StoryMat: A Play Space for Collaborative Storytelling

Kimiko Ryokai and Justine Cassell

MIT Media Laboratory

20 Ames Street, E15-320R

Cambridge, MA 02139 USA

+1 617 253 7211, {kimiko, justine}@media.mit.edu

ABSTRACT
In this paper, we present the design and prototype of StoryMat: a soft interactive play mat that records and recalls children's storytelling activities.

Keywords
collaborative storytelling, recording/recalling story, soft interface

INTRODUCTION
Collaborative storytelling plays an essential role in children's lives. Listening to and sharing their stories and ideas with others are activities through which children make sense of their world, and practice their language skills [3]. And yet, some children (for example, those hospitalized with long-term illnesses) do not have the luxury of co-temporal co-spatial playmates. Meanwhile, while computers are emerging in the world of today's children, there is a lack of computer mediated systems that support children's voices in everyday play, particularly in collaborative contexts. StoryMat is a computer-mediated system to support children's everyday collaborative storytelling, even in the immediate absence of playmates.

STORYMAT
StoryMat offers a child-driven play space by recording and recalling children's own narrating voices and the movements their toys make on a large embroidered cotton mat. For example, Mary tells a story as she moves her stuffed bunny on StoryMat ("Hop, hop, hop... Me, looking my map for the treasure. It say go here..."). As Mary plays, her narrating voice is recorded with the associated movements she makes with the bunny. Later, Rob comes to the mat and tells a story. As he finishes, Mary's story revives on the mat because Rob's story was told at the same place, with the same stuffed bunny. What Rob sees is a projected graphic of the stuffed bunny moving across the mat with Mary's narrating voice. Mary's lively story was recalled on the mat with Rob's story as the trigger. Yet, Mary's story now triggers Rob's next story because now Rob decides to tell a sequel to her story.

Objective
StoryMat was designed to support children's everyday narrative play. Its fundamental function is to be a play space where children can collaboratively tell and listen to their own stories. It is meant for young children who cannot yet easily use computer interfaces that depend on reading and writing. By recording present stories and recalling stories from the past, StoryMat offers more opportunities for children to listen to and interpret each other's stories even in the absence of physical playmates. As a result, a child who plays on the mat by herself can tell her stories as collaborative productions with stories that were told by other children in the same space, just as she might in playing with a co-temporal friend. And a child who plays on the mat with a friend will have more impetus to work on his stories, as the two children begin stories and complete each other's narrative productions. In both cases, collaboration among peers is exploited to foster storytelling on StoryMat.

The Soft/Story-Evoking Interface
Moving towards ubiquitous computing and tangible user interfaces [2] is important, especially as a part of an effort to support children's emotional engagement in computer-based activities. Incorporating soft stuffed toys as an alternative to the traditional monitor and keyboard interface seems to create a more familiar and less intimidating atmosphere for children [1]. StoryMat and its small toys are made with cotton especially to create such a soft interface. Moreover, StoryMat uses the voice and the movements children produce as input, independent of any interaction with a computer. Free from the confinement of typing and the general desktop arrangement, children on StoryMat move around and narrate freely with their toys. By using their body on the mat, children are more focused and make strong personal connections [4] with the stories on the mat.

Figure 1: StoryMat invites children to move around in an underdetermined play world and tell their stories.

In addition to providing a soft, engaging, larger-than-themselves interface, this particular kind of quilt lends itself well for storytelling. Objects sewn on StoryMat are story evoking: paths heading in different directions, trees, houses, and fields of contrasting colors. These objects serve as a kind of "story starter" for children, yet the shapes are underdetermined enough to be transformed into any objects children imagine them to be. For example, a house can be imagined by one child to be a candy shop and another child to be her own home. Children on StoryMat see and hear other children's imaginative creations and become inspired to tell their own stories. Supported by the collaboration between the past and present, children exchange the fruit of their imaginations to further cultivate a place of fantasy for exploring language use and the meaning of the world.

The Interface for Collaborative Storytelling

In StoryMat, children's stories are represented as objects for their collaboration, and children can work with those objects. Each story on StoryMat is made up of the child's narrating voice and a projected moving image of a stuffed toy, which is synchronized to the voice and replicates the exact path the child made with the toy. In spontaneous storytelling play, children often take over each other's verbal and toy-acted stories ("No, no, not like that. Like this!"). Similarly, on StoryMat, a child can easily take over a story to add an alternative ending. Stories being played back on the mat can be stopped at any point by simply putting a stuffed animal over the moving graphic, and a different ending may be narrated by the current player. In this way, stories played back on the mat become more like physical toys/objects, which a child can manipulate to tell his stories with.

The Prototype

A wireless mouse using ultrasonic triangulating technology was embedded in a small stuffed animal to translate its movement on the mat. While a child is squeezing the stuffed animal (i.e. while the mouse button inside the stuffed animal is being pressed), the computer records the child's voice and the two dimensional coordinates of the stuffed animal. When the stuffed animal is released, the voice and the movement data are saved as sound and text file of coordinates.

When a new storytelling session is subsequently encountered at the same coordinates on the mat as a previous recorded storytelling session, the new session is recognized by our program as a trigger event to reproduce and project a stored storytelling session. The stored session is played as an animation, via a projector installed above the mat, with corresponding audio heard via a pair of speakers beneath the mat. The animation of the stuffed animal travels the course of the recorded path, complemented by the previous child's recorded voice.

When there are multiple sessions stored at the same place on the mat as the current session, the one with most similar length and pattern (the length of the story session, pattern of the path the toy took, and the identity of the toy) is chosen to be played back. During the course of a playback, when the user squeezes the stuffed animal and begins to tell a new ending for the played-back story, a new animation is created of child #1's beginning and child #2's ending, and this new animation is stored in the library of possible stories to be played back on the mat. Thus, layers of children's stories accumulate in the library alongside original one-child stories.

We have yet to conduct formal user testing. In general, however, we have found that children enjoy telling stories as they travel around the mat with a toy. In listening to others' stories, they also seem to tell more interesting stories as they incorporate others' story elements into their own narration.

FUTURE WORK

We are currently extending our work with StoryMat along two dimensions. First, we are improving the accuracy of tracking and freedom of movement of the stuffed animals along the mat using electromagnetic sensing technology. The mat will be laid on a soft wired grid, which senses a magnetic tag inside the stuffed animal. Second, we are beginning user testing with young children who will play alone or in groups with the StoryMat system.

CONCLUSION

This paper presented the design and prototype of StoryMat. We introduced a new way to support collaborative storytelling among children who are, or are not, temporally and spatially co-present. The interface does not require the ability to read and write, and is free of the desktop computer set-up. We believe that StoryMat is an important advance in supporting children's everyday storytelling.

ACKNOWLEDGMENTS

REFERENCES

1. Glos, J., & Umaschi, M. Once Upon an Object: Computationally-Augmented Toys for storytelling. *In Proceedings of* ICCIMA '97.

2. Ishii, H., & Ullmer, B. Tangible Bits: Towards Seamless Interfaces between People, Bits, and Atoms. In *Proceedings of CHI* '97, ACM.

3. Miller, P. & Sperry, L. (1988). Early talk about the past: the origins of conversational stories of personal experience. *Child Language*, 15, 293-315.

4. Papert, S. (1980). Mindstorms. Basic Books.