

Building Baby Brains: Everyday Experiences for Language Learning

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The First 2,000 Days



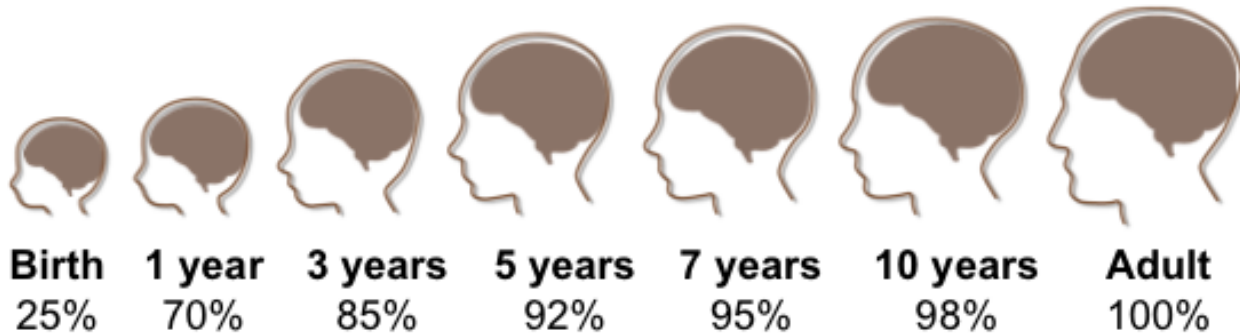
The First 2,000 Days



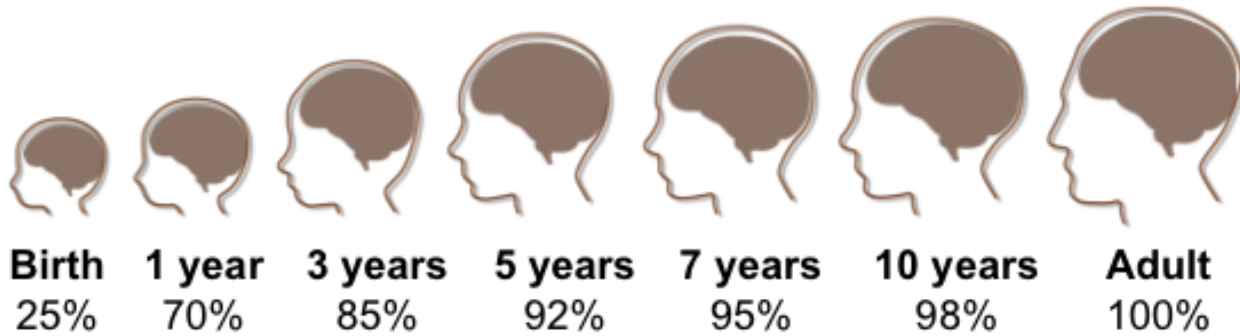
Day 1

Day 2000

2,000 Days of Rapid Brain Growth



2,000 Days of Rapid Brain Growth





“It is not only the skills children have when they enter school that matter for later success but also the path they followed in getting to these skills.”

~Rowe, Raudenbush & Goldin-Meadow, 2012

Building Baby Brains

- Evidence that experiences prepare the infant brain for learning.
- The ingredients of everyday experiences for language learning.
- Early experiences are the building blocks for later success.

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What have YOU learned from experience?



What have YOU learned from experience?



'DA'

'DA'

'TA'



'DA'

'TA'

'weird TA?'

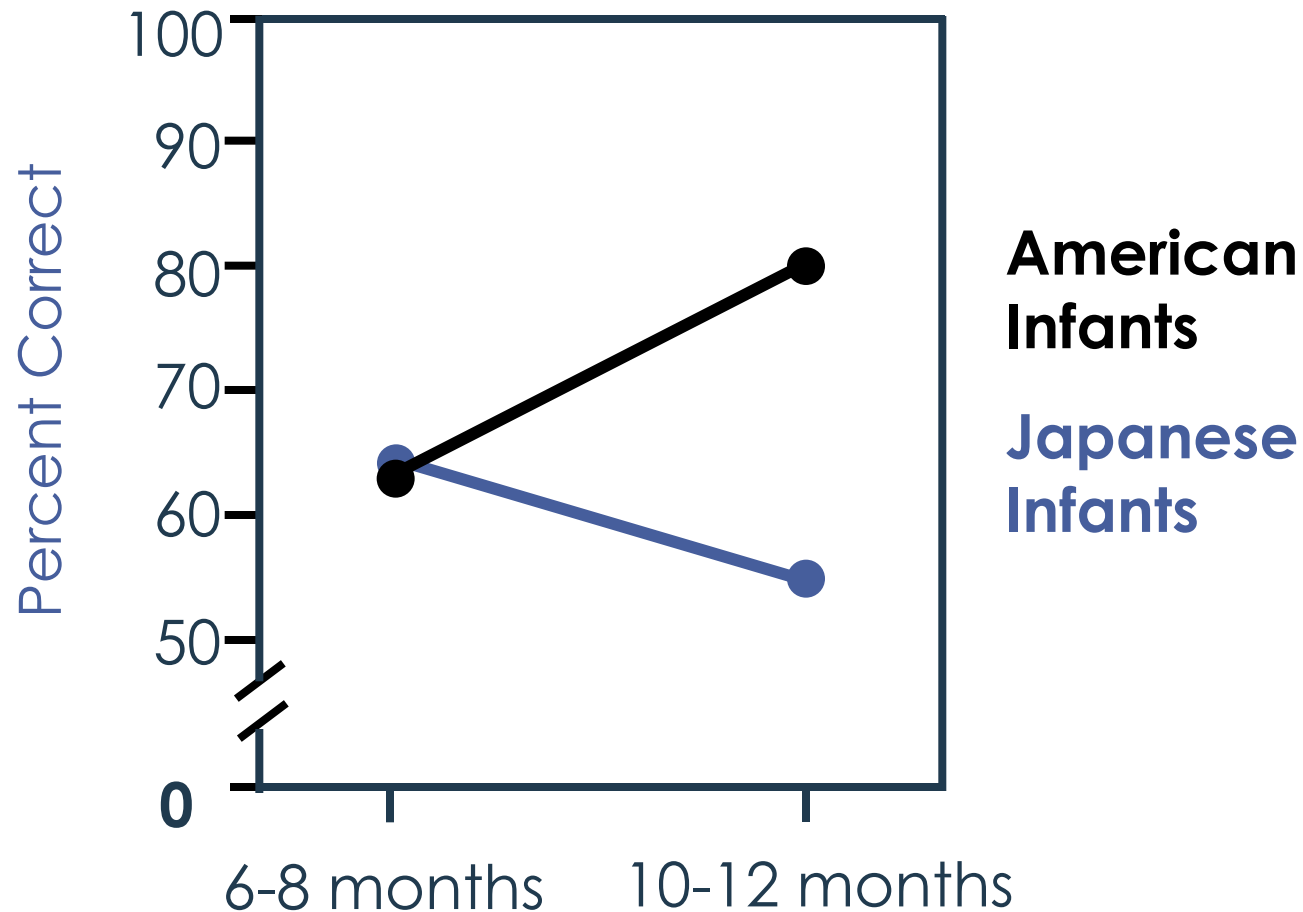
Learning Begins Before Birth

- Children are exposed to language in the womb
- Hours after birth, infants differentiate between native and foreign language sounds

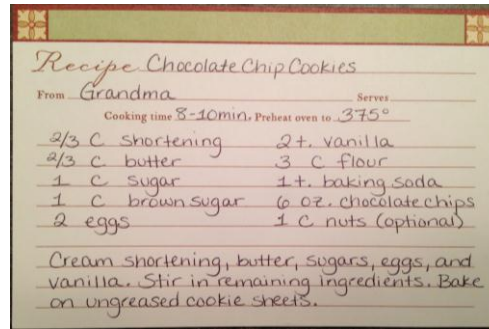


Experience Shapes Language

Infant perception of /ra/-/la/



Biology + Experience



Biological factors
provide the
'raw ingredients'

