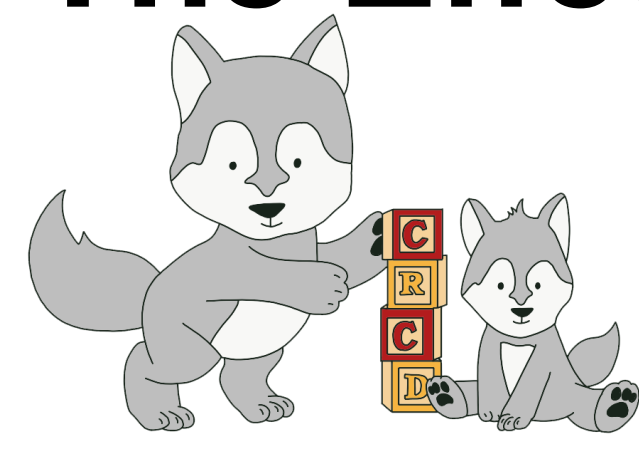


The Effect of Intersensory Redundancy on the Neural Correlates of Face Recognition



in 12-Month-Old Infants: An ERP Study

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Background

- Infant social interactions typically take place in audiovisual settings, where they see and hear people.
- This audiovisual presentation is characterized by intersensory redundancy (IR), which refers to the synchronous presentation of information across senses.¹
- Although synchronous, multimodal stimuli recruit infant attention to faces², multimodal presentation might also shift attention away from the modality-specific, visual-only properties of a face, discouraging face processing³.
- In this study, we explore attention recruitment and face recognition using event-related potentials (ERPs).
- We presented 12-month-old infants with dynamic, audiovisual face stimuli presented synchronously and asynchronously.
- We then collected ERPs in response to pictures of the synchronous and asynchronous familiar and novel faces.
- ERPs provide insight into the role of IR in attention to and processing of faces in the first year of life.
 - The Negative Central (Nc) is an ERP component that is indicative of attention allocation and stimulus salience.⁴
 - The N290 and P400 are ERP components that are associated with face processing.

Hypotheses

- Infants will recognize the async-fam face better than the sync-fam face, as they will allocate their attention to visual-only face properties in the absence of IR, as indicated by a greater Nc.
- The N290 and P400 responses were investigated exploratorily, as past literature has shown conflicting findings.

