

Talking to Babies: The Universal Ingredient for Language Learning

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- **Conflicts of Interest:** The speaker has no conflicts of interest to report.



Roadmap



Learning to Talk: From Babbles to Words



Inside the Black Box of Learning to Talk



The Universal Ingredient (Caregiver Speech to Infants with Autism)

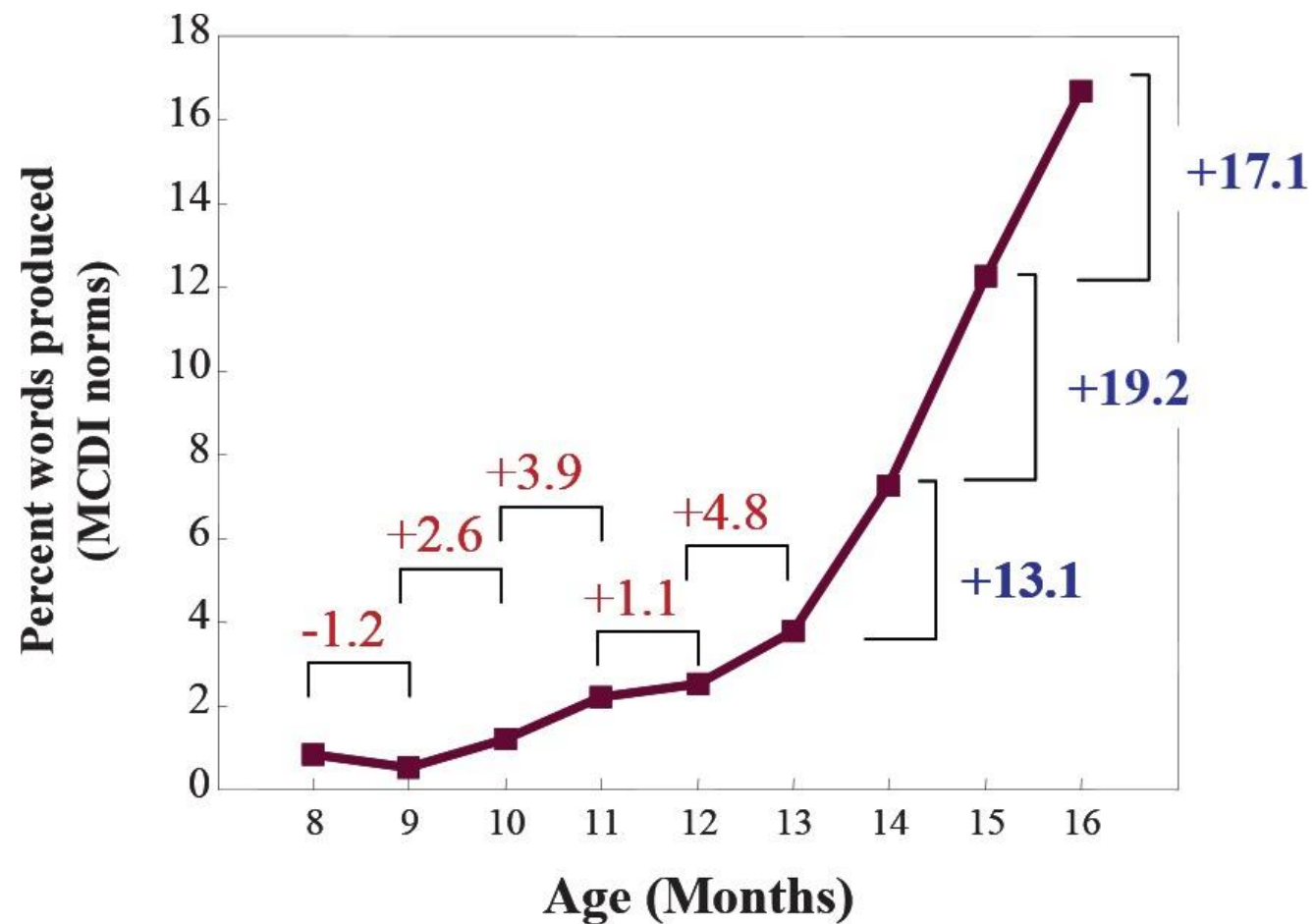


Recommendations for Parents

Language Learning Starts Well Before the First Word



The “Language Explosion”



Early Language Skills are a Harbinger for Later Development and Academic outcomes

- Better early language skills are associated with:
 - Better school readiness at kindergarten
 - Better academic outcomes
 - Fiorentino & Howe, 2004; Pace et al., 2019



