National Living Laboratory 2014-15 Cohort Stipend Final Report
The Children's Museum of Denver and the Cognitive Development Center at CU Boulder

The Children's Museum of Denver (CMD) serves an audience of children newborn through age 8 and their families, caregivers, and teachers. The Museum welcomed 348,000 guests in its most recently completed fiscal year and anticipates 416,000 in the upcoming year. The Cognitive Development Center (CDC) at the University of Colorado Boulder focuses on the study of developing executive functions (inhibitory control, planning, etc.) in young children, environmental influences, and intervention. The Children's Museum of Denver began implementing research toys on the Museum floor in the summer of 2011, and the Living Laboratory partnership between the Museum and the Cognitive Development Center DC launched in the summer of 2012.

Currently, Museum visitors interact with Living Laboratory activities about once a month in various locations on the Museum floor, by participating in research projects or interacting with research toys facilitated by Cognitive Development Center staff and students.

Goals of the NLL Stipend Award

1) Mutual Professional Development
2) Hiring an intern to support the CMD-CDC partnership
3) Establishing a more regular presence of the CDC at the Children's Museum of Denver to enhance the visitor experience and to further research initiatives.
4) Creating new signs to help attract families to our new locations amid Museum construction

The award supported all of the goals above. An intern was hired to support the partnership. She developed one research toy exploring inhibitory control, and she pilot-tested and implemented it on the Museum floor. She also developed and pilot-tested a second research toy, on lifestyle and self-directedness. The CDC was able to nearly triple the visit rate to the Museum. These visits helped the CDC collect data to support an undergraduate honors thesis on inhibitory control and provide insight into social factors in delaying gratification. We believe that we also empowered the Museum's adults guests through knowledge and insight into children's development of self control. We supported professional development opportunities for Museum staff through direct access to current research, and enhanced training for researchers to collect data from and communicate findings to diverse populations.

Total Living Laboratory visitor numbers to date:

Research Participants	Educational Opportunities	Research Toy Interactions
212	251	28

Mutual Professional Development

The CMD Living Lab team consists of Sarah Brenkert (Director of Education), Lauren Meyer and Dani Hildreth (Floor Supervisors), Erika Weiss (Education Manager), Traci McGrath (School Programs Manager), and Dana Monroe (Operations and Staff Development Manager). The CDC Living Lab team consists of Yuko Munakata (Lab Director), Arielle Jensen (Lab Coordinator), Jane Barker and Laura Michaelson (Graduate Students), Ellie Patterson (Undergraduate), and Jess Zellner-Kline (Intern).

Mutual Professional Development opportunities included:

1) The intern trained museum staff on implementation of the inhibitory control research toy.
2) Museum staff trained the academic team on explaining scientific findings to museum-goers.
3) Graduate students participated in a Living Laboratory Symposium at the Society for Research in Child Development (SRCD) in March 2015.

Reflections on our Living Lab Collaboration from Museum Guests, Museum Staff, and Researchers:

"This is really interesting! I sometimes forget or underestimate the complexity of her thinking, and this made me think about all the steps – you know, inside your brain - that have to go into a simple action, like stopping yourself from opening a box. I have more respect for how complicated that is."

- Mother of a 2 ½ year old, observing her daughter play the "Box Search" research game.

CDC and CMD Living Lab Intern Jess Zellner-Kline presents the research toy that she designed to the Children's Museum of Denver President and CEO, Mike Yankovich.

Graduate Student Jane Barker conducting research for the "Box Search Task in the museum.

"The collaboration between our Museum and Dr. Munakata's lab represents a unique and extraordinary opportunity to give families access to emerging research, and to connect the science of child development to the very real and challenging work of parenting today. We are thrilled to be part of this collaboration, and incredibly enthusiastic about the value it creates for our Museum and for families."
- Mike Yankovich, President and CEO of the Children's Museum of Denver

"I've really enjoyed my experience with the Living Lab. It's been quite rewarding to get outside of the standard experimental setting and explain our research to members of the community, many of whom are unfamiliar with our research questions and methods. The museum has also been an excellent resource for data collection, particularly when we would like to quickly pilot new experimental protocols and tasks."
–Jane Barker (Graduate Student)

"My experience with The Living Laboratory has provided me with the unique opportunity to test research ideas "in the wild" - with a diverse sample of children and parents, in a stimulating real-world setting, yielding results that will generalize to broader populations and environmental circumstances. It has changed the way I think about designing and administering research experiments."
– Laura Michaelson (Graduate Student)

Research Happenings

Data was collected for two Cognitive Development Center research projects at the Children's Museum of Denver this year, the Puppy Game and the Decision Game.

The Puppy Game explores how environmental contexts influence children's inhibitory control. Children play a computerized, touchscreen-based game, with the goal of findings puppies hidden in boxes. Cues on the boxes indicate whether or not each box contains a puppy, and only the boxes with puppies should be tapped. We use this game to study how children inhibit their strong tendency to tap boxes even when they do not contain a puppy. Data collection is ongoing. This research could inform how children's attention within exhibits could be supported by aspects of the museum environment.
The Decision Game investigates whether children think that delaying gratification is a good behavior. Children are asked their opinions about moral and social scenarios, and about behaviors on a classic delay of gratification task. Data collection is ongoing, but so far children seem sensitive to the acceptability of moral and social scenarios, but show no preference regarding scenarios of accepting immediate gratification or holding out for a delayed reward. This line of research should contribute to our understanding of factors influencing children's willingness to delay gratification.

Outcomes and Future Goals

Next steps include developing measures to assess satisfaction with and impact of our research toys, materials, and interactions, and developing more research toys and expanding our intern model. We have applied for a University of Colorado outreach grant to help support researchers' time, the development of assessment measures, travel, and materials. The research toys added an unintended benefit of encouraging creativity in compressed spaces during building construction at the Museum, which has added a great value to guest experiences. The partnership also provided the benefit of encouraging the academic team to think outside the box in terms of data collection and research methods; as a result, the CDC is now also collaborating with Science Discovery Camps at CU Boulder. Finally, the partnership supported the development of an incredible learning opportunity for undergraduates in Yuko's brand new course offering, Developmental Research Methods. Forty students heard a guest lecture from Sarah about the CMD. More than half of these students went on to receive additional training from Sarah and then completed their final research projects by collecting and analyzing observational data from children at the Museum, and sharing the projects in the form of class presentations and final papers.