Method

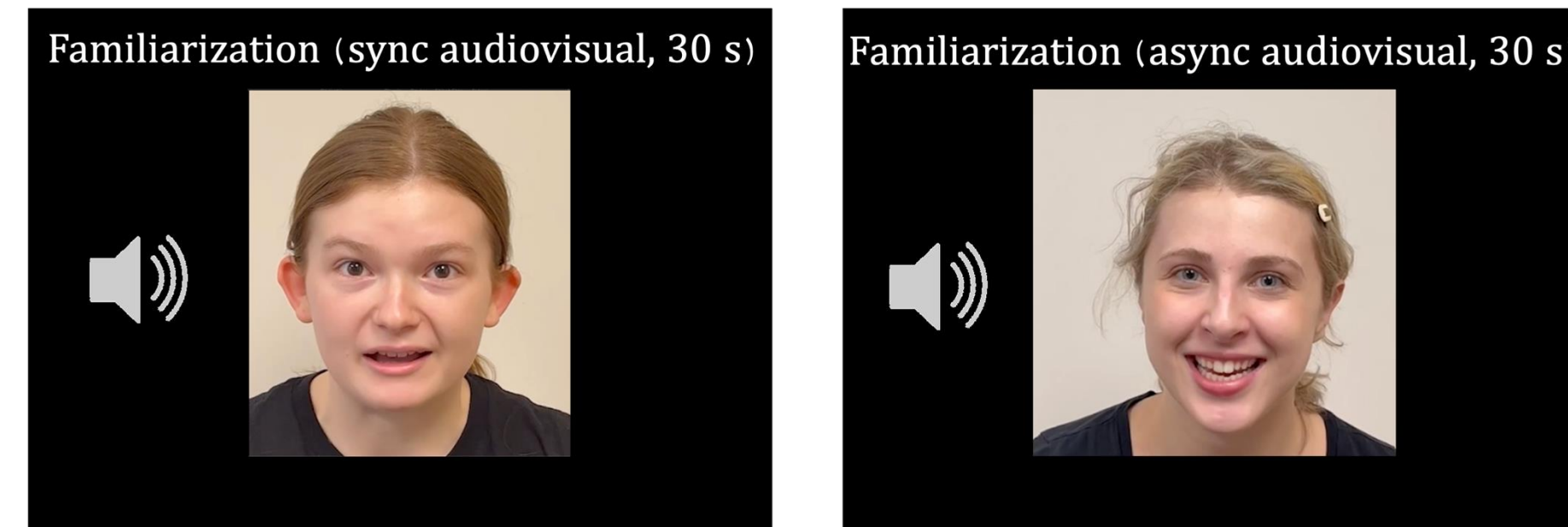
Participants

- Twelve 12-month-old infants ($M_{age} = 369.25$ days, $SD = 12.82$)
 - 7 females, 5 males

Procedure

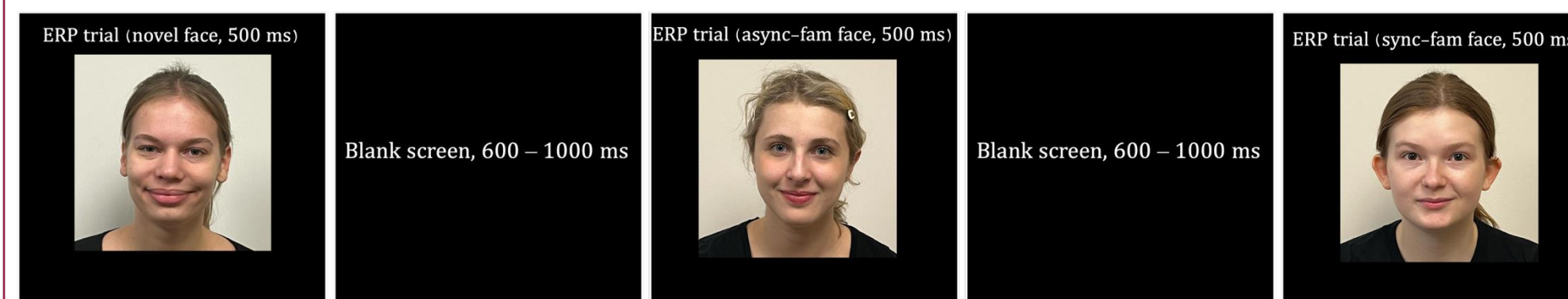
- Infants were seated on their parent's lap in a dark room and fitted with an EGI high-density EEG net

Familiarization trials: Infants viewed two videos of women, presented sequentially. The women recited a children's book, and the soundtrack was synchronous with one of the videos (i.e., sync-fam) and asynchronous with the other video (i.e., async-fam).



ERP trials: ERP responses were measured to pictures of the sync-fam face, async-fam face, and a novel face.

