Brothers and Sisters at Play: Exploring Game Play with Siblings

Janet Go, Tico Ballagas, Mirjana Spasojevic

Nokia Research Center
955 Page Mill Rd., Palo Alto, CA 94304
janet@gojanetgo.com | (tico.ballagas, mirjana.spasojevic)@nokia.com

ABSTRACT

To effectively design for families, we must understand familial relationships, which exert a significant influence on children's growth, learning, and play. In particular, siblings can be influential play partners and teachers, providing important scaffolding to each other. We report our observations of eight sibling pairs between ages 6 and 10, playing four popular games of different gaming paradigms. We found that certain patterns of sibling behavior persisted through all game sessions, regardless of the play patterns afforded by the different games, and that parents reports were consistent with our observations. We also observed instances where game design seemed to influence sibling play dynamics. We share our insights into considerations for designing for sibling play, including specialized social dynamics, opportunities for scaffolding, and the particular challenges they present.

Keywords

Games, families, children, siblings, cooperative games

ACM Classification Keywords

H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Design; Human Factors

INTRODUCTION

Siblings are often a child's earliest and most constant play partners. The sibling relationship constitutes a specialized type of peer relationship, and sibling play differs in many ways from that of peers. However, little research sheds light on the sibling relationship as a context for game design. How do siblings play together? What are the dynamics around how siblings play games?

As part of our research group's effort toward designing technologies for families, we conducted a study of sibling play to inform the design of a collaborative educational game. Our approach was to explore sibling play patterns by using a variety of games as probes. Our goal was to uncover how different design elements might influence play within a typical sibling context, and to identify the unique challenges and opportunities for designing informal learning games that siblings could play *together*. In this work, we share our insights from this experience. We present findings on sibling scaffolding of game play, how important individual dynamics often dwarfed the influence of game design, and some instances where game elements exerted their effect on those dynamics.

Figure 1. Play Sessions: Sisters playing the boardgame Upwords.

BACKGROUND

This work builds on a number of threads within the CSCW and CHI communities, including a growing body of work on designing technologies for families, research on cooperative gaming and group gaming practices, and informal learning with games.

Games and Play in the Home

Many researchers in this community have recently turned their attention to designing for families as a whole [7,16,17], as well as the parent-child relationship [8,33]. Others have expressly studied gaming and play among families or in the home, notably [13,19,31]. Yet none of this work has focused on sibling play or the sibling

CSCW'12, February 11–15, 2012, Seattle, Washington, USA.

relationship specifically, despite its ubiquity and importance in family life. Thus, the sibling relationship, which is both significant and formative, is ripe for study as another context for design within families.

Sibling Dynamics and Play

Sibling participants are often inserted as equivalent to peer groups in gaming research. However, there is reason to believe that the sibling relationship is somewhat specialized, and therefore their interactions might be qualitatively different. In general, interactions between siblings have been characterized as polarized, both intensely positive and negative, and are sometimes described as ambivalent rather than one-dimensional [11]. A number of researchers have investigated the negative and positive interactions between siblings, and in particular the influence of gender [1], age, whether siblings are same- or mixed-gender, and the lack of influence of age interval [2]. In addition, Dunn found that negativity and positivity between siblings maintains stability through middle childhood [12].

Older and younger siblings also have the tendency to assume different roles with each other in their interactions. In observations of both structured game play [6] and naturalistic observations [28] in the home, researchers found that older siblings were more likely to take on the dominant role of teacher and manager, while younger siblings were more likely to take on the role of managee or learner. In a lab study of infants and preschool siblings, researchers found younger siblings engaged in more monitoring and imitation of their older siblings, while older siblings initiated more assertive behavior (both nurturing and aggressive). These patterns of behavior were stable at later observations when younger siblings were themselves preschoolers [18]. Researchers have examined factors influencing sibling play roles, and found that they can be influenced by family structures, the gender and temperament of siblings, parental involvement, and cultural factors (See [22] for review).

Siblings and Informal Learning

This work was motivated by the potential for sibling informal learning through games in the home, and thus also extends existing research on social-learning in gameplay [20,24,27], Many educational and developmental researchers argue that learning among siblings is a special case of peer learning that benefits both parties. For example, Gregory characterizes the sibling relationship as a synergistic learning relationship that is reciprocal and bidirectional. In an ethnographic study of language learning in multilingual environments, Gregory described the importance of *shared experience* in the sibling learning arrangement [15].

In another study by Azmitia and Hezzer, older siblings were found to be more effective teachers than familiar peers on an unstructured building task. Children who were taught by their siblings performed better on post-tests, and older siblings provided more explanations, spontaneous guidance, and positive feedback than older peers. Furthermore, younger siblings were more likely to initiate such interactions, prompting for explanations and asking for more control with older siblings [3].

The Study of Group Gaming Practices

Many studies have sought to characterize group gaming practices. Social interactions around games have been described for massively multiplayer online games [10,21], handheld gaming systems [29], and console games [26,32]. However, few have examined how social interactions compare across platforms. Cooperative gaming research distinguishes between competitive, cooperative, and collaborative modes of game play, referring to the goals and incentives designed in the system. Cooperative games model situations where participants have interests to cooperate, but do not force cooperation (e.g. strategies employed in [5]). In collaborative games, players function as a team and share payoffs and outcomes [34].

Some have sought to characterize levels and types of cooperative behavior in group gaming. Seif El-Nasir et al. identified a set of cooperative design patterns and developed Cooperation Performance Metrics (CPMs) for measuring the observed levels of cooperation in screen-based digital games among collocated groups [26]. They used correlations between design patterns and CPMs to recommend different design patterns for promoting cooperation. Taking a more qualitative observational approach, Voida and colleagues investigated group-oriented behaviors around console gaming, identifying different gaming elements that contributed to these behaviors [32].

