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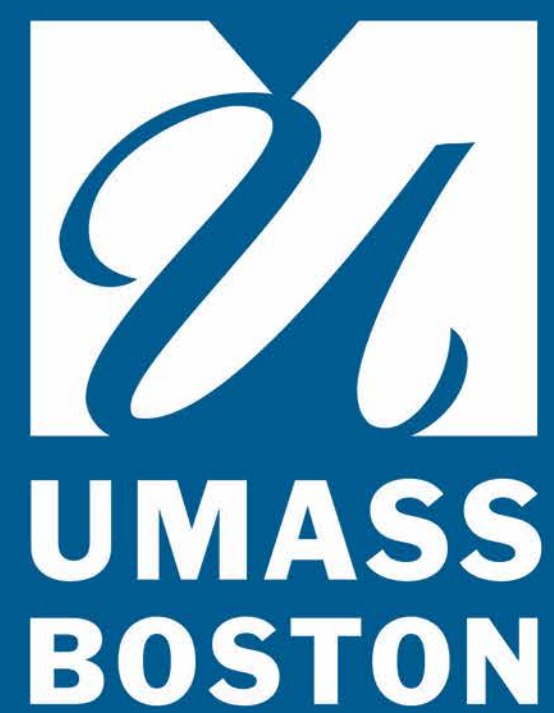
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Ciaramitaro, Vivian and Chow, Hiu-Mei, "Research and Education in Parallel: Scientific Outreach through On-site Experiments at the Museum of Science Boston Living Laboratory" (2015). *Office of Community Partnerships Posters*. 233.

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Research and Education in Parallel: Scientific Outreach through On-site Experiments at the Museum of Science Boston Living Laboratory

Vivian Ciaramitaro, Assistant Professor of Psychology, College of Liberal Arts and Hiu-Mei Chow, Graduate Student

Background

Our world is multisensory, as is our perception of it: we see lips move while we listen to what is being said, we smell food as we taste it, we touch a surface as we feel its texture as we look at. Cross-modal sensory processing, the way information from our different senses interacts and influences our conscious perceptual experience is ubiquitous in everyday life, yet, it is not well understood, compared to unimodal sensory processing, processing information from a single sensory system.

Summary

In partnership with the [Living Lab of the Museum of Science, Boston](#), one of our research goals is to standardize a set of computer-generated stimuli and procedures to study sound-shape correspondences across different ages, ranging from young children, adolescents, younger adults, to elderly participants. Since November 2014, we have interacted with more than 250 museum visitors and collected data from over 150 visitors. We found similar sound-shape correspondences association across different ages, with overall weaker effects in children.



Sensory Crosstalk

Approach
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Methods

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Description

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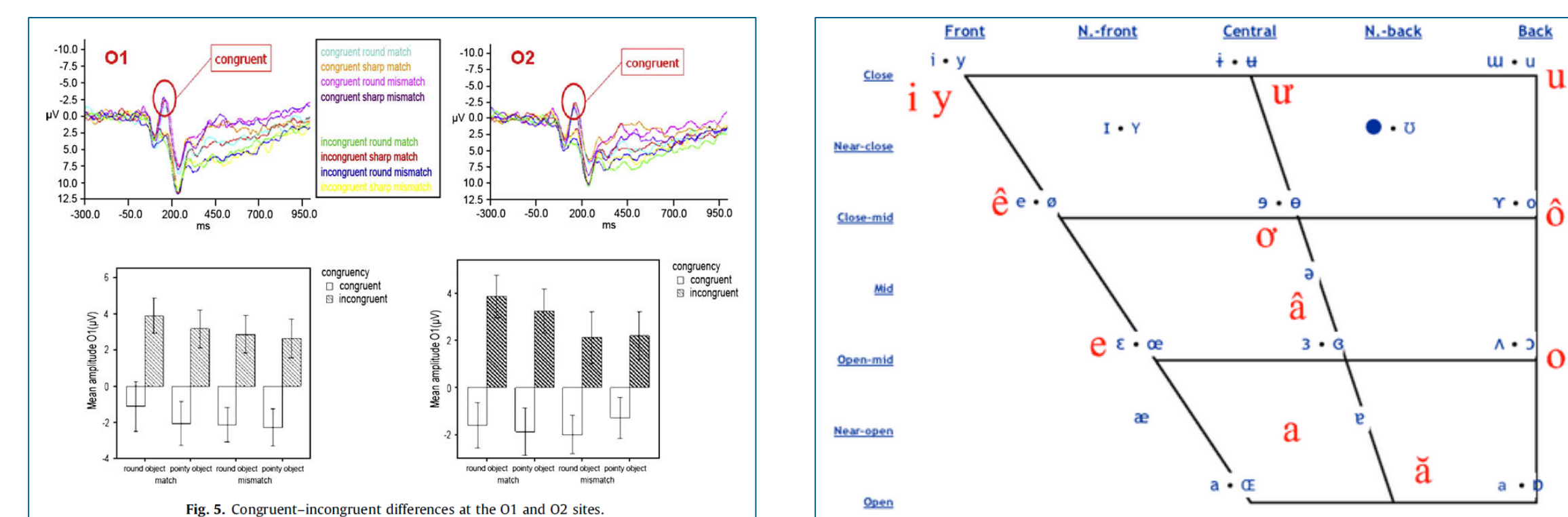
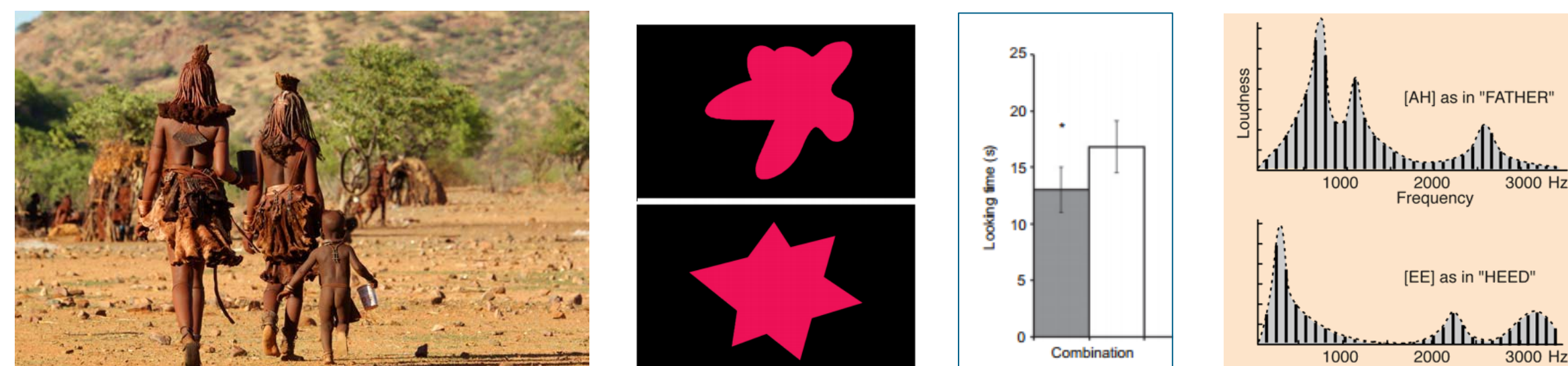
Contact
Information

Sensory Crosstalk: Background & Challenges

Bouba/kiki Crossmodal Correspondences

People tend to associate a spikier shape with 'kiki' and similar sounds, and a rounder shape with 'baba' and similar sounds. This has been found

- Across cultures
- Across ages, including 4-month-old babies,
- To be reflected in neural signatures



Research Challenges

- Does the strength of crossmodal correspondence change across the life span?
- It is difficult to compare changes in the strength of associations with age since different studies use different stimuli, different procedures, or only examine a limited number of ages.

