

## Language and Flexible Categorization in Early Childhood

Jessica S. Horst and Larissa K. Samuelson  
The University of Iowa

Poster presented at the Biennial Meeting of the Society for Research in Child Development  
April, 2003  
Tampa Florida

### Introduction

Everyday objects do not fall into single, unchanging categories.

For example, chopsticks can be categorized as . . .

"long slender things" based on their appearance or "eating utensils" based on their function



### Form, Function & Toddlers

The ability to categorize objects by Form and Function changes during toddlerhood

- Infants' attention to Form and Function changes between 10 & 18 months (Mudole, Oakes & Cohen, 1993).
- Reliance on objects' functional parts changes between 14 - 22 months (Rakison & Cohen, 1999).

### Questions

1. When Form and Function are pitted against each other in a natural manner, will toddlers categorize by Form or by Function?
2. How do children learn to flexibly categorize objects that fall into multiple categories?
3. Does highlighting objects' functions facilitate Function-based categorization?
4. How is early vocabulary development related to use of Form and Function?

### Rationale

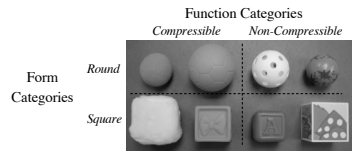
Give toddlers stimuli that can be categorized either by Form or by Function

- Measure toddlers' initial categorization
- Highlight the objects' Functions
- Measure toddlers' categorization again
- Measure vocabulary (MCDI infant form)

### Sequential Touching Task

Children are given 8 toys to manipulate for two minutes. They are simply asked: "can you play with these?"

#### Stimuli



### Procedure

1. Two-minute sequential touching task (pre demo)
2. Demonstration
  - Experimental Group: Compressibility Demonstration with a frog-shaped can crusher
  - Control Group: Visual Only Demonstration
3. Two-minute sequential touching task (post demo)

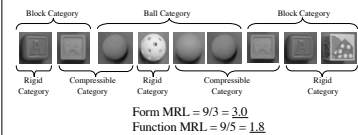
### Design

	High Vocabulary > 100 Nouns* (Receptive)	Low Vocabulary < 100 Nouns (Receptive)
	$M = 157.67$	$M = 60.17$
Experimental Condition	Range = 107 - 222 n = 18 (9 females) Mean age = 76 wks	Range = 31 - 93 n = 18 (9 females) Mean age = 67 wks
Control Condition	$M = 151.94$ Range = 101 - 220 n = 17 (11 females) Mean age = 76 wks	$M = 57.53$ Range = 18 - 92 n = 19 (7 females) Mean age = 68 wks

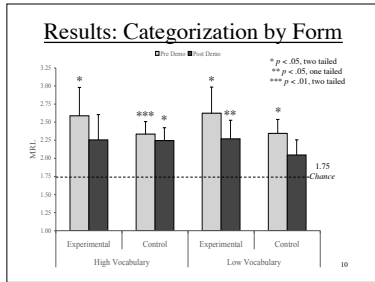
### Measures

For each sequence of touches, we calculated the **Form Mean Run-Length\*** and the **Function Mean Run-Length**

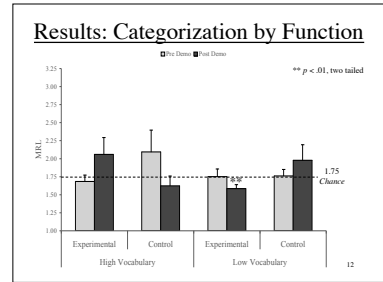
Example of a touching sequence:



\*Mean Run-Length (MRL) =  $\frac{\# \text{ of Touches}}{F \text{ of Runs}}$



- Before the demo, toddlers' shape-based mean run-lengths were greater than we would expect by chance.
- After the demo, the shape-based mean run-lengths decreased, but remained greater than chance for toddlers in the high control and low experimental groups.



- Before the demo, none of the function-based mean run-lengths were greater than we would expect by chance.
- After the demo, the mean run-lengths of the toddlers with high vocabularies in the experimental group increased.

### Conclusions

- When Form and Function are pitted against each other, toddlers initially categorize by Form
- Overall children's vocabulary development influences their ability to flexibly categorize.
- The compressibility demonstration facilitated function-based categorization for children with at least 100 nouns in their receptive vocabularies.
- This suggests that vocabulary development may be related to the ability to shift from attending to form to attending to function.

### Issues

1. Toddlers' vocabularies may have biased initial categorization by form
  - Many toddlers understand *ball* and *block*
  - Few understand *soft* and *hard*
  - => Replicate with stimuli for which children do not already have names.
2. The variability within the Form categories and the Function categories was not equal
  - There were only two forms (*round* and *square*)
  - Compressibility varied on a continuum, thus the categories were *more compressible* and *less compressible*
  - => Replicate with stimuli that control for differences in shape and compressibility

### Follow-Up Study, In Progress

- Novel Shapes (bowling pins & pyramids)
- Only 2 Materials (sponge & wood)

#### Stimuli

Form Categories	Function Categories	
	Compressible	Non-Compressible
Bowling Pins		
Pyramids		

### References

Madole, K. L., Oakes, L. M., and Cohen, L. B. (1993). Developmental changes in infants' attention to function and form-function correlations. *Cognitive Development*, 8, 189-209.

Rakison, D. H., and Cohen, L. B. (1999). Infants' use of functional parts in basic-like categorization. *Developmental Science*, 2, 423-431.

### Acknowledgements

Lisa Oakes  
Prahald Gupta

And the members of the Language and Category Development Lab and the Infant Cognition Lab at the University of Iowa

And the parents and children of Johnson County IA who participated.