Other lines of work assert the primacy of social interactions over the designed interaction of the game itself. In another study on Wii console gaming, Voida set al. explicitly emphasized *externally derived* sociability over the internally derived social interactions dictated by rules of the game [31]. Their work draws from Salen & Zimmerman, who distinguish between internally and externally derived social interactions in game play [25].

Although [26,31,32] all included within-family groups and siblings in their study, they did not focus their analysis on siblings specifically. As we have seen, sibling interactions are disparate from peer interaction, and the sibling relationship also has great potential for informal learning. Yet, to our knowledge, in both games research and the literature on designing for families, the sibling relationship has never been given its own attention. In this paper, we attempt to address this gap.

METHOD

With the help of an external recruiter, we recruited 25 participants from diverse economic and cultural backgrounds, including eight sibling pairs and their parents (6 mothers, 3 fathers). Since gender can influence sibling dynamic, we sought to comprise a sample with the full

range and balance of older-younger gendered pairings (F-f, F-m, M-f, M-m). In order to minimize variability due to age differences, we chose pairs consisting of younger siblings who were either 6 or 7 years old, and older siblings were either 9 or 10. Thus, all sibling pairs had a three or four year difference in age. We chose this age difference because we believed the corresponding differences in literacy abilities might provide the most opportunity for siblings to learn from each other. Although parents often play an important role at home, we wanted to observe children outside the presence of their parents, in part because we knew from experience that parents often feel the need to manage their children's behavior in front of researchers. However, after play sessions we also interviewed parents about their role in their children's play at home, and include this in our findings.

We chose popular games that represent a variety of archetypal play patterns. Because we wanted to observe whether or how scaffolding could take place, we also chose games that included a literacy component at a level just above the younger sibling's abilities, but within the ability level of the older sibling. We selected a wide variety of gaming paradigms – including a board game, console game, handheld game, and even pencil and paper game – to understand how these paradigms change gameplay. The games included the following:

• *Hangman* is a classic pen and paper decoding game in which one player must guess a word or words that another has chosen by guessing letters. Incorrect guesses are represented by the marking of body parts on the man for each letter, until the man is "hanged." Gameplay ends when a player correctly guesses the word(s) or makes too many incorrect guesses and the man hangs. This game was the most familiar to the children, and all participants had played it before.

• *Upwords* (Fig. 1) is a board game that is similar to the popular (and more adult) Scrabble board game. Players create words by placing letter tiles on a board, building next to or on top of existing words on the board. Players receive points for letters in a word, and the win by attaining the most points. However, none of the participants ended up keeping score in our study (which we discuss later).

• *Scribblenauts* (Fig. 2a) is a handheld game for the Nintendo DS. Like many handheld games, it is meant for single play. A player navigates the character "Max" through different levels and solves puzzles, in part by conjuring objects to use in the world by typing them into the interface. When a puzzle is solved, Max receives a star and points are accrued, unlocking additional levels. Even though this game is designed for single play, it is possible for more than one child to work together. It also represents a common gaming setup among siblings in families who often have a single shared device.

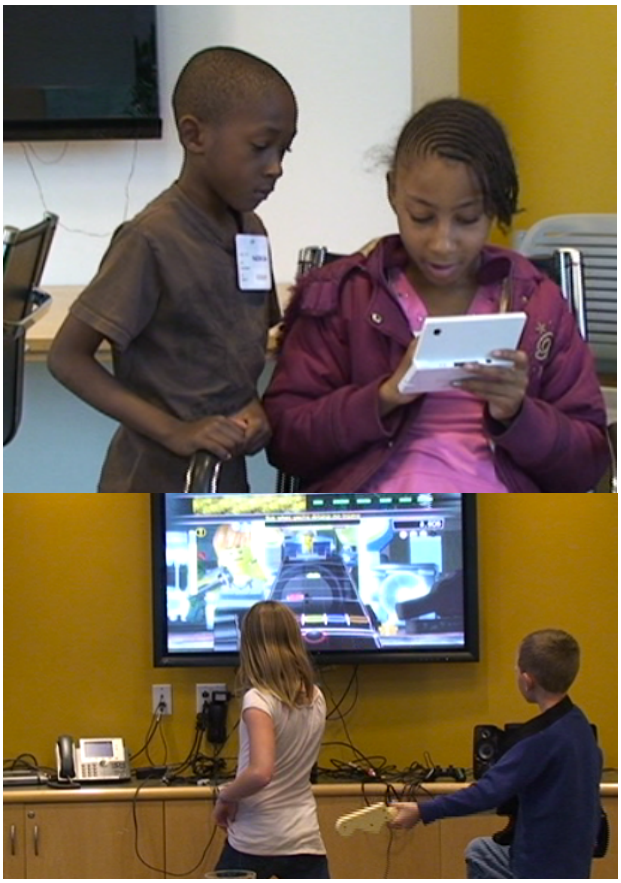

Figure 2. Play sessions: (a) Younger brother looks over his sister's shoulder as she plays Scribblenauts on the Nintendo DSI. (b) Older sister and younger brother play Rock Band.

• *Rock Band* (Fig. 2b) is a popular multi-player console game in which the interface takes the form of popular rock instruments. Each player chooses one instrument to play and scores individual points for hitting correct notes (e.g. on the guitar) or singing at the correct pitch and volume (on a microphone). Players must hit the notes in the proper timing while the notes stream across the screen. To simplify our study, only the guitar and microphone were made available. The singer role relies on a literacy skill element, since the singer follows music lyrics on the screen.

