Convergence: Neuroscience and Early Childhood Education

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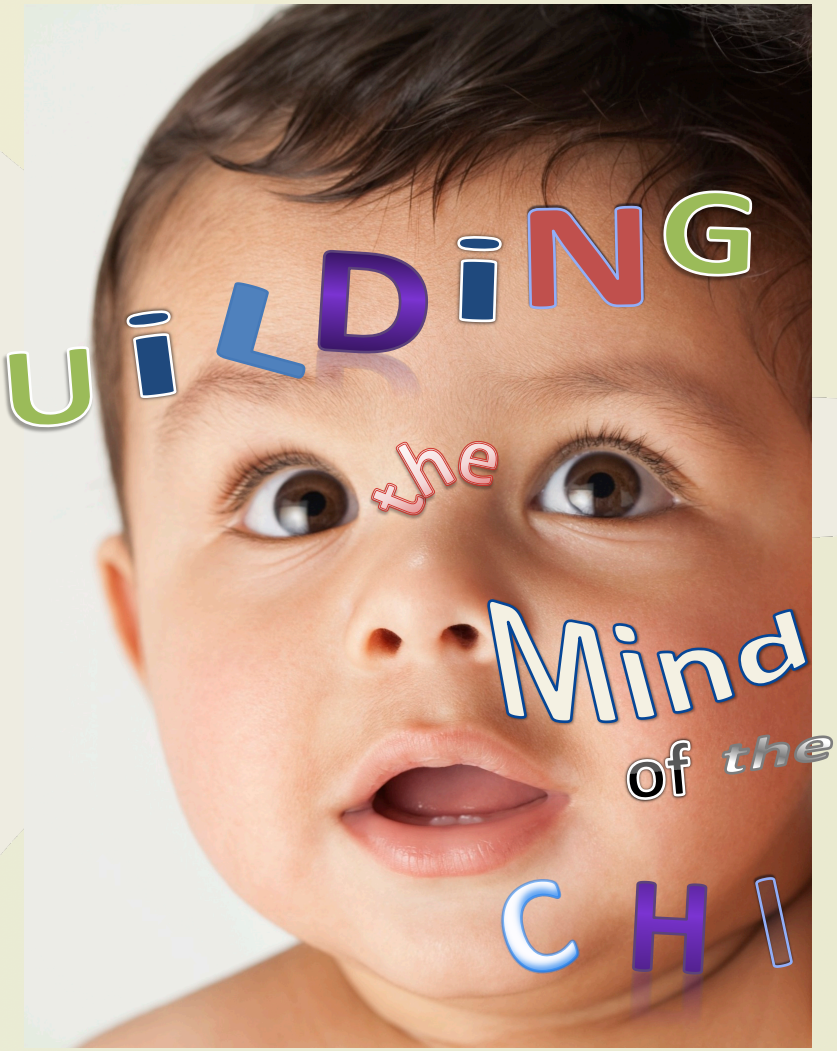
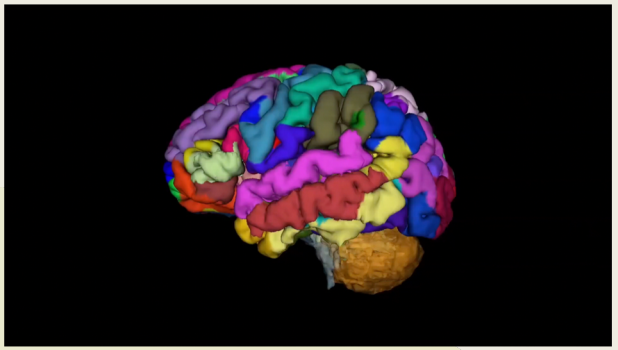


