



Do infants process other's actions differently based on language group?

#2-R-240



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Introduction

Social preference for native language speakers emerge early in development. Infants prefer to look at, imitate, and adapt the conventions demonstrated by people who speak their native language rather than an unfamiliar language (Lieberman, Woodward & Kinzler, 2017).

An **open question** is what underlies this preference: Is this preference due to a selective attention and greater encoding of others' behaviors, greater mirroring and facilitations familiar people's actions, or a selective retrieval or use of the information provided by speakers of different languages.

Current Study

The aim of the current study is to explore whether infants are more likely to encode the actions of native speakers over the actions of foreign-speakers.

Experiment 1 (Behavior): Do 9-month-old infants prefer to attend to the actions of native-language speakers over the actions of foreign-language speakers?

Experiment 2 (Behavior & EEG): What are the neural correlates of infants' visual preferences toward native-language speakers?

•**Mu-ERD:** Mirror activity (Fox et al., 2016)

•**Theta-ERS:** Attention, Memory, and readiness to learn (Bergus, Gliga & Southgate, 2016; Bergus & Bonawitz, 2020)

Participants

EXPERIMENT 1 (Lookit) (Scott & Schulz, 2017))

•**Study 1**

32 8- to 11-month-olds ($M_{age} = 9m\ 7d$)

•**Study 2**

32 8- to 11-month-olds ($M_{age} = 9m\ 3d$)

EXPERIMENT 2 (Pilot Study in the lab)

Visual Preference: 14 8-to-11-month-olds

EEG: 10 8-to-11-month-olds

References

Bergus, K., & Bonawitz, E. (2020). The rhythm of learning: Theta oscillations as an index of active learning in infancy. In *Developmental Cognitive Neuroscience* (Vol. 45). Elsevier Ltd. <https://doi.org/10.1016/j.dcn.2020.100810>

Bergus, K., Gliga, T., & Southgate, V. (2016). Infants' preferences for native speakers are associated with an expectation of information. *Proceedings of the National Academy of Sciences*, 113(44), 12397–12402. <https://doi.org/10.1073/pnas.1603261113>

Debnath, R., Buzzell, G. A., Morales, S., Bowers, M. E., Leach, S. C., & Fox, N. A. (2020). The Maryland analysis of developmental EEG (MADE) pipeline. *Psychophysiology*, 57(6), e13580. <https://doi.org/10.1111/PSYP.13580>

Fox, N. A., Yoo, K. H., Bowman, L. C., Cannon, E. N., Ferrari, P. F., Bakermans-Kranenburg, M. J., Vanderwert, R. E., & van IJzendoorn, M. H. (2016). Assessing human mirror activity With EEG mu rhythm: A meta-analysis. *Psychological Bulletin*, 142(3), 291–313. <https://doi.org/10.1037/bul0000031>

Lieberman, Z., Woodward, A. L., & Kinzler, K. D. (2017). The Origins of Social Categorization. *Trends in Cognitive Sciences*, 21(7), 556–568. <https://doi.org/10.1016/j.tics.2017.04.004>

Scott, K., & Schulz, L. (2017). Lookit (Part 1): A New Online Platform for Developmental Research. *Open Mind*, 1(1), 4–14. https://doi.org/10.1162/OPML_A_00002

