four different game titles for participants to play with, all of which are contemporary board games, based on their high rank and positive reviews from the website boardgamegeek.com (one of the most popular board game online communities). We also considered game diversity in terms of type (competitive, cooperative, and collaborative), genre (strategy or chance), and physical representations (flat surface or multiple surfaces). The games are:

- ***Puerto Rico*** (Seyfarth 2002): a strategy game where players compete to maximize their fortune by building factories, growing crops and selling products.
- ***Heroscape*** (Ness et al. 2004): a combat warfare strategy game that uses a complex board built of interlocking surfaces and miniatures. The group played collaboratively in teams.
- ***Fluxx*** (Looney 1996): a card game that players win by meeting goals. Rules, goals, and activities constantly change based on the cards players draw and play. It is competitive and chance-based, with relatively fewer strategies.
- ***Ingenious*** (Knizia 2004): a strategy board game where players collect points for six colors. It can be played competitively or cooperatively.

### Participants and Settings of Gameplay

The board games were played by groups of 4-8 players on a weekly basis. Every week one game title was played for 1-1.5 hours. *Fluxx* and *Ingenious* are shorter games, so we captured 2 sessions of *Ingenious* (one was individual play, another was team play) and 4 sessions of *Fluxx*. *Heroscape* and *Puerto Rico* are longer; we captured 1 session of each. In total, 8 game sessions were captured, the duration of sessions range from 17 minutes to 1 hour and 32 minutes. Four of the sessions have a viewer (not a researcher, but another volunteer player) who was present just to watch the play.

We recruited by word-of-mouth. In total, 9 distinct players participated in the games; therefore most participated in multiple game sessions. All participants are computer science graduate and undergraduate students at the same university, with ages ranging from 21 to 33. We provided the participants with lunch. The participants knew each other

as schoolmates, but they did not have significant personal interaction before the gameplay sessions.



**Figure 2:** Settings of gameplay (screen capture from one session of playing *Heroscape*)

### **Data analysis**

Due to the emergent nature of social play, the challenge of analyzing gameplay video is to find commonality among a large number of incidences that manifest the same type of social interaction in different ways. To address this problem, we chose an inductive method (Derry 2007), allowing themes to emerge from the data.

In total, 262 minutes of gameplay video were captured. Our data analysis consisted of a number of steps. First, one researcher transcribed all the social events during the play. By social events, we mean the actions and interactions that involve 2 or more players. In total, 358 social events were transcribed. The researcher also summarized each of the social events into short phrases, and recorded the social and physical behaviors of every player. These included bursts of laughter, smiling, raised voice, normal speech, body movement, and object maneuvering.

Second, two researchers grouped the event summaries into categories using an affinity diagram (Beyer and Holtzblatt 1998). We printed and cut out these event summaries, and placed similar ones next to each other. In the end, the categories of events emerged as an outcome of this practice.

Beside the video analysis, the authors have all devoted many hours of play time to a variety of board and card games, ensuring that we were exposed to a broad palette of social play beyond just these four games. Reflection on these game sessions prepared the authors to capture and analyze meaningful events during game play in the video analysis.

### **FINDINGS**

In total, five categories of social interactions emerged from the data based on the activity that triggered them: *Chores*, *Reflection on gameplay*, *Strategy*, *Out-of-Game*, and *Game Itself* (see Table 1).

Type	List of interaction behaviors	Board game design element
Chores	<ul style="list-style-type: none"> <li>• Interactions around object maneuvering</li> <li>• Discussion while waiting for someone to take their turn</li> <li>• Enforcing the rules through social agreement</li> <li>• Collaborative learning</li> </ul>	<ul style="list-style-type: none"> <li>• Manual bookkeeping</li> <li>• Turn-taking</li> <li>• Physical objects</li> <li>• Rulebooks</li> </ul>
Reflection on Gameplay	<ul style="list-style-type: none"> <li>• Making one's move and laughing about it</li> <li>• Discussion referring back to past moves</li> <li>• Discussion between games to reflect on the whole game</li> </ul>	<ul style="list-style-type: none"> <li>• Turn-taking</li> <li>• Shuffling cards and reorganizing the board</li> </ul>
Strategies	<ul style="list-style-type: none"> <li>• Talking about the strategy</li> <li>• Pointing at physical objects to discuss the specifics of a move</li> <li>• Negotiating and changing strategies according to game state</li> </ul>	<ul style="list-style-type: none"> <li>• Physical game pieces</li> <li>• Shared goal of having fun together</li> <li>• Co-located players</li> <li>• Flexibility of rules</li> </ul>
Out-of-game	<ul style="list-style-type: none"> <li>• Talking about out-of-game subjects</li> <li>• Reacting to distractions</li> <li>• Between-session casual chat</li> </ul>	<ul style="list-style-type: none"> <li>• Turn-taking</li> <li>• Shuffling cards and reorganizing the board</li> </ul>
Game itself	<ul style="list-style-type: none"> <li>• Commenting on the rules and setup of the game</li> <li>• Joking about the game language</li> </ul>	<ul style="list-style-type: none"> <li>• Game jargon</li> <li>• Board games as rule-based systems</li> </ul>

