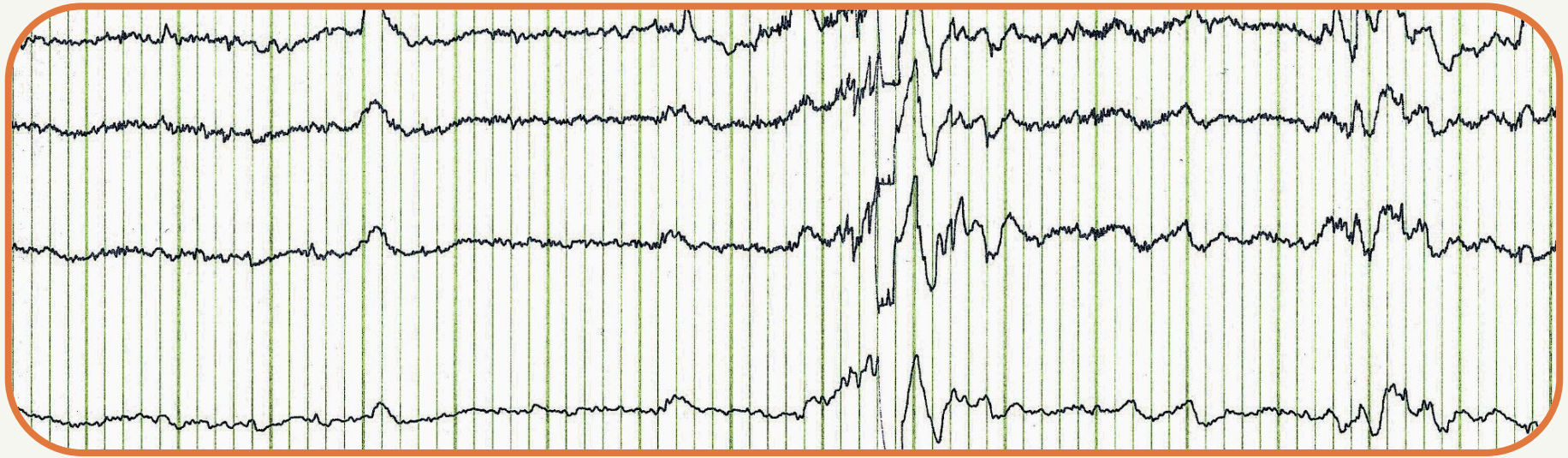


Neural Correlates of Audiovisual Integration in Infants at Elevated Likelihood for Autism

Ella Torno & Sonya Ricaurte

Dr. Maggie Guy

June 2025

Vocabulary

- ★ EEGs: Electroencephalograms
- ★ ERPs and their Components
  - Event Related Potentials
  - Nc and N290

Vocabulary

Dynamic video presentations (social or non-social) were paired with audio tracks (synchronous or asynchronous)

- ★ ASD: Autism Spectrum Disorder
- ★ ASIBs: Younger siblings of individuals with autism
- ★ Social vs. Nonsocial stimuli
  - Asynchronous and synchronous

Background

- Multisensory processing = difficult for those with ASD
- **Purpose of our study**: Understanding how this processing issue can develop in infancy before detecting behavioral issues
- **EEG** Caps on 12 month olds to measure this
    - Looking specifically at certain ERP components
- Data collection = nearly done for neurotypical control group
- Beginning recruitment for ASIBs group

Other Similar Studies

All three of these studies closely tie into each different aspects of our project

- Face processing
- Examining neural components
- Looking at high-risk groups for autism and neurotypical control groups
- EEG data
- ERPs
- ASIBS

Guy, M. W., Richards, J. E., Tonnsen, B. L., & Roberts, J. E. (2018). Neural correlates of face processing in etiologically-distinct 12-month-old infants at high-risk of autism spectrum disorder. *Developmental Cognitive Neuroscience*, *29*, 61–71. https://doi.org/10.1016/j.dcn.2017.03.002