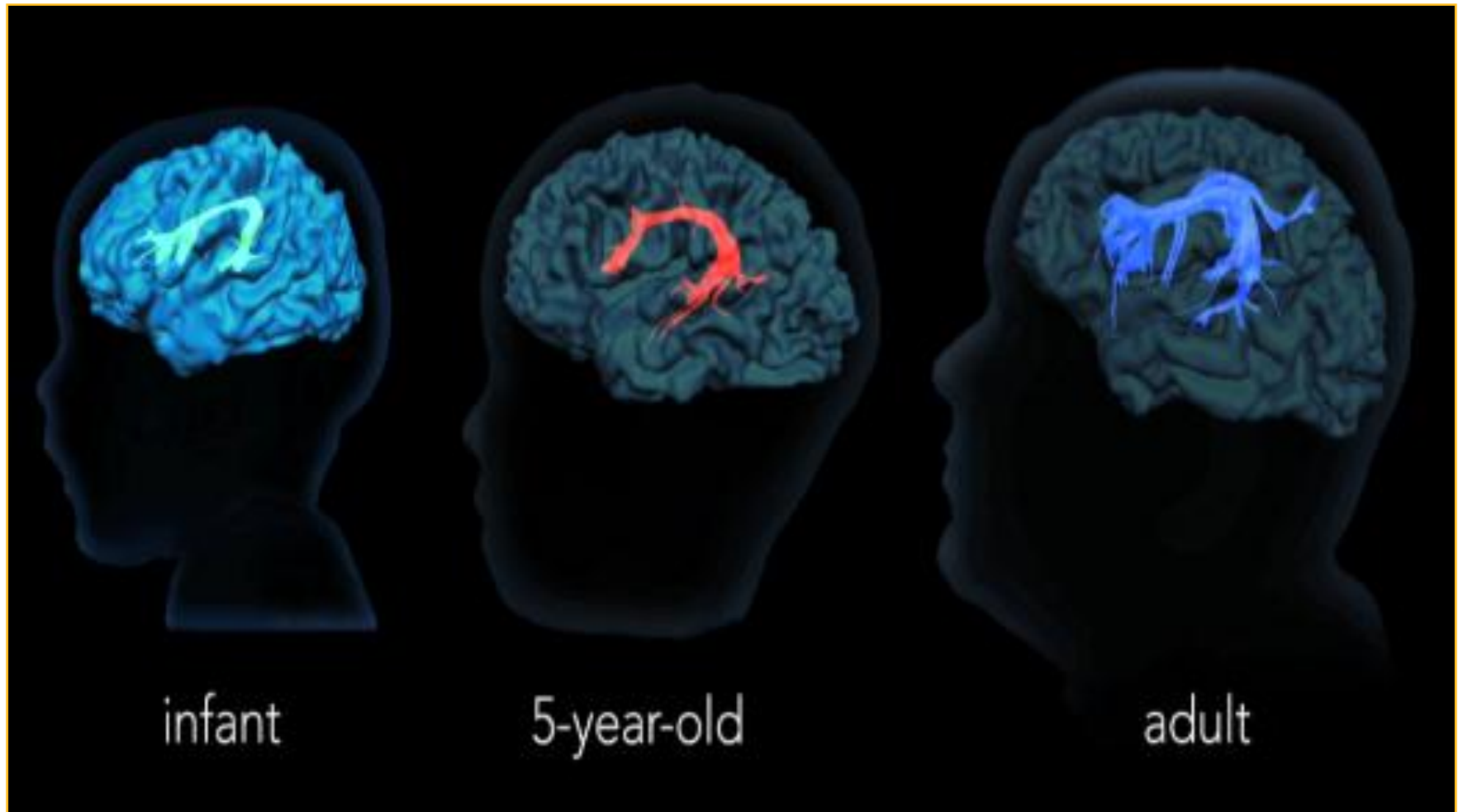
Experience is the
'recipe'

Development is
determined by
**Biology +
Experience**

Magnetoencephalography (MEG)



Forming the Brain's Language Networks



Choi et al., 2009

Real-time Coordination Between Brain Regions

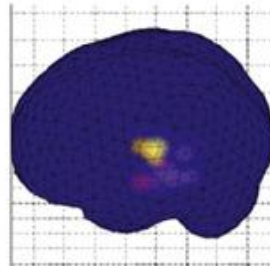
A



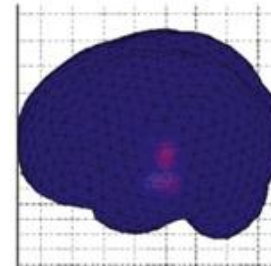
B

Speech Perception (listening)

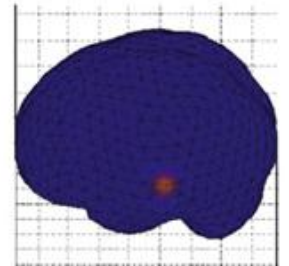
Newborns



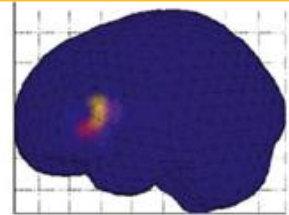
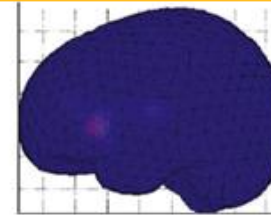
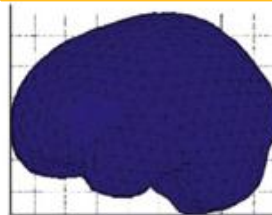
6-month-olds



12-month-olds

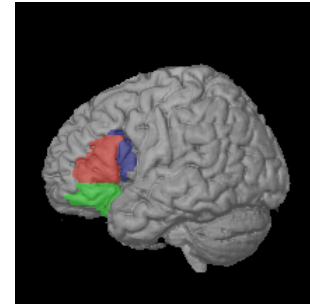
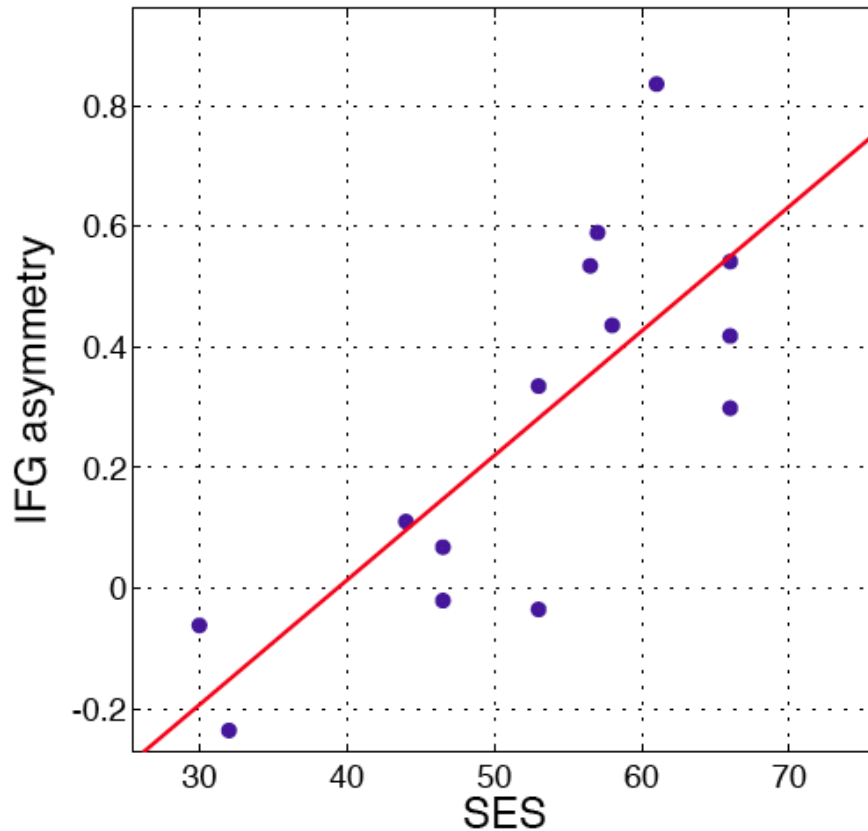


Speech Production (speaking)



1 2 3 4 5 6 (Z score relative to 100 to 0 ms baseline)

Fewer Experiences → Reduced Brain Dev't



Lower SES is related to less specialized brain function in 5-year-olds

Building Baby Brains

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Are all experiences equal?

Live Interaction



DVD Session



Audio (CD) Session



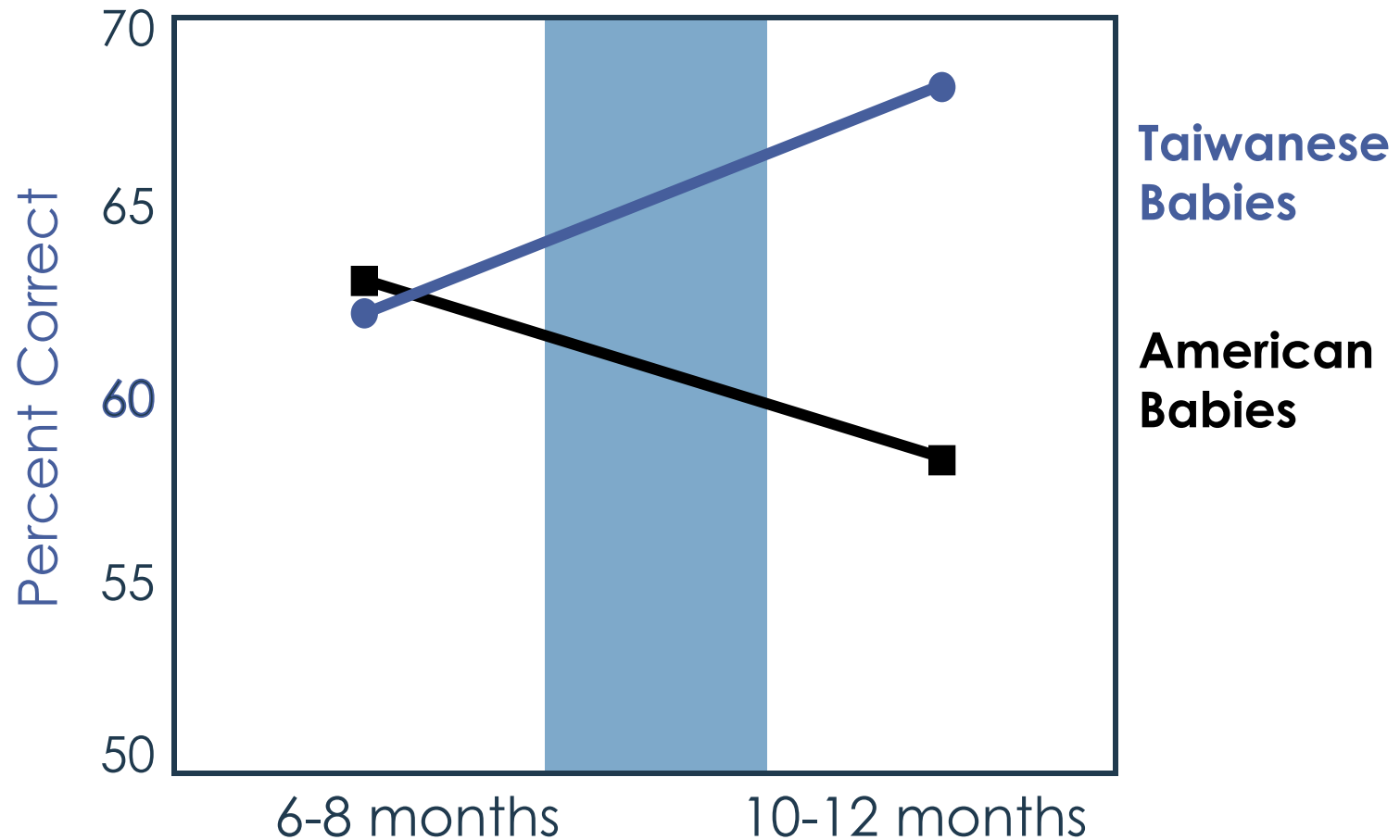
- 9-month-old Seattle infants
- Naturalistic Mandarin Chinese exposure (play & books)
- 12 sessions, 25 minutes each

Do infants learn to discriminate Mandarin sounds?