**Table 1:** Summary of social interaction category, related behaviors and the underlining board game design elements

We elaborate on the first category of social interaction, *chores*, in the greatest detail. The other four categories will also be introduced briefly, even though they are not the focus of this paper, both for completeness and because they also provide some interesting insights in relation to chores. This focus on chores is related to our goal of generating design lessons for THAR games. We argue that while these chores can be automated in many cases, their inclusion creates a foundation for emerging social play.

We adopt the Interaction Ritual theory to interpret the findings presented below. Theories can offer rhetorical powers that “*help us talk about the world by naming important aspects of the conceptual structure and how it maps to the real world.*”(Halverson 2002)

### Chores

Traditional board games require the players to facilitate the game play. All board games demand that some tasks be performed to maintain the correct game state, including (but are not limited to) setting up the board, shuffling, distributing, and reading cards, rule acquisition and enforcement (reading and checking the rulebook), moving objects on the board, etc. When designing a digital game, it is a natural to think about leveraging computing power to remove these chores. However, we found rich social interactions arising from such chores. On the surface level, these social interactions were enabled because chores slowed the pace of the game and created time that players wanted to fill with other activities. But, deeper analysis of players’ behaviors surrounding the chores

showed evidence of enhanced physical co-presence with the group and an increased awareness of other's actions. These are illustrated by the four representative social interactions surrounding chores that are described below.

### ***Interactions around object maneuvering***

Board games usually include physical objects, such as tiles, tokens, dice, boards, and miniatures. To set up the board, shuffle the cards, roll the dice, and exchange objects, players perform physical actions that oftentimes become observable to others, who may comment on or laugh about such actions. In IR theory, one fundamental ingredient for a successful face-to-face social interaction *bodily co-presence* (Collins 2004). It creates opportunities for participants to signal themselves and monitor others. As put in Goffman's words, "*when nothing eventful is occurring, persons in each other's presence are still nonetheless tracking one another and acting so as to make themselves trackable.*" (Goffman 1981) Physical objects make such tracking process easier. In the following example of two teams playing *Heroscape*, the physical action of rolling dice was not for increasing the chance of winning, but instead, the exaggerated actions amplified the intensity and created a higher level of shared emotions.

*(The team of player A and B moved their miniature and started an attack towards the other team, C and D. To decide whether the attack is successful, B and C were about to roll dice for attack and defense, respectively.)*

*B had two attack dice. He shook them in the air for a while and put them down. "Two!" B pointed at the two dice and announced it to C.*

*"Oh no!" said C when he was rolling his defense dice. Although C had six dice, he only got one defense point.*

*"Yes!!" B and A said together and jumped up.*

*"Argh!" roared C.*

*Everyone else laughed.*

*B raised both arms to show victory and high-fived with A.*

In the above example, the physical actions externalized the tension among players. And as a result, the intensity of emotions was elevated in the group. The actions of object maneuvering contributed to achieving the "synchronization of emotions" as mentioned in IR theory (Collins 2004).

### ***Enforcing the rules through social agreement***

Rule enforcement is a chore that is usually handled automatically by digital games, as such activity takes time and is prone to error when done by the players. But we found that players agree on eligibility of certain moves or scores through social interaction, which provides a reason to engage everyone when it is not their turn. The following example illustrates this.

*B made a move while the rest of the group was engaged in the discussion about the last move.*

*B counted how many points she got for this move, and asked, "Can someone else check the points?"*

*A stopped talking and checked the scores, and found that B counted one point too many.*

*Now everyone else stopped talking about previous move and start to pay attention to the current one.*

*"Nice try!" C smiled at B.*

*Everybody laughed.*

*"Not my fault, you guys were all talking!" B shrugged.*

In the above example, the social interactions fell into two threads, which was common in group communications. By the shared activity of rule enforcement, the group formed

*mutual focus of attention* among all participants again, and the thread that was not directly tied to the current state of the game ended.