Guy, M. W., Zieber, N., & Richards, J. E. (2016). The Cortical Development of Specialized Face Processing in Infancy. Child development, 87(5), 1581–1600. https://doi.org/10.1111/cdev.12543

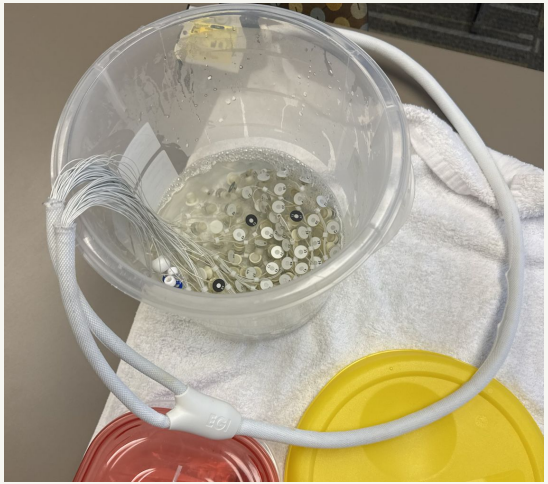
Reynolds, G. D., & Guy, M. W. (2012). Brain-behavior relations in infancy: integrative approaches to examining infant looking behavior and event-related potentials. Developmental neuropsychology, 37(3), 210–225. https://doi.org/10.1080/87565641.2011.629703

Method

30 minutes prior to the appointment

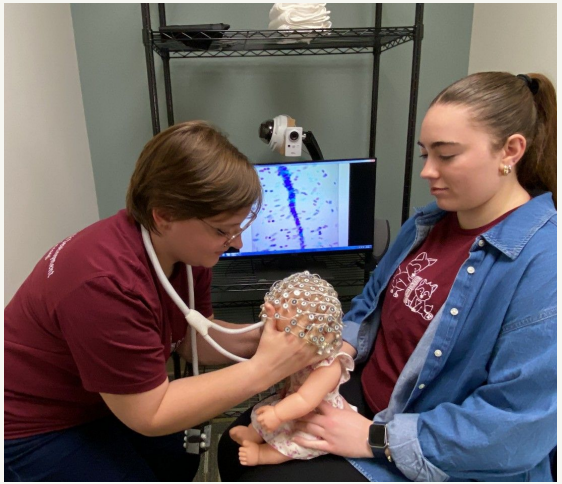
- **Behavioral Aid** goes to greet parent and child with parking pass
- **Lab Tech** begins prepping EEG solution

Once Participant Arrives



- **Experimenter** overview of consent, demographics, and payment
- **Lab Tech** measures head
- **Lab Tech** begins soaking EEG Cap

Testing Room Instructions



- Parent is instructed to sit still with child on lap
- **Experimenter** places EEG Cap on child
- **Lab Tech** takes photo for parent souvenir