Participants played each game in our lab (Figures 1 and 2) in the order listed above. Each game play session lasted approximately fifteen minutes. If siblings did not know how to play a game, the researcher explained the rules and answered questions as necessary, but otherwise attempted to assume the role of passive observer whenever possible. In cases where siblings engaged in conflict or otherwise monopolized game play, the researcher allowed them to continue without mediation. At the end of a session, if a sibling had not been given a turn to play a game or was otherwise left out of game play, the researcher would ask that they be given an opportunity to play.

Parents were interviewed in a pre-screening phone call about the games their children played and more generally about their playing habits at home. A more extensive semi-structured interview was conducted with parents following play session observations. In this interview, we asked about patterns of play at home and followed up on important observations noted during the study. In most cases this interview was conducted with one parent who would be considered a primary caregiver (5 mothers, 2 fathers). In one case, both parents (mother and father) were interviewed together. Siblings were present during these interviews and sometimes contributed to their responses.

All play sessions and interviews were videotaped and transcribed for both verbal and nonverbal behaviors. Transcripts were then inductively coded for behaviors, beginning with an open coding scheme that was guided by initial research questions. Thus, we were originally oriented toward behaviors related to scaffolding among siblings (in the hopes of understanding possible influencers across the different games), including coding categories such as "helping", "conflict over resources", and "correcting". Codes were subsequently categorized according to emergent themes, forming the basis for the findings presented below.

FINDINGS

We found that sibling dynamics sometimes exerted a primary influence over how sibling pairs played different games together, more than the games themselves: siblings' dominance, competitiveness or cooperativeness, and particular roles were often exhibited across play session for every game played. However, some game elements influenced sibling play in circumscribed ways, sometimes allowing for more or less scaffolding, or mitigating conflict. In the next section, we offer two case studies to illustrate the arc of the play sessions we observed, and to sensitize readers to the findings that follow.

Sibling Dynamics: Case Studies

Tyler and Aaron[1]: Competitive Brothers

The dynamic observed between Tyler (9 years old) and Aaron (7 years old) could best be described as both competitive and antagonistic. Tyler, an extremely dominant older sibling, constantly orders his brother around. He often controls the situation to do what he wants, and rarely accommodates his brother's desires or his participation. Although the younger sibling, Aaron is anything but complacent in asserting his own will. With an ever-present antagonism, every game they play feels like it involves some kind of battle.

Even though they reportedly play Hangman at home together, their session is less about play than Tyler telling Aaron what to do. He impatiently directs Aaron at each guess, issuing curt directives like "Go" and "Hurry!" He provides no feedback other than "Nope. Guess another letter." During one round, Tyler gives him a mere three guesses before pronouncing, "You killed the man. My turn." When it is his turn to guess, Tyler takes an unusual approach. He draws out his own set of blanks to guess and proceeds to spell out the word *of his own choosing*, while having Aaron write down the letters. In the end Aaron refuses to play. He declares, "I give up because you keep on playing," indicating that Tyler has essentially been playing without him. Unfazed, Tyler pronounces that he will play by himself.

During Upwords, Tyler expresses impatience with Aaron when he places letters that do not spell a word: "What does that spell? That ain't a word." He avoids conflict and leaves Aaron's letters in place, but does not bother to correct or help him. The game eventually devolves to a point where instead of taking turns, Tyler and Aaron race to put down letters, sometimes pushing each other out of the way.

When it's time to play Scribblenauts Tyler says, "I call first!" and immediately takes hold of the Nintendo DS. Aaron throws himself on the floor in a tantrum. Finally standing up, Aaron makes a point of not watching Tyler play. At the researcher's suggestion that he help his brother, Aaron starts to look at the game screen, then walks away saying, "I know how to play the game but I can't help him… He knows how to play by himself." After switching turns at the researcher's request, Aaron struggles with the game. In one moment, he seems to look for help, asking his brother a question. But when Tyler approaches to take a look, Aaron taunts him by offering him the DS, then quickly pulling it away. Unable to figure out how to move an object in the game, Aaron quickly loses interest and gives up. Tyler takes the game back.

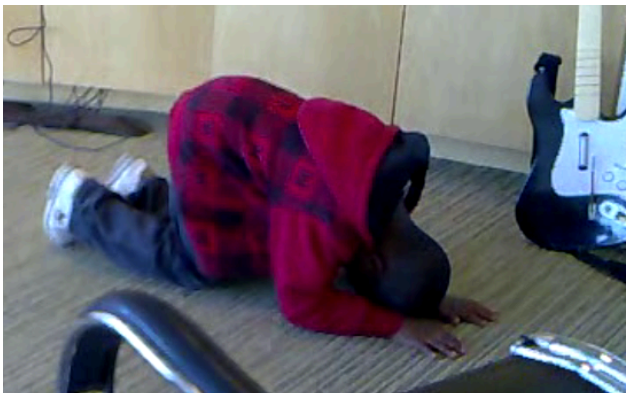

Figure 3. A younger sibling throws himself on the ground in protest to his brother monopolizing play.