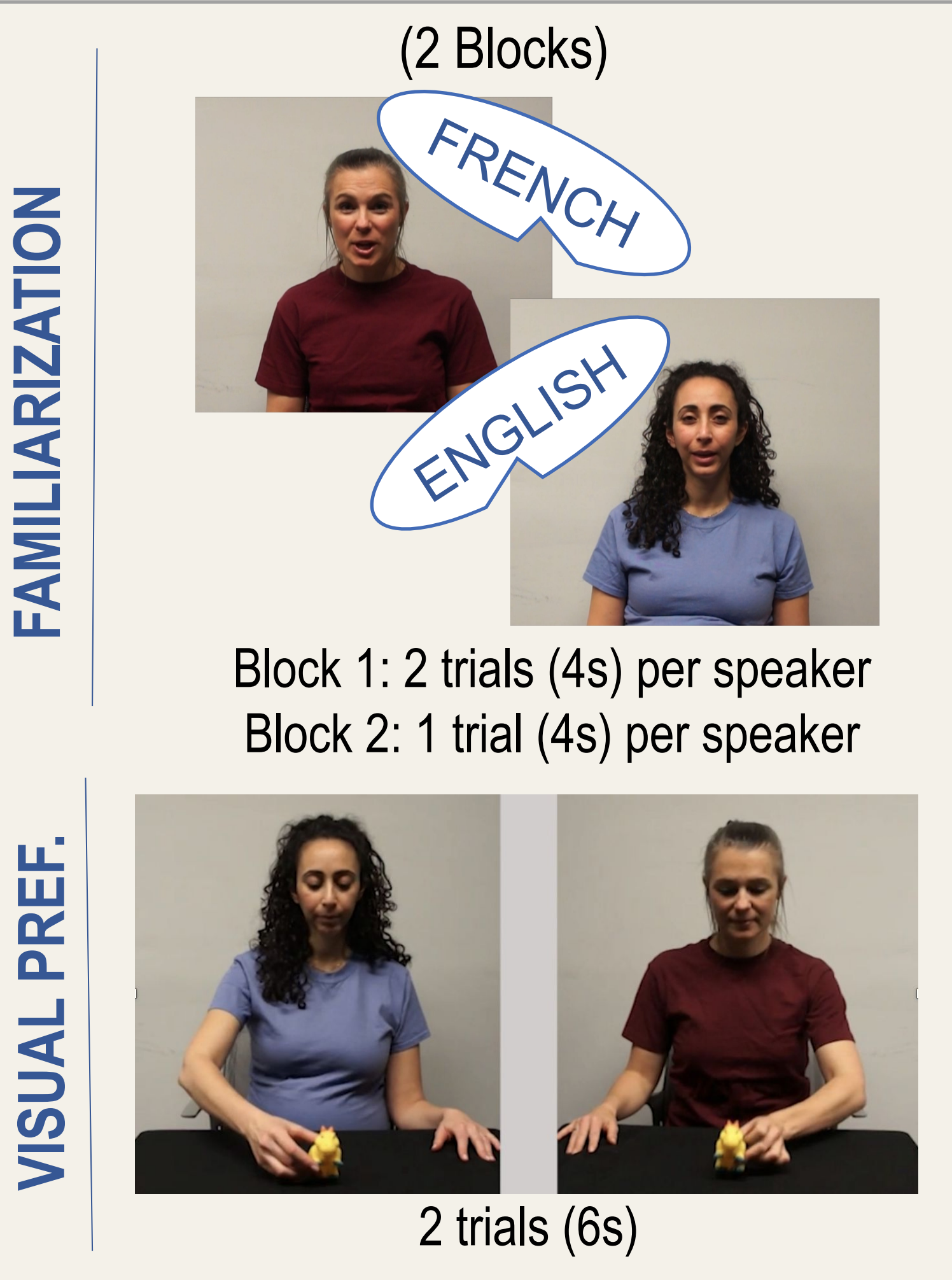
Acknowledgements

We thank the families who participated and Sydney Buffonge, Omar Hussein, Analea Beckman, Emily Chan, and Claire Weber for their help with coding. This research was supported by the National Science Foundation (BCS – 2041218)