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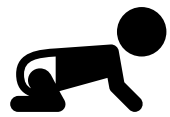
Inside the Black Box of Learning to Talk



The Universal Ingredient (Caregiver Speech to Infants with Autism)



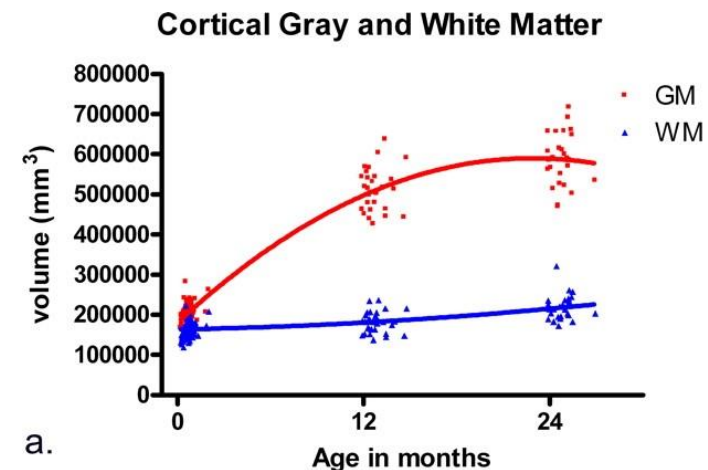
Recommendations for Parents



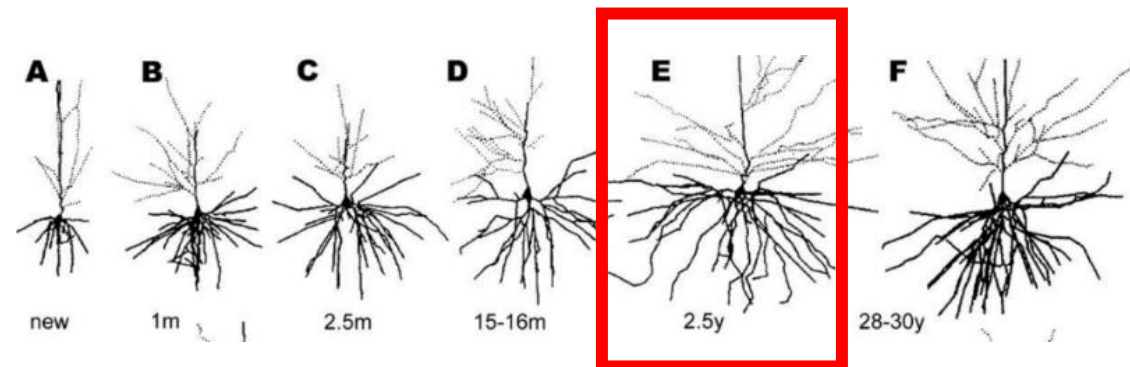
40-60,000 spoken words
at 18 years of age

Early Brain Development is Dynamic and Rapid

- When infants are 2-4 weeks old their brain is ~36% of adult volume, at 24 months it is 83% of adult volume
- Pyramidal neurons go from immature to adult-like between birth and 2.5 years