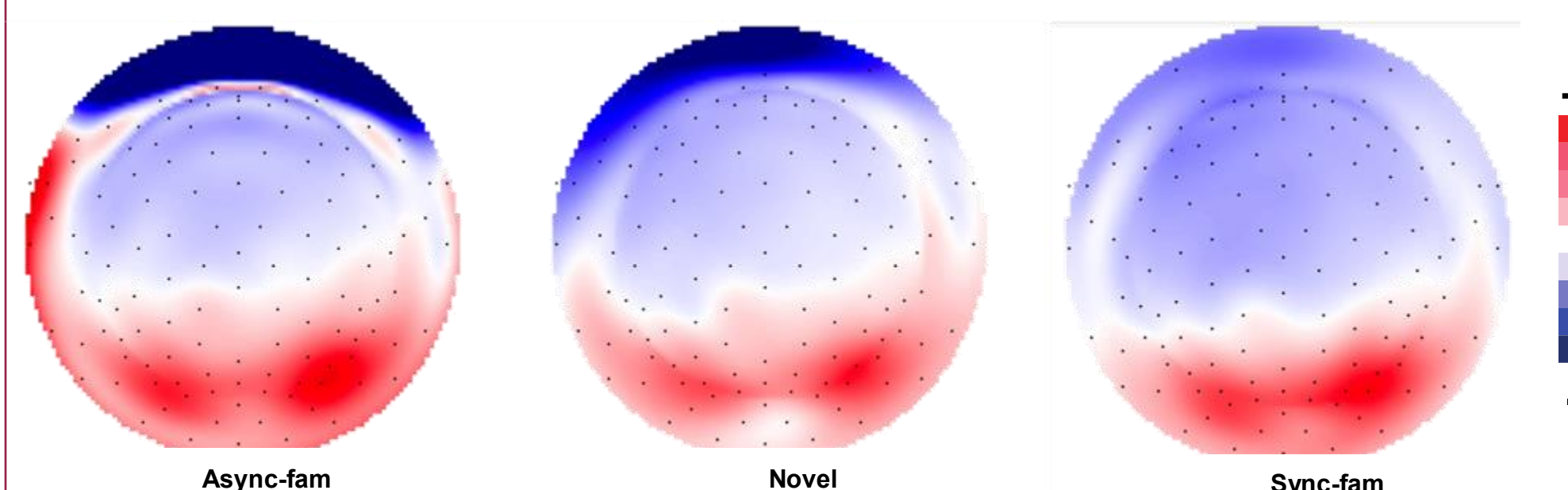
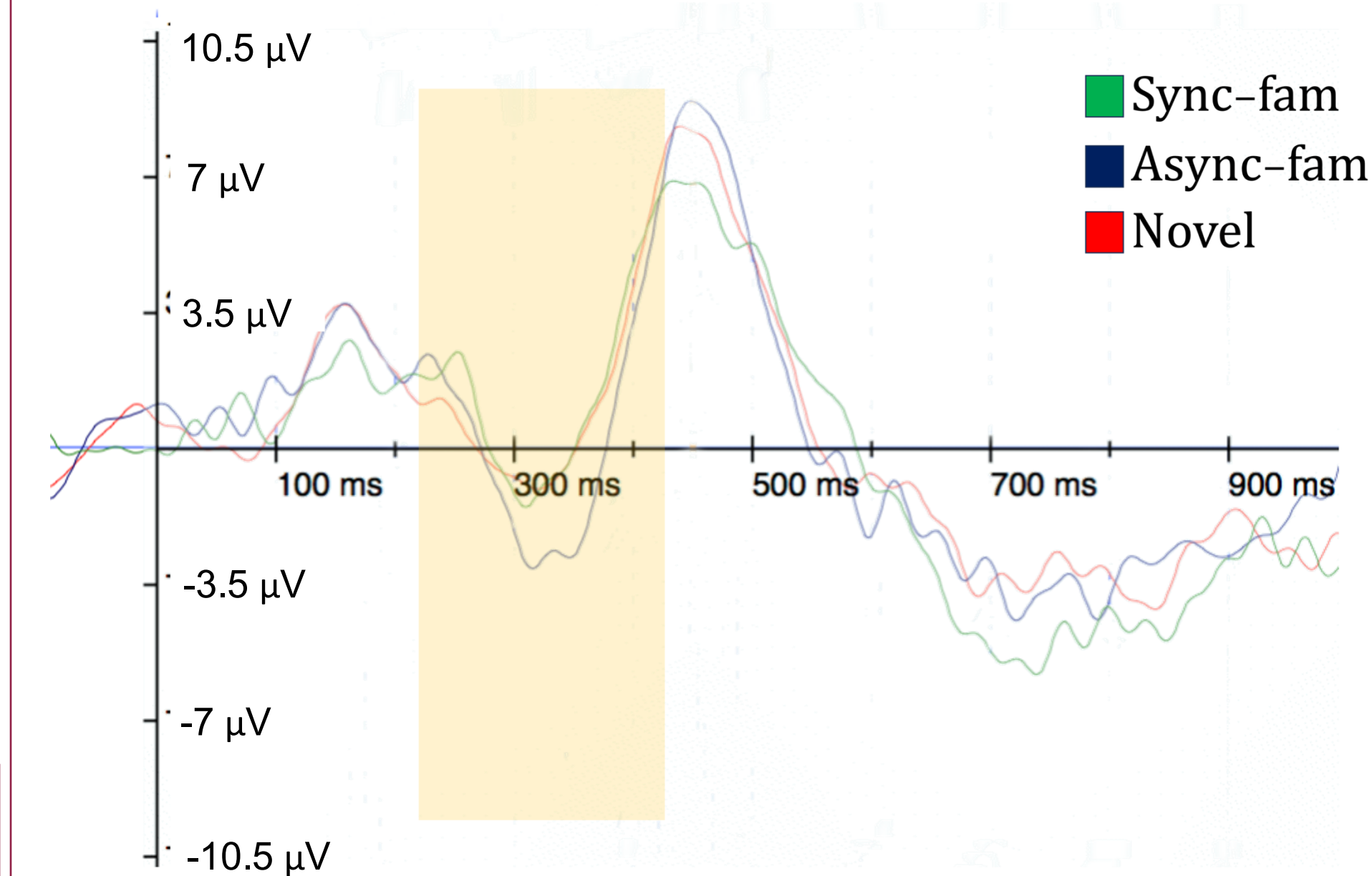
- We measured N290, P400, and Nc amplitudes.
- We conducted ANOVAs including stimulus type (sync-fam, async-fam, novel) and electrode location (varied by component) as repeated measures.