Players may also push the envelope of game rules through social negotiation, which increases the tension of social play. In the following examples, players tried to form a union against another player who was about to win. This interaction changed the competitive roles assigned by the game rules to cooperative roles.

*(D just needed one more color to win. A, B, C tried to stop him by cooperation)*

*A talked to B, "you can block off one of those two ends."*

*D said, "Don't do that. I don't want to be greedy."*

*A said, "That IS being greedy", looking at D.*

*B said, "It's kind of tricky to block off it here."*

*A said, "If you block it here, (pointing at the board), he will still get one or two."*

*C said, "Why should we play for all?"*

*A said, "Because you will lose if he ends on his turn."*

*C said, "We will see."*

*(B looks a bit annoyed when A tried to direct her move again)*

*D said, "Let her play her turn!"*

*After B decided his move and placed it down, A commented that, "Oh great, he (D) wins next turn."*

*D said, "If I have a blue."*

*A said, "You do (pointing at the rack), otherwise you would thrown your entire hand last time."*

*D said, "Maybe, I don't have to..."*

*B smiled.*

*C said, "Yeah, I think you want to win so you would."*

In the above example, players re-appropriate their roles through social negotiation. While A tried to persuade others to work together to stop D from winning, D tried to emphasize the rule of turn-taking (i.e., "*let her play her turn!*"). This emergent behavior is an example of social agreement for flexible rule enforcement – the rules serve the purpose of supporting more enjoyable social experience; and the boundary of the rules are pushed, bent and even discarded to enable that experience (DeKoven 1978).

### ***Interactions and communications when waiting for someone to take a turn***

Board game players seemed to be comfortable with reasonable waiting times. While waiting, they discuss the last move, chit-chat about off-game subjects, and talk about the game itself. A turn-based structure not only provides time for conversation, but also allows players to flexibly switch in and out of the center of group attention or, to put it in terms of performance, the roles of performers and spectators. This rhythm of switching prevents dominating behaviors from happening. Gibson (2003) researched turn-taking behavior patterns in group conversations, and found that people struggle to become the *focus of attention*. For example, group conversation may end up as "ping-ponging" between two central members while other members retreat to be spectators. In board games, the predefined turn-based structure proceduralized the problem of attention shift, allowing everyone to take turns at becoming the center of group attention. In some cases, one player's turn may take much more time than expected, players often reflect on it and joke about it. For example, the game of *Fluxx* allows the players to constantly change the rules of play, sometimes leading to prolonged turns. The following example shows how players cope with such situations.

*(It was A's turn. He had played two cards already.)*

*After he played the second one, he put down another card, saying, "Now, I take another turn!"*

*"Oh god", said G, putting his hand against his forehead.*

*"What?" D raised her voice.  
The group continued to make complaint noises and laughter.  
"You played a long time. Dirty!" complained C.  
A laughed even more and said, "Isn't that great?"  
B (who was the next to play) said, "No, I waited forever!"  
Everyone laughed.*

### **Collaborative learning**

Learning complicated rules in a new game takes time away from the gameplay and can be tedious, but conversations and interactions among players (e.g., Q&A, correcting illegal moves, explaining the rules, watching others' moves) support the learning process collaboratively and make it part of the gameplay. Players who pick up the rules faster can both pass on their understanding to other players, and reinforce their own learning. We found that rulebooks, which are often multipage booklets, are not typically read page-by-page as an instruction manual. Instead, players read them briefly at the beginning, and refer back to them when an unseen situation happens, or to resolve confusion. The following example shows the learning process for a new rule:

*H played a card that first time appeared in the game.  
A (who played this game before) looked at it and said, "Oh, I hate this (rule)!"  
G read the rule on the card out loud, "every number now adds one, so it's now draw four..."  
A added on G's unfinished sentence, "draw four, play five, keeper limit five."  
Everyone was leaning forward towards the card.  
C asked, "So do we get three of these?" pointing at two cards in front of him.  
"No" A and G answered simultaneously.  
Everyone laughed.*

This example shows that collaborative learning was not just for finding out legal moves. Players added their own interpretations and feelings, reminders about the complexities and scope of rule application, and even occasional shorthand for complex concepts and relationships into discussion. Therefore, the relation between collaborative learning and social interaction is reciprocal. Learning rules provides a common topic that every player has interest in, and social interactions make learning more effective and fun.

