
Video Play: Playful Interactions in Video Conferencing for Long-Distance Families with Young Children

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Abstract

Long-distance families are increasingly staying connected with free video conferencing tools. However research has highlighted a need for shared activities for long-distance family communication. While video technology is reportedly superior to audio-only tools for children under age 7, the tools themselves are not designed to accommodate children's or families needs. This paper introduces games for intergenerational families to play with young children during a video chat. We build on research in CSCW and child development to create opportunities for silliness and open-ended play between adults and young children. Our goal is to create a space for shared activities that scaffold interaction across distance and generations.

Keywords

Family Communication, CSCW, Video Conferencing, Games, Children, Play

ACM Classification Keywords

H.5.2. Information interfaces.

General Terms

Design, Human Factors

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Introduction

Recent reports [1, 2] document the uptake of free video conferencing tools like Skype™ among geographically distributed families. Video chat is superior to audio-only phone calls for a number of reasons. First, video seems to be a better match to young children's developmental stages. Especially for children under age 5, the visual nature of video allows young children to show their ideas. Children may stand on their heads to demonstrate a new skill, hold up an artwork to share it, or make silly faces to play together. Further, young children who use the telephone often require a high level of prompting and scaffolding from adults, seemingly from lack of experience [2]. While the same seems to be true in video conferencing, the shared nature of video conferencing allows adults to more easily support and help young children in connecting with distant family members.

People connect with children (whether close or far) through *play*, rather than *conversation*, and the motivation of our work is to support families to play with children over a distance. Recent research in family communication over a distance [1] refers to families who play as a means to strengthen the emotional bonds and relationships. This play tends to be more open ended and improvisational than typical technology games. Silliness and face-to-face interactions are central to families who connect over a distance.

However, even families with regular video chats need to work in order to create ways to connect with young children. In fact, while video is a vast improvement over audio calls for families with children, it is not sufficient, since few families today report sustained interaction with young children over a distance [1, 2]. Even though

video conferencing isn't explicitly designed to facilitate play, families are finding creative ways to play over video conference. Our work strives to build on this and scaffold family interactions over a distance by providing a number of play activities for children and elders to share. In this paper we outline a series of prototypes and a related design framework to spark the creation of shared activities for family video communication.

Related Work

The CSCW community has described existing practices around how families use video conferencing specifically to connect children with distant family members, and documented some benefits compared to traditional telephone calls. In particular it has been noted that children are able to show rather than tell, the group nature of the medium allows for easier adult scaffolding of conversations, and that relatives are motivated by the chance to see their younger family members [1].

A number of projects from HCI research have focused on new ways to leverage video conferencing technologies in the home environment. Work like ClearBoard [4] that focuses on face to face interaction presents one example of how open-ended basic activities like collaborative drawing can support relationships over a distance. Technology probes [3] addressed how always-on video links could connect distant families, and Sharetable [8] suggested the opportunities for shared activities like playing board games over video conferencing.

Exertion interfaces have explored similar themes of social interaction and connection through remote play. Break out for two [5] demonstrated that partners who play full-body sports together over a distance are more

likely to connect emotionally and socially than with a mouse. We build on their concept of using a shared activity and do engage children's full bodily movement in some situations. Our work differs from exertion interfaces in that our central design principle is not "exertion" per se, but rather "shared activities" over video conferencing.

The general trend towards more full-body interactions leveraged in systems like Nintendo Wii and Sony Eye-toy may be more appropriate for children than GUI methods, and the Wii's success among the young and old highlights this medium's strengths. Our goal is to optimize for interpersonal relationships rather than addictive game mechanics, for example by creating games that can only be played with another (remote) player.

Other projects are addressing the needs for shared family activities over a distance. Family Story Play addressed shared activities over video conferencing through a system that enabled remote families to read together over a distance [7]. Similar to this work, we build on creating a playful shared activity over video chat, although we are working towards scaffolding more spontaneous and simple game-play.

