



# How Young Children's Actions Influence Object Recognition

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## Background

- Manually manipulating objects has been shown to facilitate subsequent recognition in adults (Harman et al., 1999; James et al., 2001), does manual manipulation change object processing in children also? Would it change shape processing? Color processing?
- Surface properties may provide salient cues for object recognition – for adults, object color provides a cue to identity that facilitates recognition (Nicholson & Humphrey, 2003).
- Surface property encoding may not be facilitated by action.
- Shape property encoding may be facilitated by action.

### Questions

- How do actions during study affect use of shape and color information during subsequent recognition?
- Is there developmental change in use of the properties?

## Experiment 1

### Free Play

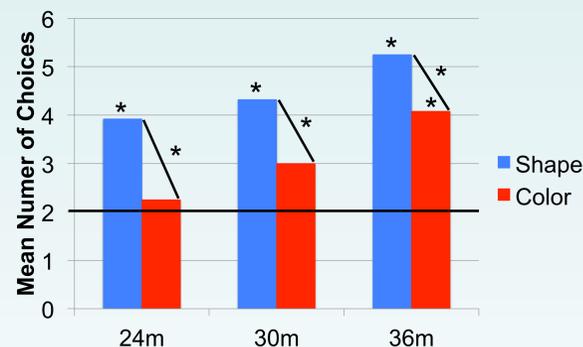
- Participants:** Children ages 24m (n=12), 30m (n=12), 36m (n=12)
- Stimuli:** Novel, 3D objects with novel names
- Task:** Each trial had 3 phases
  - Experimenter shows and labels one object
  - Child plays with object, then object removed
  - Test: 3AFC: "Get me the Teeka."

Example Shape Trial

Example Color Trial



Children completed 2 color trials and 2 shape trials for each exemplar object (12 trials total)



### Summary Experiment 1 results

- 24- and 30-month-old children chose the targets based on shape, but not color.
- 36-month-old children chose the targets in both shape and color trials, suggesting that they use both properties during recognition.
- Younger children may not have interacted with the objects in ways that facilitated the use of both shape and color.

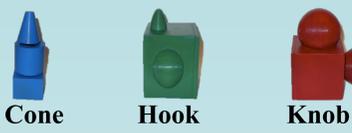
## Experiment 2

### Functional Parts

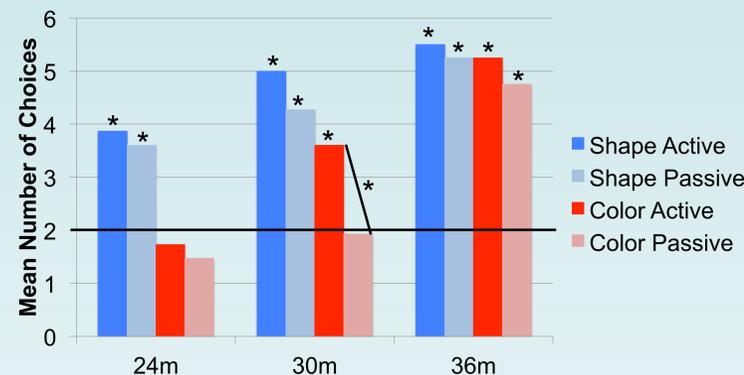
We added functional parts to the objects from Experiment 1 to make them more interesting and to get the younger children to interact with them longer.

- Participants:** Children ages 24m (n=30), 30m (n=30), 36m (n=24)
- Stimuli:** Same objects as Experiment 1, but each had a part that moved and objects were not named

### Functional Parts, no names:



- Task:** Each trial had 3 phases
    - Demonstration of functional part by experimenter
    - Active condition: child manipulates functional part  
Passive condition: Experimenter demonstrates functional part
    - Test: 3AFC: Cued with Pantomime of action used in demonstration of part: "Which one did this...?"
- Children completed 2 color trials and 2 shape trials for each exemplar object (12 trials total)



### Summary Experiment 2 results

- 24-month-old children only chose the targets based on shape after actively manipulating or passively viewing the objects.
- 30-month-olds chose the targets based on shape after active manipulation and passive viewing of the objects, but they chose targets based on color only after active manipulation.
- By 30-months, children use color as a cue for object identity, but only after active manipulation of an object's functional part.

## Experiment 3

### Moving Objects Through Tubes

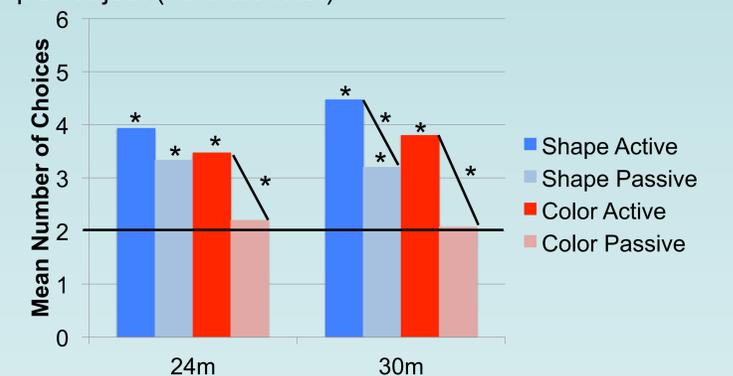
Younger children in Experiment 2 may have been attending most to the functional parts, and therefore to the shapes, of the objects. To get children to interact with the objects without drawing attention explicitly to shape we had them move objects through tubes.

- Participants:** Children ages 24m (n=30), 30m (n=30)

- Stimuli:** Same objects as Experiment 1
- Task:** Each trial had 3 phases
  - Experimenter labels object, moves it through a tube
  - Active condition: child moves object through the tube  
Passive condition: E2 moves object through the tube



- Test: 3AFC: "Get me the Teeka."  
Children completed 2 color trials and 2 shape trials for each exemplar object (12 trials total)



### Summary Experiment 3 results

- 24- and 30-month-old children chose the targets based on shape regardless of whether they were in the active or passive condition.
- Children in both age groups chose the targets based on color only after actively moving the objects through the tubes, suggesting that active interaction facilitated the use of color.

## Conclusions

- Manual interaction facilitates use of color for object recognition, but not shape.
- Effect of manual interaction depends on age.
- Effect of manual interaction depends on task.
- These experiments suggest that shape and color processing may proceed along different developmental trajectories and may depend on the way children interact with objects.

### References:

- Harman, K. L., Humphrey, G. H., & Goodale, M. A. (1999). Active manual control of object views facilitates object recognition. *Current Biology*, 9, 1315-1318.
- James, K. H., Humphrey, G. H., & Goodale, M. A. (2001). Manipulating and recognizing virtual objects: Where the action is. *Canadian Journal of Experimental Psychology*, 52, 111-120.
- Nicholson, K. G. & Humphrey, G. K. (2003). The effect of color congruency on shape discriminations of novel objects. *Perception*, 32, 339-353.