

# Neural Responses to Audiovisual Speech in Infants at Increased Likelihood for Autism and Links with Language: An ERP Pilot Study

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## Background

- ❖ Explaining individual differences in language of children on the autism spectrum is a *top priority* of research because early language has been repeatedly linked with long-term outcomes in this population.
- ❖ Theory and prior research suggest that audiovisual speech processing may explain variability in language understanding and use.
- ❖ P2 amplitude has been shown to be suppressed when processing audiovisual vs auditory-only speech in adults and school-aged children.
- ❖ Infant siblings of children with autism (Sibs-AUT) are at increased likelihood for autism and are, thus, an ideal population for studying this possible neural mechanism of early language development in autism.

## Purpose

- ❖ This study aims to determine:
  - ❖ if visual cues increase efficiency of speech processing as indexed by P2 amplitude suppression in infancy;
  - ❖ if Sibs-AUT display less P2 amplitude suppression in response to multisensory vs unisensory speech cues compared to infants at relatively lower familial likelihood for autism (Sibs-TD); and
  - ❖ if individual differences in speech processing efficiency covary with language ability across Sibs-ASD and Sibs-TD.

## Procedure

- ❖ 40 12-18 month infants (20 Sibs-AUT; 20 Sibs-TD matched on biological sex and chronological age) are being recruited for this NIH-funded study.
- ❖ Preliminary results include 10 infants (5 Sibs-AUT; 5 Sibs-TD).

