Two-Year-Olds Fast-mapping of Novel Labels: How Fast is Fast?

Justin Halberda

Harvard University

poster presented at SRCD 2003, Tampa Bay Fl.

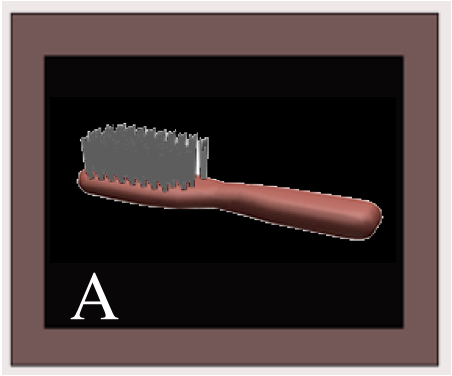
ABSTRACT

This Experiment revealed two important findings:

1) The logical inference Disjunctive Syllogism underlies the word-learning strategy Mutual Exclusivity.

2) Two-year-olds can learn new nouns given a single exposure to a spoken label in an ambiguous labeling context, devoid of social cues, that lasts only 3 seconds.

Disjunctive Syllogism



"Point at the dax."

- The name "dax" either refers to A or B
- "Dax" does not refer to A (because A is called "brush")
- Therefore, "dax" must refer to B

Consistent with:

Mutual Exclusivity
Contrast
Pragmatic Account

Not consistent with:

Novel-Name
Nameless-Category

METHOD

An extension of Halberda (2003).

Participants: 20 children (10 boys),
mean age: 30-0

Children observed two monitors which presented pictures of known and novel objects (Fig.1). Objects appeared simultaneously. A speech stimulus asked children to point to one of the two objects, "Point at the DAX." Comprehension was measured as increased looking and correct pointing to the labeled object.