Method

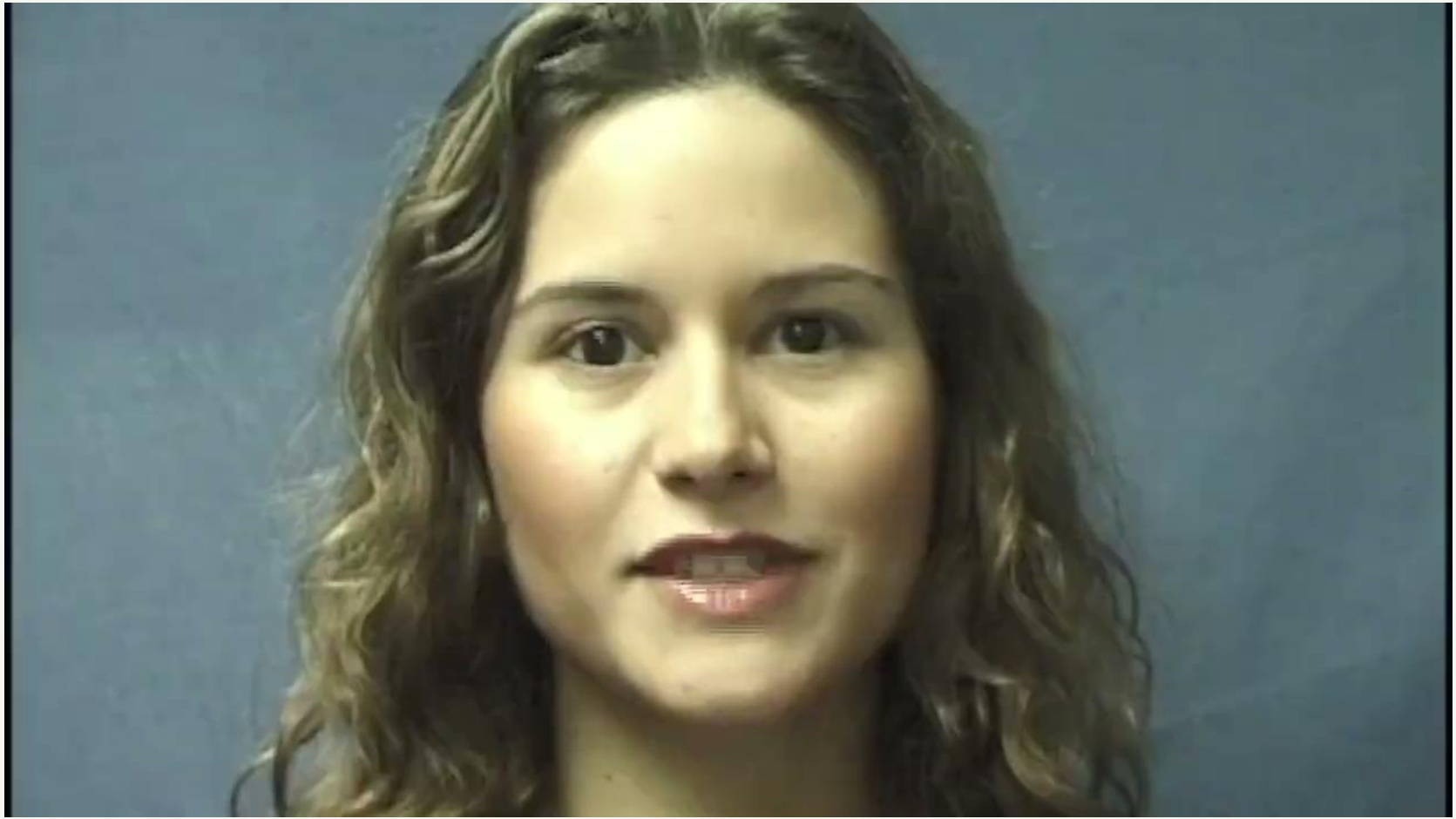
Video is Played

- Synchronous and asynchronous clips of faces and hammers with visual and audio are played for the child for ___? trials
- Sesame Street clips are intertwined for attention

Participant Departure

- **Experimenter** removes EEG Cap
- Lab and Waiting Rooms are Cleaned
- **Behavioral Aid** walks parent and child back to their car