Motivation and Hypothesis

This work is motivated by the question, "how can families play together over a distance?" Our hypothesis is that different kinds of shared activities can help scaffold families' play, and this paper reports on a three preliminary games created specifically to promote family togetherness during a video chat. Unlike typical video games, Video Play is intended to support open ended play and collaboration among the young and old.

While players may be motivated to play through extrinsic goals like "finding something red," their intrinsic motivation in the games is not to win or reach the end, but rather to connect with one's partner through a shared play activity.

Design Principles

Our early designs are guided by a number of principles related to families, social interaction, and technology design.

Build off of Existing Play Patterns. Leverage classic toy and game designs that relate to children's - and adults' - interests at stages of development. *Create a Shared Context.* Game designs should provide means to share an activity and thus envision the context of the remote player. For example, two players may see an identical view of the game. *Provide Scaffolding for Conversation.* For example with conversation tips that prompt adults with age-appropriate content. *Limit On Screen GUI Interaction.* Leverage existing technologies like GUI's where appropriate, but focus on full body interactions and physical play that is intuitive to children and novice computer users. *Highlight relationships through open-ended play.* Following the strategy of basic children's materials, we pursue open ended play, because open-ended game mechanics can allow the players to share their thoughts, desires and emotions through their play.

Video Play

Find It

Find It is an interactive game for an adult and child 1.5 to 6 years old. The goal is to find an object that has a certain property and share it with the other party. The players are presented with a simple GUI (Figure 1) with



Figure 1. Find It presents simple challenges for children to find objects in their environment.

video conferencing windows and a button for a new "Find It Challenge." If clicked, a new challenge will appear for the literate (adult) players to announce. For example, "Find something Red" or "Find something Silly." Then the other player has to run around the room and find such an item to share. The GUI also features a series of tips, which are interrogative prompts that encourage the adult to create a conversation with the child about the object they have found. "What is it that you have found? What does it do? Who is it for?" The game is designed to be physical and active for the child, to provide shared context in that the objects create a basis for shared context and conversation, and to be extremely simple to understand.

For young children, the adult will likely prompt the child to search for objects and tell stories about them. As children get older, they too may wish to challenge adults to "Find Something Silly," perhaps even racing to see who can find something the fastest, and debate which is the silliest. Our future designs will address supporting these multiple modes of play.

Farmer's animals

Farmer's Animals is a game of digital dress-up in which the players wear digital masks of different animals. The design is inspired by the classic children's toy "speak and say". In our game, a player will click on the virtual toy and watch the arrow turn and stop at a random animal. Face tracking software aligns a mask of that animal to the player's face so that the players can pretend to be the animals together (Figure 2). The goal is to support pretend play and storytelling that is developmentally appropriate for children ages 2-6.



Figure 2. Farmer's Animals uses face tracking to digitally dress up the players.

Similar to Find It, Farmer's Animals includes tips for the adult player, such as "Ask what questions: i.e. What is your favorite animal." Other tips include "Use Character voices," and "Relate back to the children's experiences: Have they ever seen that animal before? Where?" The goal of these tips is to encourage parents and grandparents to engage the children in deeper conversation around the play, and they were modeled after conversation prompts designed to support dialogic reading with young children [6].

In interviewing elders who use video tools, we found that elders need support as much as children. This may range from helping them to overcome self-consciousness about looks and behavior, or remembering how to interact with young children. Farmer's Animals is intended to help address some of these concerns.

Peek-a-boo Portals

While families could easily play ordinary peek-a-boo over video conferencing, we sought to create a magical way to hide and appear in different parts of the video frame. With Peek-a-boo Portals a player can instantly appear in an unexpected region of the screen, or they can uncover a silly or surprising face or object.