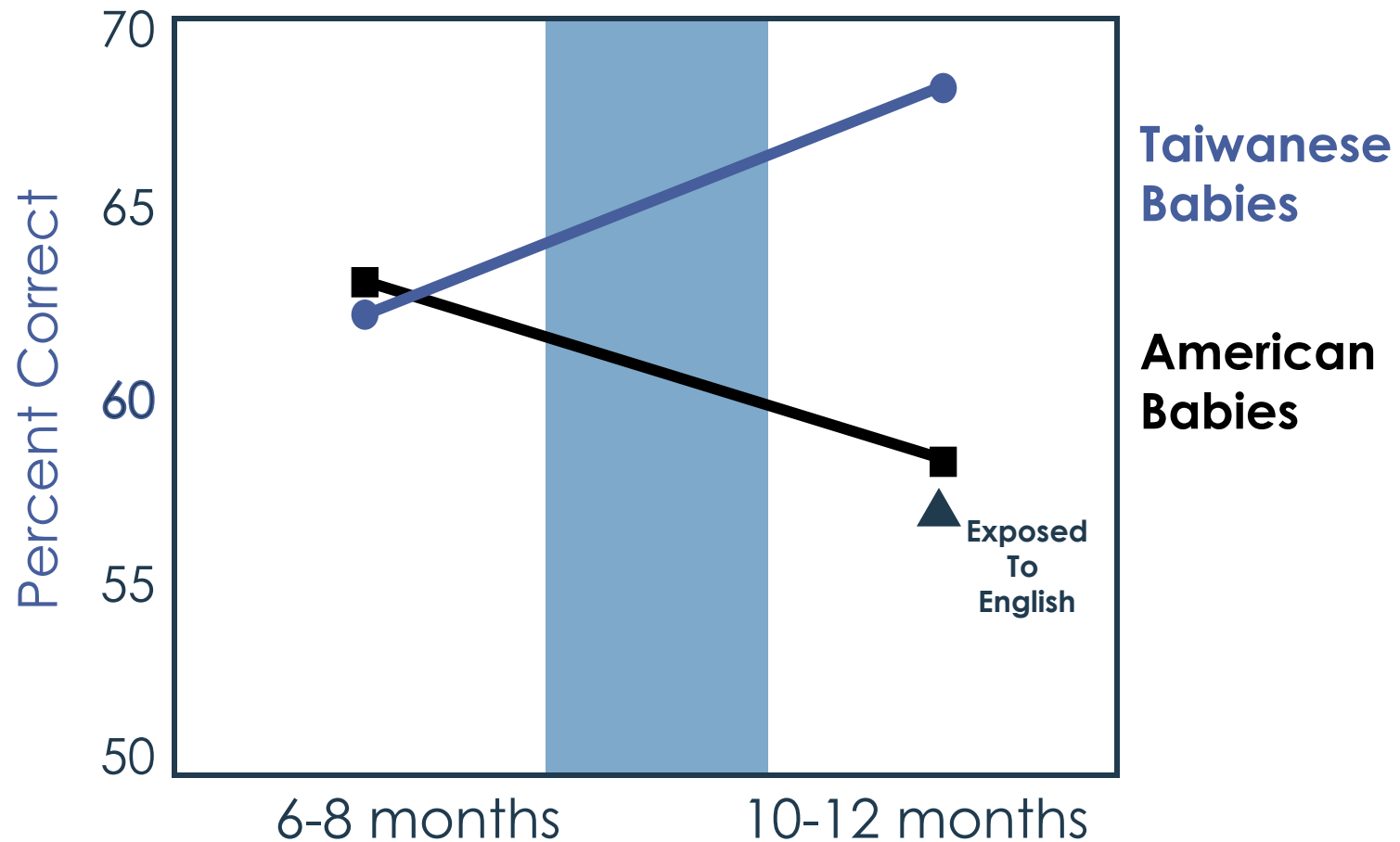


Kuhl, Tsao & Liu, 2003

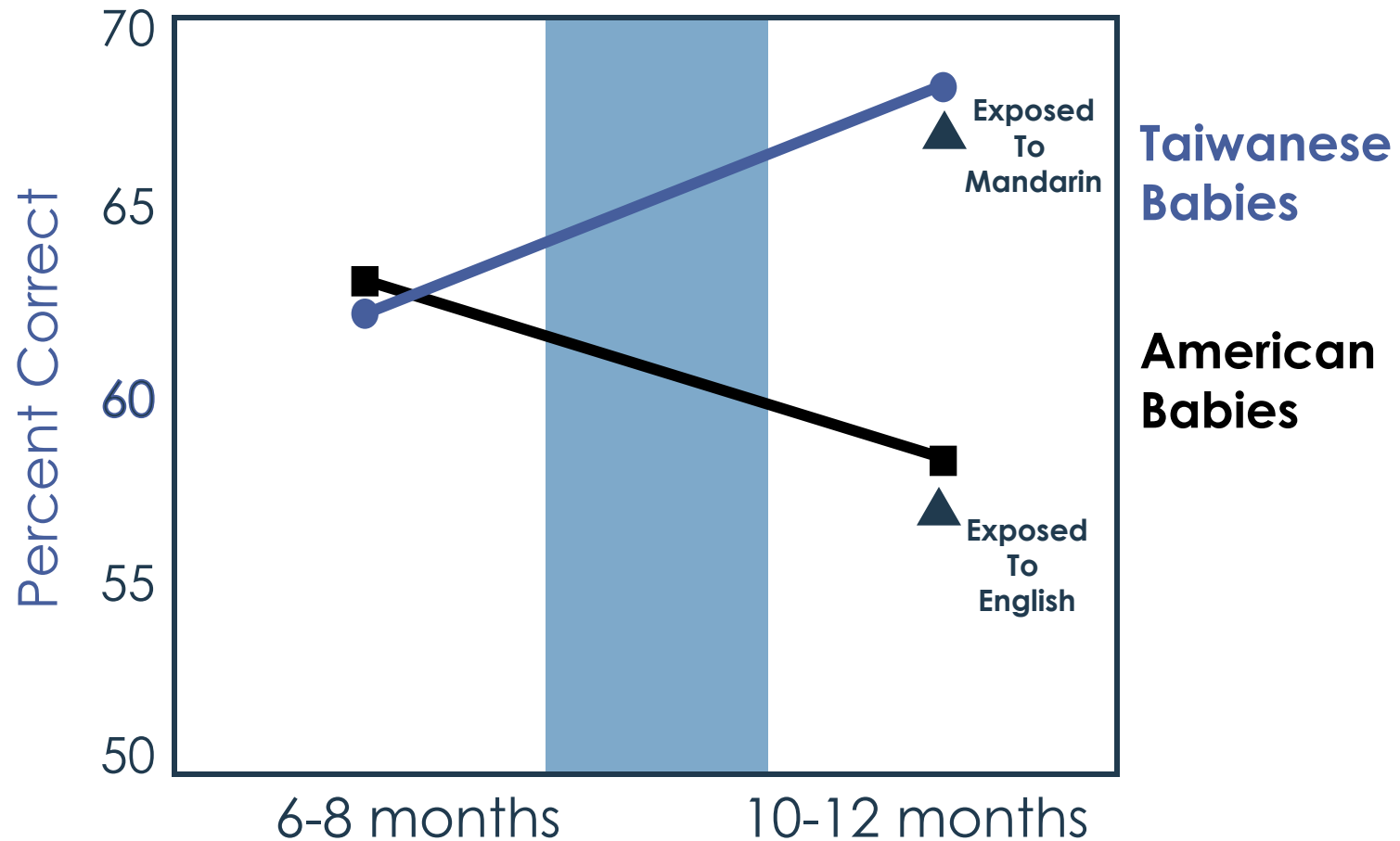
Children Learn From **Other People**



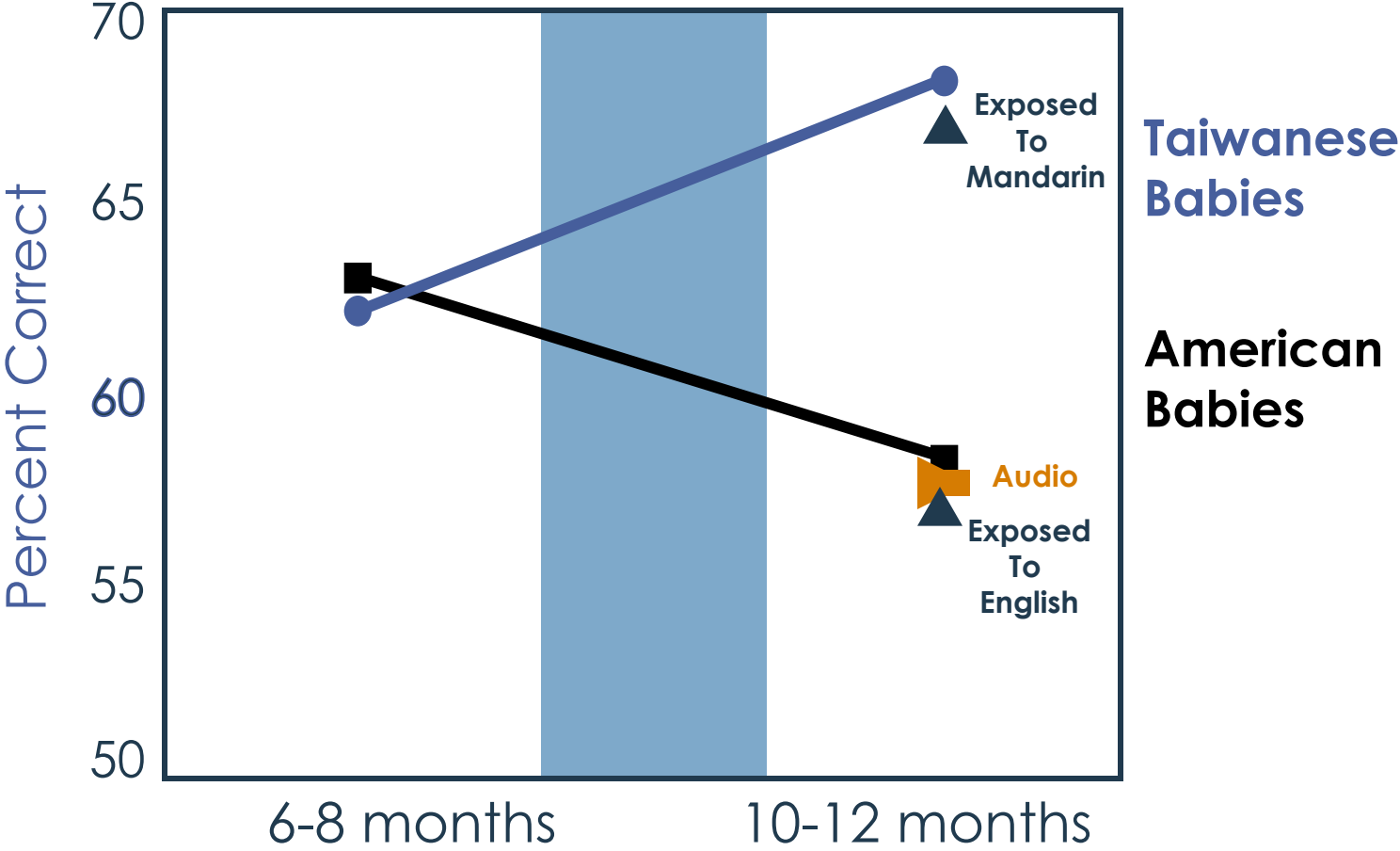
Children Learn From Other People



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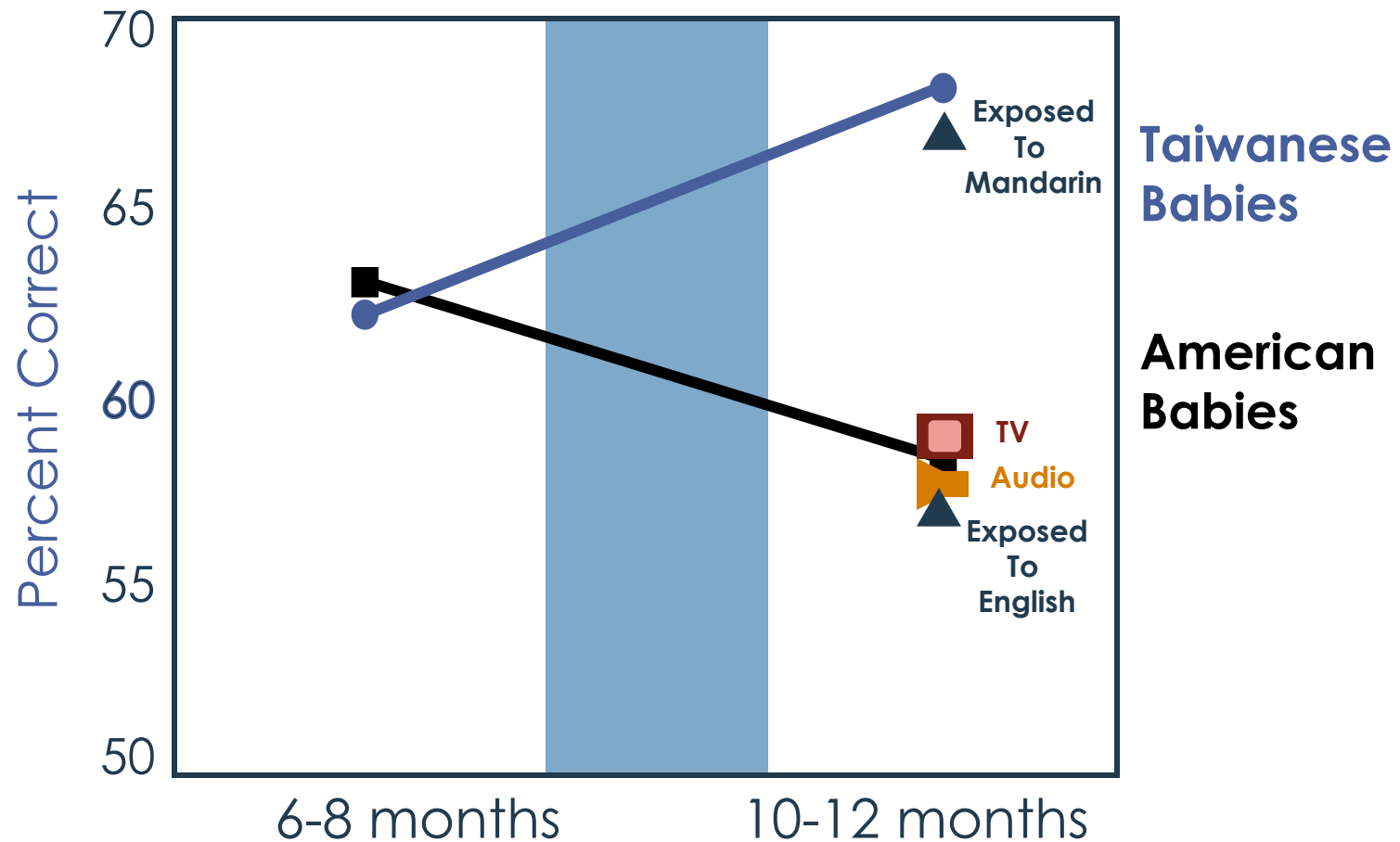