Video clips for experiment



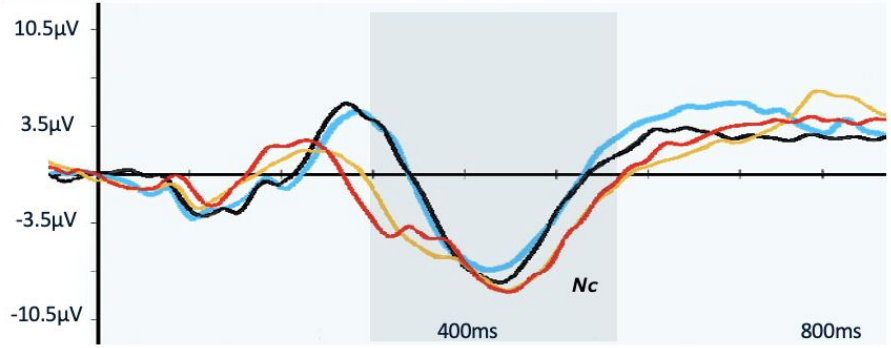
Participant Recruitment

- All participants are pulled from the **Center for Research and Child Development Database**
- **Recruitment** events to help build this database
  - Edgewater Arts Festival
  - Andersonville Midsommar Festival
- We have almost finished collecting data on neurotypical participants, now working on outreach to local autism organizations to help broaden our scope

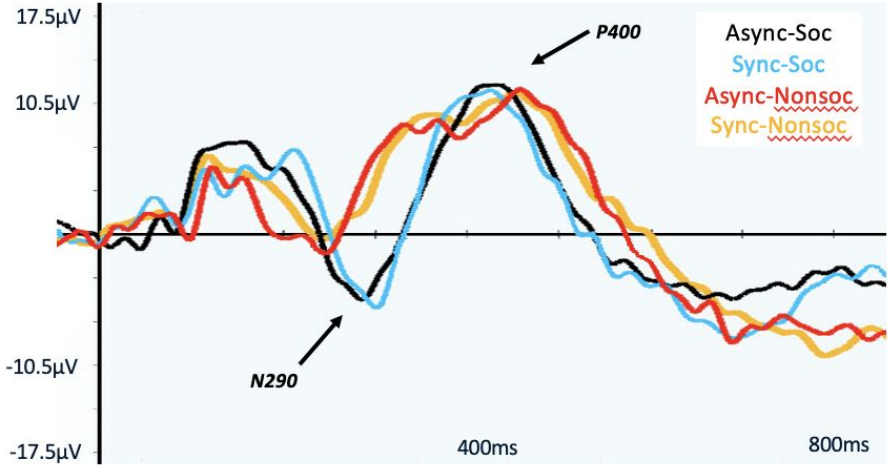
Preliminary Results

- **N290** more negative to social than nonsocial stimuli, F(1, 14) = 11.5, p = .004
- **Nc** more negative to nonsocial than social stimuli, F(1, 14) = 8.22, p = .012

  However, these differences were accounted for by the strong positive peak for social stimuli immediately preceding the Nc
- **No impact of synchrony on any component**

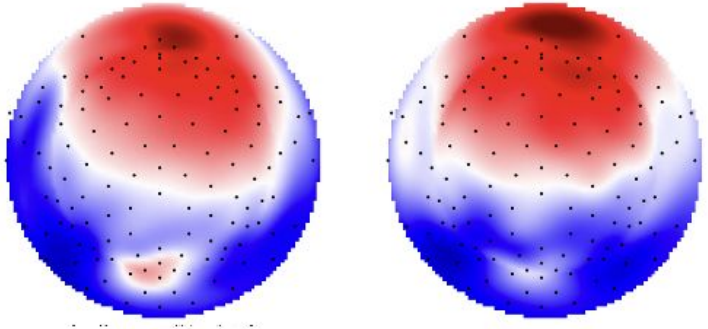


Nc ERP response at frontocentral electrodes



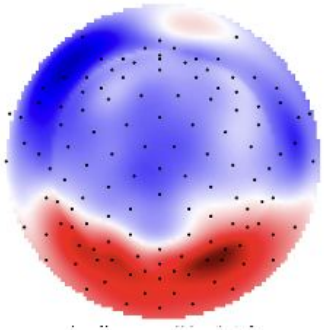
N290 and P400 ERP response at occipitoparietal electrodes