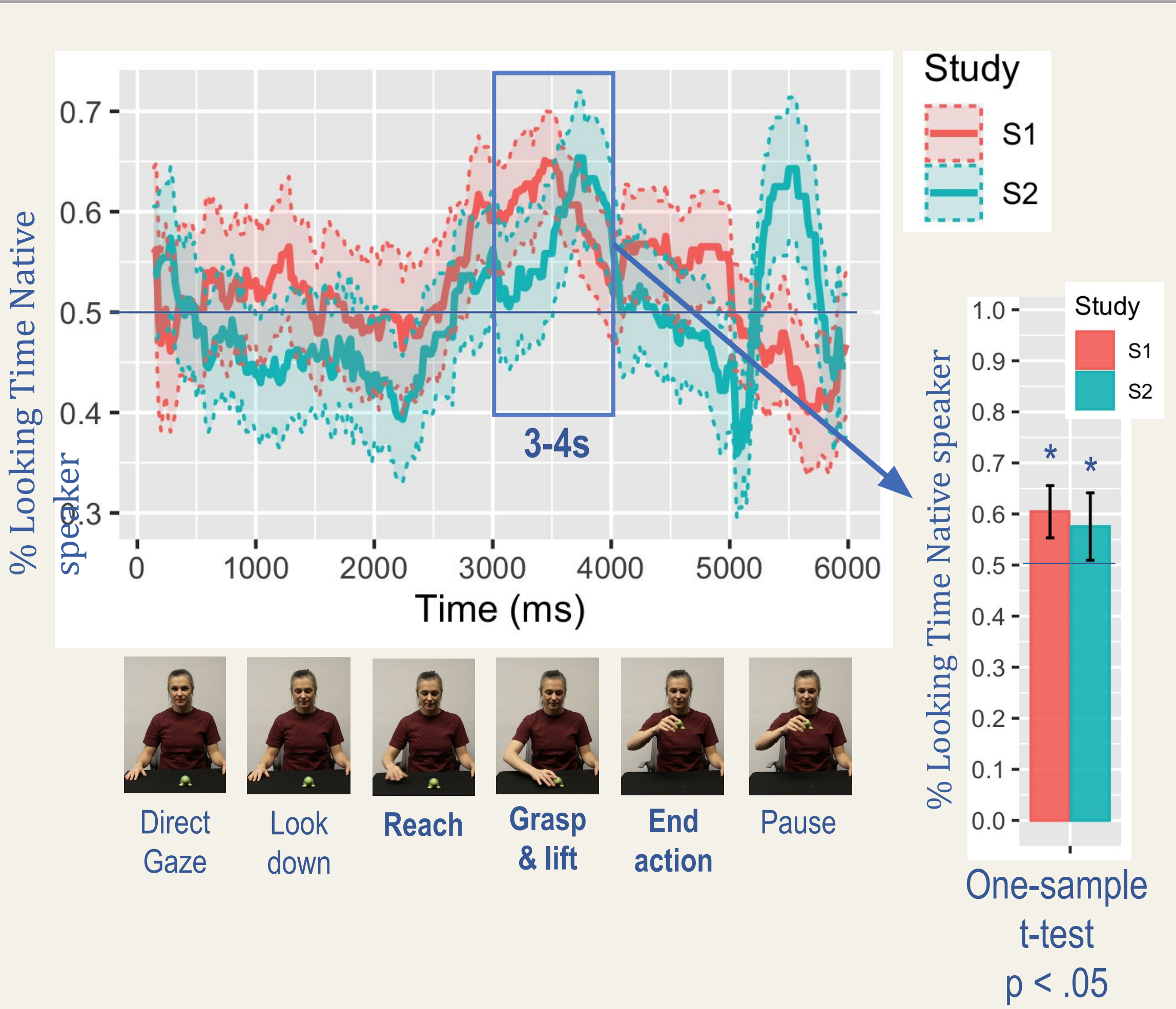
Experiment 1 (Visual Preference)



METHOD



RESULTS



Experiment 2 (Visual Preference + EEG)