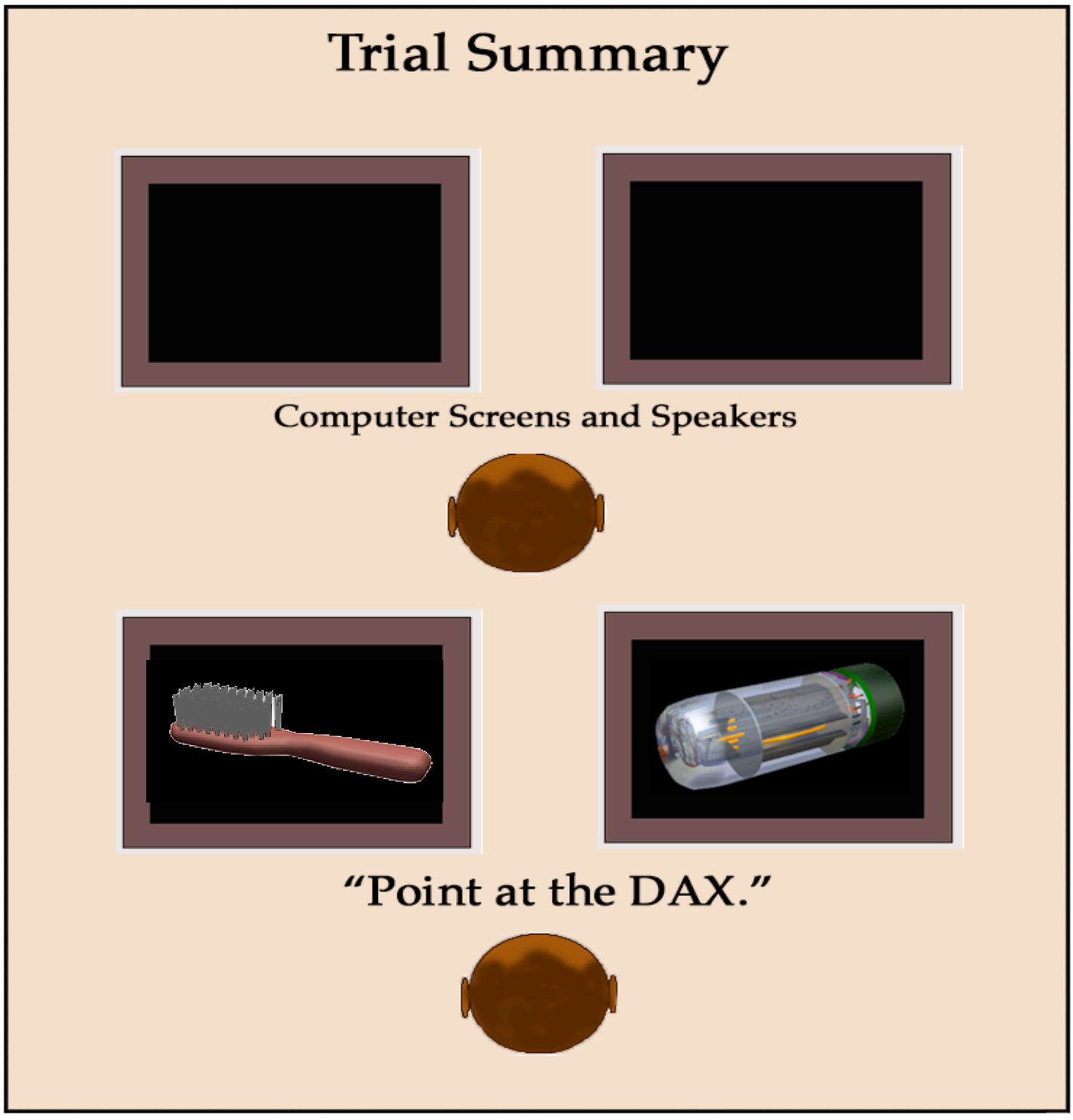

Trial Summary
Computer Screens and Speakers
"Point at the DAX."