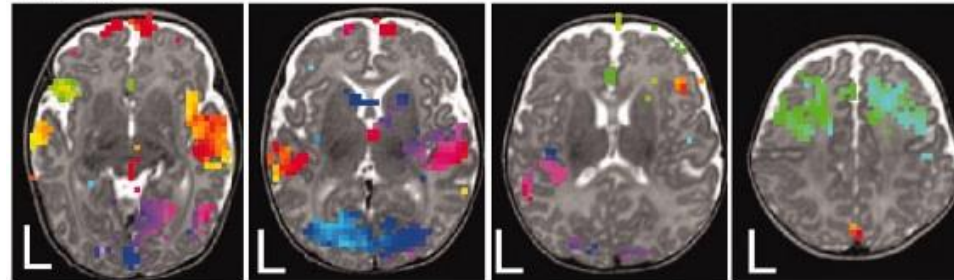
Knickmeyer et al. 2008, *J. Neurosci*



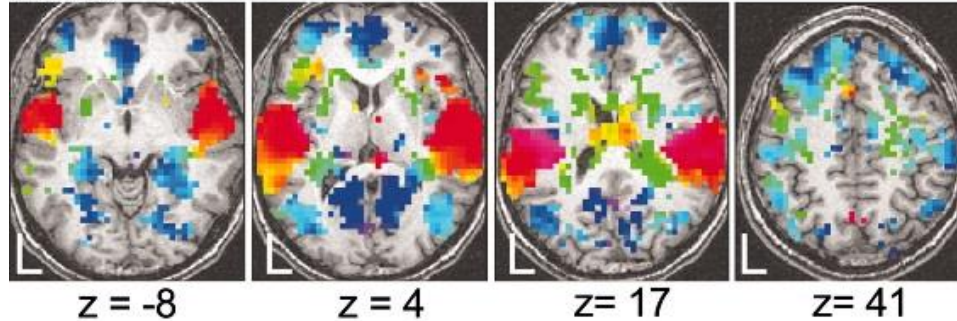
Petanjek et al. 2008, *Cerebral Cortex*

“Adult-like” functional organization in the language network at 3 months of age

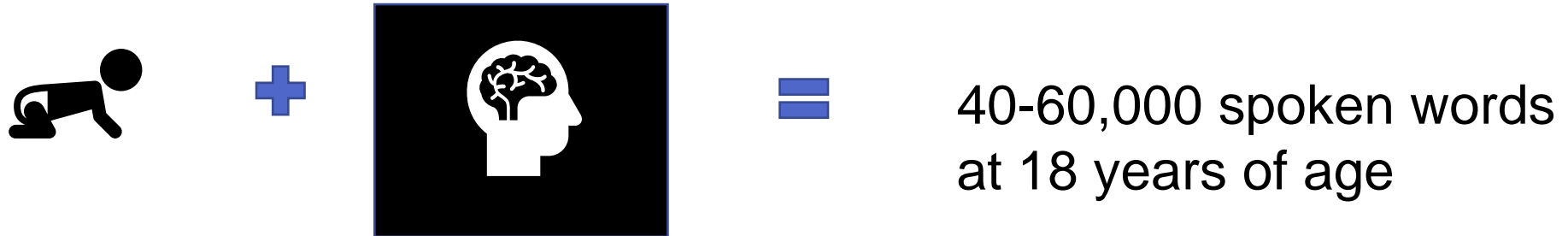
Infants

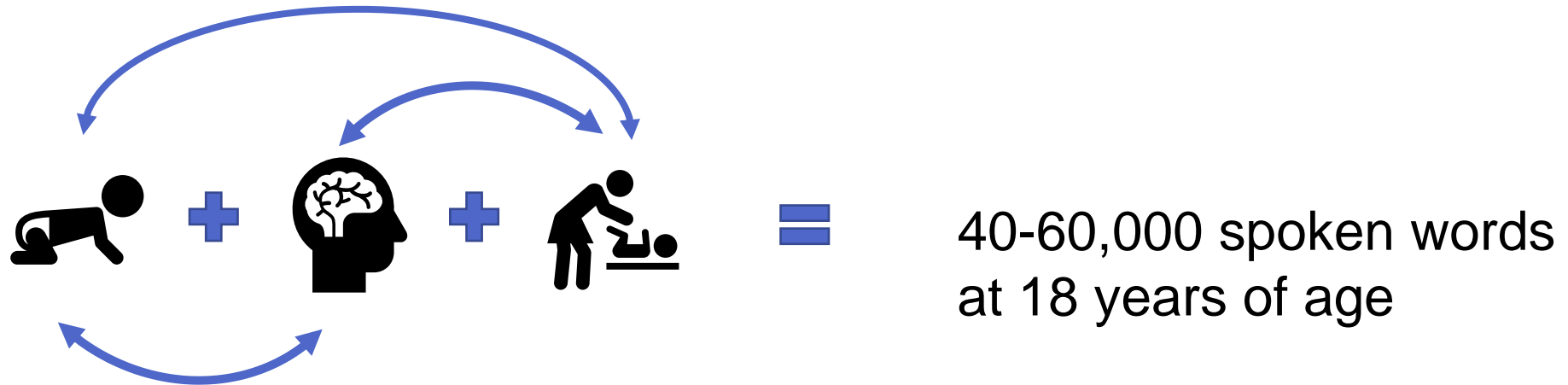


Adults



(Dehaene-Lambertz et al., 2006)