In Rock Band, Aaron is excited to sing on the microphone and Tyler is happy to play guitar. Tyler does all the work of picking their characters and choosing a song, while ignoring his brother's requests. Aaron protests with shouts of "No!" and "Oh come on!" at Tyler's choices. As the song starts, Tyler yells commands to his brother: "Don't sing yet. Now. Sing. SING!" He grabs the microphone

[1] *All participant names have been changed.*

away, but Aaron eventually takes it back, asserting, "I want to do it." Although they both initially enjoy playing the game, Aaron eventually asks to play the song that he knows how to sing. He is repeatedly ignored. At the end of one of the songs, Aaron laments, "I lose." He begins to "act out", pushing Tyler's chair and turning up the volume, and eventually asks the researcher if they can play a different game.

In the follow-up interview, the boys' mother shares her insight into their relationship, actually attributing the pattern to her younger son's competitive streak:

They're really competitive. Aaron is more competitive than Tyler. Aaron always wants to win. And then when Aaron wins he rubs it in your face. But then when Aaron loses, he cries and Tyler will laugh at him.

She remarks how this competitiveness often extends to games that are supposed to be cooperative:

Like video games. If it's a two-player game and they're playing together and one's fighting the other one, [but] it's supposed to be ***together*** *fighting something else. They'll not get along…*

She also shed light on a deeper dynamic in their relationship that she believed contributed to their competitiveness:

They may act like they don't like each other but they are inseparable… Aaron really looks up to Tyler.

Talaysia and Jarell: Non-competitive Playmates

For a younger sibling, Jarell seems somehow older and more of an equal to his older sister, compared to some of the other younger siblings we observed. Their relationship can be characterized as a meeting of equals who manage to peacefully coexist, and seem to genuinely enjoy each other's company. Even though Talaysia maintains a degree of control over activities as an older sibling, she never plays the teacher role and rarely shows impatience with her younger brother.

During their Hangman session, Talaysia and Jarrell smile quite a bit, expressing their enjoyment. In hangman, Talaysia allows her brother more guesses by continuing to draw more features on the hangman. They both enjoy teasing and challenging each other, as if it adds fun to their game. At some point when Jarell shares his discouragement at having trouble guessing the final letters of a word, Talaysia gives him progressive hints to help him. During Talaysia's turn to guess, Jarell smiles as much when she guesses correctly as when she gets it wrong. In the end when Talaysia is stuck, he also helps her with a hint.

During Upwords, the two take an unorthodox approach to play, at first making words collaboratively. Each puts down one letter at a time, and they build words together. When Jarell puts down letters that don't make a word, Talaysia starts to benignly question, but doesn't correct him or disallow the move.

During Rock Band, Talaysia wants to sing at first, then after two songs tells Jarell to switch. They both smile often, and neither seems to pay attention to the score.

Their Scribblenauts session is the least oriented around co-play, though devoid of conflict. Jarell calls, "I go first!" and says he wants to play by himself. Talaysia calmly acquiesces and leaves him to play on his own. When Jarell gives up the game because "it's too hard," Talaysia takes over while he watches over her shoulder and calls out suggestions. She ignores most of them, but talks out loud about what she's doing, as if broadcasting for him to hear.

In the parent interview, Talaysia and Jarell's mom reflects that "they do pretty well together" and infrequently fight.

The juxtaposition of Talaysia & Jarell and Tyler & Aaron exemplifies the marked contrast between some sibling pairs, as well as the tendency for some dynamics to exhibit persistence across sessions. Although not every sibling pair expressed behaviors to such extremes, dynamics were often more salient than the effects of the different games they played.

These examples also paint a nuanced picture of the many factors at play in their dynamics, including the disparity of sibling abilities. In the case of Tyler and Aaron, Aaron's lack of ability is a constant source of frustration for both siblings, and sometimes exacerbated their antagonism. In contrast, Talaysia and Jarell experience little if any conflict, but also play more as equals who are able to help each other. In the following sections, we highlight some of the salient issues in the play of siblings, including how levels of games discourage co-play, the nature of persistent sibling dynamics, and the success and failure of sibling scaffolding of play.

Game Levels and an Age Divide

As we have seen, one important aspect of young sibling relationships is that the disparity in their abilities can make it difficult to play the same games. In the age range we chose to study in particular, children experience a number of developmental milestones. Their corresponding cognitive, motor, and education abilities can make for a real difference in game play ability and enjoyment. Games are often designed for different levels of player ability, providing just enough challenge to be fun. However, it is rare for a game to strike the exact balance between challenge and fun for siblings of very disparate abilities. We heard from parents that this separation, by levels of games and siblings' abilities, was a critical factor in determining which games siblings played together at home (and whether they played together at all). As one mother observed:

The things they don't really play well with together are I guess the kinds of things that separate them in level." [Mother of SP8]

Another mother reported the dilemma she felt at the store, looking for games to purchase that all her children could

play. She noted a common division in the recommended age requirements of the games popularly found in stores:

And it's unfortunate that there's a break in the games, at like eight [years old] – You can play eight to adult, or three to eight, or four to eight. So eight seems to be the breaking point to me. Where an eight year old can go either way... They start to be able to do logic and problem solving…[The younger daughter] is a lot more linear... [But] Everybody will play Mousetrap. One thing about Mousetrap is it's not one of those games where you really have to strategize or solve. It's a more linear game. [Mother of SP3]

Another result of this "age divide" in games is that games are considered to be predominately "for" specific children. For example, one family explained that the older child had their DS, and the younger had their LeapPad. Console games and some board games were also often considered the domain of the eldest sibling. Additionally, older siblings sometimes saw their younger siblings' games as too infantile, describing them as "for babies".

The fact that children play their own games according to their level is a natural extension of a real difference in children's physical and cognitive abilities, but the consequence is that many children's games aren't actually played together. We consider this gap an especially relevant opportunity for designing for siblings. In order to create games for siblings, designers will need to pay particular attention to how games accommodate players of very different levels of ability.