Children Learn From Other People

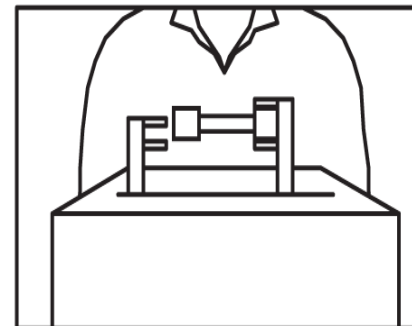
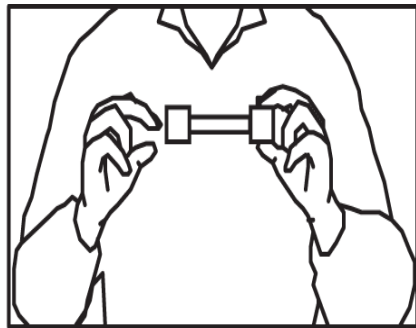
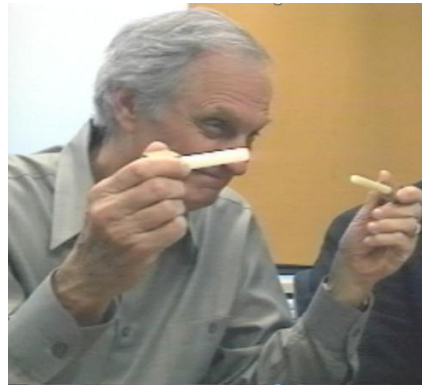
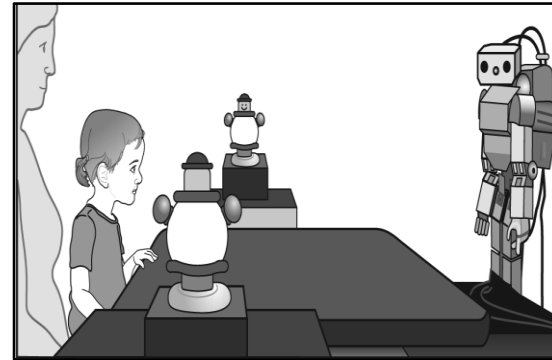


Kuhl, Tsao & Liu, 2003

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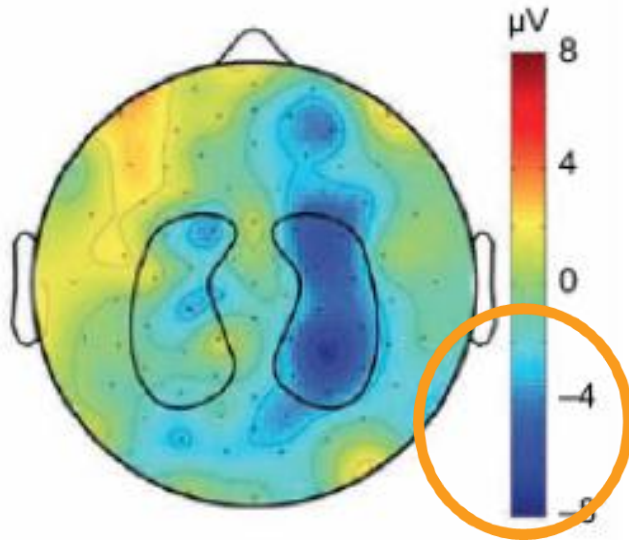