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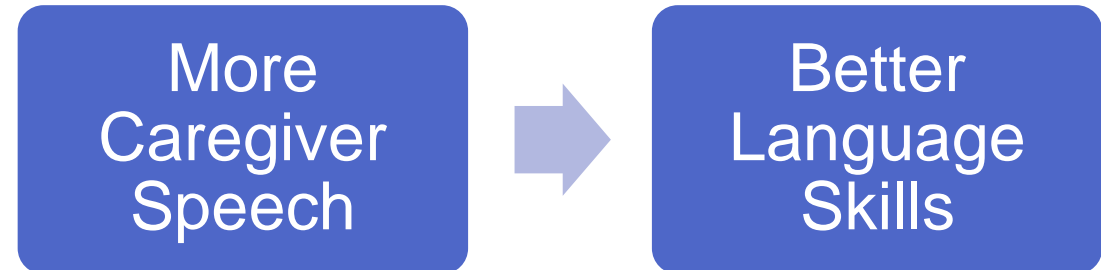
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Recommendations for Parents

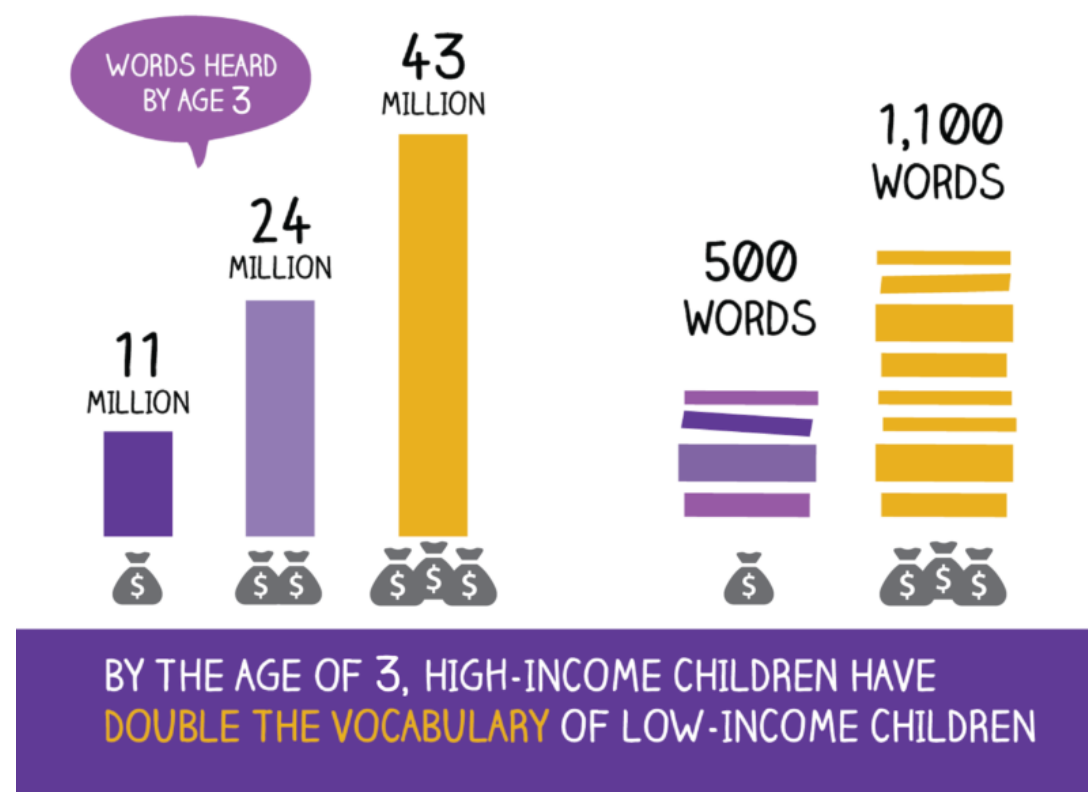
The Universal Ingredient: Caregiver Speech

- 30 years of scientific evidence indicates that quantity and quality of caregiver speech is positively associated with child language skills
 - Typically developing children
 - Spanish-speaking children from low-income homes
 - White and Black children from low-income homes
 - Children with brain injury
 - Children with autism



Parental Factors that Influence Caregiver Speech

- Distal Factors
 - Income
 - Occupation
 - Education
- Proximal Factors
 - Knowledge of child development
 - Views of learning/intelligence
 - Material hardship
 - Household chaos
 - Depression/stress



Autism Spectrum Disorder (ASD)

- A lifelong neurodevelopmental disorder affecting 1:54 children
- Core features include deficits in social communication, social interactions and the presence of RRB
- Average age of diagnosis is over 4 years



Infant Brain Imaging Study (IBIS)

- Infants are enrolled at 6 months, up to 4 visits (MRI and behavioral assessments), diagnosis at 24-months