Educational Challenges

- Public's limited understanding of crossmodal interactions, an important step of sensory processing.
- Public's limited opportunity to apply the scientific method.

Overcoming Both Challenges

- We use identical stimuli & procedures across ages (2-75 years old) in the same museum setting.
- This allows us to better quantify & compare how associations change with development
- We also engage visitors in understanding crossmodal processing through by going over the scientific method.

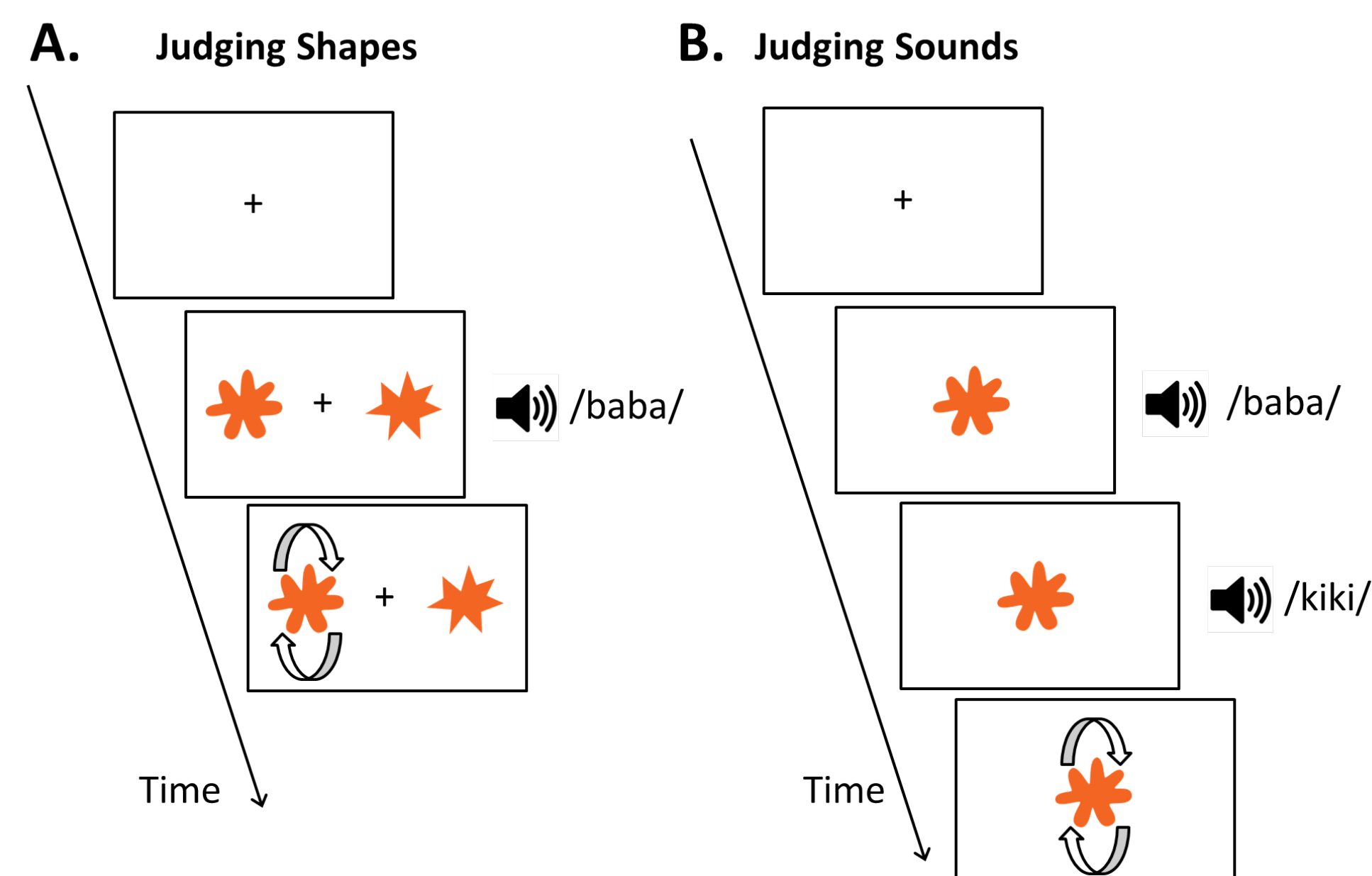


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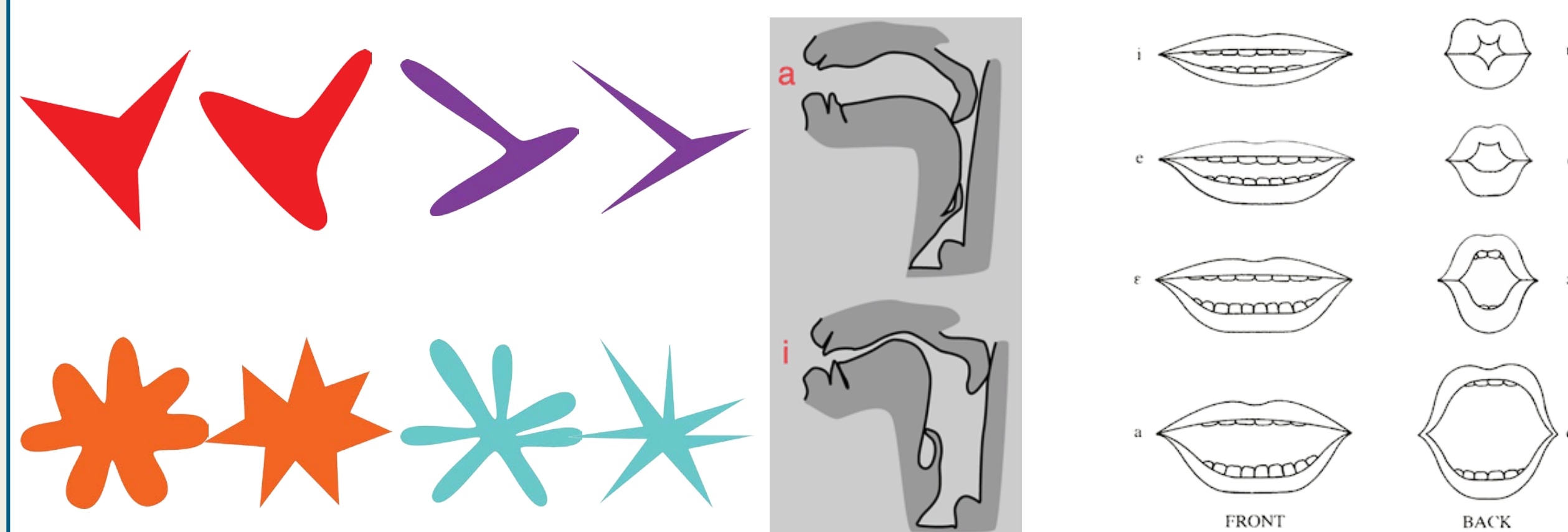
Vivian Ciaramitaro, Assistant Professor of Psychology, College of Liberal Arts and Hiu-Mei Chow, Graduate Student

Approach and Methods

Computer Task Procedure



Computer Task Stimuli



Demographics

- After the computer task, we collect demographic information, including age, language exposure and musical background.
- The Museum of Science Boston is the perfect venue to conduct this research because of the diversity of visitors from different age groups and different cultural, language and musical backgrounds.