Figure 1

DESIGN

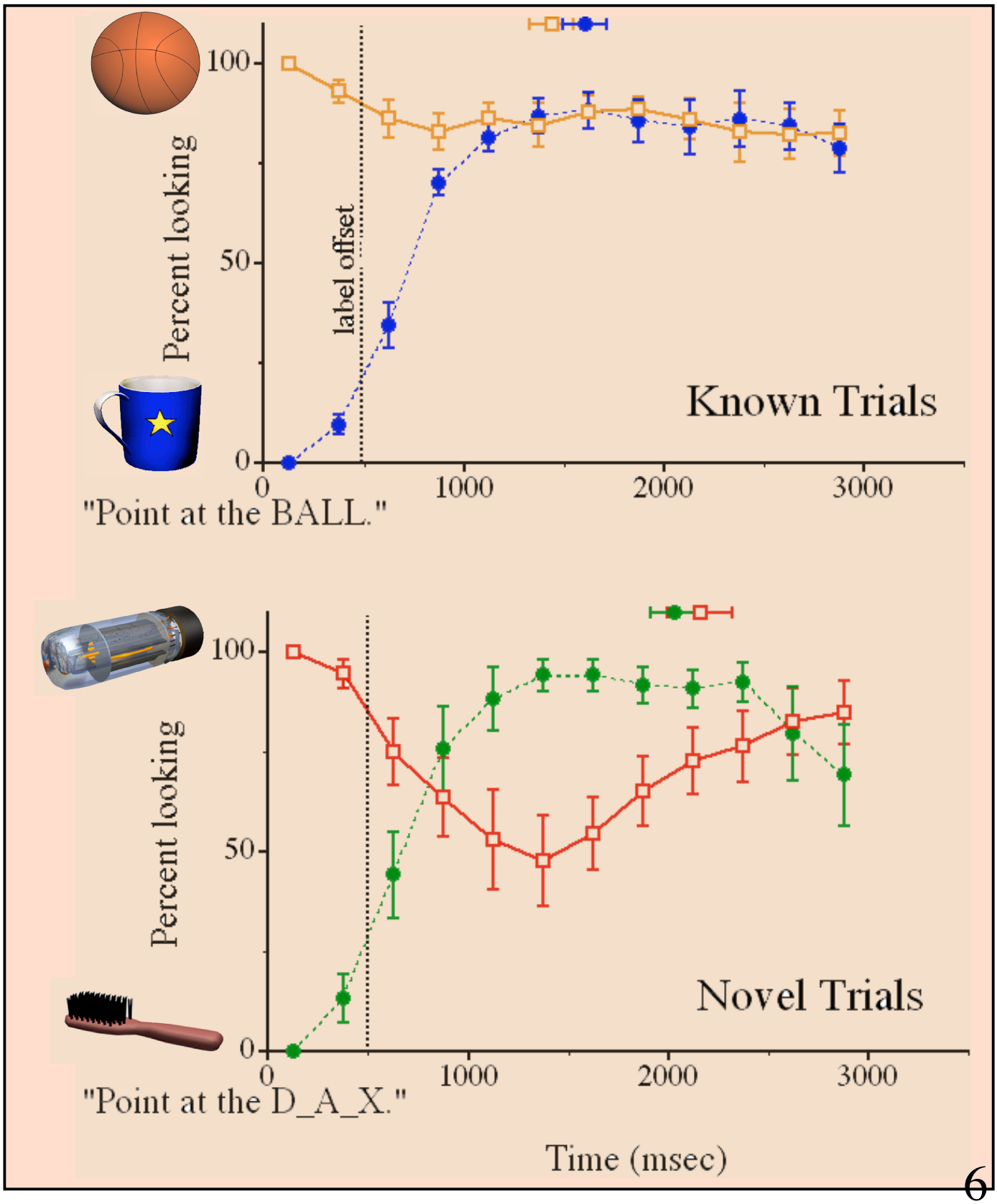
25 total trials

12 known/known trials (e.g. BALL vs. CUP)
12 known/novel trials (e.g. BRUSH vs. DAX)
On 6 of these trials the novel object (DAX)
was the labeled target.

Children's looking to each object (target and distracter) was analyzed frame by frame revealing the pattern of fixations that led to success.