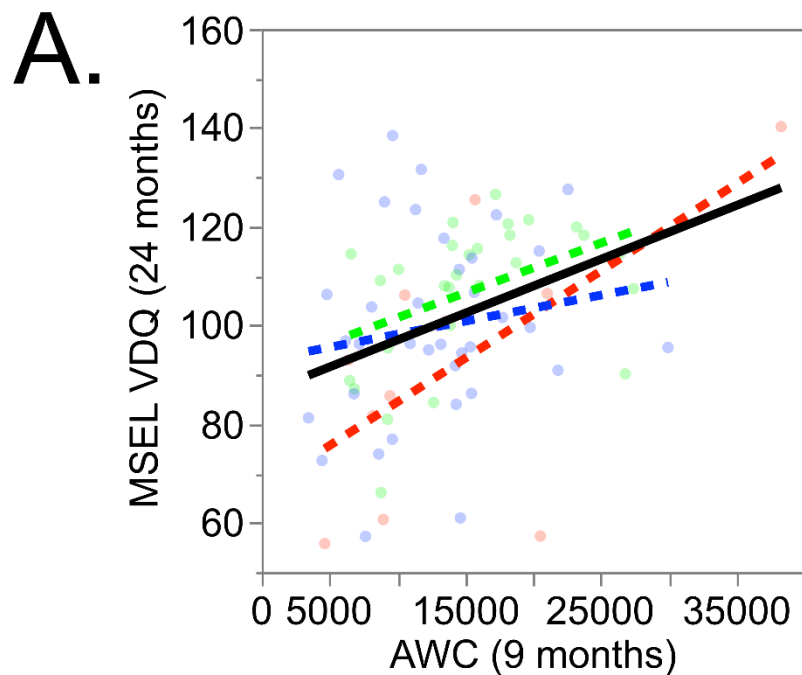
How Do We Measure Caregiver Speech?

- Two days (32 hrs) of home recording at 9-months and 15- months of age
- Daily counts of infant vocalizations, adult words, and infant-adult conversational turns

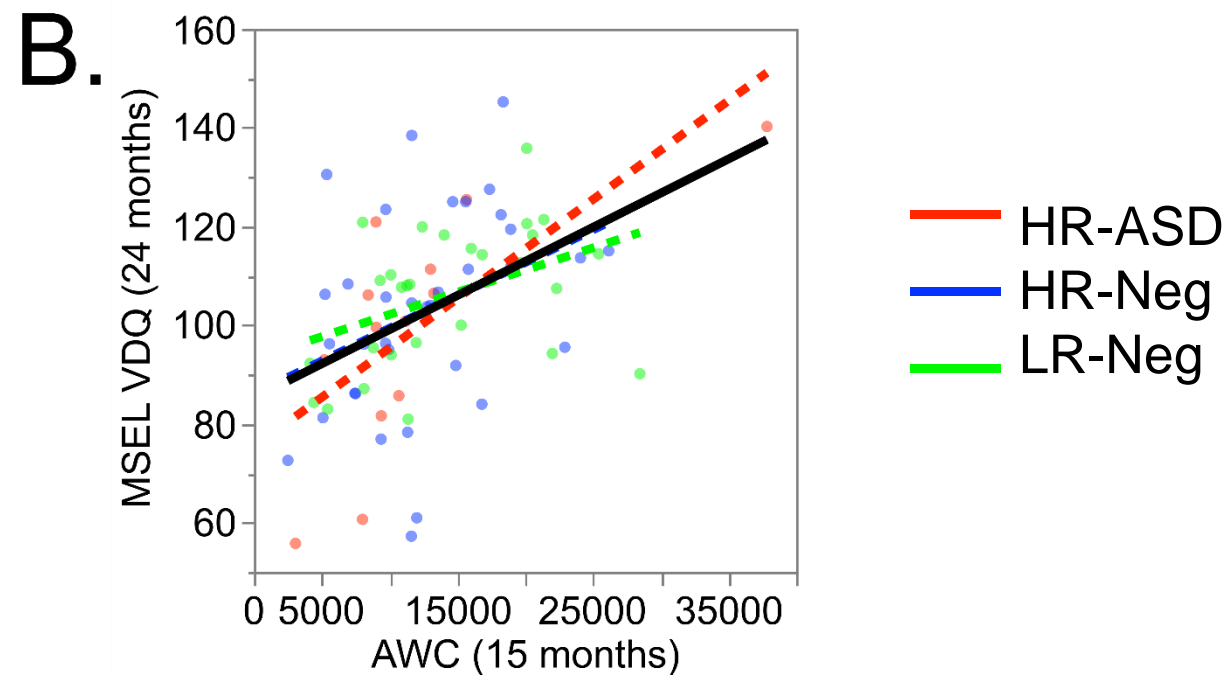


Photo credit: LENA Research Foundation

Adult Word Counts (Speech Quantity) are Positively Associated with Later Child Language Skills