Child friendliness

- Helpers are trained to explain the experiment in a way easy to understood by children and average lay person.
- The computer task is embedded with fun sounds and visual progress bar



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Data I (Judging Shapes)

We will continue data collection and scientific outreach at the museum through August 2015. Since November 2014, we have collected data from:

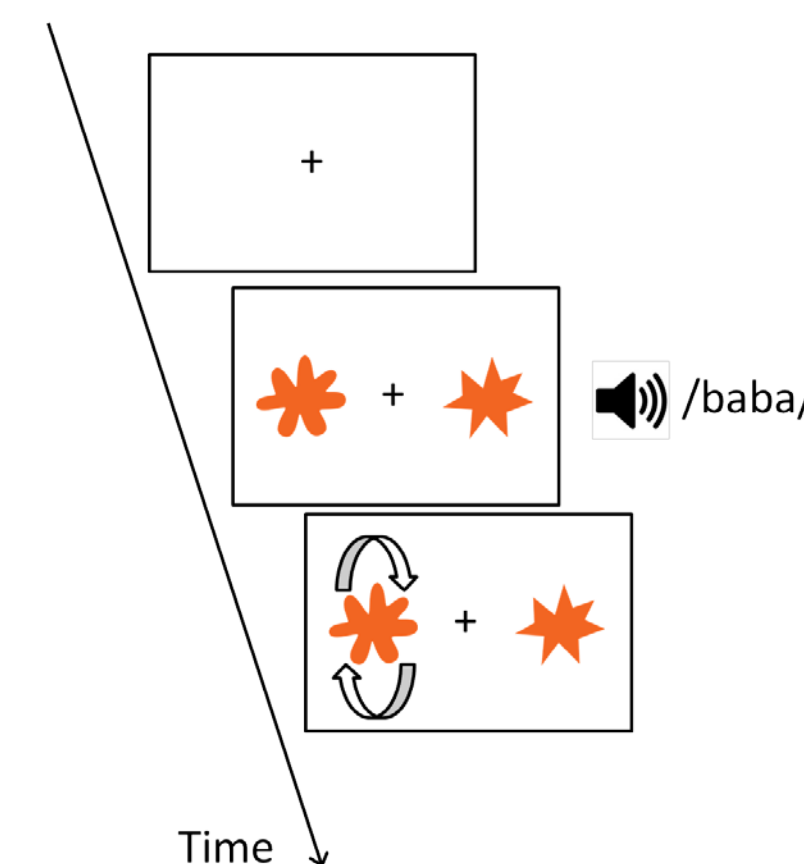
70 Adults
42 Children

We measured:

1. The percentage of trials that participants chose a particular shape with a given sound
2. The time needed for participants to make that choice. We expect that the greater the percentage and the faster the reaction time, for a particular sound-shape pair, the stronger the association.

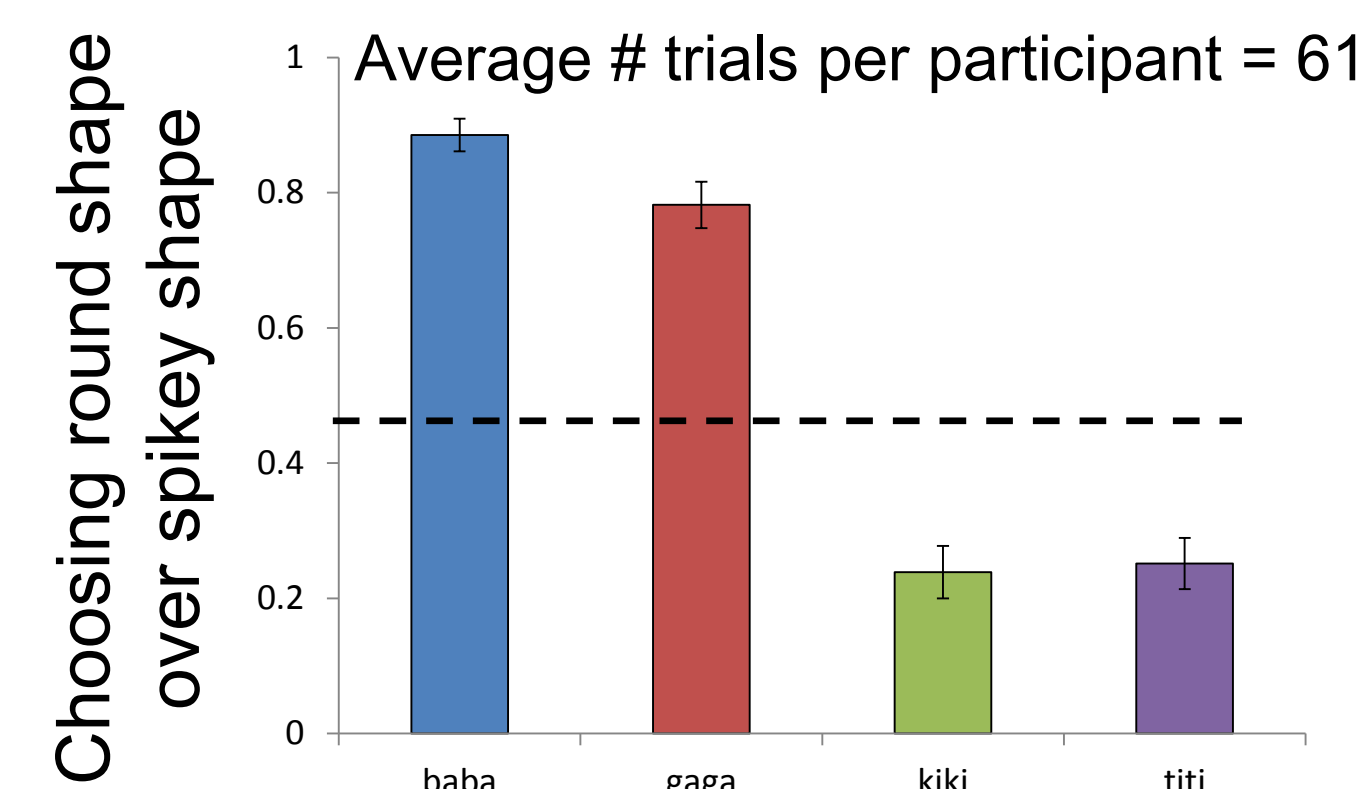
We expect:

A stronger association between round shapes and 'baba' or 'gaga' sounds, and spikey shapes and 'kiki' or 'titi' sounds in adults than children.