### **Other Categories of Social Interactions**

Other than the social interactions required for and generated from *chores*, we also report four other kinds of social interactions, including *reflecting on gameplay*, *discussing strategies*, *reacting to out-of-game events/subjects*, and *joking and commenting on the game's content*. In table 1, we provide a set of behaviors related to each of the categories based on our video analysis. These four social interactions have also been discussed in the literature.

Our focus in this paper is to discuss how *chores* enable these other types of interactions that appear more relevant to play strategy and game enjoyment. For example, we found that players tended to point their fingers at certain spots or move objects on the table when discussing the strategy with their teammates. Interestingly, the physical actions also made their intention and strategy perceivable by the other team, who was usually waiting for their turn at that time. Consequently, the competing teams also got involved, even when it was not their turn. Physical actions on the game board and with objects are kinds of *chores* that can be automated by the computer, but in board games, they create the common ground for understanding the game state. The following example illustrates this.

*(C and D were discussing the next move.)  
D pointed at a few miniatures on the board and suggested some moves to C.*

*C stood up and leaned forward to see what D was talking about.*

*A, who is on the other team, grabbed the rule book and started reading. A pointed to some text in the rule book and said, "You can't make that move..."*

Another example is about the chore of score keeping and how it enables the group of players to reflect on their shared game history. In many board games, tokens and physical score boards serve a score keeping purpose for individual players, but also function as a public display for other players to check and keep abreast of each other's status.

*D picked another token during her turn and placed it on her scoreboard.*

*B started laughing immediately after she saw that D stocked up on another tobacco token.*

*D laughed right after B and said, "I am like, (laughter), an old ...(laughter, can't discern), there is reek of smoke...like I figured...( interrupted by C)"*

*C joked, "You should figure out what you get."*

*D laughed, "Yeah, that's right."*

*A followed C's joke, "What? What? No no no... I am getting tobaccos. "*

*D stopped laughing for a second and asked, "Can we have two boats with the same stuff in it?"*

*"You can't." answered B.*

*A said, "I guess you could have... (interrupted by D)"*

*D, "I fill all the boats with tobacco (laughter)"*

*The group burst into laughter.*

In the above example, players' conversations and laughter overlapped repeatedly. Without finishing the sentence, others already understood the joke based on the shared game history, and immediately followed it by laughter or another joke. Jokes, comments, and laughter build on top of each other, and are an indicator of *synchronization*, one of the key ingredients of successful social interaction (Collins 2004). Moreover, the player who repeated her pattern of play (*D*) did not seem to realize the funniness in her action at the beginning. Only when another player (*B*) glanced over the tokens was the group laughter initiated. The score keeping tokens were a trigger for this group interaction.

In some other cases, chores become fun through other kinds of social play. For example, joking and playing with the game content can make the chore of learning new rules more fun. In this case, verbal utterances, exaggerations, body language, and facial expressions are all part of the interactions that make learning easier and more memorable. In the following example, players discussed one game rule on a few occasions, which were mostly fun moments and attracted the group attention.

*Player H played a card that has "Love" on it, H said, "I will have 'Love'."*

*Everyone laughed.*

*A said, "you should keep 'love' (card), not 'war' (card)." (This is a winning condition called 'All you need is love', which requires the love card, but there shouldn't be a war card on the table at that moment. It was the first time this group encountered this rule). A raised his voice and held his fist up to stress on it.*

*...(Later in this session, H won by meeting the winning condition of "All you need is love")*

*(Shortly after a new game session just started)*

*D had to discard a card according to the rule, she decided to give up the "love" card she owned.*

*A joked, "you don't like 'love' either?"*

*A and D laughed.*

In summary, chores in the board game may form the basis for and trigger other kinds of social interactions. On the other hand, the social interactions and play may also make the chores less like a tedious task and more like a source of fun.