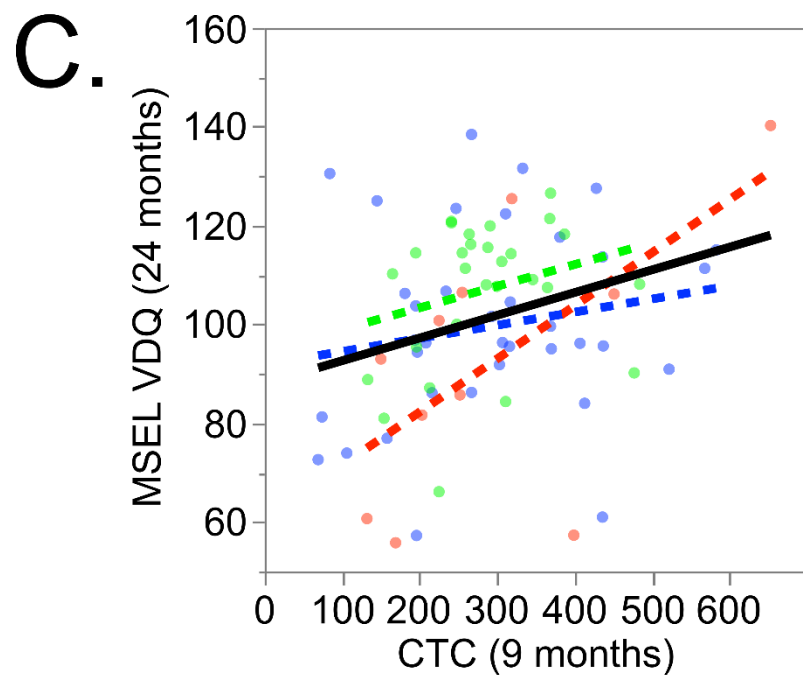


$(F(1, 63) = 8.70, p = .004)$

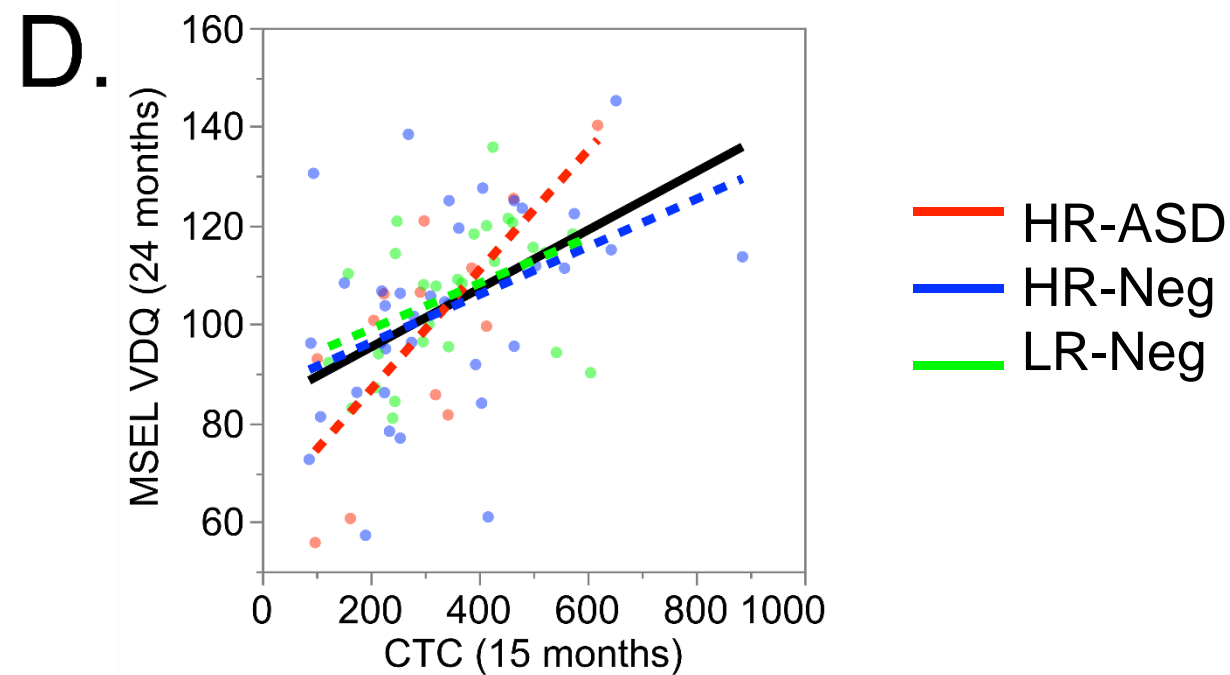


$(F(1, 63) = 16.78, p = .0001)$

Conversational Turn Counts (Speech Quality) are Positively Associated with Later Language Skills