METHOD

Procedure: 3 Blocks with 2 parts

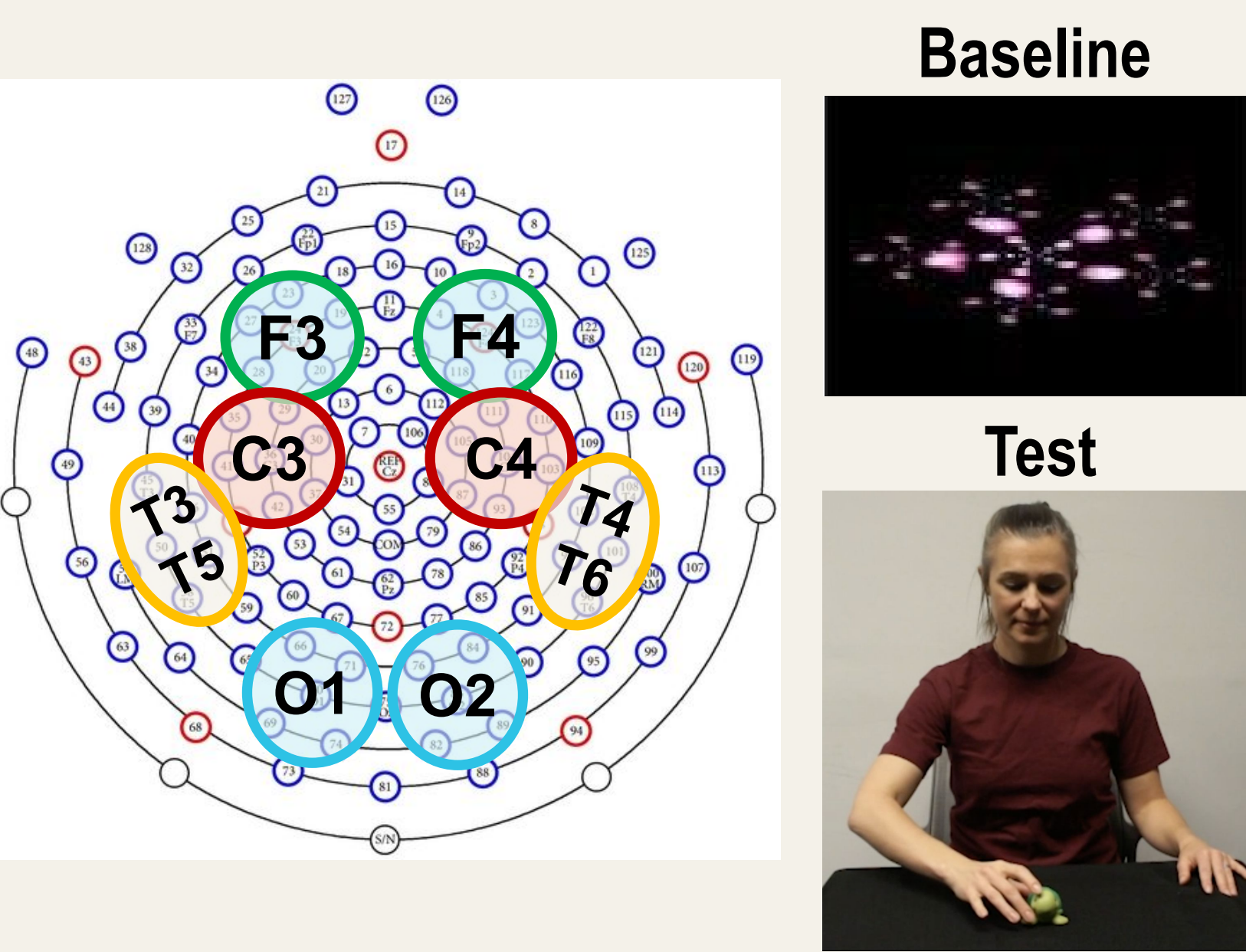
Part 1: Familiarization (6 trials (B1), 2 trials (B1 & B2)), Visual Pref (1 trial), Test (6 trials)

Part 2: Familiarization (2 trials), Test (6 trials)

* Half of the trials with Native-speaker (English), half of the trials with Foreign-speaker (French)

* Total: **16 famil trials** (8 for speaker), **36 test trials** (18 for speaker), and **3 Visual Pref trials**

Stimuli: Same as Exp 1, but in the Test the speakers' actions were presented individually



Net: Hydrocel Geodesic 128-channels

Processing: MADE Pipeline (Debnath et al., 2020)

AOI: Left and Right Hemispheres of Frontal (F) Central (C) Temporal (T) Occipital (O)

Baseline: -500 to 0ms from test onset

Test: -1000 to 1000ms from when the toy was first touched (0 = ~3000ms after test onset)

Frequencies: Theta (3-5Hz) & Alpha (6-9Hz)