A player will grasp a controller with two handles that are connected by a retractable cord. The player will hold the handles up to the video conferencing screen, which will cause the image of her to become very dark. Then, by separating the two handles, she can create a round *portal* into the video frame - of full brightness video - that grows larger or smaller as she moves her hands apart or together (Figure 3). The goal is to maintain the simplicity and mechanic of classic peek-a-



Figure 3. Peek-a-boo Portals uses special controllers to play augmented Peekaboo



Figure 4. Peek-a-boo Portals' special controllers that can be "closed" (top) and "opened" (middle). A retractable string keeps the paddles connected and applies an enjoyable force to open and close them.

boo but add a new dimension of play, suspense and magic with a novel software and hardware system.

Implementation

The Find It and Farmer's Animals prototypes were created using Processing and OpenGL. All prototypes used two cameras attached to the same computer and two monitors that were mirrored to achieve a video conferencing effect. For Peek-a-boo Portals Reactivision fiducial markers were attached to two paper handles which were connected by a retractable string.

Trials with families

We are following a user-centered iterative design methodology which incorporates user input at multiple stages of development. We used formative field research to understand how families use video and have shared conceptual ideas with some of these families. We have also completed preliminary trials with two families (5 users) of Find It and Farmer's Animals, to evaluate the effectiveness of those prototypes at creating engaging conversation and supporting relationships over video. Peek-a-boo portals has not yet been tested.

Two families — one mother with a 5 year old girl, and another mother with two daughters 2 and 5 years old — played with our prototypes in a controlled lab setting. Children and mothers were set in adjacent rooms, communicating through the systems, to approximate use with a distant parent or grandparent.

After a brief overview of how each system worked, the families played with the system. After the session, we conducted an interview with the family to gain insight into their experiences with the systems and prior family

video conferencing experiences. The sessions were video taped and later analyzed.

Results and Future work

Find It seemed to warm up the children well in comparison to Farmer's Animals. Because it encouraged children to explore the space around them they were more active and engaged. The motivation and goal of having to find something seemed to be enough to keep kids wanting to play for much longer than their parents.

Because Find It involved getting up and moving around to find objects, this often resulted in parents not being able to see their children directly and outside of our lab setting this would be even more of a problem. Perhaps a different system, including a portable or wireless camera would be more appropriate so that children and adults could remain in contact. In home environments a co-located parent may also be present which would change the social dynamics.

Farmer's Animals excited children yet they needed more motivation or goal directed play. Children were not able to be encouraged to make up stories about the animals, and parents also did not engage in story telling. After exhausting all the different mask choices there was little interest in the game. This suggests that the interface requires further scaffolding, either in terms of physical action and dramatic play, or in terms of story telling. We are considering including written stories, story prompts, and even cinematic elements that may cast the players as actors in a story landscape.

The existing tips seemed to help parents direct conversation and get the children to open up, especially in the "Farmer's animals" game. In general the tips and

the game play in both games elicited a playful response from the parents, who went further out of their way to act in silly ways than the children. We believe that this playfulness played a roll in loosening the children up and engaging them.

In post interviews parents said they would like to record, playback and organize albums of interactions with their children over the system. They also wanted to create more content with the children as an activity, for example drawing together. We believe that the digital and physical artifacts created from Video Play sessions may become relevant for asynchronous communication and recorded artifacts may help family members to create stronger emotional connections with each other. We are exploring ways to easily create these artifacts within the system, whether pictures, videos, stories or art, and how they can be displayed and shared after they are composed.

Conclusion

Video Play presents early investigations in games to support long-distance family communication. By augmenting traditional video conferencing tools with open-ended play-based games, we are working to support the needs of young and old family members to connect over a distance. Our games are designed to meet the needs of young children ages 1-7 and their adult family members, and provide scaffolding for both children and adults to engage in playful activities and conversation. Results from initial trials show that the games seem to engage both young children and their parents in sustained play, and our notion of parental scaffolding is effective but incomplete. Our ongoing work includes the creation of new games as well as the refinement of existing designs.



Figure 5. After being introduced to the system together (top), a 5 year old plays Farmer's Animals with her mom and 2 year old sister (bottom).

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