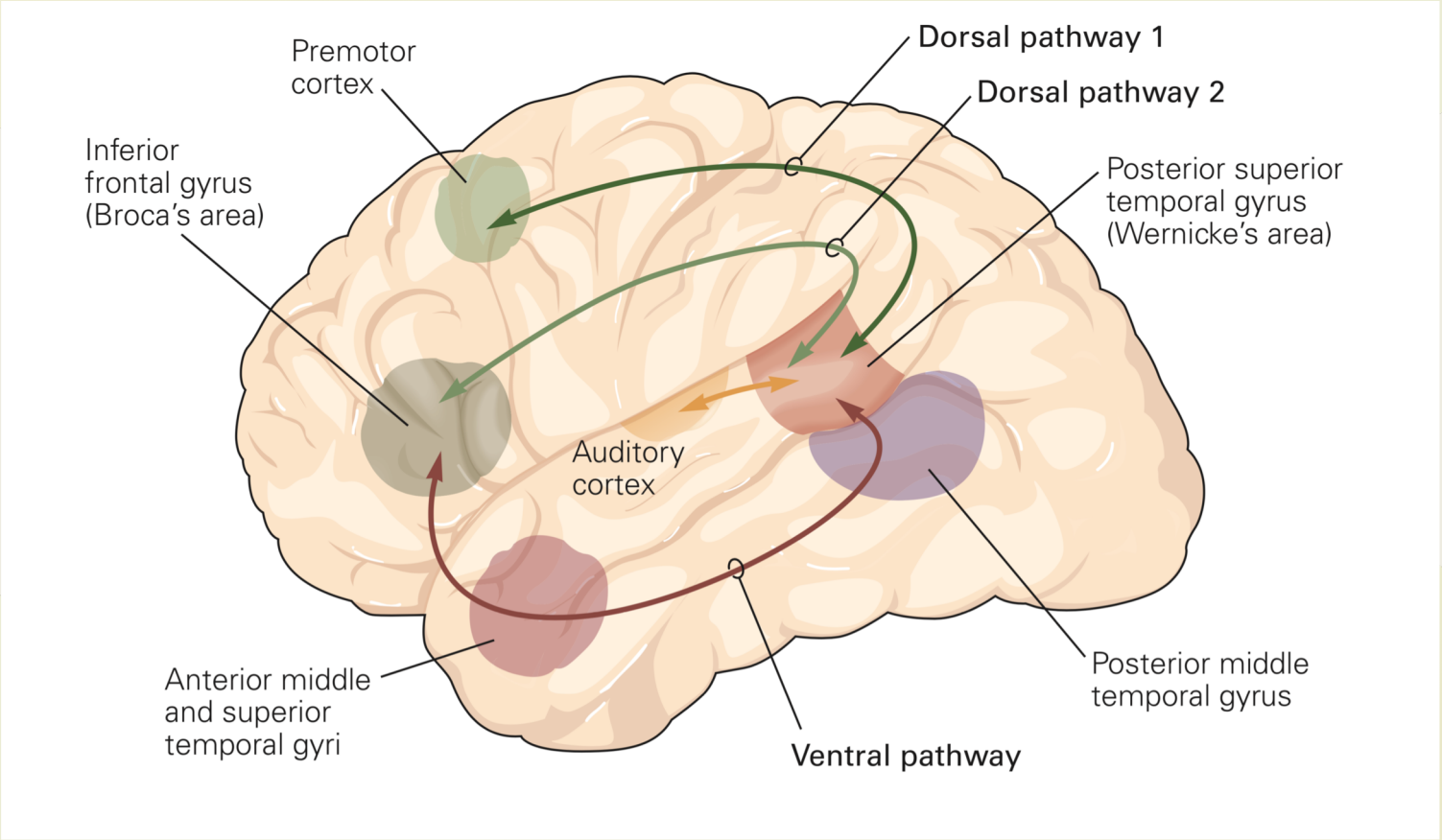
Brain Function

Brain Structure



Neuroscience will explain how the brain is affected by experience and why it matters.