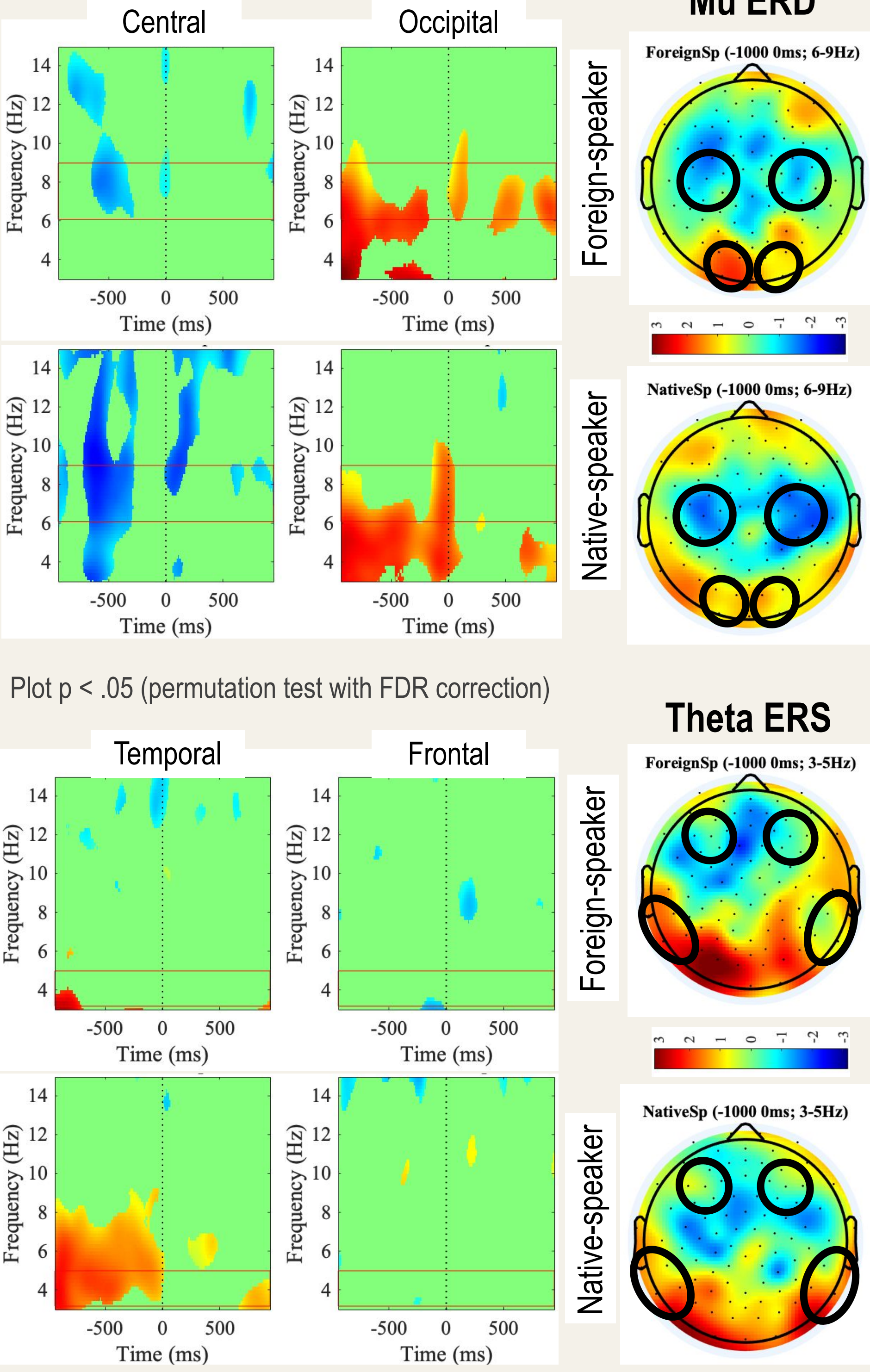
Inclusion criterion: Min of 3 trials per condition for EEG; Min of 2 trials for the Visual Preference (Looking Time in each trial > 4s)

RESULTS

Visual Preference (grasping)
Similar results to Experiment 1

EEG:

- Mu-ERD over central areas
- Theta ERS over temporal (and occipital) areas
- Stronger activity for native-speaker



Conclusions

Nine-month-olds prefer to track the goal-directed actions of those who speak their native language.

Pilot data indicates a potential modulation of mu-ERD and Theta-ERS in response to others' actions depending on the agent's linguistic group, which would suggest a selective encoding of social input.