Preliminary Results

N290 amplitude

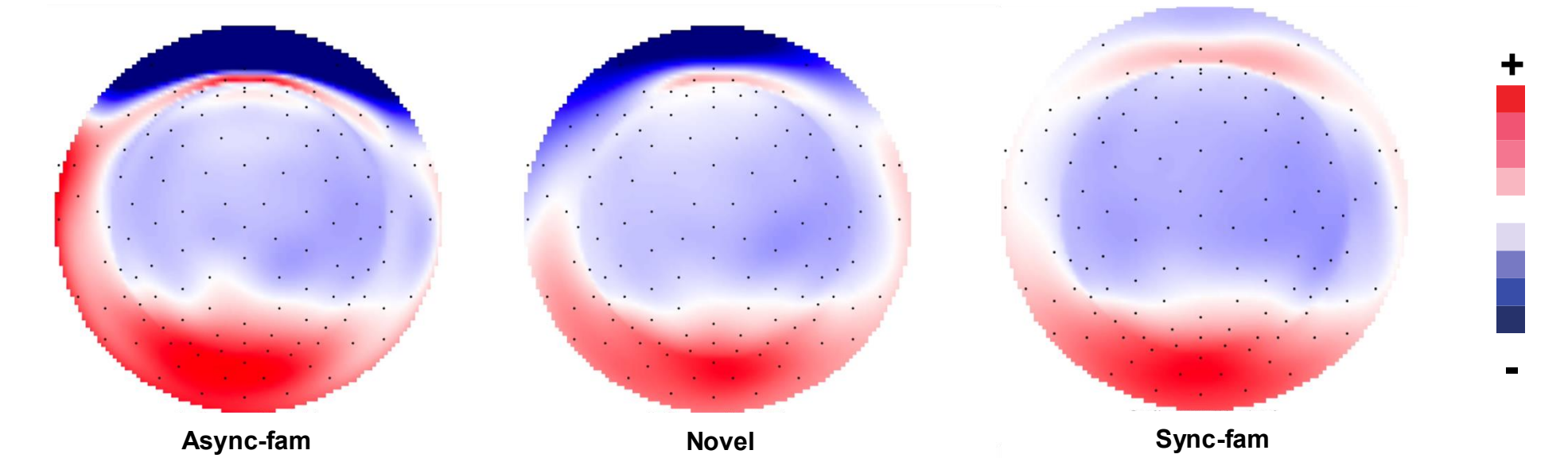
- The N290 amplitude was greater in response over parietal electrodes to the async-fam face than the novel and sync-fam faces, $p > .05$.



