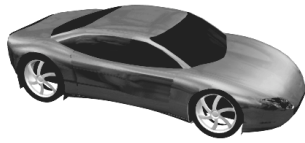


The Novel Label/Novel Object Strategy: A case of developmental discontinuity?



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ABSTRACT

Young children and adults prefer to fix a novel label to a novel object in word learning situations^(1,2). Infants (15-months) in our studies show behavior inconsistent with this pattern. Shown a picture of a car and a vacuum-tube (a novel object) and asked to "look at the DAX," infants reliably increase looking to the car, an object for which they already know a label. Frame by frame analysis of the process of mapping a novel label to a novel object in preschoolers and adults suggests that rejecting the known object (CAR) as a possible referent for the novel label ("DAX") may be the first step in applying the mature word-learning strategy (Mutual Exclusivity) in this situation.

METHOD

The current paradigm combines pragmatically natural labeling⁽⁴⁾ with a highly controlled word recognition task⁽³⁾.

Participants:

20 infants (10 boys), mean age = 15-0,
range = 14-7 to 16-08

20 preschoolers (10 boys), mean age = 3 yr 9 m
range = 2 yr 11 m to 5 yr 2 m

20 adults (10 men), mean age = 23 yr,
range = 18 yr to 31 yr

Participants observed two monitors which presented pictures of known and novel objects (fig.1). Objects appeared simultaneously. Following a measure of image preference, a speech stimulus prompted participants to watch one of the two objects, "Look at that BALL." Comprehension was measured as increased looking to the labeled object.

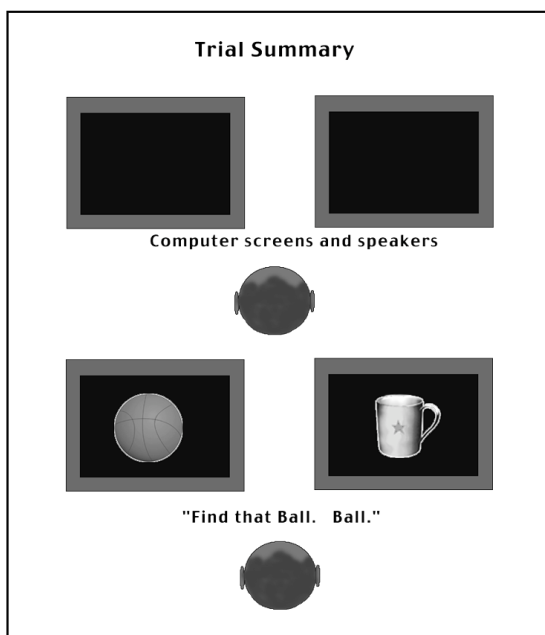


Figure 1

DESIGN

24 total trials

12 known/known trials (BALL vs. CUP)

12 known/novel trials (CAR vs. DAX)

On 6 of these trials the novel object (DAX) was the labeled target⁽⁵⁾.

Participants' looks to each object (target and distracter) were analyzed frame by frame allowing for both a gross analysis of success (fig.2&4) and an analysis of looking throughout the trial (fig.3&5).

RESULTS

Known Labels

- All age groups succeed on known labels as evidenced by increased looking to the labeled object (fig.2).

Infants: +11.6%, $t(19) = 4.02$, $p < 0.001$

Preschoolers: +31.5%, $t(19) = 15.32$, $p < 0.001$

Adults: +42.3%, $t(19) = 17.16$, $p < 0.001$

- Preschoolers and adults show a high probability of fixating the target following labeling (fig.3).

Known Labels

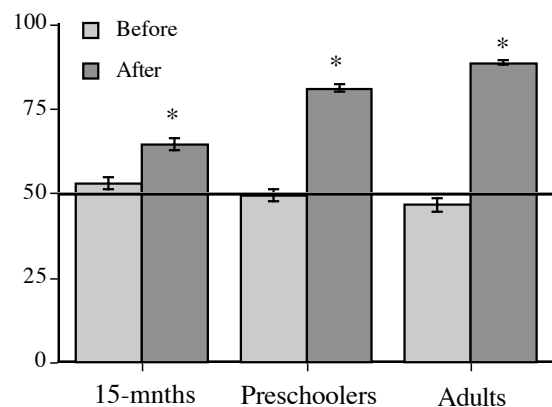


Figure 2. Mean percent looking (\pm SE) to the labeled target before and after label onset.

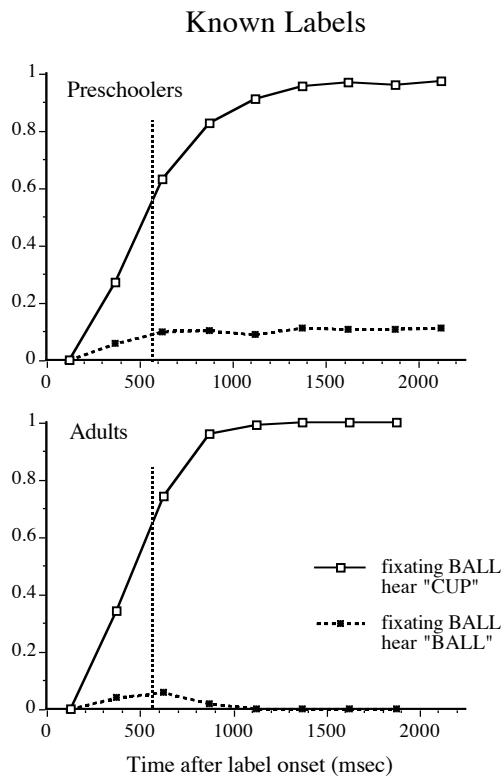


Figure 3. Probability of fixating the object other than the one fixated at label onset displayed for successive 250 msec time blocks following label onset.