Sibling Scaffolding

On the other hand, one can also imagine that a difference in abilities can also be advantageous, if more experienced siblings are able to help their less experienced siblings during play, and scaffold them beyond their abilities [23]. In many ways, siblings were extremely adept at scaffolding each other. They were good at choosing levels of play that were appropriate to each other's abilities, and sometimes provided help when the other encountered difficulty.

At times, we witnessed how different aspects of each game enabled scaffolding or hindered it. In Hangman, some older siblings chose words to be easy to guess (e.g., each other's names or words with few letters) and increased the difficulty with their younger siblings performance. As we saw in the example of Talaysia and Jarrell, both siblings provided progressively helpful hints and extra guesses. In Hangman, siblings exercised flexible control over the game, and this allowed them to accommodate each other's abilities.

Although Scribblenauts was a common source of conflict and often resulted in solo play, the multiple-input interface enabled certain kinds of scaffolding. The touch screen, stylus, and buttons, which serve redundant functions, allowed siblings to help by reaching in to spell a word, or moving the character while the other sibling continued to "drive" and maintain control over the device. This worked to a point; sometimes older "helpful" siblings felt compelled to take over the device, resulting in conflict. Similarly, some coaching occurred with one sibling looking over the shoulder of another. However, the small screen size made actions somewhat difficult to see.

Possibly due to rule complexity and lack of system guidance, Upwords seemed to pose the most difficulty for siblings. Younger siblings who were normally capable of spelling sometimes struggled with generating words from the set of letters they had drawn. Older siblings were at a loss to help them, since it required seeing the other's letters. (This sometimes caused the younger sibling to protest their "cheating".) Some siblings applied ineffective (and frustrating) helping strategies; One sister suggested random letters that she knew would make words on the board, rather than starting with the letters that were in her sister's possession. This was a case where enforcing the game rules (i.e. keeping letters hidden from one's opponent) exacerbated the difficulty of the task. Yet helping the other ultimately meant playing for them, and disrupted the point of the game. It is interesting to contrast Upwords with Hangman, in which siblings were able to help each other without playing for them or taking over.

In Rock Band, some younger siblings struggled with the physical coordination necessary to play the guitar, and with reading or knowing the lyrics. Older siblings were usually the one to take the controls, set up characters, and choose songs. They often helped by choosing easier levels for their younger siblings to play. However they did not always want to choose songs that were within their younger sibling's ability, since that affected their own enjoyment. Although many sibling pairs enjoyed playing, once play started, the combination of high engagement and fast parallel play left little opportunity or motivation for helping. In contrast to other games that do not feature fast-paced parallel play, Rock Band leaves little room for in-play scaffolding. Some siblings tried multi-tasking, struggling to help the other sing into the microphone while trying to maintain their role as guitar player (and vice versa).

It is worth noting that when siblings play together, it is often in the presence of parents or other family members, and thus parents often take the role of scaffolding. Some parents reported that sibling game play benefited from their support through a culture of playing together as a family, and at least one family participated in a weekly "game night." Parents stated that during family game play, they were able to scaffold their children's abilities (often through team play), and that children were motivated by the chance to play with parents. However, what siblings were able to play with parents was not the same as what they were able to play by themselves. For instance, an older sibling was able to play a card game with his parents, but would not be able to scaffold that by himself with his younger sibling.

In general, if siblings were willing to help, it could not overly interfere with their enjoyment of the game. Most older siblings who took the time to scaffold their younger siblings showed diminishing motivation as play sessions continued. Even for the most inclined of siblings (such as those who enjoyed playing the role of teacher), helping often seemed to conflict with their own enjoyment of the game. Another aspect of sibling scaffolding was that older siblings were not always in a position to provide correct information to their younger counterparts, sometimes spelling words incorrectly or providing incorrect interpretations of game rules. This does not mean that siblings can never scaffold each other's play. However, it is a reminder that their burden must be balanced against their ability to enjoy the game, and that the help they provide may be imperfect and require its own scaffolding. Another challenge for designers is how to balance system flexibility against the facilitating role it plays in rule enforcement, monitoring correctness, and scoring

Sibling Dominance and Conflict

One common pattern of interaction that we observed was the tendency for one sibling to take a more dominant role during sessions, taking more control of the direction and flow of activities. Reflecting previous findings in the literature, most of the time the dominant sibling was the elder. However, in one interesting case, it was a younger sister who was very assertive of her needs and gave direction for activities, while her older brother usually deferred.

Dominance could be double-edged. It could be used to efficiently direct activities or scaffold to everyone's benefit. (For example, an older sibling assuming the role of "teacher" involves a form of dominance.) However, a dominant sibling might also exclude the other's meaningful participation. In the case of one sister-sister pair, the dominant older sister enacted both sides, alternately playing the patient teacher and the insensitive tyrant. Her mother observed:

I don't know if you noticed but she's [the older sister's] bossy. Yeah she helps her a lot. She'll say, "Wait, Maya. Let me show you, Maya." And Maya wants to try to do something all by herself. [Mother of SP6 (f-F)]

One highly dominant sibling might work to build consensus, while another might assert their will, ignoring that of their partner. (If a younger sibling refused to accept this arrangement it usually ended in conflict.)

Sources of Conflict

One of the largest sources of conflict among siblings was turn-taking. which typically involved a limited resource in a game. Not surprisingly, this usually meant struggles over the Nintendo DS, but also occurred when choosing instruments in Rock Band. One mother commented how turn-taking was such a common source of conflict that she wished for a built-in feature to mediate it:

If you had a game that had a built in timer and would stop and tell them to switch players… It would solve lots of arguments for the game to say "ok time to switch players…." It would sure make my life easier.