Topographical Map of N290 ERP Response

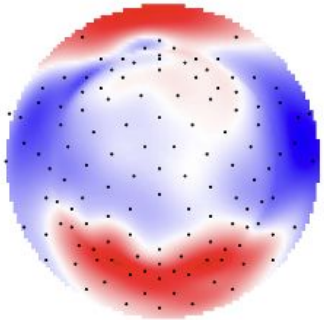


Async-Soc

Sync-Soc

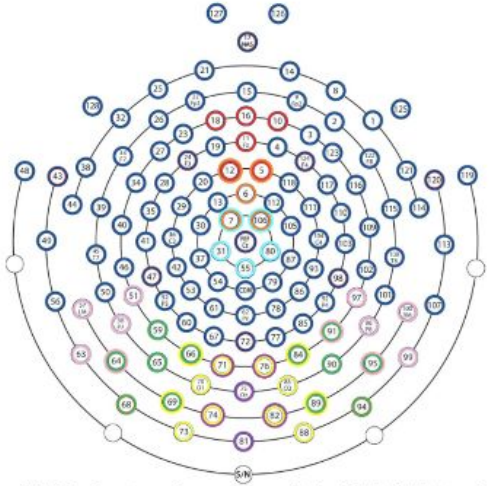


Async-Nonsoc



Sync-Nonsoc

-8.3μV 8.3μV



EEG electrode map with highlighted electrode clusters

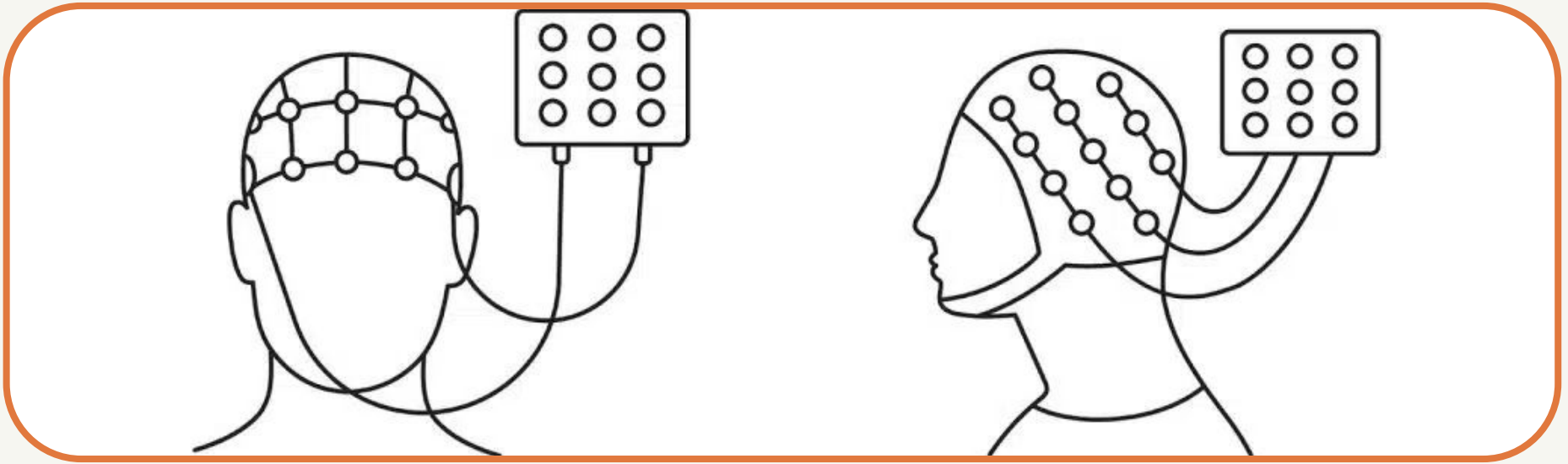
Personal Value of Working on this Project

Ella Torno

- Insight into what the research process looks like
- Relation to future career plans: Speech Pathology
- Introduction to EEG research
- Experience working with child participants

Sonya Ricaurte

- Learning about the research field
- Previous interest and curiosity in research
- Further experiences with young children and infants
- Being apart of important research
- Major- Psychology
  - Can be a path to discovering what's next for me



Questions?