Children Learn From **Other People**

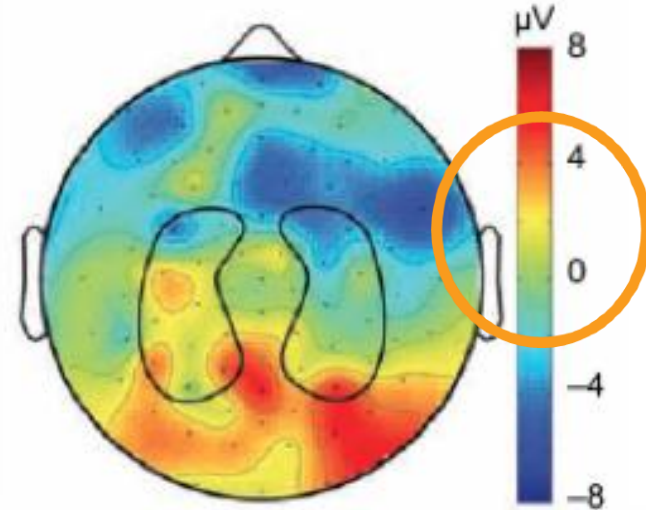


Children Learn Best from **Familiar People**

Mother-Speech Condition



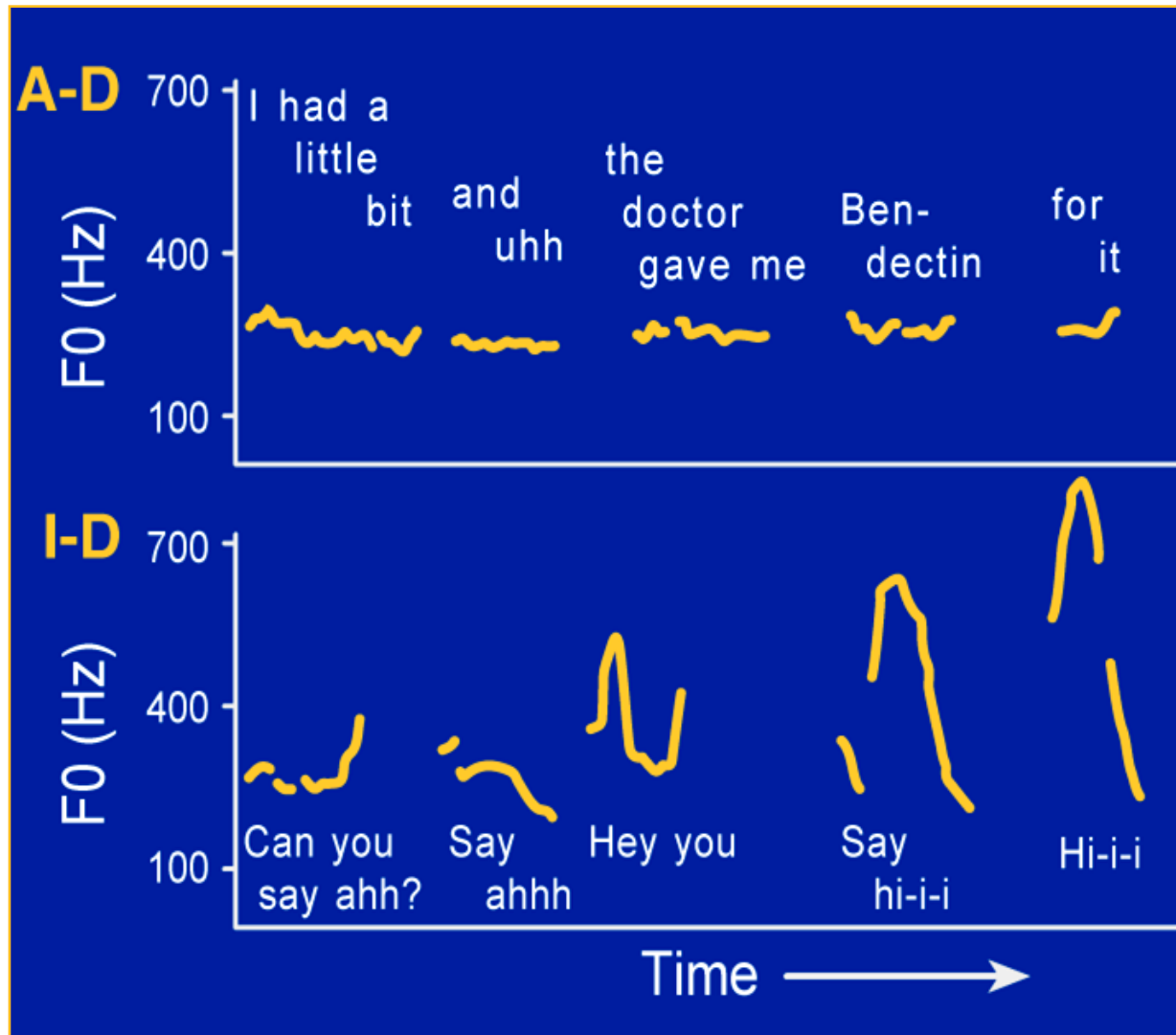
Experimenter-Speech Condition



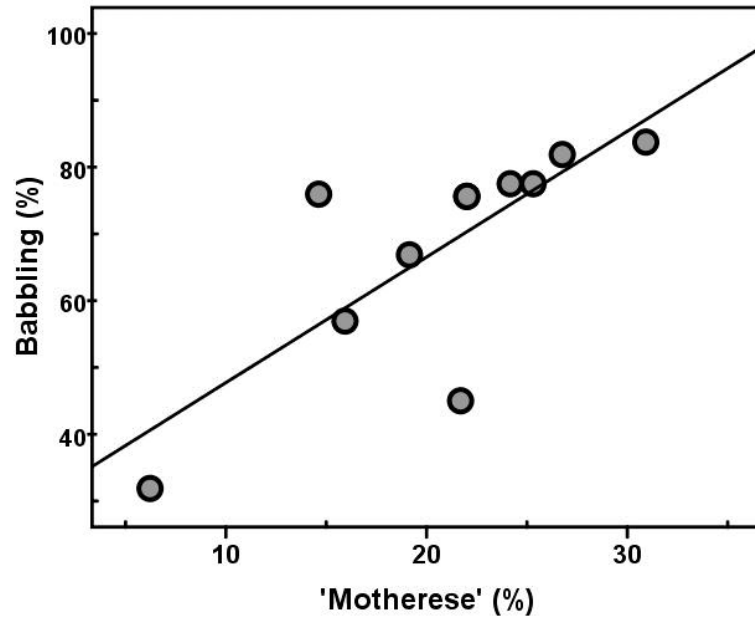
↓
Maturity of Response

- 9-month-olds show more mature neural responses to language from a familiar, important person (i.e., a parent)

Children Learn from **Infant-Directed Speech**

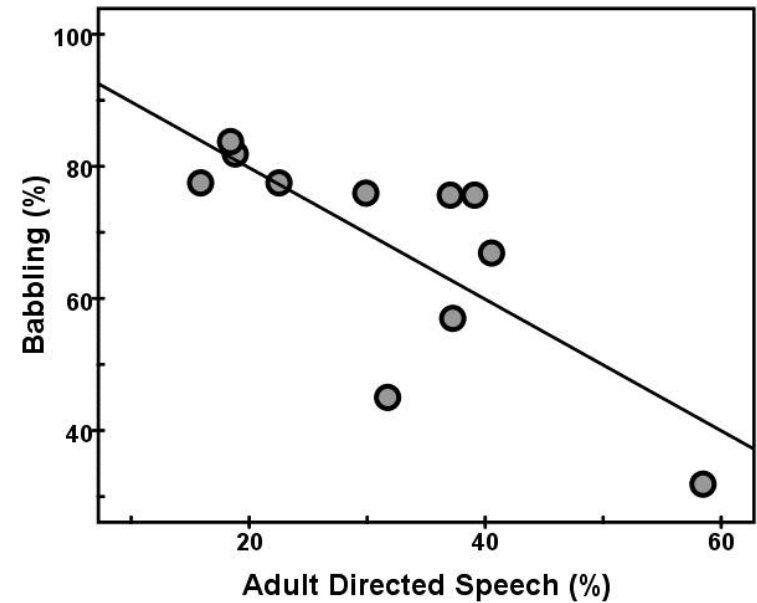


Children Learn from **Infant-Directed Speech**



↑ **Infant-Directed Speech**

↑ **Babbling**



↑ **Adult-Directed Speech**

↓ **Babbling**

Children Learn from **Infant-Directed Speech**

- Babies who heard more Infant-Directed Speech in one-on-one interactions:
 - Babbled back to parent more at the time of study (12 months)
 - Had larger vocabularies at 24 months
- Infant-Directed Speech is most effective when a parent spoke with the a child individually
- Quality – not just quantity – matters



...And **Type of Speech** Matters

“You worked
so hard!”



“You’re so
great!”