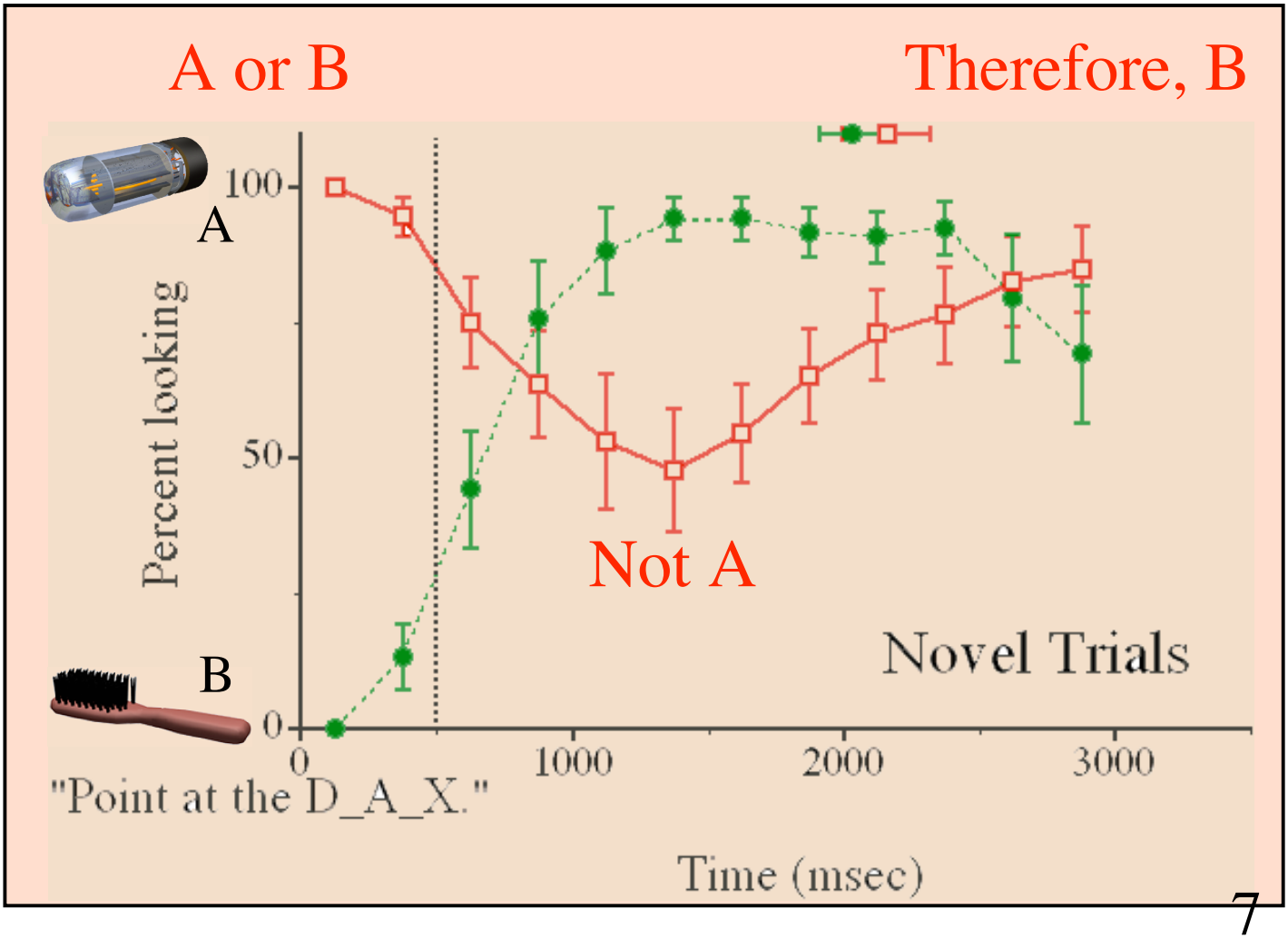
RESULTS

Disjunctive Syllogism



Disjunctive Syllogism

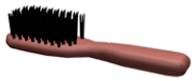
• Children showed a significant tendency to "double-check" the familiar object distractor (e.g. brush) on novel label trials (e.g. "dax") compared to known label trials (e.g. "ball") consistent with the possibility that children are reasoning:



Disjunctive Syllogism

• Also, there is a significant Trial Type X Object Fixated interaction for subjects' Reaction Time to Point to the Target.

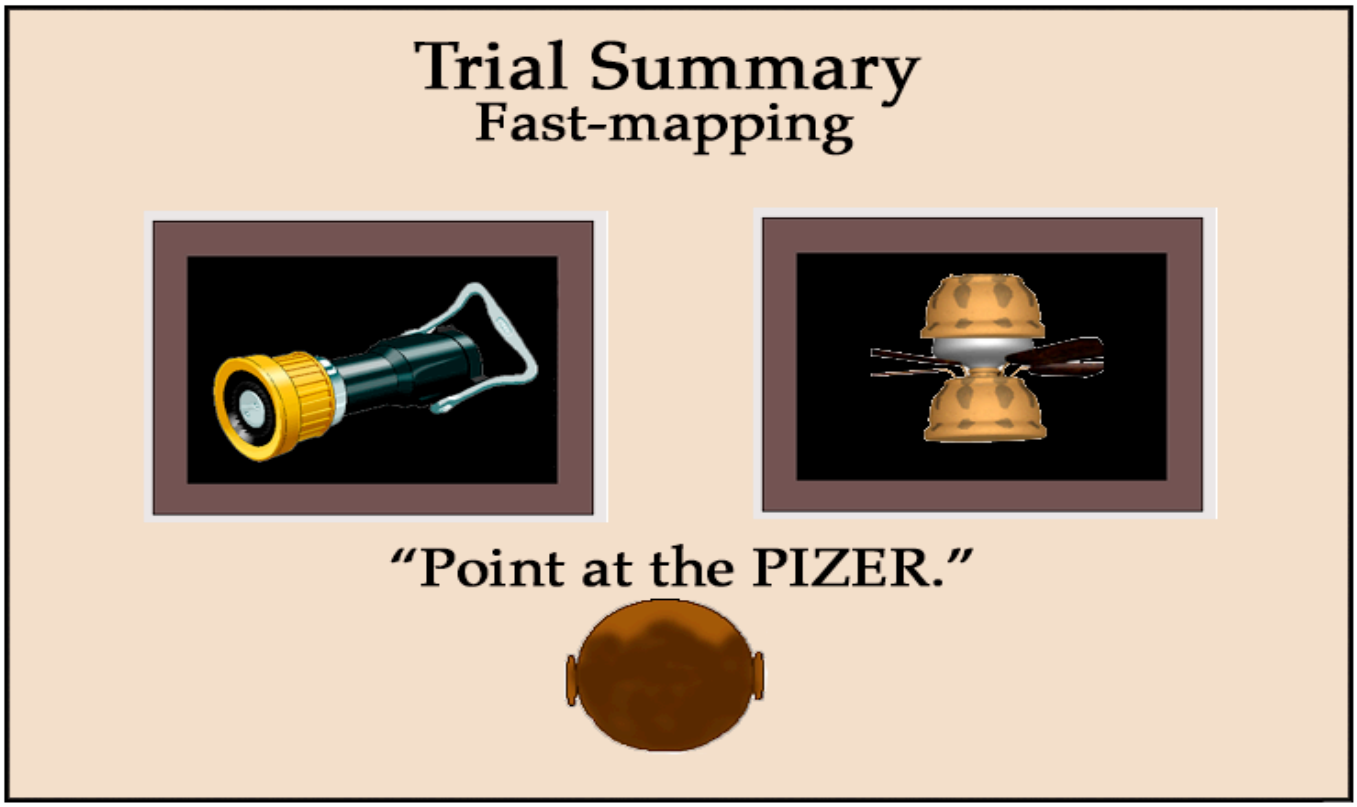
• For deciding which object is a "Ball," the rate-limiting information to decide to point is in the Target object  . Point times are faster for Target-fixated trials then for Distractor-fixated.