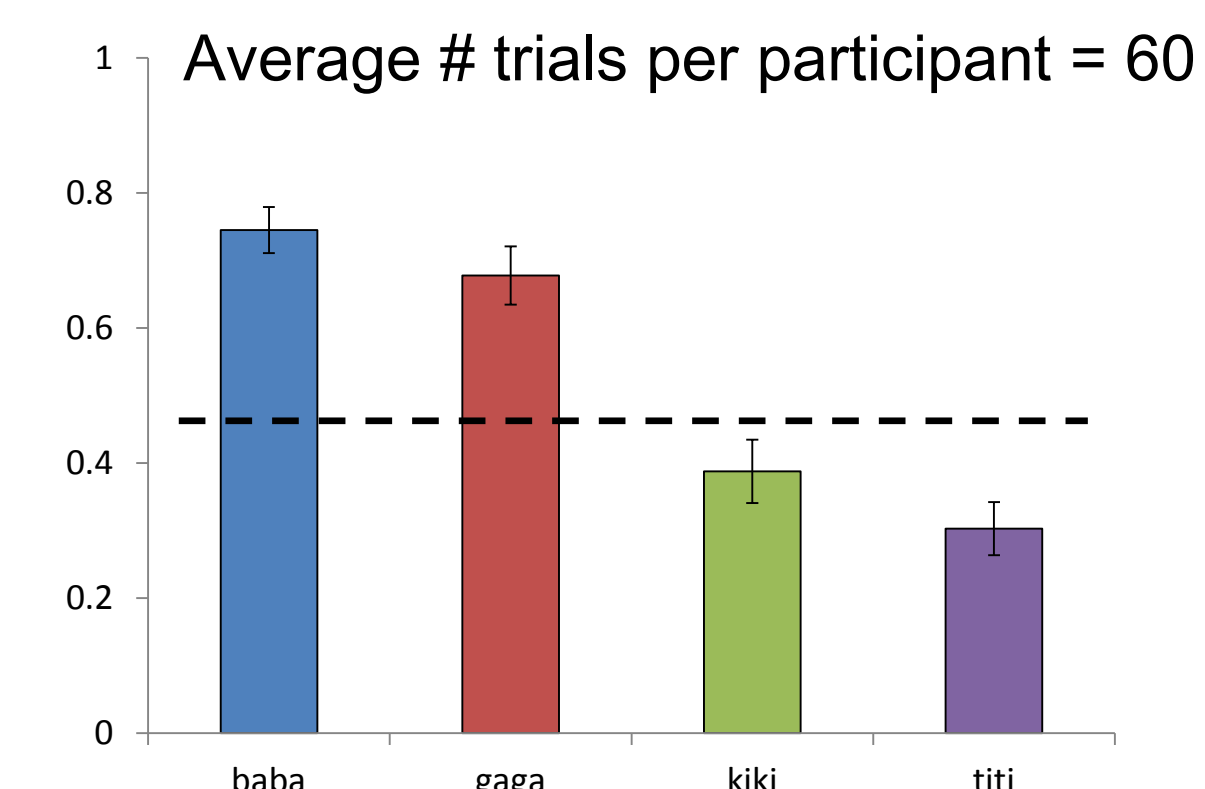


Judging Shapes

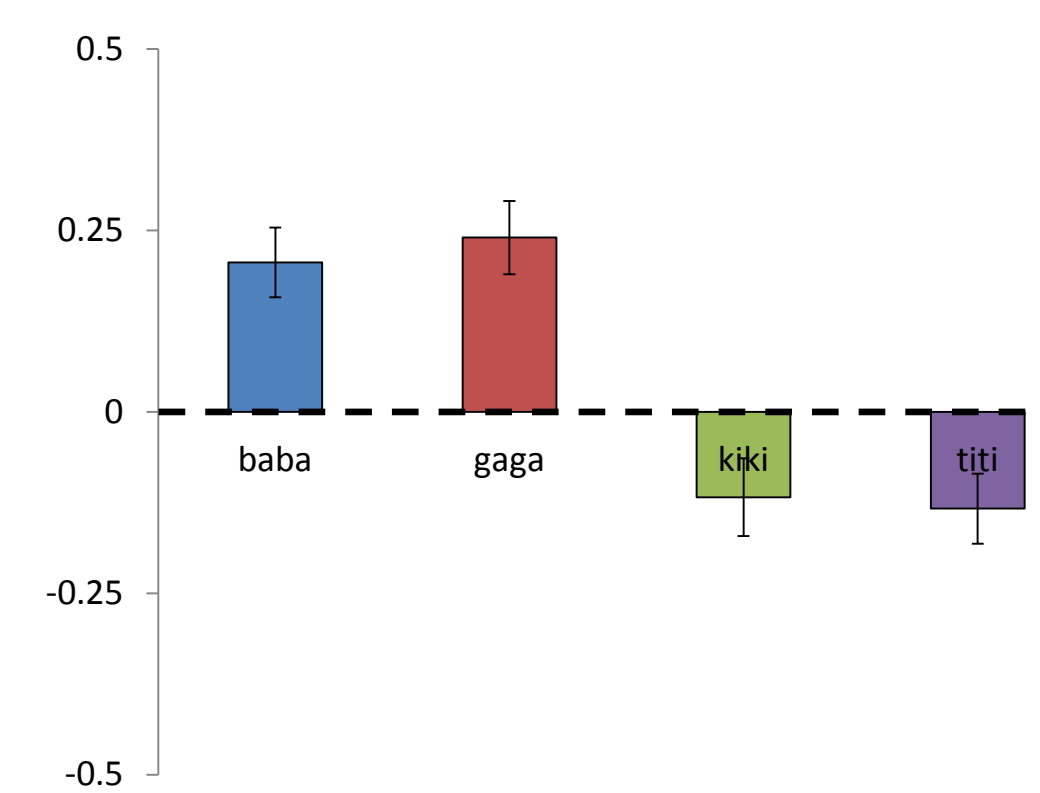
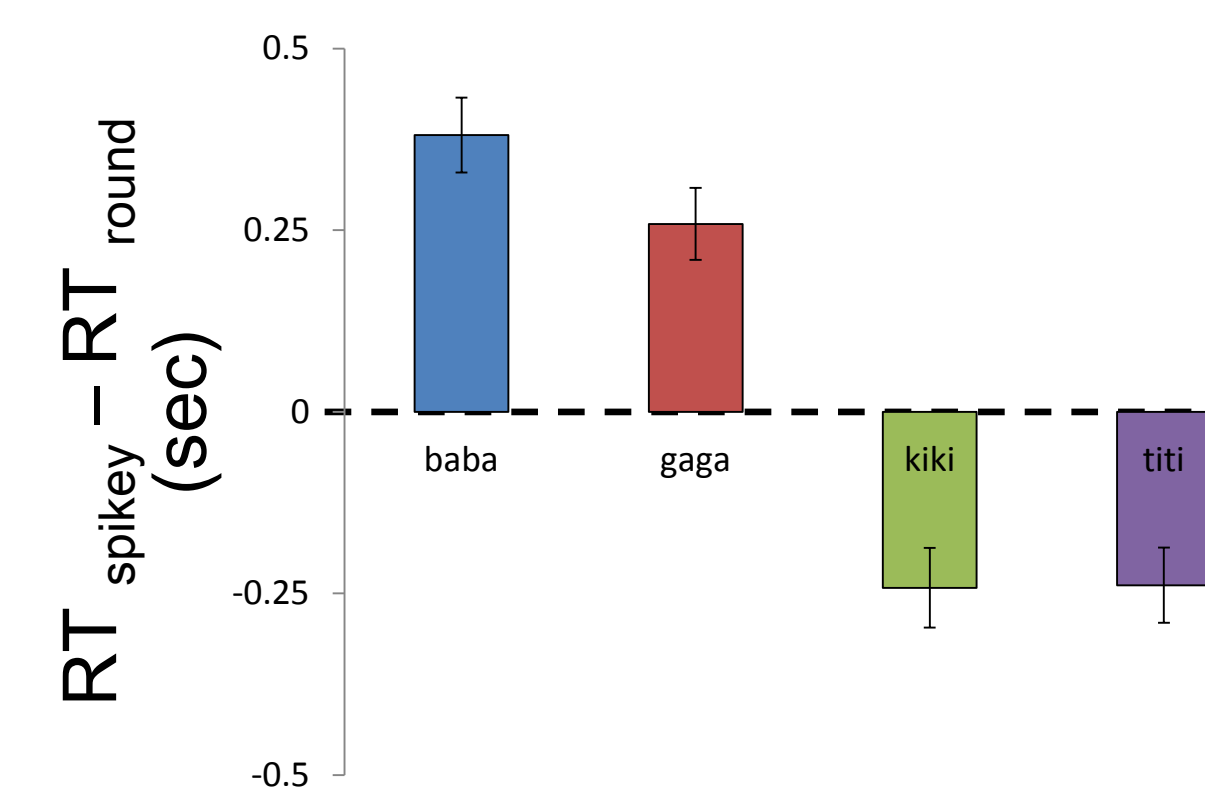
Adult Data (N = 70)