## SUMMARY AND DISCUSSION

In our empirical data analysis, we explore how the key ingredients of successful social interaction, including bodily presence, mutual focus of attention and synchronization of emotions, are supported in board games. Players maneuver physical objects and talk to each other, which makes these actions more observable and trackable to other players, enhancing co-presence and increasing the awareness of other players. During the game, players share common interests about the game, its rules and their gameplay. Every player can comment on or laugh about these topics, the accumulated interaction history that reinforces synchronization of emotions among players. With a turn-based structure, players take turns becoming the group's attention center; when it is not a player's turn, there are different ways that they can engage with the group's activities, such as learning new rules, checking results during others' turns, reflecting on someone's move or partially participating in the decision-making for another move. In summary, our analysis shows that chores, the *work* required for *play* to happen, are integral to social play.

In this section, we focus on one category, "chores," and the need to translate the effects of chores into the new medium of tabletop handheld augmented reality (THAR) games. With THAR interfaces, physical objects are tracked by computer vision technology and digital content is rendered and registered on top of the real world using handheld devices such as high-end mobile phones. With this new form of game, the limitations of non-digital media might be eliminated technically, but designers still need to make informed choices that would facilitate or impair certain social behaviors. We agree that games with too many chores can become tedious, and some chores should be automated to create a fluid experience. But, as we have shown, chores are often a source of the fun and social interactions in board games, especially those that occur in a shared physical play space, and are a potential design element for creating novel kinds of social play in THAR games.

The idea of adding chores to digital games is not as counter-intuitive as it might seem: chores already exist in digital games, even though they take on different forms than those seen in the board games studied here. For example, creating avatars, selecting levels, and configuring controls are all chores associated with digital gaming. These chores, however, tend to be private to individual players, and require them to focus on their personal displays. As a starting point, designers might reconsider the usual methods for these common "digital chores", and make these traditionally private chores public and visible in the shared space. The observations presented in this paper, combined with the lens of Interaction Ritual (IR) theory, suggest that they might become a source of rich social interactions rather than a source of player isolation. In general, an important message of this paper is that choices that "socialize" the work needed to play digital games can have profound effects on the overall game experience, and co-located THAR games present the opportunity to make this work public in a way many other games do not.

In the remainder of this section, we reflect on specific aspects of how the careful introduction of chores into THAR games may lead to the kinds of rich social interactions typically associated with board games.

### Performance

An important contributor to social enjoyment in tabletop games is performance, which is supported by turn-based structure and manipulation of physical objects. When it's time to take a turn, a player may enact an elaborate performance of the action to be taken (e.g.,

when taking another player's piece, a player might dramatically knock it off the board); this performance can cause comedy, suspense, or elevation of group tension, and leads to enhanced emotions and group synchronization. In these board games, physical objects act as props for performers on a stage. The process of dramatically acting out gameplay should lead to social enjoyment, according to IR theory.

With THAR interfaces, physical objects have been used as triggers for virtual events. For example, in *EoJ*, the tangible objects of cards are placed on the table, recognized by the computer, and initiate a series of animations and sounds. The fact that these physical objects can be props for performers has not been fully explored in THAR games, which may provide opportunities for performances to take place in both the physical and virtual spaces. A player's performance can thus be enhanced by both these worlds, if the game mechanics and simulation behaviors are designed to facilitate performance. For example, in a game where a player is about to play a spell card, they can offer a physical performance by menacingly waving the physical card, and this performance can be digitally enhanced through virtual flame effects and reactions from virtual actors. If the mixed physical/virtual performance is visible to all players, similar kinds of social experiences to those seen in board games may happen in THAR games as well.

### **Virtual Voyeurism**

Social play happens when people fully share a play experience. As we pointed out above, digital games already have chores, typically purely virtual chores that are performed by individual players (e.g., choosing the type of spell to perform in a turn, changing an avatar's costume or weapons, etc.). When appropriate for the game, these chores can be moved from the purely virtual space of a player's device into the shared playspace. For example, if a player needs to assemble a virtual team to overcome an obstacle in the game, the team can be assembled and configured on the edge of the gameboard, for all to see. Perhaps not all aspects of the team are visible, but by exposing the virtual manifestations of the players virtual chores in the shared playspace, all players are aware of what each other are doing. These can be transformed into social performances by giving players control over when and how different aspects of their activities become publicly visible to other players.

### **Turn-based vs. Continuous Play**

Although a turn-based structure in board games is largely the result of the non-digital medium, we find group interactions benefit from it by the imposed rhythm of turn-taking. Players switch in-and-out of the center of group attention, and give attention to and receive attention from other players regularly. The side effect of a turn-based structure is to create time and space for players to synchronize with each other's game play and emotional experience, which is universally important for digital and non-digital games.