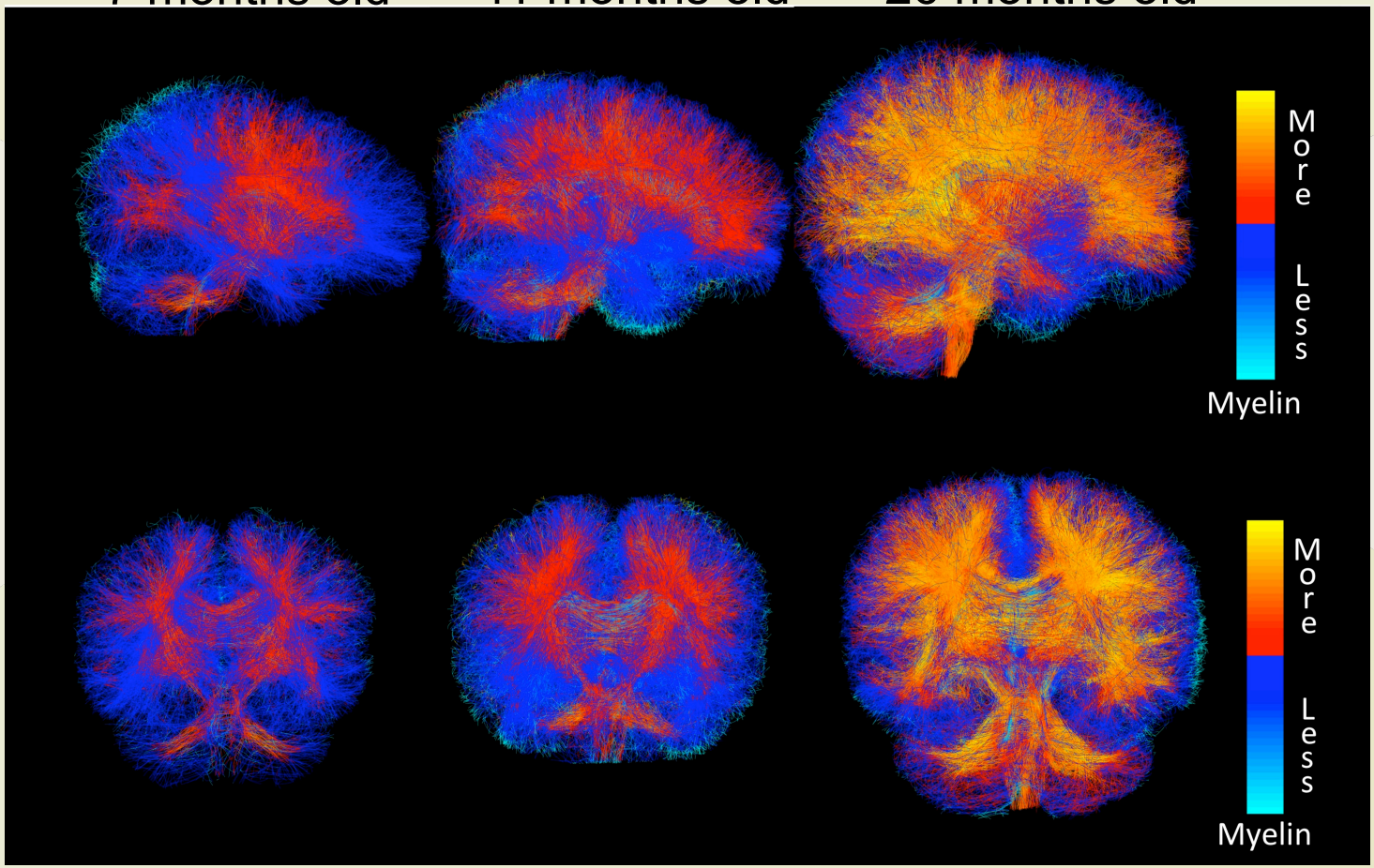
The Language Network



Kuhl, in Kandel et al. *Principles of Neural Science, 6th Ed.*, 2021

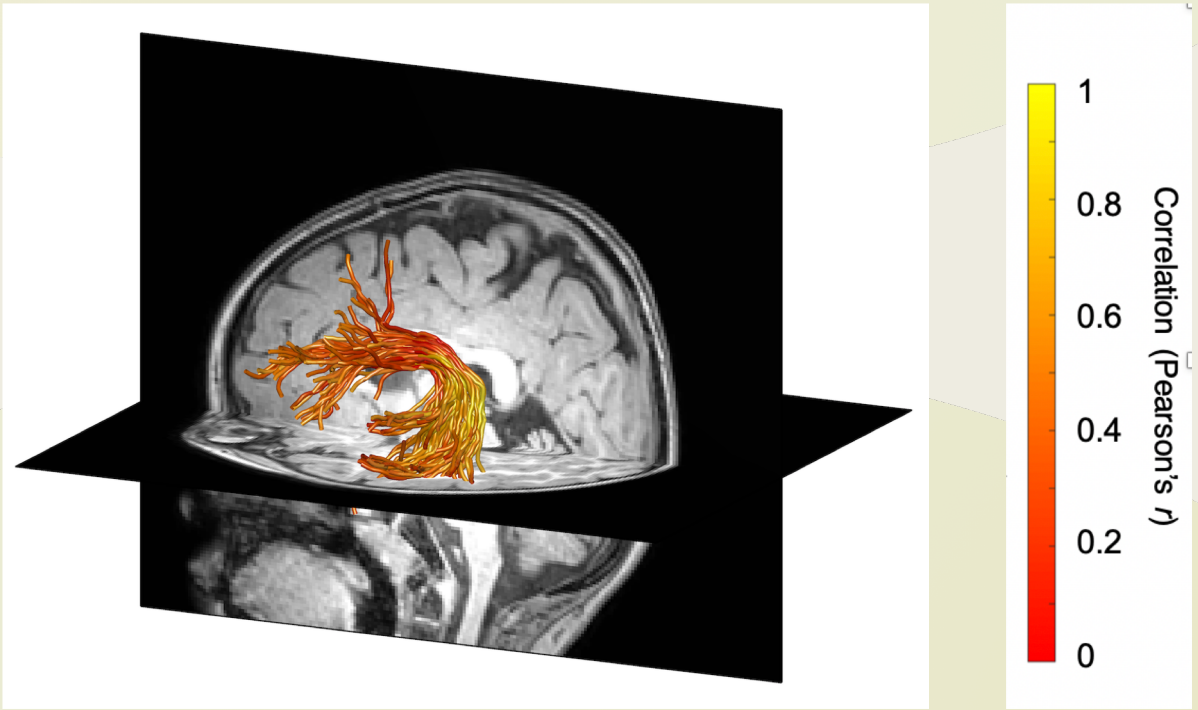
How Does Experience Build Networks?