Children Learn from **Eye Gaze**



Brooks & Meltzoff, 2002

Children Learn from **Eye Gaze**



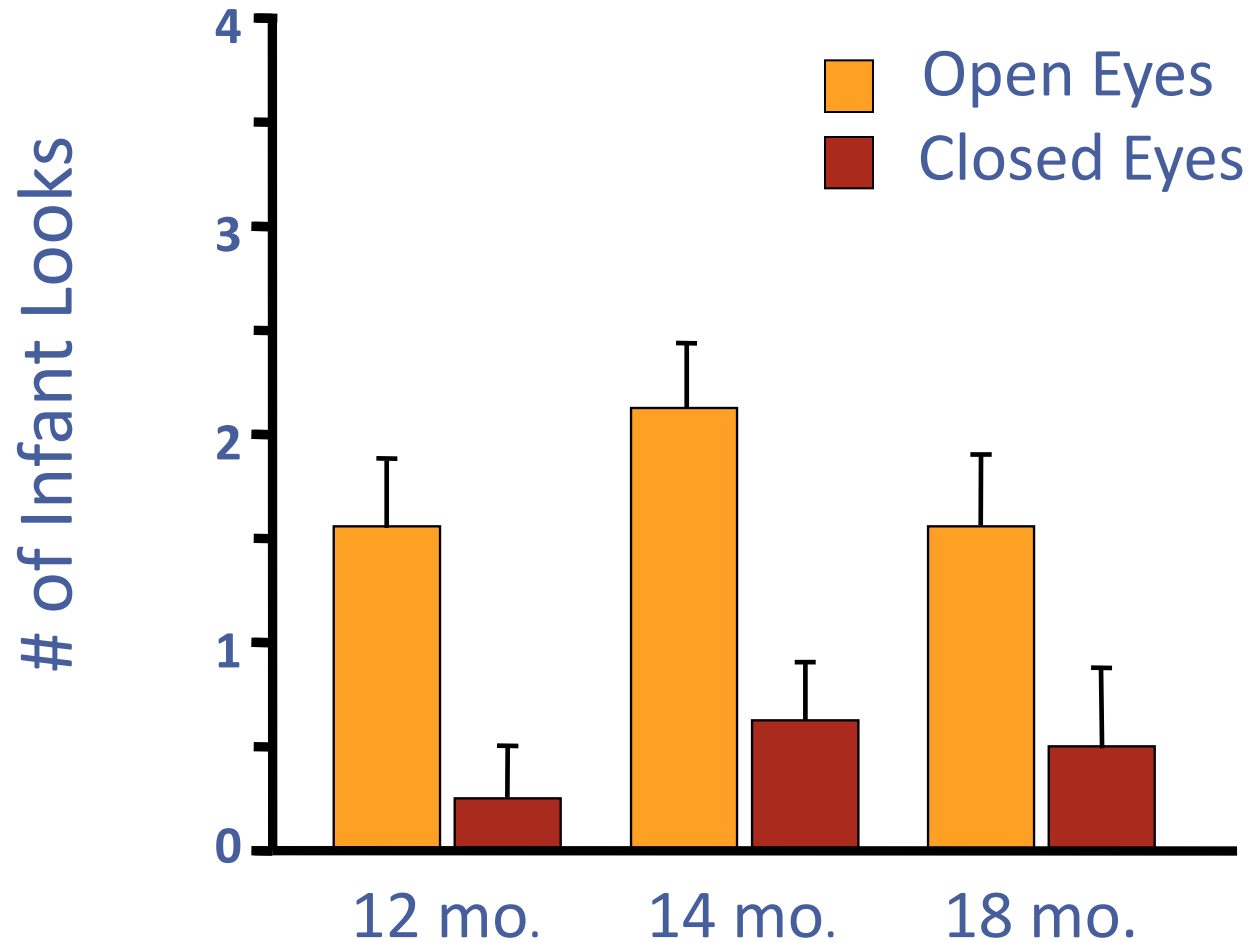
Brooks & Meltzoff, 2002

Children Learn from **Eye Gaze**

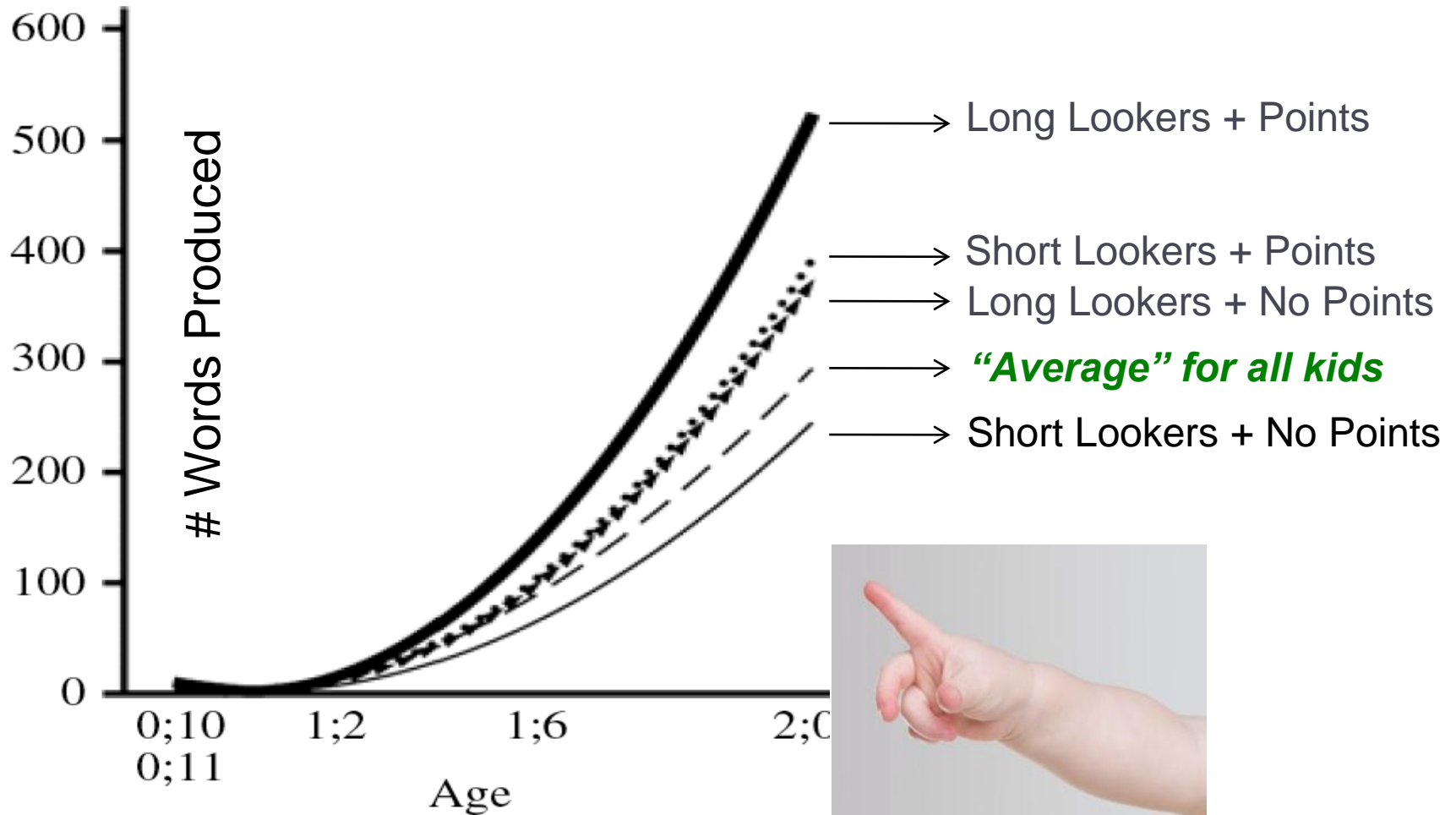


Brooks & Meltzoff, 2002

Children Learn from Eye Gaze



Children Learn Words from **Eye Gaze**



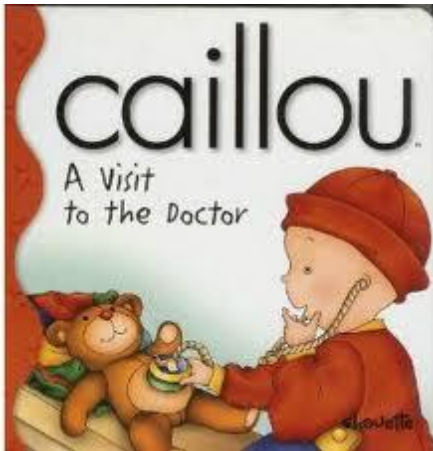
Brooks & Meltzoff, 2008

Children Learn from **Back-and-Forth Interactions**



Roseberry, Hirsh-Pasek & Golinkoff, 2013

Children Learn from **Scaffolding**



Do you remember going to the doctor like Caillou?



What do you think Caillou will do at the doctor's office?



That's a tongue depressor!
Can you stick out your tongue like Caillou?



Boosting Scaffolding



Boosting Scaffolding

“Ask your child to sort cans of fruit from cans of vegetables.”

“Help your child count their money to pay for the groceries.”

*“Squash”
“Asparagus”
“Dairy”
“Eggplant”*

*“Milk comes from a cow.
What else comes from a
cow?”*



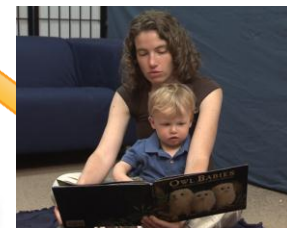
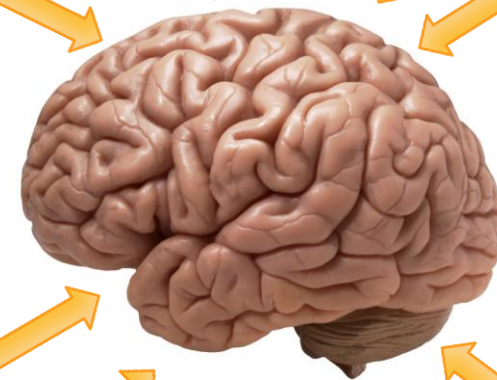
Ingredients of Quality Interactions



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Building Baby Brains



Early Learning Sets the Stage

7 mo.