One mother reflected on how limited resources led to a basic lack of sharing:

That's the biggest thing, is that we don't have multiples. There's not two computers to play. Two iPods to play. There are two DS's, but there aren't two of the same game. It tends to be that someone's playing something and neither wants to play along too. So there's a lack of sharing… [Mother of SP3]

Another common source of conflict was found in accusations of cheating. Interestingly, this sometimes was simply a consequence of a younger sibling who, not knowing how to spell or perhaps not knowing the rules of the game, tried to play as they could:

That ain't no word. She don't know how to play. She's a cheater. [Older sister, SP6]

This kind of conflict occurred only during Hangman and Upwords, where it is the players rather than the system enforcing the rules.

Parents spoke of strategies for dealing with and avoiding these kinds of conflicts, which they felt were part of their daily lives. Some used pre-emptive strategies such as forced turn-taking. Others motivated siblings to work things out on their own by threatening to take away play privileges if they could not resolve their conflict.

[I say] stop. Play turns. Or get off of it. [Mother of SP8 (m-M)]

Although one can argue that conflicts among siblings are a normal part of family life, these findings raise questions around how a system can avoid or mediate conflict, for example, by enforcing rules or enforcing turn-taking. And while one can surely observe both dominance and conflict among some peer groups, in our observations, it tended to be more intense and pronounced than what is generally reported for peer groups.

Cooperative and Competitive Stances vs. Game Modes

Echoing Voida et al's observations around group-oriented behavior, we found that siblings sometimes assumed competitive or cooperative stances in games that were not aligned with the way the game was intended. Furthermore, different sibling pairs sometimes played the same games in very different ways. In Rock Band, for instance, some siblings focused on their relative scores, appearing to orient to the game competitively. However, others seemed to ignore the score feature entirely and celebrated their performance as a team:

Younger sister: *Ok so let's rock n roll…Ok everyone… Ladies and gentlemen, meet the rock n roll band.*

Older sister: *We about to rock on. […]*

Younger sister: *Ladies and gentlemen, please welcome…*

Older sister: *The best rock and roll team in the universe!*

Younger sister: *We'll call it the rulers of the world…*

Older sister: *Woohoo!* [SP6]

We have already described other examples of these different orientations. In Upwords, some siblings took turns laying down one letter at a time, building words collaboratively, and in Hangman many siblings helped their "opponent" arrive at the answer with extra hints and leniency. Some siblings were more competition-oriented, paying attention to scores or whether they "won" or "lost". As we saw earlier, Tyler and Aaron reportedly turned a collaborative video game into a competitive conflict. Still other siblings were neither cooperative nor competitive, but rather indifferently engaged in parallel play or playing alone. For most siblings these patterns appeared to be established pattern of mutual preference and habit, perhaps deriving from parent strategies for managing conflict at home. ,The takeaway is that external social dynamics can indeed be more important than the internally derived interactions dictated by the rules of a game, and this is especially true for siblings.

"You always win": Sibling Identities around Knowing and Competency

We found that siblings assigned identities to each other as well as to themselves according to their perceived abilities. For example, one sibling exclaimed, "We're good at this game!" when he guessed a word easily during Hangman. As his sister increased the level of difficulty and he experienced difficulty with a word, he whined, "Aw, I'm a bad guesser." These kinds of attributions were common during play sessions, seemingly stemming from longstanding assumptions of each other's abilities, yet continually negotiated and provoked by events in the game.

One older sister frequently resorted to name calling with her younger sibling:

Older sister: *You gotta fill in the eyes, dummy.*

Younger sister: *I ain't no dummy. That ain't nice to call someone dummy.* [SP6]

It worked both ways, however, as the younger sister was just as critical of the elder's abilities:

Younger sister: *Alice, you don't know how to spell ladder.*

Older sister: *I don't know.*

Younger sister: *Alice, you're 10. And you don't know how to spell!* [SP6]

Such attributions were an indication that these identities are always at play, especially for siblings. In some cases, assumptions about a sibling's ability interfered with game play, such as when a sibling did not trust the other's abilities in Hangman:

Older sister: *Is it 'want'?*

Younger brother: *No*

Older sister [not convinced]: *Michael, is it 'want'?*

Younger brother: *NO. You want me to give you a hint?*

Older sister: *Dude, you spelled the word wrong anyways.*

Younger brother: *No I didn't!* [SP1]

Another thing we did not anticipate in our study was how discouraging it would be for younger siblings to play only games where they were never as able as their older siblings. Many younger siblings became visibly upset over time or lost motivation to continue play. It was a reminder that even if a game can be designed for younger siblings to be scaffolded beyond their abilities, it should be sensitive to the implications of these kinds of attributions. For example, such a game might be designed to highlight a younger sibling's contribution rather than simply calling attention to their deficiency. The way a system attributes achievement and abilities matters, because over time it feeds into identities that are already at play among siblings.

DISCUSSION

Our exploration has suggested a number of directions for designing games for siblings to play together. First, the difference of ability is critical at these ages, and popular leveling of games is a barrier to siblings playing together at all. For siblings to play together, we must find ways to design games that balance their play at different levels, while still providing enough challenge to be fun. One success of Rock Band was that siblings were able to play their role at their own level without drawing too much attention to those differences. Another consideration is how different types of play might be more conducive to accommodating disparate abilities. Informally, we observed and heard from parents that if siblings played together it was more likely to involve creative play. We noticed with Scribblenauts, which involves creative problem solving, that younger siblings were sometimes able to provide an equally valuable contribution (whether or not it was recognized). For instance, a sibling may not have known how to spell a word, but they were able to generate ideas around what objects to create or how to "solve" the puzzle.