Maturation and Learning Increase Connectivity



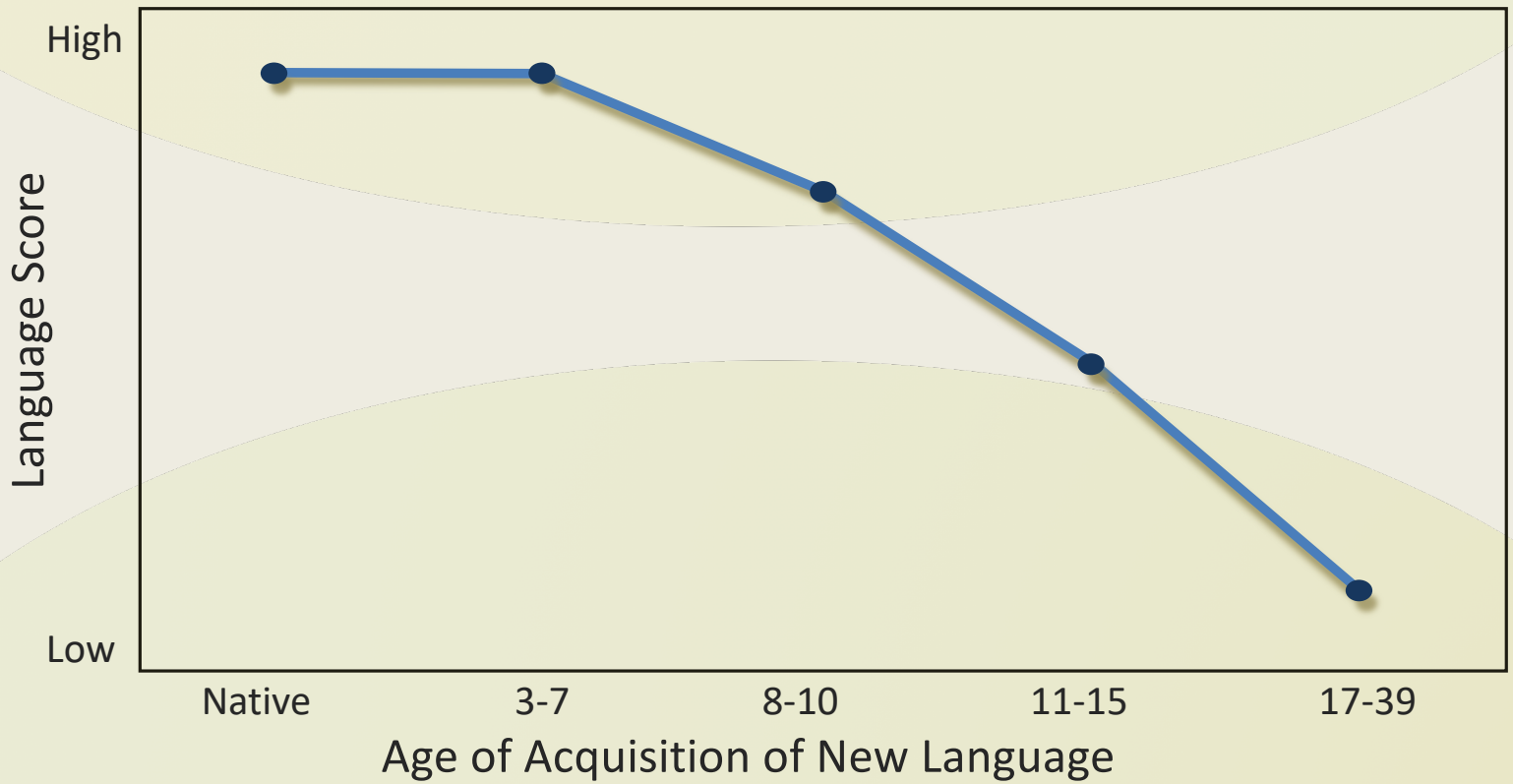
Kuhl,
in progress

Verbal exchanges with children systematically strengthen network connections by 26 months



