

# Parents, Docents and Robots: Examining Mediation at the Personal Exploration Rover Exhibit

Debra Bernstein<sup>1</sup>, Kevin Crowley<sup>1</sup>, Illah Nourbakhsh<sup>2</sup>, Emily Hamner<sup>2</sup>, Kristen Stubbs<sup>2</sup>

<sup>1</sup>University of Pittsburgh Center for Learning in Out of School Environments; <sup>2</sup>Robotics Institute, Carnegie Mellon University

## Introduction

Increasingly, our society is embracing technology in a variety of domains. So-called 'smart' technologies are now being employed for functions as diverse as inter-planetary exploration, house cleaning, and children's toys. This infusion of smart technologies puts museums and science centers in a unique position. As institutions, they are able to provide families with the opportunity to explore new technologies in an educationally supportive environment. However, the question remains of how best to facilitate such explorations.

Prior research on parent-child conversations suggests that parents play an important role in explaining scientific phenomenon to their children [Crowley & Galco, 2001; Callanan & Oakes, 1992]. Within the museum setting, docents also play an important educational and explanatory role. The current study investigates the different methods used by parents and docents to mediate the content of a museum exhibit designed to facilitate public engagement with the Mars Exploration Rover mission.

## Research Questions

1. What types of conversations does an interactive exhibit about autonomous rovers support?
2. Is this content approached differently at parent-led and docent-led installations of the exhibit?
3. How do families build models of technology across different settings?

## The PER Exhibit

The Personal Exploration Rover exhibit provides museum visitors with an opportunity to team up with an autonomous rover and explore a mock Mars Yard.

The exhibit was installed in 5 museums across the country. In some museums, the exhibit was installed as a stand-alone activity; in others, as a docent-led activity.



Mars Exploration Rover



Personal Exploration Rover

## Methods

### Participants

Participants were recruited at two installations of the Personal Exploration Rover Exhibit: The Exploratorium (stand-alone exhibit) and the National Air and Space Museum (docent-led exhibit).

#### Exploratorium:

- 29 families
- Average age=8.8 years (SD=2.1 years)
- 12girls; 17 boys
- Mean time at exhibit\* = 6m, 38s
- Mean time at kiosk = 5m, 1s



#### National Air and Space Museum:

- 14 families
- Average age=8.8 years (SD=1.1 years)
- 4 girls; 10 boys
- Mean time at exhibit\* = 15m, 9s
- Mean time at kiosk = 4m, 18s

\*Mean time at exhibit includes time waiting in line to use exhibit.

### Procedure

Families were videotaped as they used the exhibit. Following exhibit use, parents and children were interviewed separately. All exhibit interactions and interviews were transcribed.

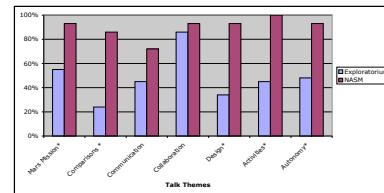
### Coding

Exhibit interaction transcripts were coded for 7 categories of content. Statements about robotic autonomy were additionally coded along 2 dimensions: (1) targeted vs. general; (2) autonomy feature vs. hi-level autonomy.

## Results

### Content of Exhibit Conversations

Similar content was discussed at docent-led and parent-led exhibits. However, conversations at the docent-led exhibit were more likely to include talk about the Mars mission, autonomy, rover design and activities, and robot comparisons.



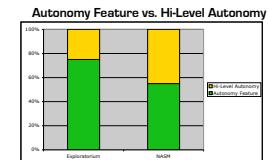
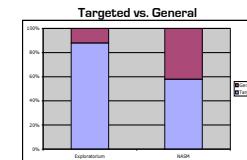
\*indicates a statistically significant difference between the Exploratorium and NASM groups, p<0.1

## Results, cont.

### Mediation Around Autonomy

In order to determine if content was approached differently in docent-led and parent-led interactions, statements about robotic autonomy were additionally coded into mediation categories. Robotic autonomy statements were chosen to undergo additional coding for two reasons: (1) autonomy is a difficult concept, and parents and docents used a variety of strategies to explain it to children; and (2) the PER exhibit was specifically designed to teach museum visitors about the importance of on-board rover autonomy.

Statements were categorized as either referencing a specific instance of rover activity (**targeted**), or as a general statement about the rover (**general**). Statements were also categorized as pointing out an autonomous feature of the rover (**autonomy feature**) or introducing the concept of autonomy at a higher conceptual level (**hi-level autonomy**).



Autonomy statements at the parent-led exhibit were more likely to be targeted to a specific instance of rover activity, and to address autonomy at the feature level. Statements at the docent-led exhibit were equally likely to be targeted or general, and to include either feature level or higher level information about autonomy.

## Conclusions

- This research serves as a first step towards understanding how children and families develop models of technology in informal settings.
- The process of documenting family conversations at the PER exhibit helps us understand what types of access points families may use to explore new technologies. The docent-led exhibit serves as a comparison point, to remind us that families will approach content in qualitatively different ways than professionals.
- In the future, we hope to extend this research to further study children's interactions with technology in formal, informal and everyday settings.

## Acknowledgements

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