2 yr.

4 yr.

5 yr.

6 yr.

4th grade

Gray matter →
Vocabulary

Deniz Can et al., 2013;
Brooks & Meltzoff, 2008; Kuhl et al., 2005; Lebedeva et al., 2010;
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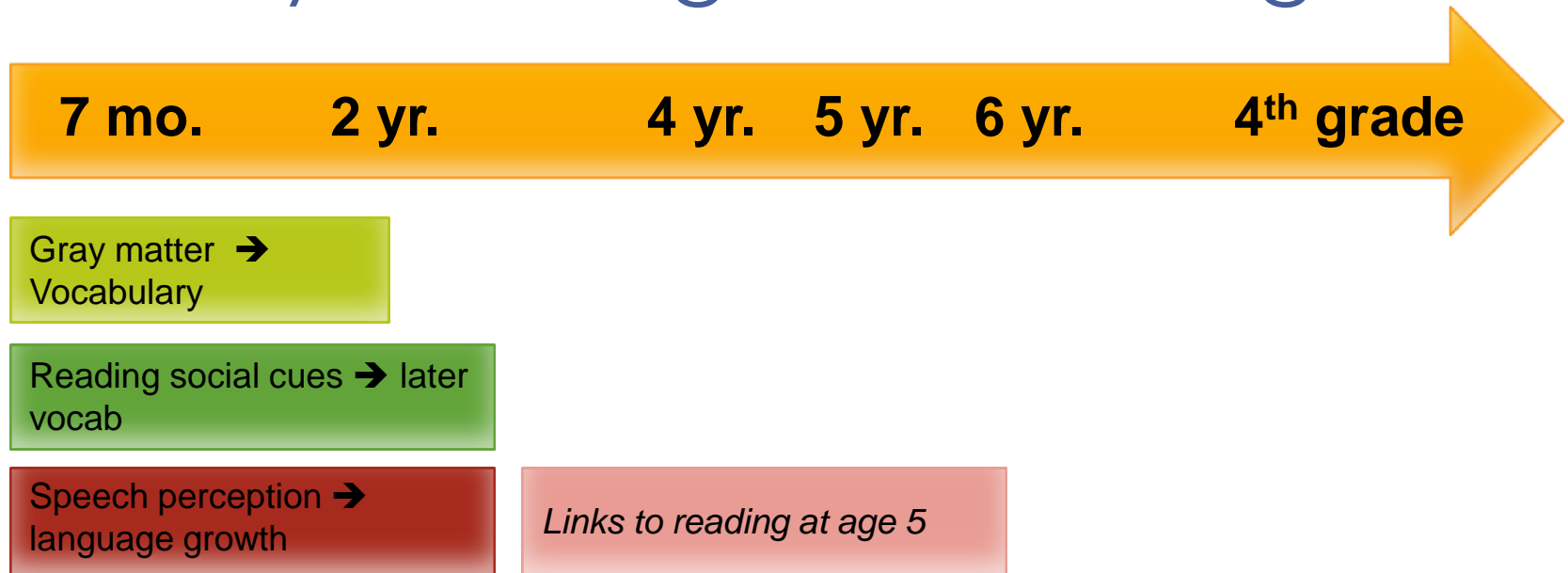
4th grade

Gray matter →
Vocabulary

Reading social cues → later
vocab

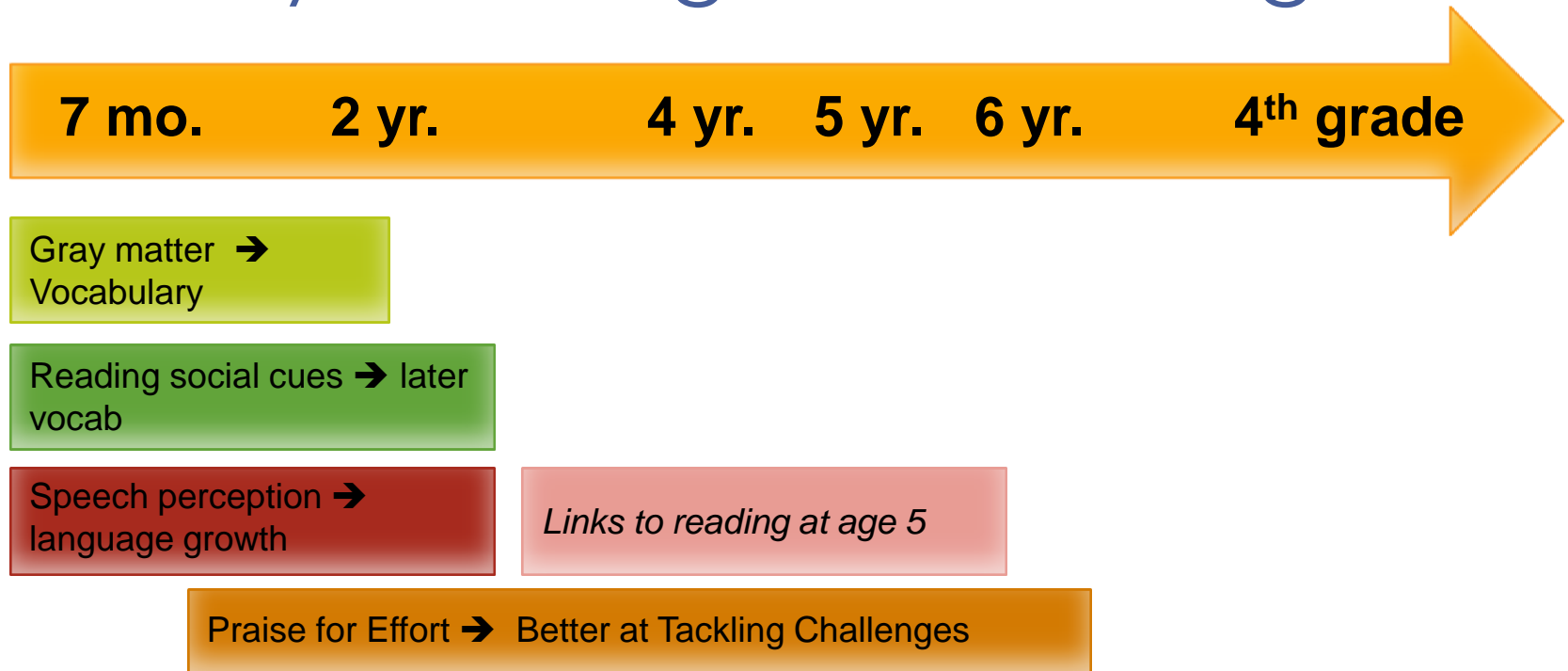
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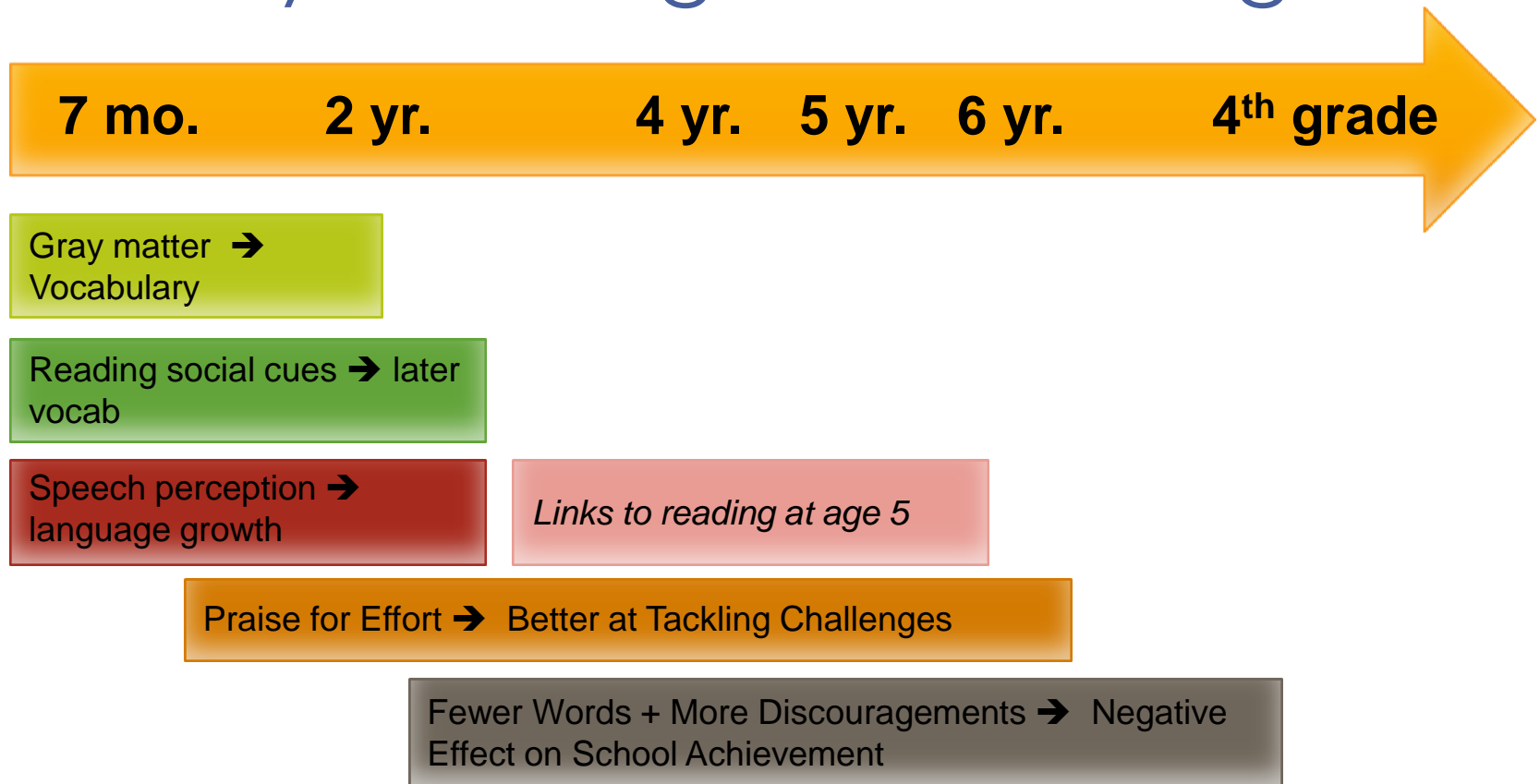
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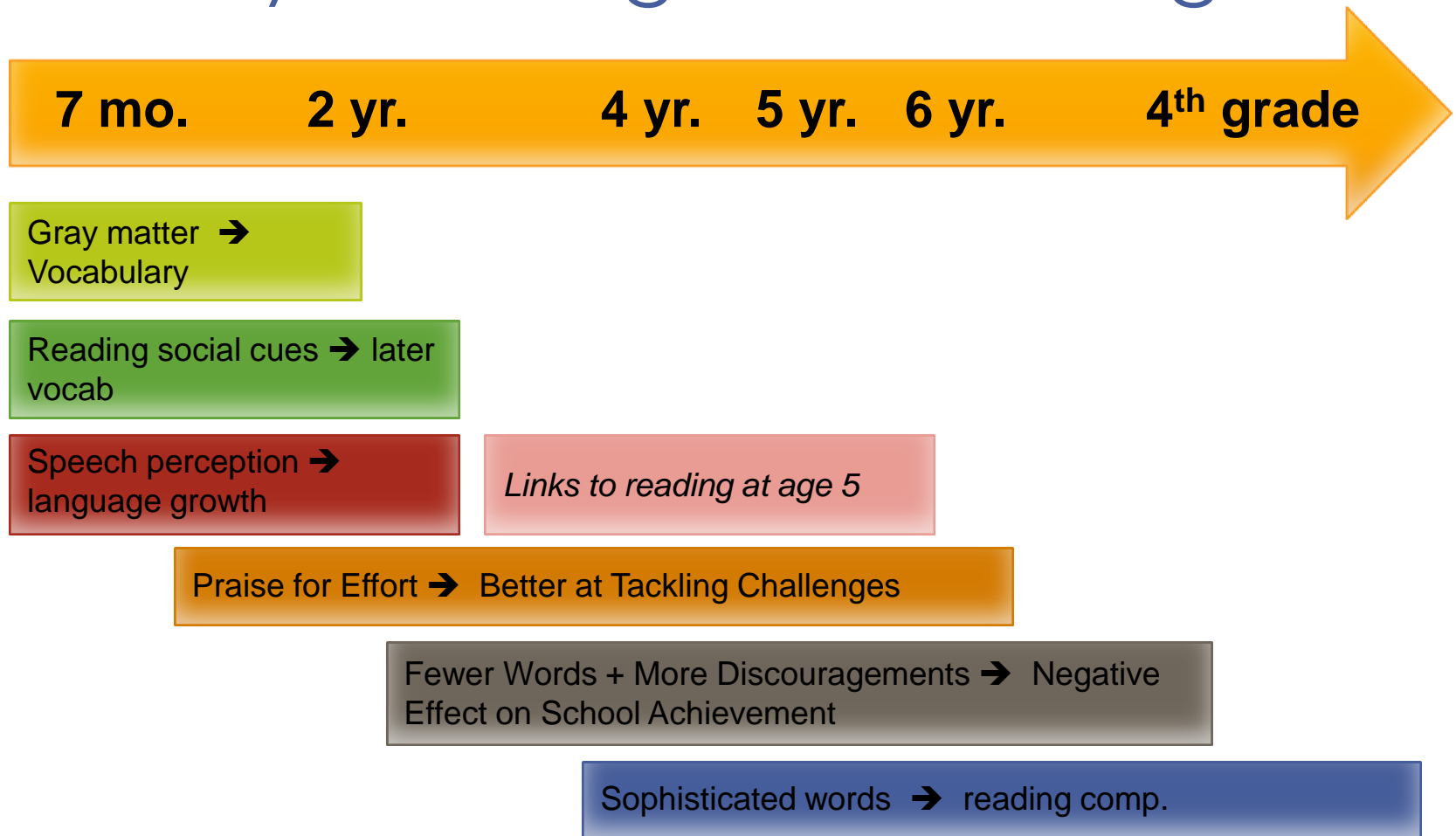
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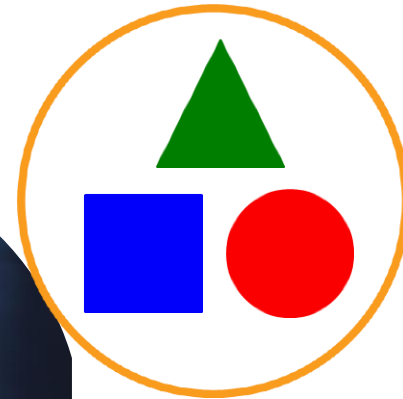
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What Makes a School-Ready Child?