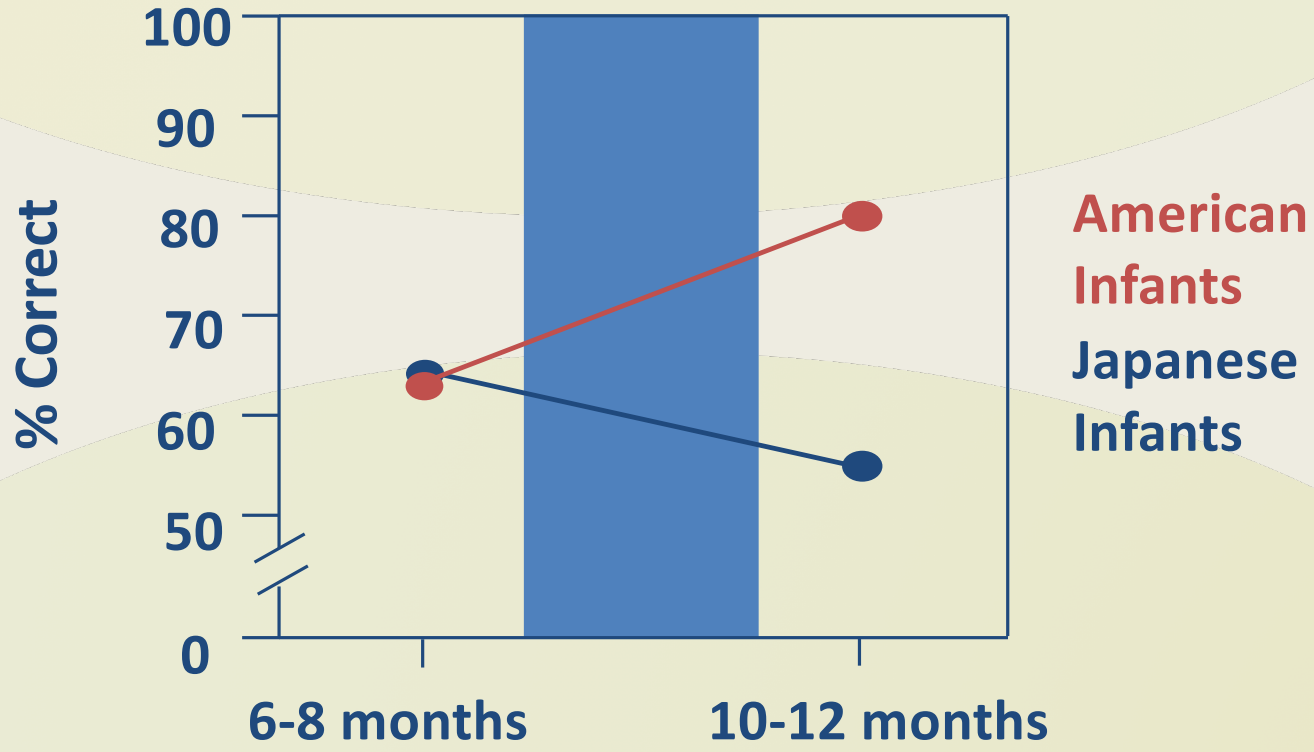
Huber, Ferjan Ramirez, Corrigan & Kuhl, in preparation, 2021