THAR games have the flexibility of choosing continuous or turn-based game structures or to combine them. To translate the essence of turn-taking to THAR games, other designs can be integrated in continuous games that have a similar effect of turn-taking. For example, in some digital games designed for group play, only one controller is used so that there is only one person playing at any moment, the rest become the audience. The key is to find structures such that everyone is paying attention to, and receiving attention from, other players. This attention provides a basis for communication and interaction.

## **Appropriation and Flexible Play**

Digital games have a tendency to have rigid pre-programmed rules that are automatically enforced by the game. On one hand, this approach is beneficial because it simplifies game programming and makes the games understandable and approachable. Having the computer enforce the rules reduces housekeeping and rule-enforcement chores on the part of the players. However, it may also create a rigidity that limits social interactions that might evolve when a game environment is appropriated by the players to create variations not foreseen or intended by the game's creators, as often happens in traditional tabletop games. Groups often change or negotiate the rules of tabletop games (creating "house rules"), either to give advantages to novice players, or because they want to have a different game experience. There are examples of so-called "sandbox" games, but they are not common (usually because they are so difficult to create with digital media). We believe that the flexibility afforded by such open games is particularly appropriate for creating social experiences in THAR games.

## **CONCLUSION**

In this paper, we report on our empirical study of social interaction in board games. Using an inductive analysis method, we found five categories of social interactions, including: *chores*, *reflecting on gameplay*, *deciding strategy of play*, *game itself*, and *out-of-game subjects*, of which we focused on understanding the interactions and communications enabled by chores. We found that chores are critical to support players to form a mutual focus of attention, and to synchronize their emotions. The physical objects (e.g., dice, tiles and score-keeping tokens) direct players' attention to other's current action and status. Turn-based structure allowed players to switch between the role of performer and spectator, supporting the players to give and receive attention interchangeably. In short, chores are the foundation for social play because they are an effective approach to increase player's awareness of each other, assist their communications, and help players engage with each other.

With the lessons learned from board games, we discuss how the essence of chores can be translated to the different platform of THAR games. In the future, we hope to develop metrics for evaluating and designing social play experience for THAR games.

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## **BIBLIOGRAPHY**

- Andersen, TL, S Kristensen, BW Nielsen, and K Grønbaek. 2004. Designing an augmented reality board game with children: the battleboard 3D experience. Proceedings of the conference on Interaction design and children: 137-138.
- Bakker, S, D Vorstenbosch, E van den Hoven, G Hollemans, and T Bergman. 2007. Tangible interaction in tabletop games: studying iconic and symbolic play pieces. Proceedings of the international conference on Advances in computer entertainment technology: 163-170.
- Barba, E, Y Xu, B MacIntyre, and T Tseng. 2009. Lessons from a class on handheld augmented reality game design. Proceedings of Foundations for Digital Games. 2-9
- Beyer, H., and K. Holtzblatt. 1998. Contextual design: defining customer-centered systems: Morgan Kaufmann Pub.