ABCs



123s



red
blue
green

What Makes a School-Ready Child?

Supportive
Relationships

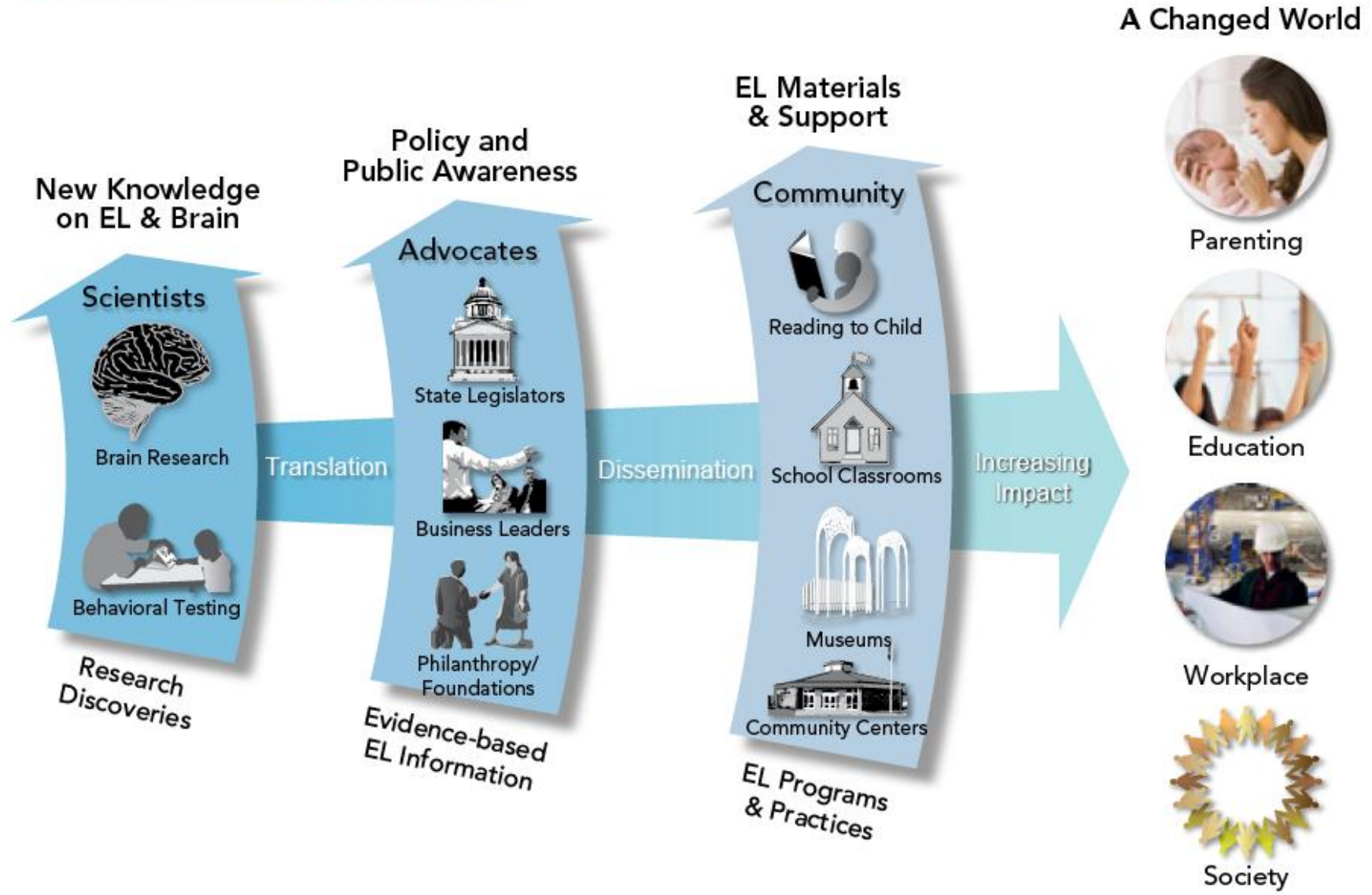
Communication
Skills

Everyday
Experiences
&
Play

Understanding
Emotions



Early Learning Ecosystem



Gratefully acknowledging our partners, collaborators, colleagues, & supporters



- NSF Science of Learning Center grant to the University of Washington's LIFE Center
- The National Institutes of Health (NIH)
- The Hsin-Yi Foundation
- The McDonnell Foundation
- The Human Frontiers Science Program
- Cure Autism Now

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