The ‘Critical Period’ for Language



A 'Sensitive Period' for Speech Learning

Infant discrimination of /ra/ vs. /la/



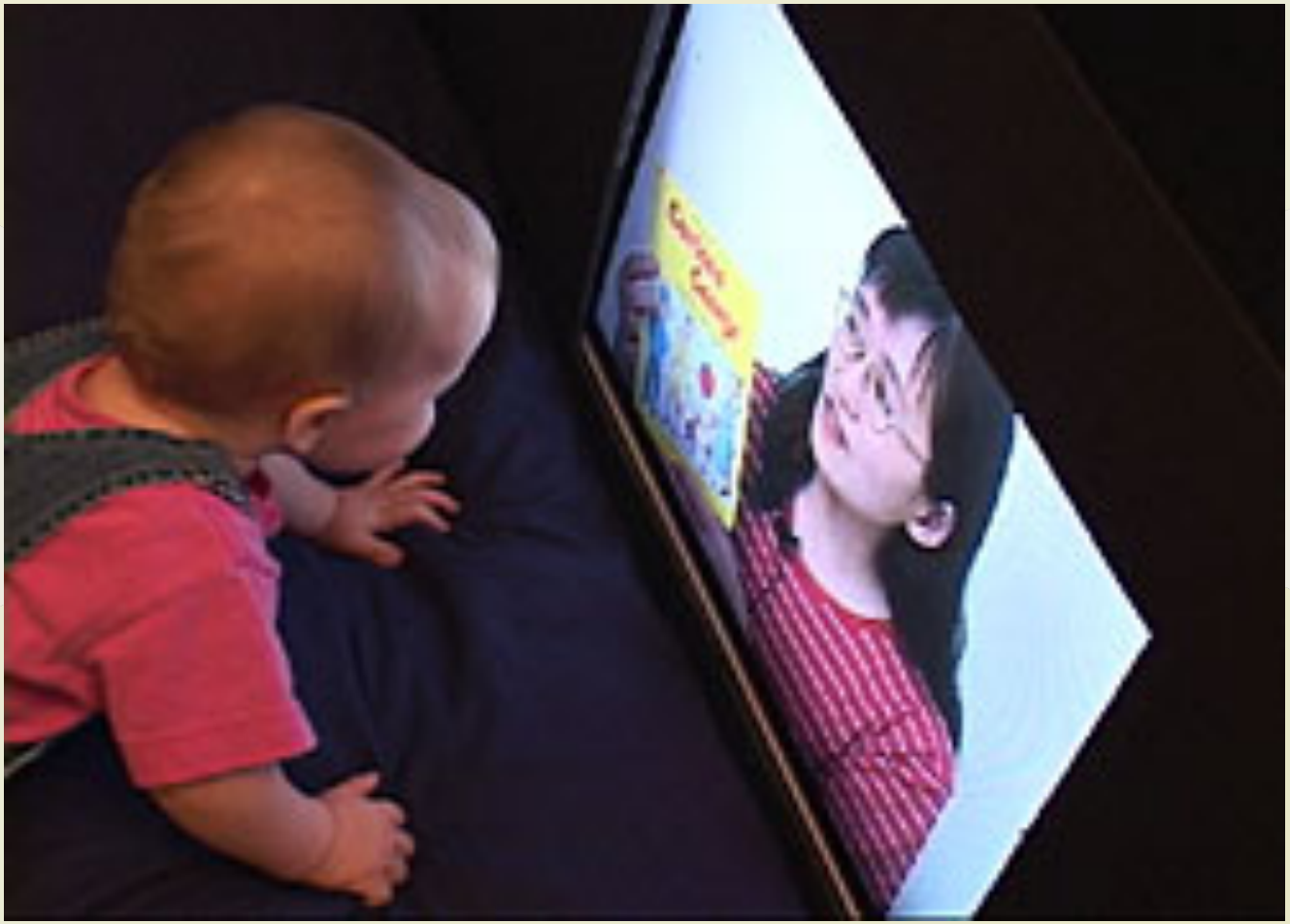
Kuhl et al., *Developmental Science*, 2006

Mandarin Chinese Exposure

12 sessions between 9 and 10.5 months of age

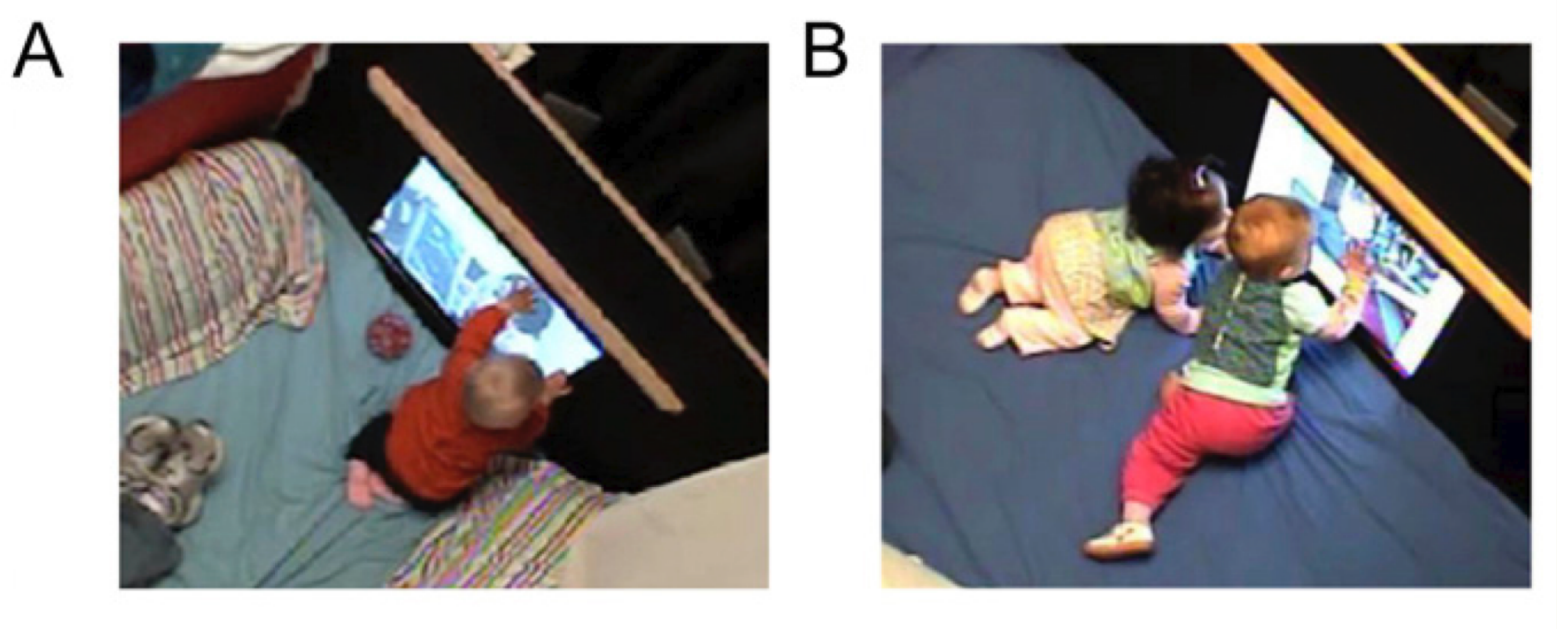
Kuhl, Tsao & Liu, *Proceedings of the National Academy of Sciences*, 2003