Novel Labels

- Infants increase looking to the known object distracter (CAR) in response to the novel label ("DAX") as evidenced by negative looking to the target (fig.4).
Infants: -12.1% , $t(19) = -2.72$, $p < 0.05$
- Preschoolers and adults succeed at mapping novel labels to novel objects (fig.4).
Preschoolers: $+29.8\%$, $t(19) = 6.95$, $p < 0.001$
Adults: $+34.8\%$, $t(19) = 9.90$, $p < 0.001$
- When preschoolers and adults are fixating the novel target (DAX) as they hear the novel label ("DAX") they show a tendency to refixate the known object distracter (CAR) (fig.5). Looking gradually returns to the target (DAX) as subjects reject the (CAR) as a possible referent of the novel label ("DAX").
- This tendency is not observed when preschoolers and adults are fixating a known target (BALL) and hear a known label ("BALL") (fig.3).

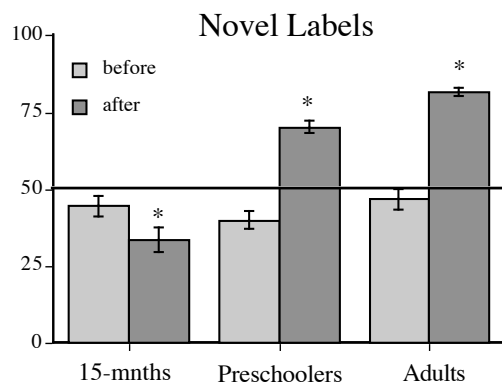


Figure 4. Mean percent looking (\pm SE) to the labeled target before and after label onset.

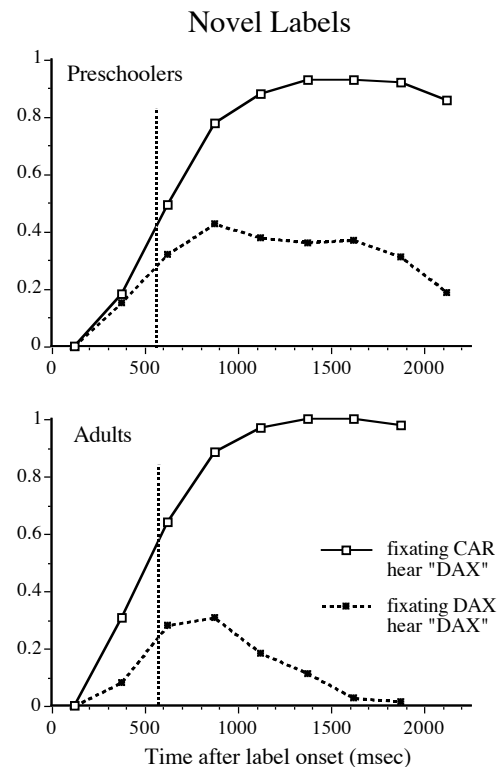


Figure 5. Probability of fixating the object other than the one fixated at label onset displayed for successive 250 msec time blocks following label onset.

CONCLUSIONS

- Participant's success on known labels illustrates the effectiveness of this method.
- On novel label trials, infants show a pattern of looking which is seemingly inconsistent with the strategy of mapping novel labels to novel objects.
- However, one version of this strategy (Mutual Exclusivity) stipulates that subjects must first reject the known object distracter (CAR) before mapping the novel label to the novel object.
- Preschoolers' and adults' tendency to refixate the known object distracter (CAR) prior to mapping the novel label ("DAX") to the novel object (DAX) supports this version (Mutual Exclusivity) of the mature strategy of mapping novel labels to novel objects.
- Thus, infant's fixation of the known object distracter (CAR) on novel label trials ("DAX") may indicate that infants are working through this same strategy, just at a slower rate.
- Future work will explore this possibility for young infants and describe the transition from the infant to the mature state.

REFERENCES and NOTES

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2. Markman, E. M. (1987). How children constrain the possible meanings of words. In U. Neisser (Ed.), *Concepts and conceptual development: Ecological and intellectual factors in categorization* (pp. 255-287). Cambridge, England: Cambridge University Press.
3. Fernald, A., Pinto, J. P., Swingle, D., Weinberg, A., and McRoberts, G. W. (1998). Rapid gains in speed of verbal processing by infants in the 2nd year. *Psychological Science*, 9, #3, pp.72-75.
4. Arriaga, R., Xu, F., and Carey, S. (1996). Pragmatically natural assessment of early noun comprehension. Poster presented at the biennial meeting of the International Conference on Infant Studies. Providence, RI.
5. Preschoolers and adults saw different known and novel objects on every trial while infants saw repeated trials with cup, ball, car and dax. These objects have been used as labels throughout the poster as a simplification.