Topographical plot of ERP responses by stimulus type during the N290 time window

P400 amplitude

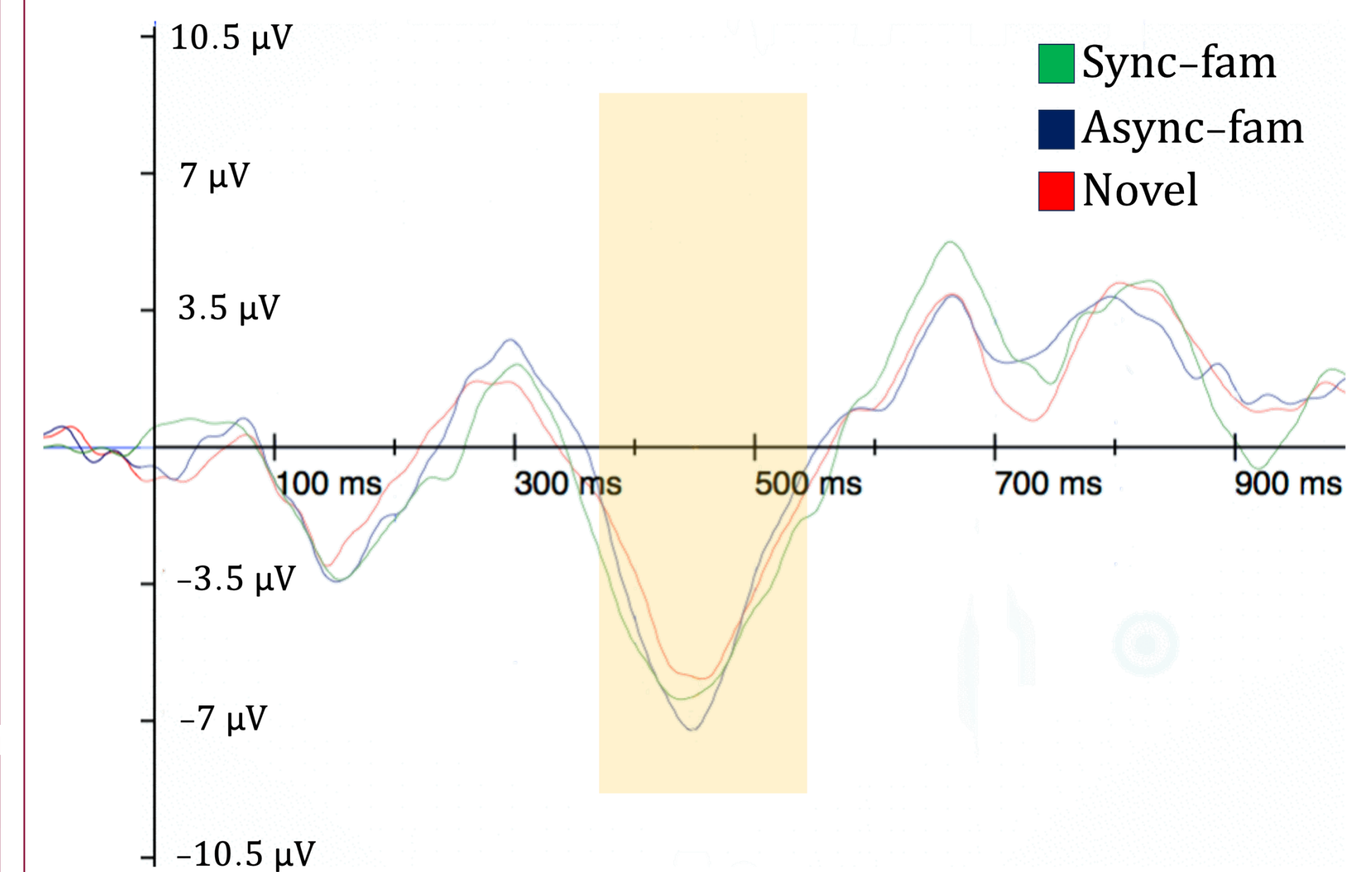
- The P400 amplitude was greater in response to the async-fam face than the novel or sync-fam faces, $p > .05$.



Topographical plot of ERP responses by stimulus type during the P400 time window

Nc amplitude

- The Nc was greater in amplitude over frontocentral electrodes to the async-fam face than the sync-fam and novel faces, $p > .05$.



Discussion

- Our analyses yielded no significant results. Although there were amplitude differences for the components of interest based on stimulus type, these were not significant.
- These results indicate that familiarization with audiovisual faces, regardless of intersensory redundancy, does not lead to face recognition.
- This study contributes to the literature by adding to the understanding of how face processing occurs in naturalistic contexts, in the presence of audiovisual cues.
- The nonsignificant results may be due to the small sample size. Data collection is ongoing to further investigate these attentional patterns and examine the role of IR on infants' face processing.

References

1. Bahrick, L. E., & Lickliter, R. (2000). Intersensory redundancy guides attentional selectivity and perceptual learning in infancy. *Developmental psychology*, 36(2), 190.
2. Curtindale, L. M., Bahrick, L. E., Lickliter, R., & Colombo, J. (2019). Effects of multimodal synchrony on infant attention and heart rate during events with social and nonsocial stimuli. *Journal of experimental child psychology*, 178, 283-294.
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4. Guy, M. W., Zieber, N., & Richards, J. E. (2016). The cortical development of specialized face processing in infancy. *Child Development*, 87(5), 1581-1600.

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