Do Infants Learn From a Machine?



Kuhl, Tsao & Liu, *Proceedings of the National Academy of Sciences*, 2003

Learning in Pairs Significantly Increases Neural Signatures of Learning



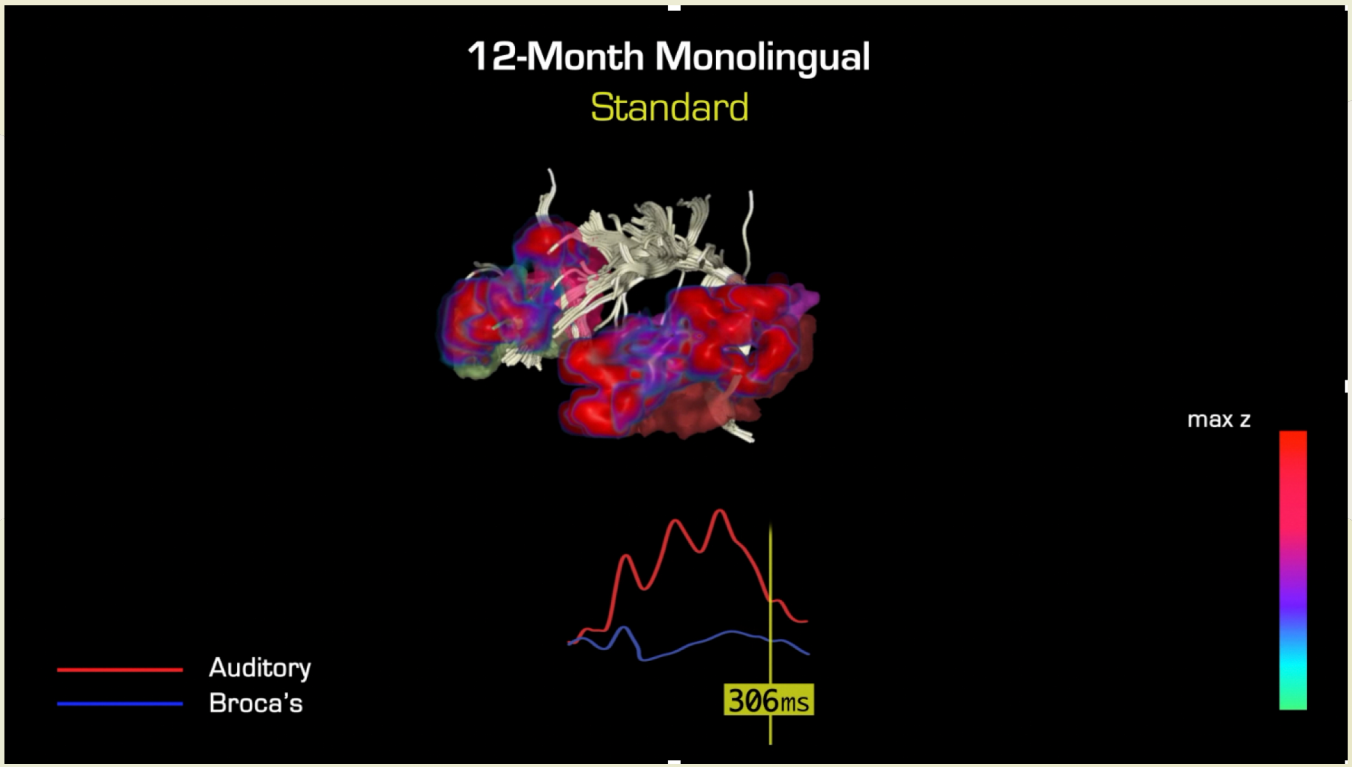
Lytle, Garcia-Sierra, & Kuhl, *PNAS,* 2018