We also found that conflict and dominance can be more intense and common for siblings. In anticipation of these dynamics, we can design systems that balance or leverage sibling dominance, and avoid common sources of conflict, such as resource scarcity. For instance, everyone should have their own controller, their own role, and equal view into the system. A system can also play the role as moderator, for example, by enforcing turn-taking. To minimize conflict over cheating (real or imagined), the role of rule enforcement should be offloaded to the system rather than the players.

Another area for consideration is how a system can best support scaffolding of players. In some instances, it was the *openness* and *flexibility* of the system that allowed for

siblings to scaffold each other (e.g., being able to show leniency or give hints in Hangman. Sometimes the "rules" of the game made it impossible for scaffolding to occur, as in Upwords where helping required knowing the other player's letters. Thus, to support scaffolding, systems should afford flexibility for players to adjust for each other's abilities or even bend the rules. For example, a game might allow players to take actions back, or to pass resources from one player to the next. ("I need an 'e' to spell this word I know.")

We also learned that the same level of game that a sibling is able to play may not be one they can scaffold. Similarly, a game that can be played together as a family may not be playable by siblings alone. Thus the system needs to anticipate these breakdowns as a function of the group, rather than at the level of individual players. Another implication is that even if siblings are able to scaffold each other, they may not be motivated to do so if it interferes with their enjoyment of a game. We also saw with Rock Band that children are unable to take on a scaffolding role if they are not given space to do so within game play.

Another finding was that siblings tend to exhibit distinct and established identities around *knowing* and competence relative to each other. We observed that any event in game play both reflects on and is influenced by these identities. Older siblings, defending their identity as the more competent one, were reluctant to make or admit mistakes. Younger siblings, discouraged by their inferiority, lost a sense of fun and no longer wanted to play. This seemed like a particularly pronounced phenomenon in our observations of siblings, compared to what might be expected for peers. Researchers who have studied social comparison and identification (and de-identification) among siblings have implicated its role in self-esteem and its influence on behaviors [30]. If games ultimately reinforce ongoing epistemic identities, how can they be designed to support different levels of play without having that understood as levels of deficiency? We saw in Rock Band that players set their characters at different difficulty levels, without invoking comparison. It was also understood by siblings that it was normal to have different abilities based on their different ages. This suggests that it was not so much lower levels of play that communicated deficiency as much as relative scores and failures. One potential direction is to design performance indicators that communicate scores relative to age. Another promising tactic is to have the system adapt with *minimally perceptible* assistance or handicaps, to balance players' skill levels (as exemplified in [4]).

Finally, our findings also suggest that the existing patterns of siblings in relationship can sometimes exert an equal if not greater influence than the designed interaction of the game. Our findings echoed those of Voida et al. on the disconnect between game design and the group dynamics they observed:

In fact, some of the most group-oriented practices we observed occurred in a group that was playing a competitive game. And some of the most individual-oriented practices we observed occurred in a group that was playing a collaborative game. [32]

In our case, we not only observed this discrepancy, we also noted that patterns of competition, dominance, and roles sometimes persisted for siblings across different games. While this might hold true for any group relationship where individuals develop a collective history of relating, take on roles, and ascribe identities to each other, we argue that for siblings this is particularly applicable. This study has implications not only for the design of sibling games, but for the study of group gaming behavior in general. For example, when we evaluate a game for cooperation (as performed in [26]), we often draw on small participant samples that include peers as well as siblings. However, siblings and peers are not equivalent. Further, sibling pairs may exhibit especially strong biases toward competitive or cooperative behavior. There are several possible approaches to balancing for skewed results, including observing baseline behaviors, using self-report questionnaires (such as developed in [14]), or relying on parent reports. We found that parents' description of sibling dynamics exhibited remarkable fidelity to those that we observed. Thus surveys to be used with parents, such as those used in [9], where parents characterize the amount and intensity of children's conflict, might be a promising area for development. In any case, siblings must first be understood as a specialized type of peer group.

CONCLUSION

In this work we have presented considerations for designing for siblings as a user group, as well as implications for game research and evaluation. Many investigations take as an implicit assumption that the *designed* interaction of a system is the major determinant of the group-oriented dynamics around game play. However, as we have seen, there are benefits in examining how externally derived social dynamics influence game play. In future work we intend to compare sibling play to peer play to investigate the extent to which they are different.

ACKNOWLEDGMENTS

We would like to thank the sixteen brothers and sisters and their families who participated in this study. We also thank Glenda Revelle, Lori Takeuchi, Morgan Ames, Daniela Rosner, and Jofish Kaye for their kind feedback, and the rest of the Nokia IDEA team.

REFERENCES

1. Abramovitch, R. and Corter, C. Sibling Interaction in the Home. *Child Development 50*, 4 (1979), 997-1003.
2. Abramovitch, R., Corter, C., and Pepler, D. Sibling and peer interaction: A final follow-up and a comparison. *Child development 57*, 1 (1986), 217.
3. Azmitia, M. and Hesser, J. Why Siblings Are Important Agents of Cognitive Development: A Comparison of

Siblings and Peers. *Child Development 64*, 2 (1993), 430.