Children Data (N = 42)



Both adults and children chose round shapes for 'baba' or 'gaga' and spikey shapes for 'kiki' or 'titi'.



Both adults and children responded more quickly when they made a congruent choice.



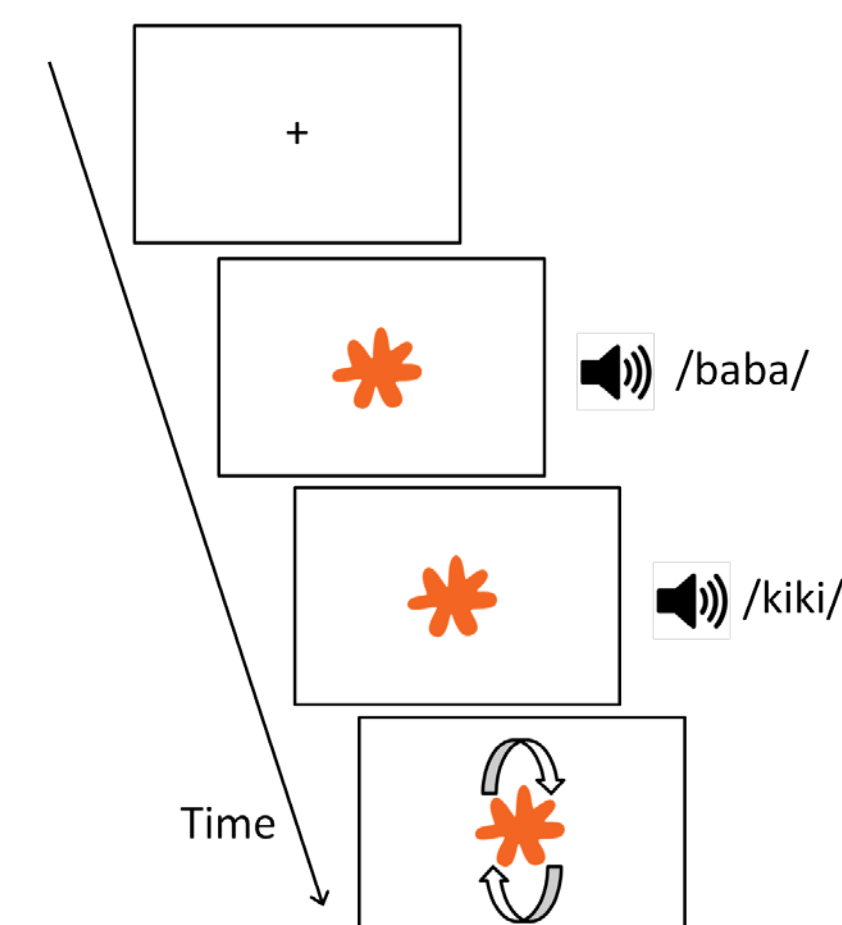
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Data II (Judging Sounds)

We will continue data collection and scientific outreach at the museum through August 2015. Since February 2015, we have collected data from:

41 Adults



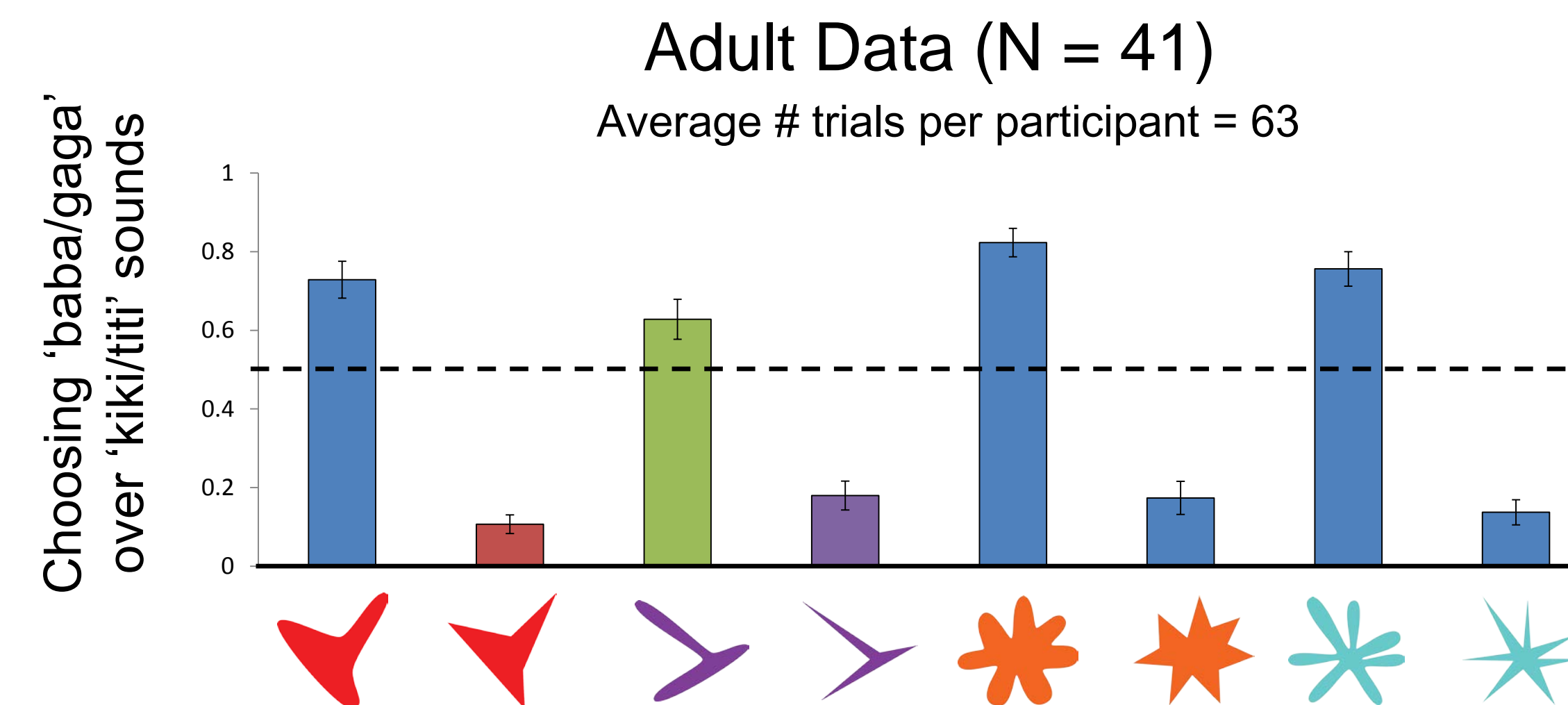
We measured:

1. The percentage of trials that participants chose a particular sound with a given shape
2. The time needed for participants to make that choice. We expect that the greater the percentage and the faster the reaction time, for a particular sound-shape pair, the stronger the association.

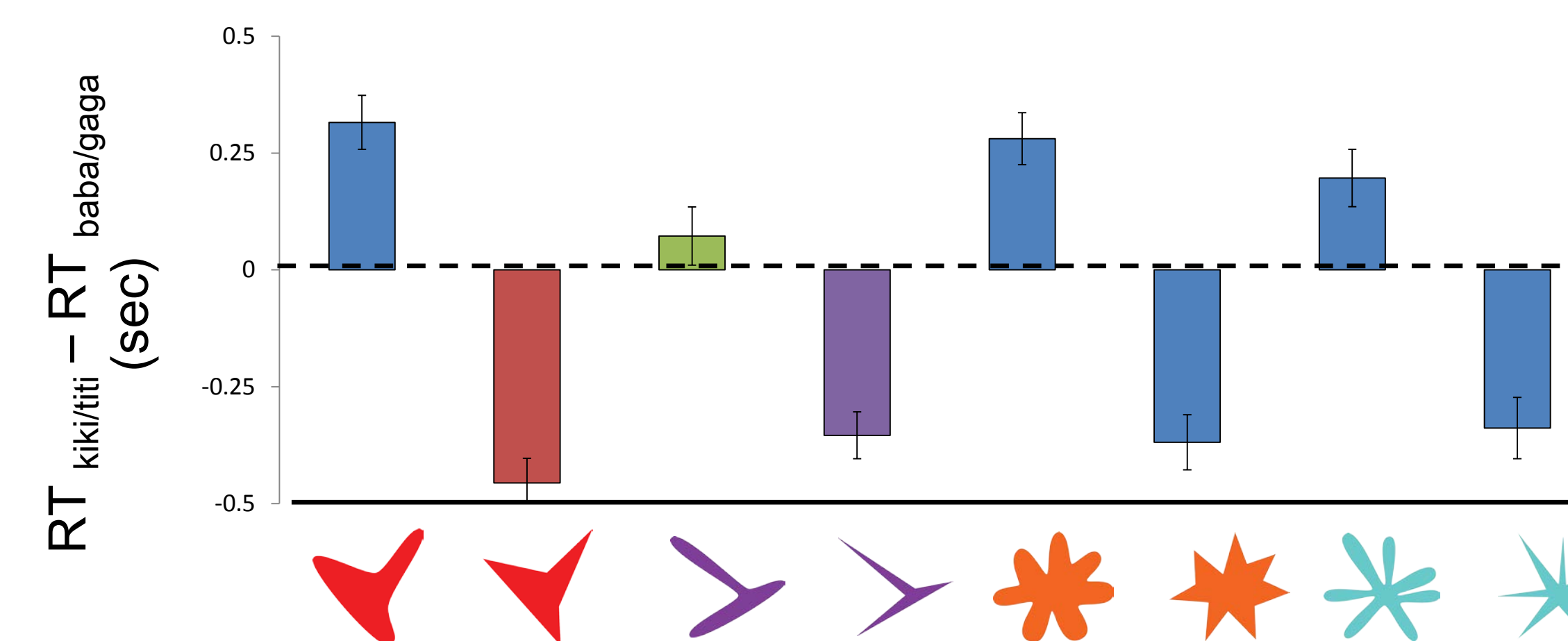
We expect:

A stronger association between round shapes and 'baba' or 'gaga' sounds, and spikey shapes and 'kiki' or 'titi' sounds in adults than children.

Judging Sounds



Adults chose 'baba' or 'gaga' for round shapes and 'kiki' or 'titi' for spikey shapes.



Adults responded more quickly when they made a congruent choice.





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Demo I

Ready?
Press to Start
+





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Demo II

Ready?
Press to Start
+





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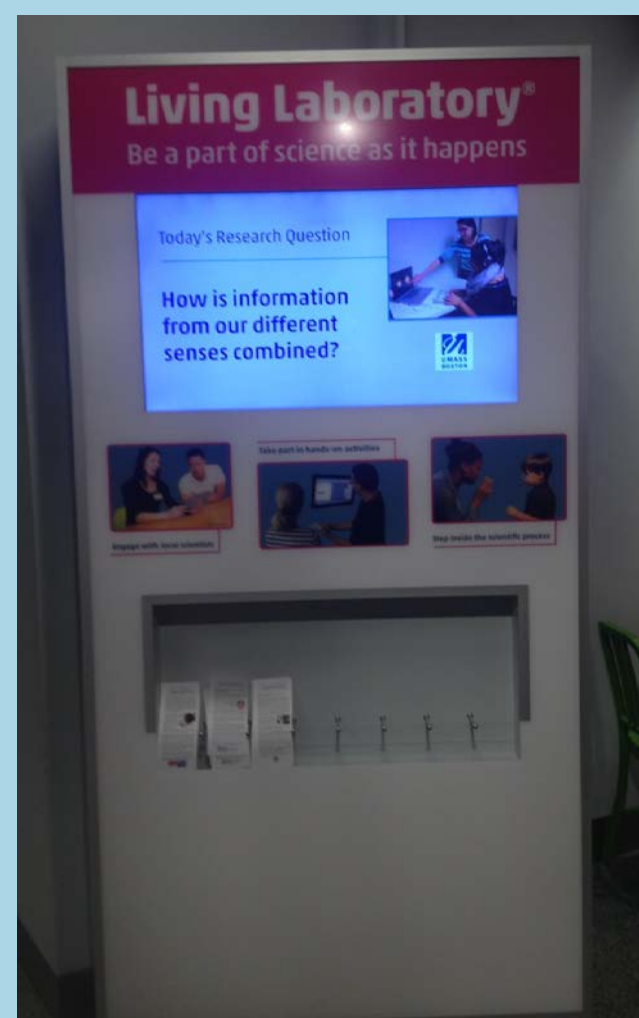
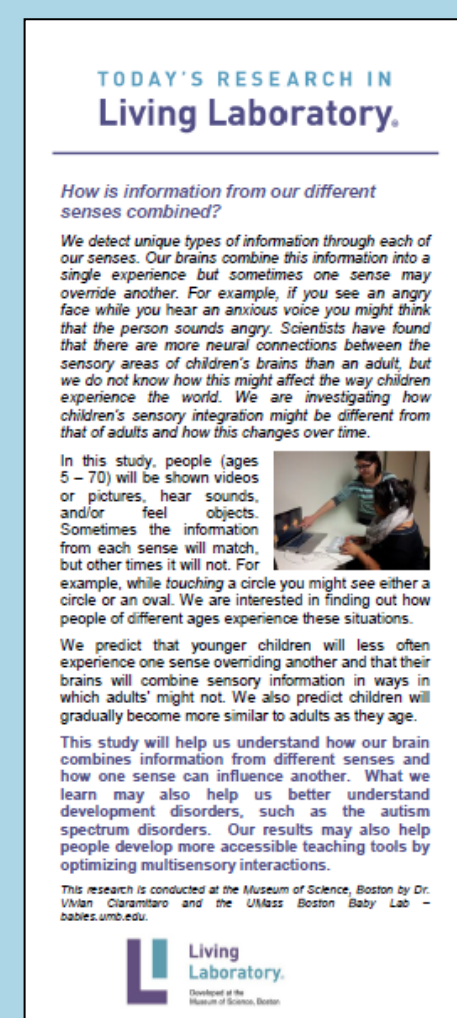
Project Activities and Outputs