$(F(1, 63) = 7.61, p = .007)$

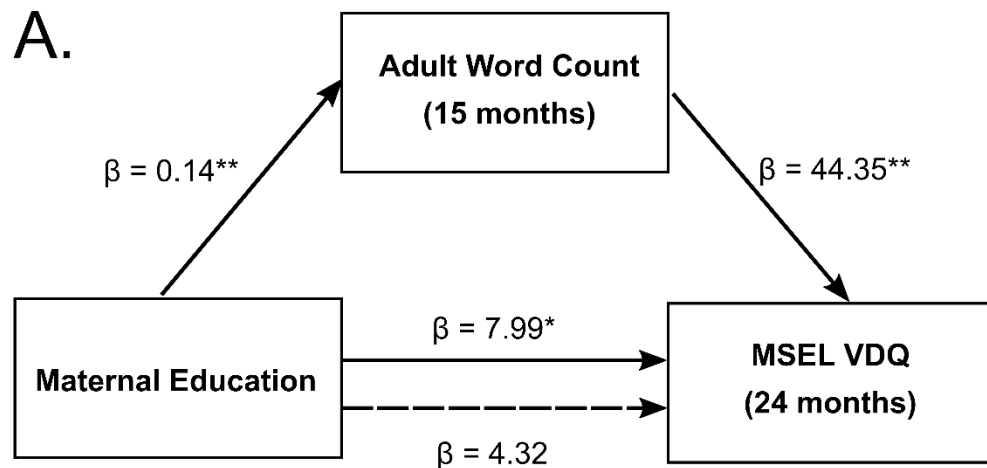


$(F(1, 63) = 16.53, p = .0001)$

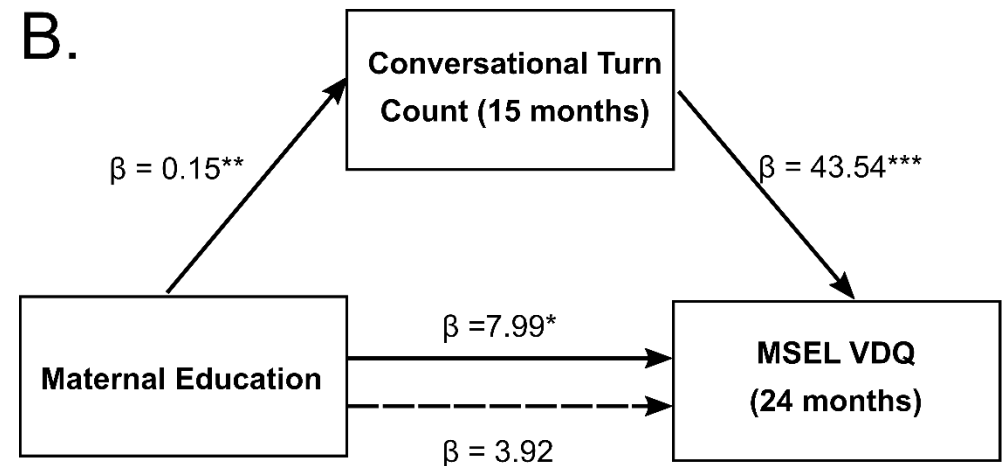
What parental factors are associated with quantity of caregiver speech?



Caregiver speech mediates the relationship between SES and child language skills



Significant mediation (Sobel's Test = 2.59, $p = .009$, percent mediated = 58.87%)



Significant mediation (Sobel's Test = 2.66, $p = .007$, percent mediated = 62.06%)

* $p = .05$, ** $p < .001$, *** $p < .0001$

Future Directions

- What are modifiable factors that influence caregiver speech?
 - Distal factors: Parental education, income
 - Proximal factors: knowledge of child development, theories of intelligence, access to books
- Does caregiver speech impact infant neurodevelopment?
 - Preliminary evidence suggests YES!