4. Bateman, S., Mandryk, R.L., Stach, T., and Gutwin, C. Target assistance for subtly balancing competitive play. *Proc. CHI '11*, ACM Press (2011), 2355.
5. Benford, S., O'Malley, C., Simsarian, K.T., et al. Designing storytelling technologies to encouraging collaboration between young children. *Proc. CHI '00*, ACM Press (2000), 556-563.
6. Brody, G., Stoneman, Z., and MacKinnon, C. Role asymmetries in interactions among school-aged children, their younger siblings, and their friends. *Child Development 53*, 5 (1982), 1364.
7. Brush, A., Inkpen, K.M., and Tee, K. SPARCS: exploring sharing suggestions to enhance family connectedness. *Proc. CSCW '08*, ACM (2008), 629–638.
8. Dalsgaard, T., Skov, M.B., Stougaard, M., and Thomassen, B. Mediated intimacy in families: understanding the relation between children and parents. *Proc. IDC '06*, ACM (2006), 145–152.
9. Deater-Deckard, K. and Dunn, J. Sibling Relationships and Social-emotional Adjustment in Different Family Contexts. *Social Development 11*, 4 (2002), 571-590.
10. Ducheneaut, N., Moore, R.J., and Nickell, E. Virtual "Third Places": A Case Study of Sociability in Massively Multiplayer Games. *Computer Supported Cooperative Work (CSCW) 16*, 1 (2007), 129–166.
11. Dunn, J. Sibling relationships in early childhood. *Child Development 54*, 4 (1983), 787–811.
12. Dunn, J. Brothers and sisters in middle childhood and early adolescence: continuity and change in individual differences. In *Sibling relationships: Their causes and consequences*. Ablex Publishing, 1996, 31-46.
13. Follmer, S., Raffle, H., Go, J., Ballagas, R., and Ishii, H. Video play. *Proc. IDC '10*, ACM Press (2010), 49.
14. Furman, W. and Buhrmester, D. Children's Perceptions of the Qualities of Sibling Relationships. *Child Development 56*, 2 (1985), 448-461.
15. Gregory, E. Sisters and Brothers as Language and Literacy Teachers: Synergy between Siblings Playing and Working Together. *Journal of Early Childhood Literacy 1*, 3 (2001), 301-322.
16. Hutchinson, H., Mackay, W., Westerlund, B., et al. Technology probes: inspiring design for and with families. *Proc. CHI '03*, ACM (2003), 17–24.
17. Kirk, D.S., Izadi, S., Sellen, A., Taylor, S., Banks, R., and Hilliges, O. Opening up the family archive. *Proc. CSCW '10*, ACM (2010), 261–270.
18. Lamb, M.E. The development of sibling relationships in infancy: A short-term longitudinal study. *Child Development 49*, 4 (1978), 1189–1196.
19. Lindley, S.E., Harper, R., and Sellen, A. Designing a technological playground. *Proc. CHI '10*, ACM Press (2010), 2351.
20. McConnell, D. *Implementing computer supported cooperative learning*. Routledge, 2000.
21. Nardi, B. and Harris, J. Strangers and friends: Collaborative play in World of Warcraft. *Proc. CSCW '06*, ACM (2006), 149–158.
22. Oden, S. Sibling and peer influence on play. In D. Fromberg and D. Bergen, eds., *Play from birth to twelve: contexts, perspectives and meanings*. CRC Press, 2006, 297-307.
23. Rogoff, B. *Apprenticeship in Thinking: Cognitive Development in Social Context*. Oxford University Press, USA, New York, 1991.
24. Roschelle, J., Rafanan, K., Estrella, G., Nussbaum, M., and Claro, S. From handheld collaborative tool to effective classroom module: Embedding CSCL in a broader design framework. *Computers & Education 55*, 3 (2010), 1018-1026.
25. Salen, K. and Zimmerman, E. *Rules of play: Game design fundamentals*. MIT Press, 2004.
26. Seif El-Nasr, M., Aghabeigi, B., Milam, D., et al. Understanding and evaluating cooperative games. *Proc. CHI '10*, (2010), 253.
27. Stevens, R., Satwicz, T., and McCarthy, L. In-game, in-room, in-world: Reconnecting video game play to the rest of kids lives. In K. Salen, ed., *The Ecology of Games: Connecting Youth, Games, and Learning. The John D. and Catherine T. MacArthur Foundation Series on Digital Media and Learning*. The MIT Press, 2007, 41-66.
28. Stoneman, Z., Brody, G., MacKinnon, C., and Url, S. Naturalistic Observations of Children's Activities and Roles While Playing with Their Siblings and Friends. *Child Development 55*, 2 (1984), 617-627.
29. Szentgyorgyi, C., Terry, M., and Lank, E. Renegade gaming: practices surrounding social use of the Nintendo DS handheld gaming system. *Proc. CHI '08*, ACM (2008), 1463–1472.
30. Tesser, A. Self-esteem maintenance in family dynamics. *Journal of Personality and Social Psychology 39*, 1 (1980), 77-91.
31. Voida, A. and Greenberg, S. Wii all play: The console game as a computational meeting place. *Proc. CHI '09*, ACM (2009), 1559–1568.
32. Voida, A., Carpendale, S., and Greenberg, S. The individual and the group in console gaming. *Proc. CSCW '10*, ACM (2010), 371–380.
33. Yarosh, S. and Abowd, G.D. Mediated parent-child contact in work-separated families. *Proc. CHI '11*, ACM (2011), 1185–1194.
34. Zagal, J., Rick, J., and Hsi, I. Collaborative games: Lessons learned from board games. *Simulation & Gaming 37*, 1 (2006), 24-40.