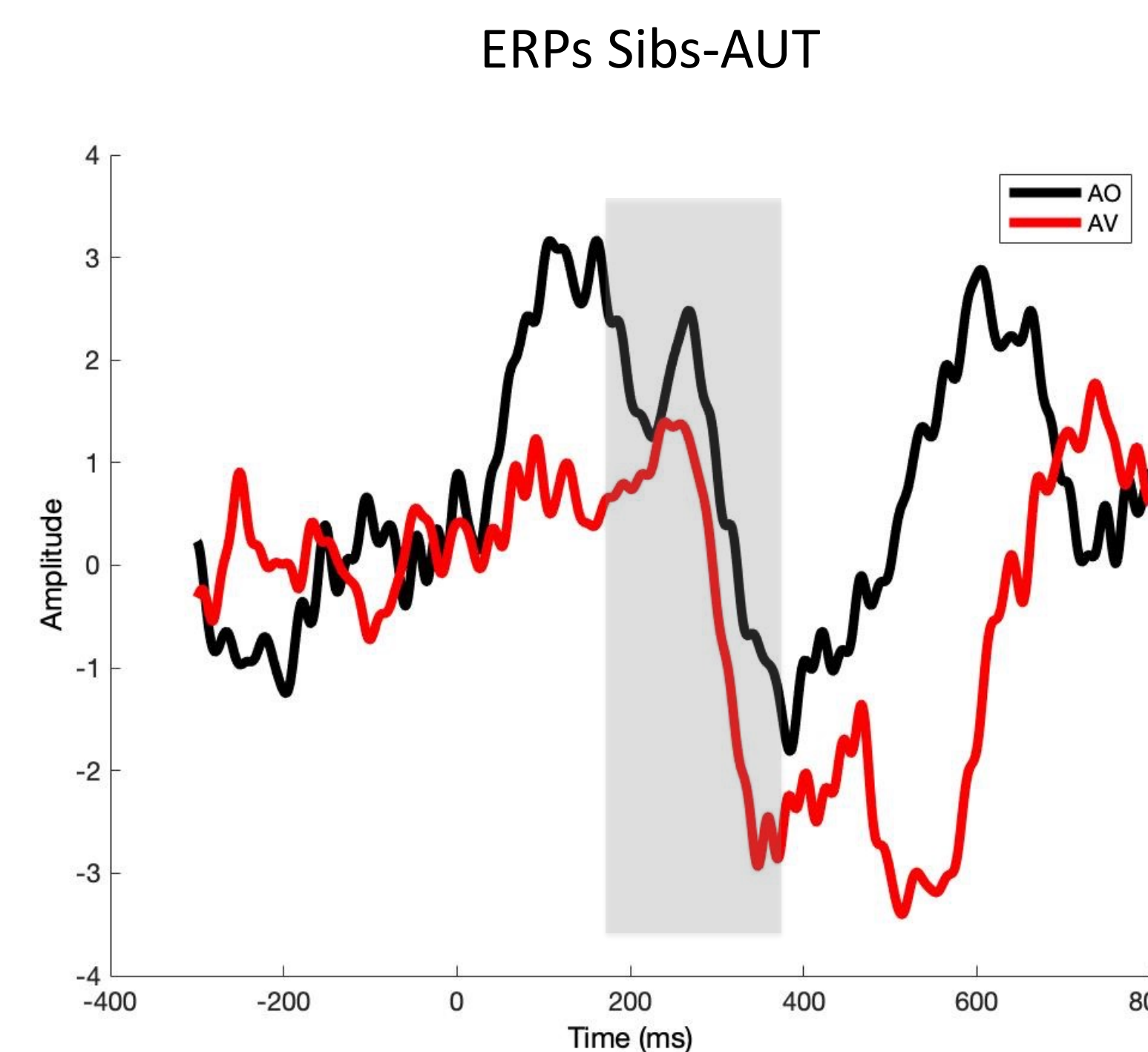
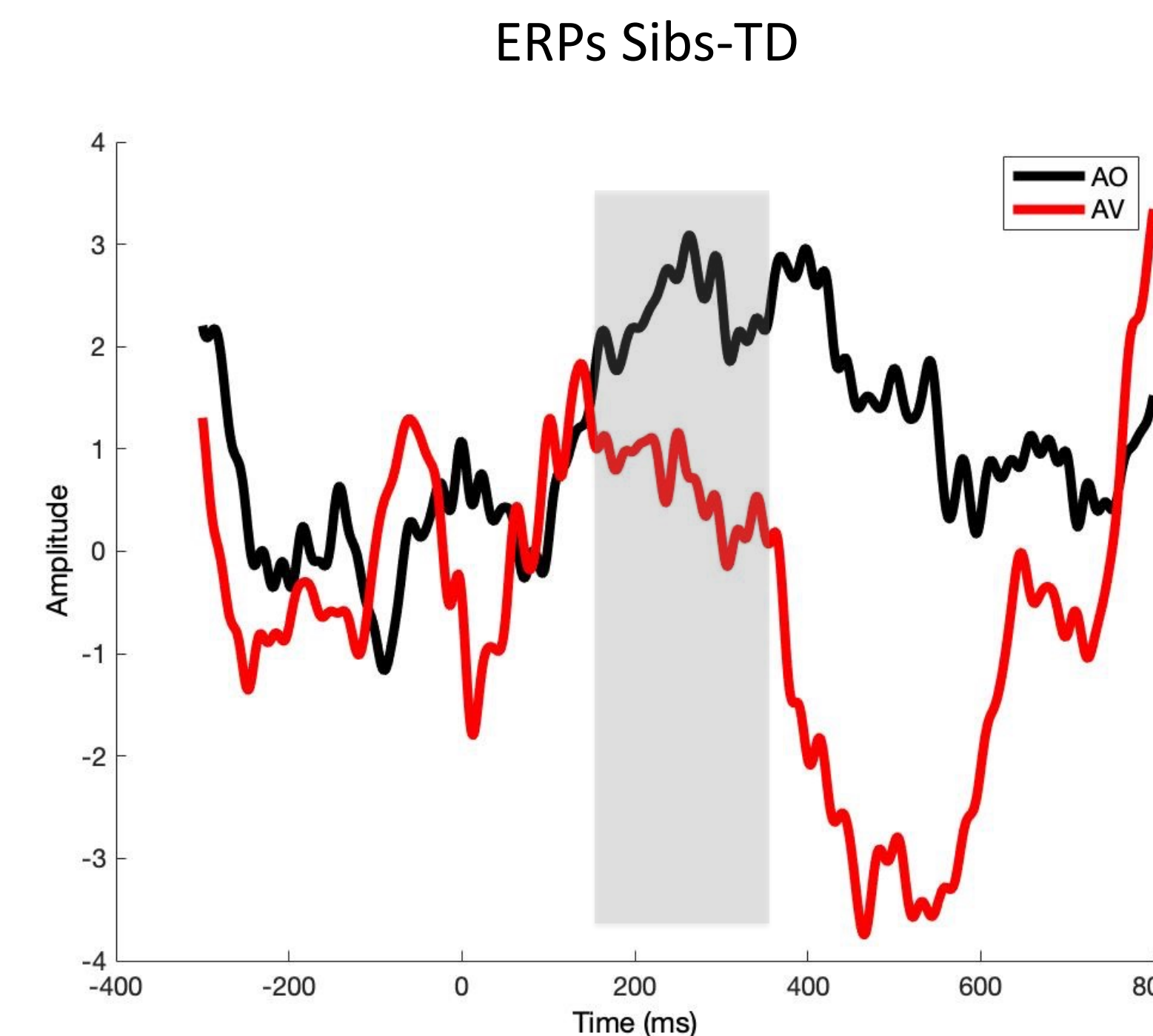
	Sibs-AUT M(SD)	Sibs-TD M(SD)
Age (months)	15.6 (1.34)	14. (3.08)
Biological Sex	1 male; 4 female	3 male; 2 female
MCDI Receptive	99.25 (52.14)	127.4 (145.6)
MCDI Expressive	10.5 (6.45)	19.2 (20.8)

Note. MCDI = MacArthur-Bates Communicative Development Inventories: Words and Gestures checklist.