As a result of our project's implementation, we

1. Educate the public about science and developmental research,
2. Strengthen relationship with the Museum of Science staff
3. Promote UMass Boston, our graduate program, and research laboratories
4. Train our UMass Boston undergraduate students to be effective leaders and competent researchers.

1

Permanent display at the Museum of brochures about our research:



2

The professor doing research at the Museum gave a talk to museum staff/volunteers last fall and will give another talk this summer.



3

We pass out flyers for the BabyLab, for parents interested in getting involved in research at UMass Boston.



4

Undergraduate students trained to be team leaders through our project:





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Partnership Description

Living Laboratory, Museum of Science

- Is an innovative model for educating the public about current topics in child development and human health and behavior
- Encourages visitors to learn via active participation with a bonus of helping researchers advance science
- Is funded by National Science Foundation and will be extended to three additional museums at other states in USA

UMass Boston x Living Laboratory

- Our lab started stationing at Living Laboratory of Museum of Science since October 2014.
- We are the first public university from the greater Boston area to join Living Laboratory.

Students' interaction with museum staff

- Students receive training and orientation by museum staff at the beginning of the semester.
- Every week before and after our research shift, students are greeted by museum staff when they can freely discuss questions and concerns about doing research at the museum with the staff.
- Some museum staff participated in our experiment and discussed with us what they thought about the crossmodal phenomenon.

Dissemination of findings

- The professor leading the research team gives a talk to museum staff every 4-6 months where she presents update of the research findings.
- We will publish our finding in a form of lab newsletter to be sent to interested participants who left us contact email address.

