Preschoolers Refer to Adult's Timing of Intentional Actions for Object Categorization

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INTRODUCTION

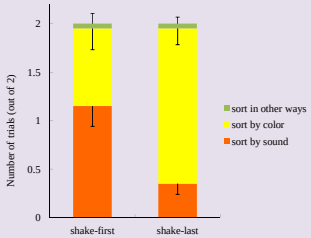
- Children are capable of using both surface features and causal properties in categorization of objects (Gelman & Markman, 1986; Gopnik & Sobel, 2000; Sloutsky & Fischer, 2004).
- One way children learn to sort objects with different properties is through observing how adults sort them (Williamson, Jaswal, & Meltzoff, 2010)
- We are interested in how adults' *social cues* influence children's sorting strategy. In particular, we manipulated *the timing of adult demonstrator's causal action*, and explored its effects on children's sorting strategies.

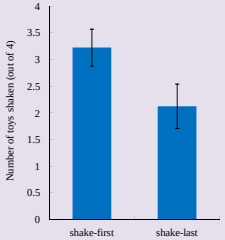
EXPERIMENT 1a

- **Question:** Could 4-year-olds use the timing of demonstrator's causal action as a cue to guide their sorting strategy?
- **Participants:** 40 4-year-olds (22 boys, age 4.0-5.0 y). n = 20 for each group (shake-first and shake-last).
- **Demonstration**

- **Test**

- **Results**
  - Sort by sound: shake-first > shake-last (p = .005)
  - Sort by color: shake-last > shake-first (p = .005)
  - Number of toys shaken for each trial: shake-first > shake-last (p = .005)



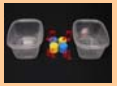


- **Conclusion**
  - Four-year-olds were more likely to sort objects by causal property when the demonstrated causal action *precedes*, rather than *follows*, the sorting process. They use the timing cues to determine which properties are relevant to categorization.
  - They were also more likely to investigate the causal property when it is shown to be relevant to categorization.

EXPERIMENT 1b

- **Question:** Are 4-year-olds learning to sort only objects that have been demonstrated, or to sort more *generally*?
- **Participants:** 30 4-year-olds (15 boys, age 4.0-5.0 y), all in shake-first condition
- **Demonstration:** same as shake-first condition in Exp 1
- **Test:**

Original trial: same as Exp 1



Generalization trial: new set of toys with different color and sound

Free play: after children were done with the study, the tester asked them if they wanted to play more with the toys. Those who stayed played freely with all toys. Their reactions were recorded.

- **Results**
  - 28 out of 30 children sorted the same way in generalization trial as they did in the original trial
  - Most children who sorted by sound in the test continued to sort by sound during free play (8/9).

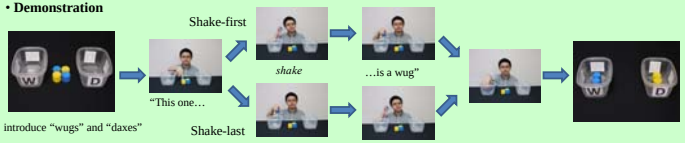
		Children's reaction in generalization trial		
		sort by sound	sort by color	sort in other way
Children's reaction in original trial	sound	21	0	0
	color	0	8	1
	other	1	0	0

- **Conclusion**

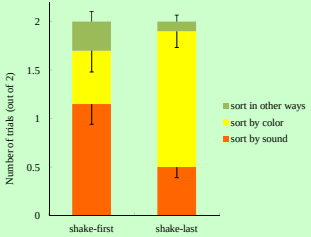
Children are learning the *general sorting strategies* from the demonstration, which could generalize beyond the particular objects used during demonstration to new objects.

EXPERIMENT 2

- **Question:** Labels signify non-obvious commonalities among objects (Gelman 2003, Gopnik & Sobel, 2000). How does the timing of causal actions influence children's sorting of *labeled* objects?
- **Participants**: 40 4-year-olds, (20 boys, age 4.0-5.0 y). n = 20 for each group (shake-first and shake-last).
- **Demonstration**



- **Test**

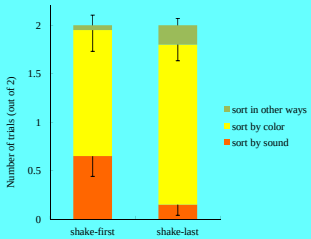


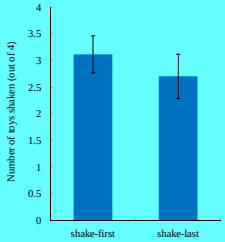
- **Results**
  - Sort by sound: shake-first > shake-last (p = .017)
  - Sort by color: shake-first < shake-last (p = .001)
  - Number of toys shaken: shake-first > shake-last (p = .003)
- **Conclusion**

Although labels may signify causal properties, the effect of timing of causal action was *still significant* for categorization of *labeled* objects.

EXPERIMENT 3

- **Question:** *Three-year-olds* are in general more attentive to surface features and less attentive to causal properties (Nazzi & Gopnik, 2000). Will they pay attention to the timing of causal action?
- **Participants**: 40 3-year-olds, (20 boys, age 2.9-4.0 y). n = 20 for each group (shake-first and shake-last).
- **Procedure:** same as Experiment 1
- **Results**
  - Sort by sound: shake-first > shake-last (p = .04)
  - Sort by color: shake-first = shake-last (p = .2)
  - Number of toys shaken: shake-first = shake-last (p > .2)
  - Compared with 4-year-olds (Exp 1), 3-year-olds were less likely to sort by sound (p = .05)





- **Conclusion**
  - Overall 3-year-olds were *less likely to sort by sound* than 4-year-olds
  - However, timing of causal action *still has a significant effect* on their sorting behavior.

INVESTIGATION OF CAUSAL PROPERTIES

- **Question:** What factors affect children's *investigation of causal properties* of the objects to be categorized?
- **Analysis**: Four experiments were combined. Regression analysis were done on *number of toys shaken per trial*, predicted by *child's age group*, *condition* (shake-first vs. shake last), and *sorting strategy* (sort by sound vs. sort by color).

	B	β	t - value	p - value
Age group	-0.46	-0.12	-2.27	.024
Condition	-0.57	0.19	-3.02	.003
Sorting strategy	1.16	0.16	7.46	< .001

- **Conclusion**
  - *Younger* children, children in *shake-first condition*, and children who *sorted by sound* were more likely to shake the toys.
  - May indicate higher *exploration* in younger children and children who thinks the causal properties are relevant to sorting.

CONCLUSION

- Both 3- and 4-year-olds were attentive to the demonstrator's *social cues* when they learn to categorize novel objects. When the demonstrator performed the causal action *before* rather than *after* sorting, children infers that causal properties were *relevant* to the sorting process, and were more likely to sort by the causal property during their turn.

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