- ❖ We are collecting event-related potentials (ERPs) in response to spoken syllables (“ba”) in two conditions:
  - ❖ Auditory-only: auditory speech + still image of the face
  - ❖ Audiovisual: auditory speech + synchronous mouth movements.
- ❖ EEG data are collected using NetStation and a 128 Geodesic sensor net.
- ❖ The EEG signal is sampled at 1000 Hz and referenced to vertex (Cz).
- ❖ Analyses are focused on P2 (160-340 ms poststimulus) amplitude suppression (auditory-only P2 amplitude – audiovisual P2 amplitude).
- ❖ Parents also complete the MacArthur-Bates Communicative Development Inventories (MCDI) to report their child’s early vocabulary.

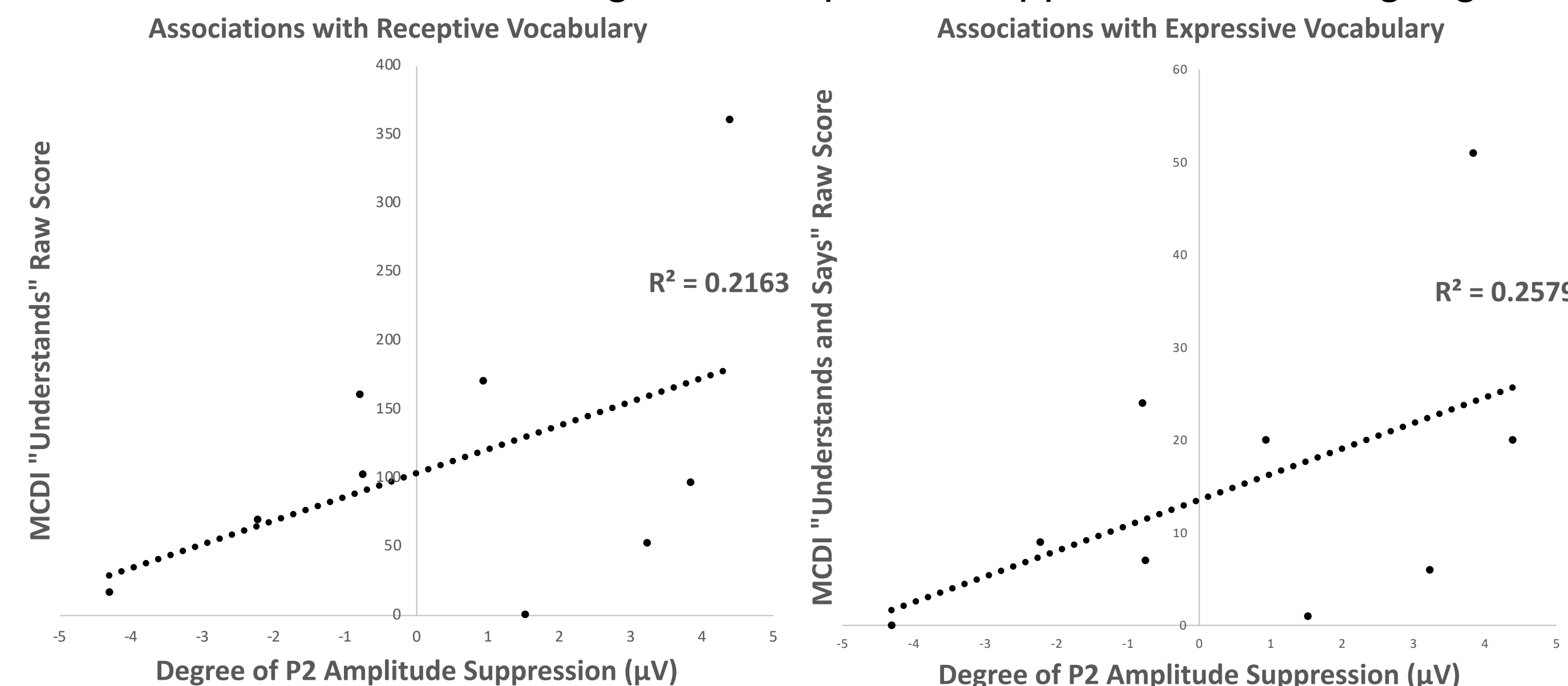
## Amplitude Suppression at 12-18 Months

- ❖ P2 amplitude suppression is present in both groups at 12-18 months (Cohen’s  $d = .615$ ).
- ❖ P2 amplitude suppression is reduced in Sibs-AUT compared to Sibs-TD (Cohen’s  $d = .203$ ).



## Potential Associations with Language

- ❖ Preliminary correlations with vocabulary scores suggest moderate associations between degree of amplitude suppression and language.



## Conclusions and Future Directions



- ❖ These preliminary findings suggest that differential processing of audiovisual speech relative to auditory-only speech may emerge early in life.
- ❖ Reduced amplitude suppression may have clinical utility for explaining individual differences in language ability and/or for predicting future language ability in autism and related neurodevelopmental conditions.

- ❖ In our final sample, we will conduct mediation analyses to evaluate whether amplitude suppression mediates replicated links between looking to visual speech cues and language.
- ❖ Long-term we aim to test whether early intervention targeting use of audiovisual speech cues yields more optimal language in children with or at increased likelihood for autism, via this neural mechanism.



## Select References

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