Magnetoencephalography (MEG)

Baby MEG

Imada, et al., *NeuroReport*, 2006; Kuhl, et al., *PNAS*, 2014

Perception Activates Brain's Motor Centers



Kuhl et al., PNAS, 2014; Maggie Clark, UW PhD Dissertation, 2021

National Academy of Sciences, USA: Early Childhood Education Makes a Difference!

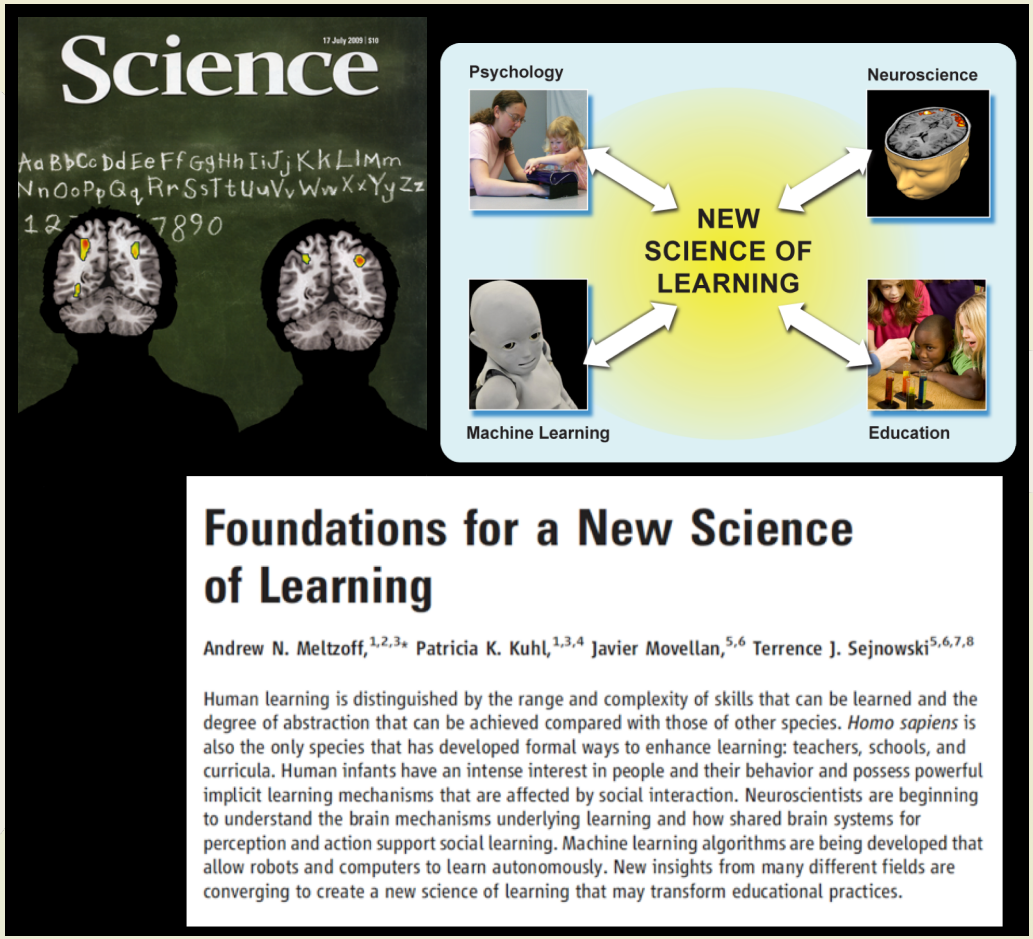
NATIONAL ACADEMY OF SCIENCES

THE SCIENCE BEHIND IT

Does quality early childhood education lead to more successful lives as adults?

July, 2020

Convergence on the Science of Learning!



Meltzoff, Kuhl, Movellan, & Senjowski, *Science* (2009)

Early Learning:

- Computational
- Implicit
- Social
- Informal contexts enhance learning
- Action oriented (agency/ sensorimotor)
- Humans show lifelong neural plasticity, but especially in the early period
- Language, math, reading abilities are highly malleable early, but require opportunities to learn