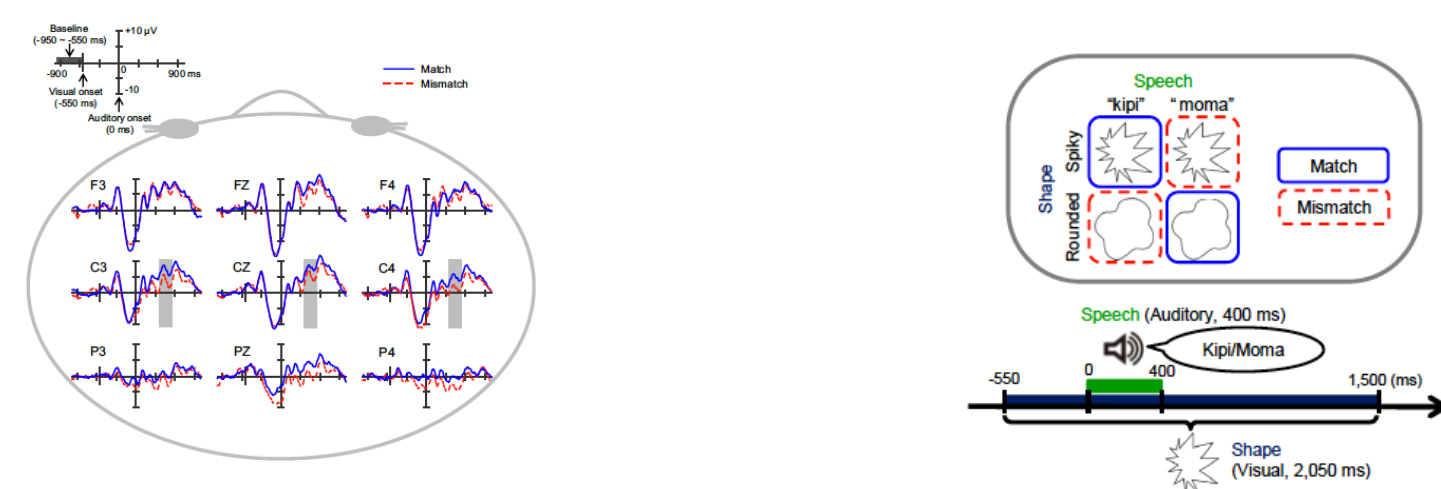


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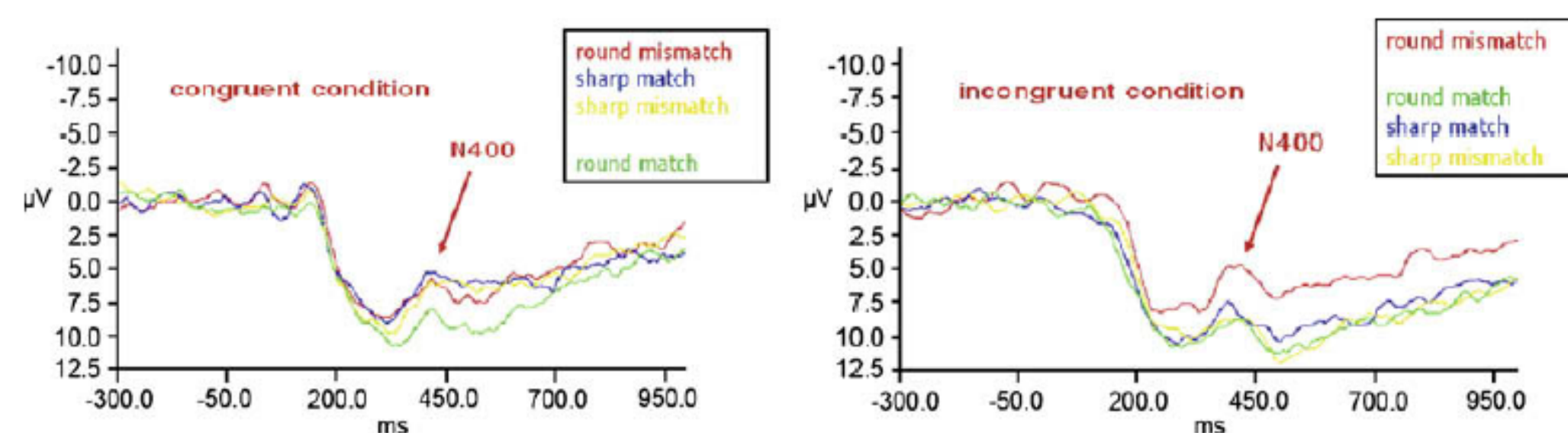
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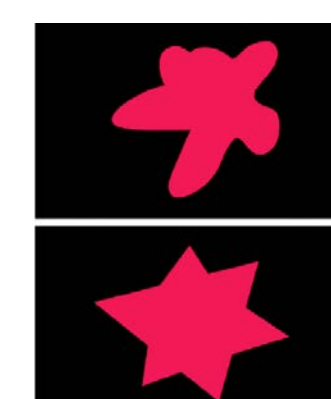
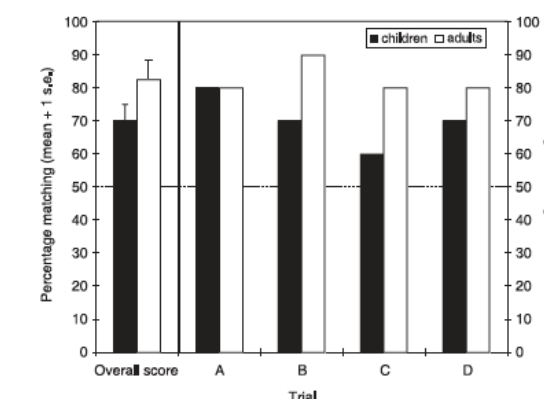
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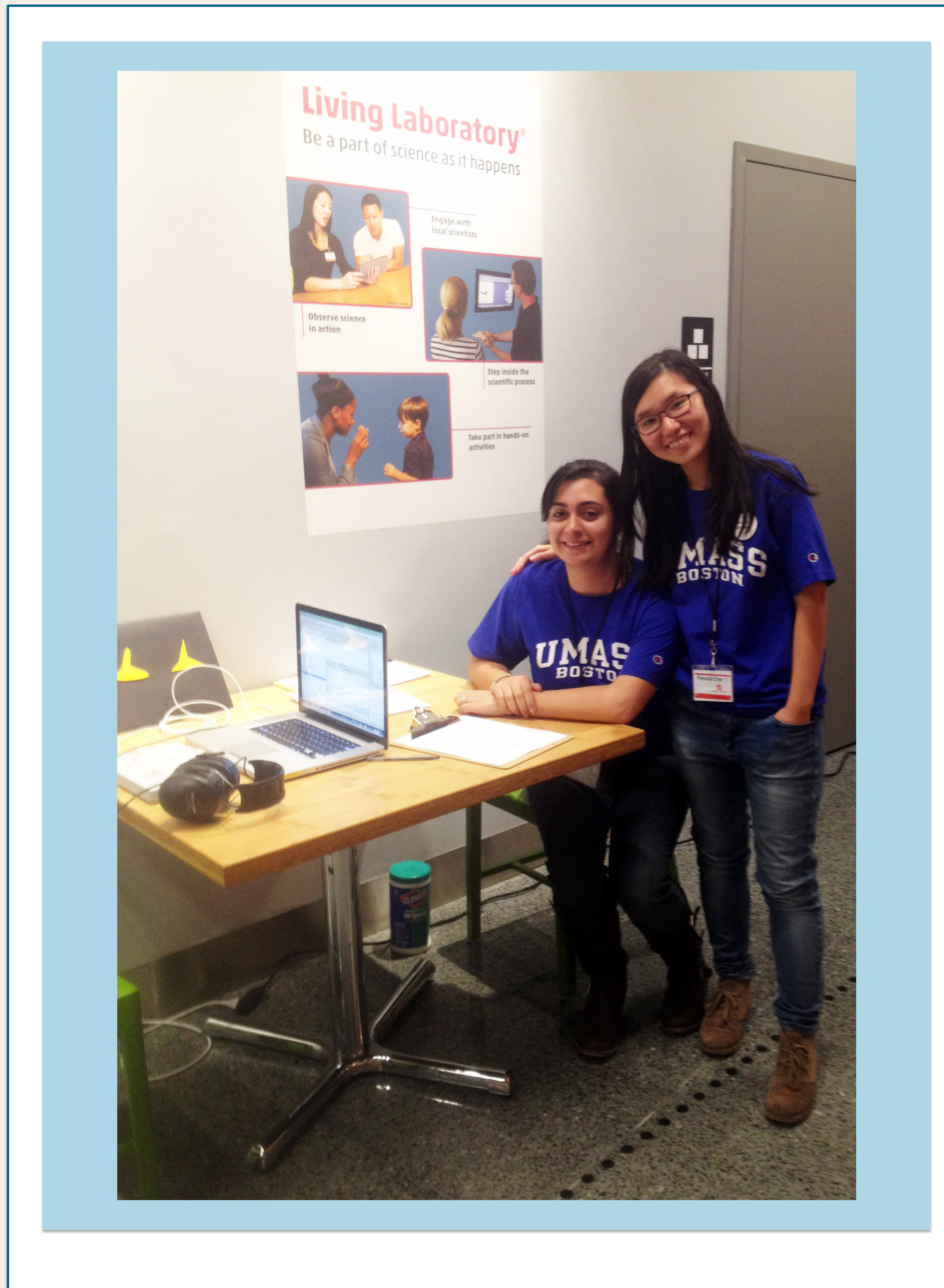
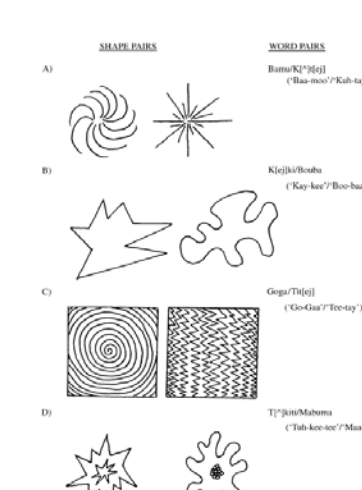
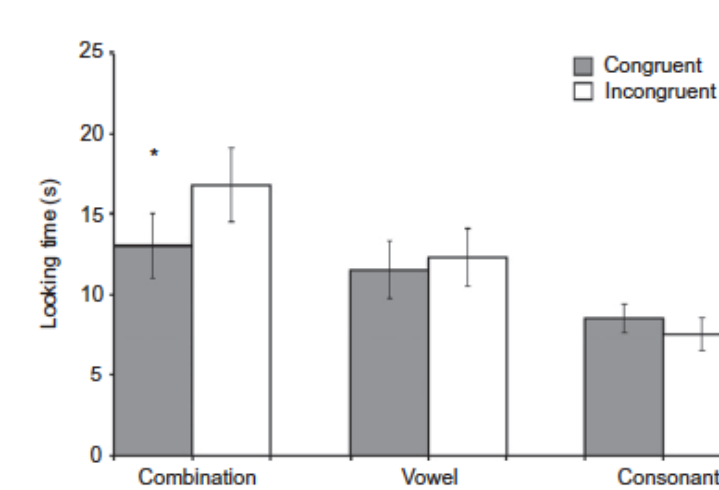
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