- Björk, S, Falk, J., Hansson, R., Ljungstrand, P. 2001. Pirates! Using the Physical World as a Game Board. *Proceedings of Interact*: 423-430.
- Björk, S and Holopainen, J. 2005. *Patterns in game design*: Cengage Learning
- Bolter, Jay, Grusin, R. 2000. *Remediation: Understanding new media*: The MIT Press
- Collins, R. 2004. *Interaction ritual chains*: Princeton University Press.
- Derry, Sharon J. 2007. *Guidelines for video research in education* Data Research and Development Center (DRDC).
- DeKoven, B. 1978, *The well-played game: A player's philosophy*. New York: Anchor Books.
- Garfield. 1993. *Magic: The Gathering*. Wizards of the Coast.
- Gibson, D.R. 2003. Participation shifts: Order and differentiation in group conversation. *Social forces* 81 (4):1335-1380.
- Halverson, CA. 2002. Activity theory and distributed cognition: Or what does CSCW need to DO with theories? *Computer Supported Cooperative Work (CSCW)* 11: 243-267.
- Huynh, DNT., Raveendran, K., Xu Y., Spreen, S., and MacIntyre, B. 2009. Art of defense: a collaborative handheld augmented reality board game. In *Proceedings of the 2009 ACM SIGGRAPH Symposium on Video Games*: 135-142.
- Ishii, H., and B. Ullmer. 1997. Tangible bits: towards seamless interfaces between people, bits and atoms. *Proceedings of CHI*: 234-241.
- Jacob, RJK., Girouard, A., Hirshfield, LM., Horn, MS., Shaer, O., Solovey, ET., and Zigelbaum, J. 2008. Reality-based interaction: a framework for post-WIMP interfaces. *Proceedings of CHI*: 201-210
- Japan Studio. (2007). *The Eye of Judgment*. [PlayStation 3], Sony Computer Entertainment, played 25 May, 2008.
- Knizia, R. 2004. *Ingenious*. Kosmos.
- Leitner, J., Köffel, C., and Haller, M. 2009. Bridging the gap between real and virtual objects for tabletop games. *Int. J. Virtual Reality* 7 (4):33-40.
- Lindley, S. E., Le Couteur, J. , and Berthouze, N.L. 2008. Stirring up experience through movement in game play: effects on engagement and social behaviour. In *Proceeding of CHI*: 511-514.
- Looney, A. 1996. *Fluxx*. Looney Labs.
- Magerkurth, C., Cheok, AD., Mandryk, RL., and Nilsen, T. 2005. Pervasive games: bringing computer entertainment back to the real world. *Computers in Entertainment (CIE)* 3 (3):4.
- Magerkurth, C., Engelke, T., and Memisoglu, M. 2004. Augmenting the virtual domain with physical and social elements: towards a paradigm shift in computer entertainment technology. *Computers in Entertainment (CIE)* 2 (4):12.
- Magerkurth, C., Memisoglu, M., Engelke, T., and Streitz, N. 2004. Towards the next generation of tabletop gaming experiences. In *Proceedings of Graphics Interface*: 73-80.
- Mandryk, RL, and Maranan, DS. 2002. False prophets: exploring hybrid board/video games. *CHI extended abstract*: 640-641.
- Ness, C. V., Daviau, R., and Baker, S. 2004. *Heroscape*. Hasbo Games.
- Nilsen, T. 2005. Tankwar Tabletop war gaming in augmented reality. In *In Proc. 2 nd Int'l Workshop on Pervasive Gaming Applications*:.
- Novarama. (2010). *InviZimals*. [PlayStation Portable], Sony Computer Entertainment, played November, 2010.
- Salen, K., and Zimmerman, E. 2004. *Rules of play: Game design fundamentals*.
- Seif, E., Aghabeigi, B., Milam, D., Erfani, M., Lameman, B., Maygoli, H., Mah, S., 2010. Understanding and evaluating cooperative games. *Proceedings of CHI*: 253-262.

- Seyfarth, A. 2002. Puerto Rico. Alea
- Stenros, Jaakko, Janne Paavilainen, and Frans Mäyrä. 2009. The many faces of sociability and social play in games. Proceedings of the 13th International MindTrek Conference: 82-89.
- Szentgyorgyi, C., Terry, M., and Lank, E. 2008. Renegade gaming: practices surrounding social use of the Nintendo DS handheld gaming system, Proceedings of CHI: 1463-1472.
- Voida, A., Carpendale, S., and Greenberg, S. 2010. The individual and the group in console gaming. Proceedings of the 2010 ACM conference on Computer supported cooperative work:371-380.
- Voida, A., and Greenberg, S. 2009. Wii all play: The console game as a computational meeting place. Proceedings of the 27th international conference on Human factors in computing systems:1559-1568.
- Whalen, T. 2003. Playing well with others: Applying board game design to tabletop display interfaces. ACM Symposium on User Interface Software and Technolog: 4-5.
- Woods, S. 2010. Convivial Conflicts: The Form, Culture and Play of Modern European Strategy Games. PhD Thesis, To be published by MacFarland Press.
- Xu, Y. and Gandy, M. and Deen, S. and Schrank, B. and Spreen, K. and Gorbsky, M. and White, T. and Barba, E. and Radu, I. and Bolter, J. and MacIntyre, B. 2008. BragFish: exploring physical and social interaction in co-located handheld augmented reality games, Proceedings of the International Conference on Advances in Computer Entertainment Technology: 276-283.
- Zagal, JP., Nussbaum, M. and Rosas, R. 2000. A model to support the design of multiplayer games. Presence: Teleoperators & Virtual Environments 9 (5):448-462.
- Zagal, JP., Rick, J. and Hsi, I. 2006. Collaborative games: Lessons learned from board games. Simulation & Gaming 37 (1):24.