• For deciding what is a "Dax," the rate-limiting information is in the Distractor object  . Point times are faster for Distractor-fixated trials then for Target-fixated trials.

• These inferences are also supported by detailed RT data from adult subjects (Halberda, submitted).

RESULTS

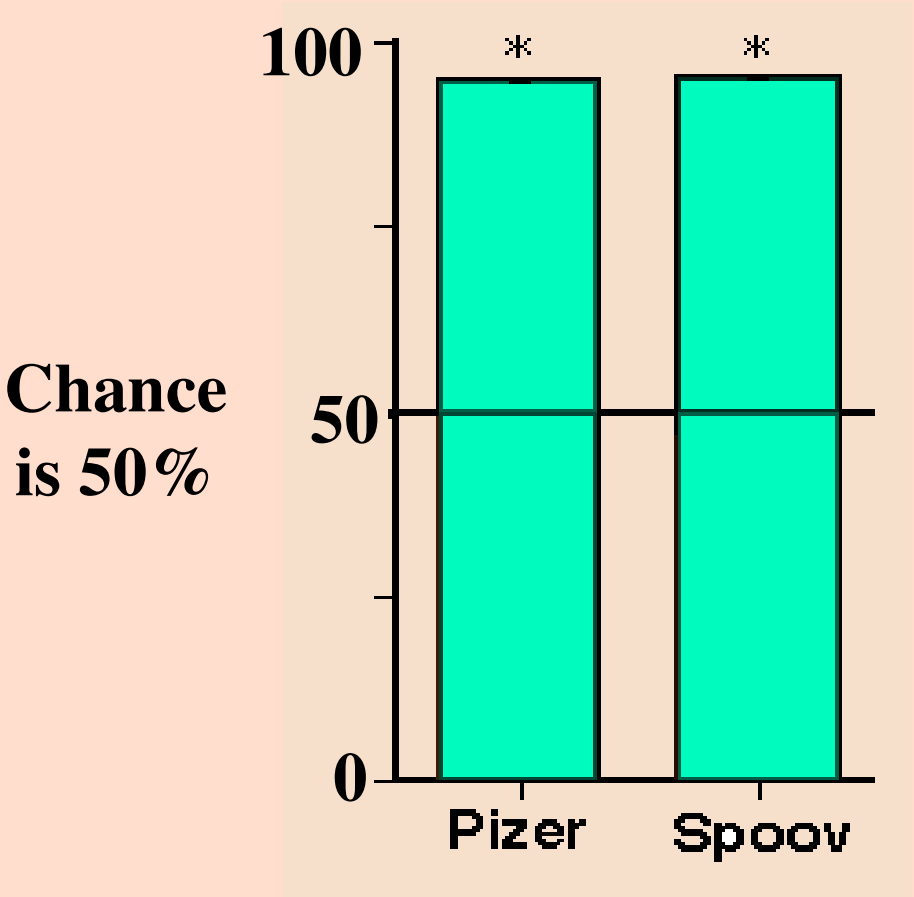
Fast-Mapping



The last trial that children saw was identical to all other trials. But, it presented children with two novel objects, the names of which they had had a single 3 second opportunity to learn earlier in the study. Children were given no feed-back as to the correct referent on any trials.

Fast-Mapping

The Number of Children Pointing to the Correct Object



Children correctly pointed to the novel target indicating that they had learned the name of at least one of the novel objects during the course of the study.

CONCLUSIONS

• Children's eye-movements appear to correlate with the inferential steps of Disjunctive Syllogism (A or B, Not A, Therefore B)

• The relative ordering of point times also reflects the use of this strategy.

• 2-3 year-old children are able to learn a new noun given only a single 3 second exposure to the noun and object in a completely ambiguous labeling situation.

•Fast-mapping is Fast.

REFERENCES

Halberda, J. (2003). The development of a word-learning strategy. Cognition 87, pg B23-B34.

Halberda, J. (submitted). Is this a dax I see before me? Disjunctive Syllogism support a word-learning strategy.