FINDING EARLY SIGNS OF AUTISM

The brains of infants who develop the disorder grow too fast, researchers say. The discovery could help doctors prevent impairments before they appear.

by yudhijit bhattacharjee

PHOTOGRAPHS BY LYNN JOHNSON

FOR PARENTS WHO LEARN their child has autism, the diagnosis often comes as a shock: How could their baby have gone from appearing healthy to having an incurable disorder? Since autism was first identified in the 1940s, researchers have struggled to explain it. The cause remains a mystery, but scientists are beginning to learn what happens in the brains of these children.

Studies indicate that it may be possible to detect signs of autism at as early as three months of age, long before the disorder manifests itself. Early detection would allow for interventions that might prevent or mitigate the impairments associated with autism.

“What we are learning is that autism is a trait, and whether or not that trait becomes a disability depends on early experiences,” says Ami Klin, a psychologist at Emory University. That raises

Alia Amar soothes her 10-month-old daughter, Aneesa, before researchers scan her brain in Joseph Piven’s lab at the University of North Carolina at Chapel Hill. Aneesa has an older brother with autism, so she has a greater likelihood of developing it. By regularly scanning the brains of babies who might develop autism, the researchers hope to pinpoint brain changes that could be used to help make an early diagnosis.

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Recommendations for Parents

5 steps for Brain-Building Serve and Return

- Step 1: Notice the serve and share the child's focus of attention



5 steps for Brain-Building Serve and Return

- Step 2: Return the serve by supporting and encouraging



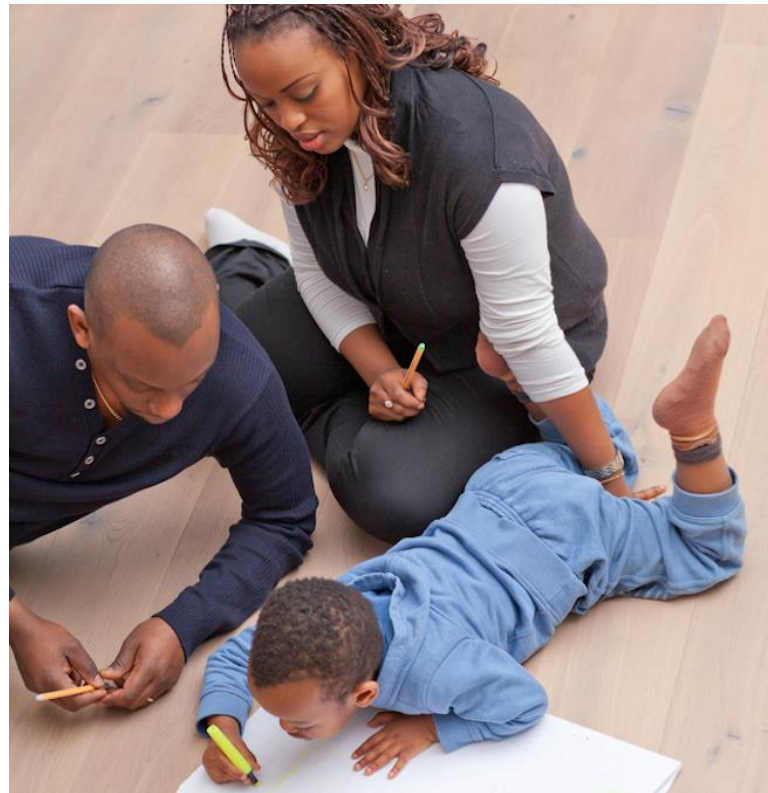
5 steps for Brain-Building Serve and Return

- Step 3: Give it a name



5 steps for Brain-Building Serve and Return

- Step 4: Take turns...and wait. Keep the interaction going back and forth.



5 steps for Brain-Building Serve and Return

- Step 5: Practice endings and beginnings



What type of caregiver talk best supports child language at each age?

- **0-6 months:** infant directed speech with contingent responding
- **6-18 months:** pointing to objects and labeling
- **18-36 months:** use a diverse vocab, wh-questions
- **Beyond 36 months:** speech that includes past and present tense, having children tell stories

- *Book reading can be used to create brief, high-quality loving interactions with children at all ages!*

Thank you to the participating families!



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- R01-HD055741 (PI Piven)
- Autism Speaks
- Simon's Foundation



Questions?



Links

- <https://labs.utdallas.edu/babybrainlab/information-for-families/>
 - We are currently recruiting infants 0-6 months of age from the DFW area for a research study on early language development
- <https://www.ibis-network.org>
- <https://developingchild.harvard.edu/resources/5-steps-for-brain-building-serve-and-return/>
- <https://firstwordsproject.com/>

