Using Haptic Inputs to Enrich Story Listening for Young Children

Siyan Zhao*, Jill Lehman†, Ali Israr†, Roberta Klatzky*
*Carnegie Mellon University, † Disney Research Pittsburgh

Traditional story listening with only audio and illustrations is slowly losing its appeal [1]. In response, technologies have been created to augment stories with additional modalities, e.g., animations and physical interaction, to engage young listeners. Israr and colleagues showed a natural association between haptics and semantic knowledge expressed in language for adults [2], suggesting that haptic inputs to stories might engage semantic processing without increasing the workload of listening. In this study, we explored the use of meaningful haptic signals to augment story listening in young children. Study 1 showed that, similar to adults, 5- and 6- year olds could associate haptic effects with semantic interpretations. Study 2 demonstrated that 5- and 6-year olds showed better comprehension of haptically-signaled content in one of two stories tested, and no performance degradation in the other. The results provide initial evidence that haptics can potentially enhance the listening experience of children older than 4 years old.

STUDY 1

PARTICIPANTS

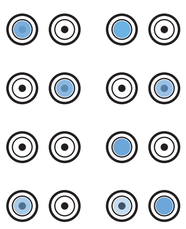
29 children (ten 4 years, ten 5 years, nine 6 years).

STIMULI

A Feel Effect (FE) consists of a haptic pattern (HP) paired with a language phrase (LP).

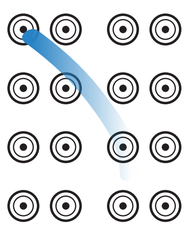
MATCH

LP: "I feel rain on me"

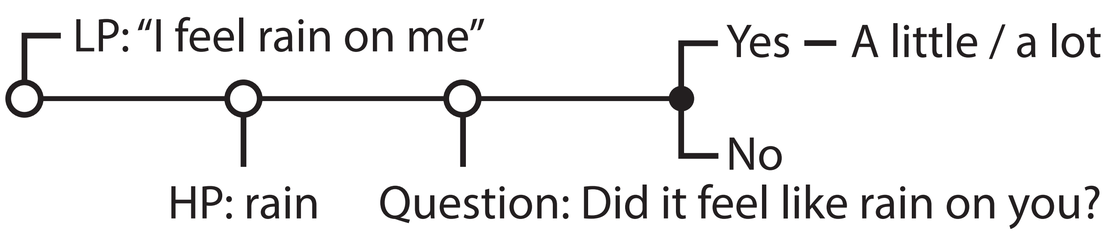


MISMATCH

LP: "I feel rain on me"



PROCEDURE



RESULT

Rating data indicate a gradual progression of developing language-haptic associations with age, with 6-year olds similar to adults in [2]. Four-year olds showed little sensitivity to the congruence of haptic/semantic pairings, suggesting that 5- and 6-year olds are the best candidates for augmenting story comprehension and memory with haptics.

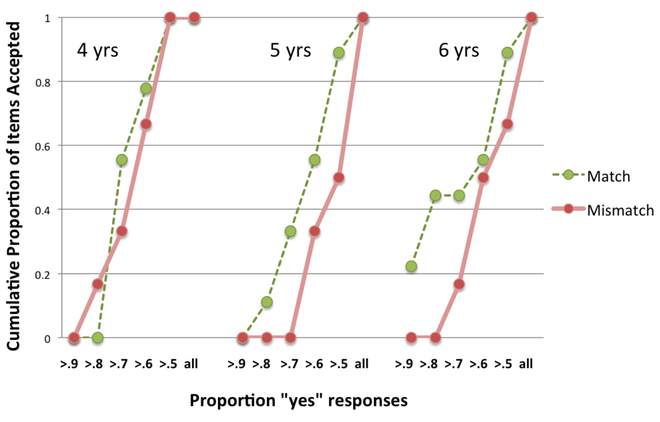


Figure: The cumulative proportions of FEs that Match and Mismatch semantic content at differing acceptance criteria for 4-, 5-, and 6 years old.

STUDY 2

STIMULI

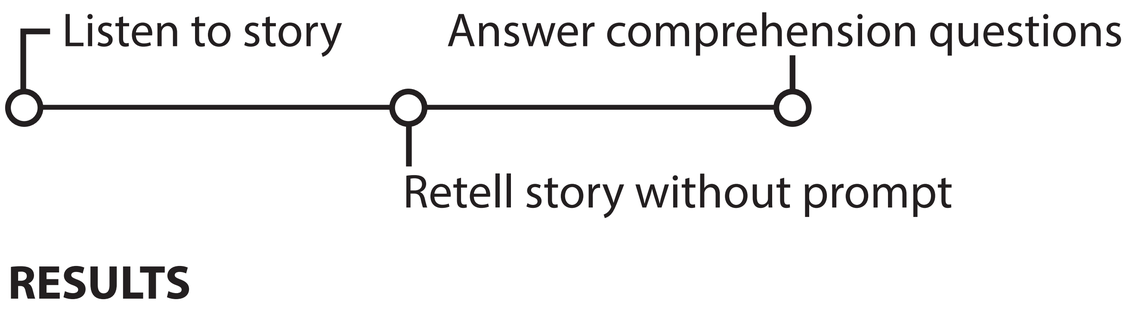
TIGER STORY

The listener is a jungle explorer searching for a legendary silver-striped tiger, which is said to be large and ferocious but, upon discovery after a few events, turns out to be small and friendly.

SPACE STORY

The listener delivers a package to Saturn by space ship. After some events, he/she reaches the destination only to discover he/she has been carrying his/her own birthday cake to a surprise party.

PROCEDURE



RESULTS

For the Tiger story, children performed better on comprehension questions with content that was paired with an FE (M = 0.78 vs. 0.62). The Space story showed no such effect. No effect of age was observed in either story. Re-examination of Space and its questions suggests that comprehension performance may have suffered both because the tested content contained elements that were not central to the story and because a few active FEs included were rated more poorly in Study 1.

[1] G. Paton. Children too distracted by technology to listen to stories. http://www.telegraph.co.uk/education/educationnews/10200487/Children-too-distracted-by-technolog-to-listen-to-stories.html, 2013
[2] A. Israr, S. Zhao, K. Schwalje, R. Klatzky, and J. Lehman. Feel effects: Enriching storytelling with haptic feedback. ACM Trans. Appl. Percept., 2014