

Neural Processing of Own- and Other-Race Faces in Infancy

Cidnee M. Hall¹, Maya Martin¹, Trinity Bauer², Ashi Bursalıoğlu³, & Maggie W. Guy¹
¹Loyola University Chicago, ²Michigan State University, ³Northwestern University



Background

Other-Race Effect (ORE): biased processing and recognition of faces of one's own race compared to faces of another race¹

- Develops by 9 months of age, impacted by exposure to racial and ethnic diversity^{2,3}
- **Event-related potentials (ERPs) can boost understanding of neural basis of ORE**

Face-sensitive ERP components in infancy:

- N290/P400: face encoding and recognition
 - Nc: attentional allocation, salience, novelty
- Limited past EEG/ERP research finds:
- 9-month-old White infants show enhanced N290/P400 to own-race faces^{4,5}
 - Neighborhood diversity and participant racial identity impact infants' neural responses to own- and other-race faces⁶

Need for greater sample diversity and investigation of experience in shaping neural responses to racial in- and out-groups

Study Objective

Examine N290, P400, and Nc ERP responses to own- and other-race faces in a racially heterogeneous group of 9-month-old infants

Method

Participants

- 13 full-term 9-month-old infants
 - Gender: 9 female, 4 male
 - Race: 7 White, 1 Latine, 5 bi-/multi-racial

Procedure

- Demographic and exposure to diversity forms
- **Familiarization phase:** view single own- or other-race face for 20s; condition randomized
- **EEG phase:** used Magstim-EGI high-density 128-channel system
 - Randomized presentations of the **familiar face**, novel faces of the same race as the familiar (**same-race novel, SRN**), novel faces of another race (**other-race novel, ORN**)
 - Sesame Street attractor stimuli

EEG Processing

- 0.10-30 Hz bandpass filter
- Video coded for looking, segmented 100 ms before to 1000 ms after stimulus onset
- EEG inspected for artifacts and poor recordings; segment excluded if >15% channels included excessive artifacts
- Utilized bad channel replacement, average rereferencing, and baseline correction
- Minimum 10 trials per condition

ERP Segmentation

- N290 – measured amplitude and latency from 250-350 ms at parietal-occipital electrodes
- P400 – measured amplitude and latency from 300-500 ms at medial occipital-inion electrodes
- Nc – amplitude from 300-600 ms post-stimulus at frontocentral electrodes

Data Analytic Plan

ANOVAs

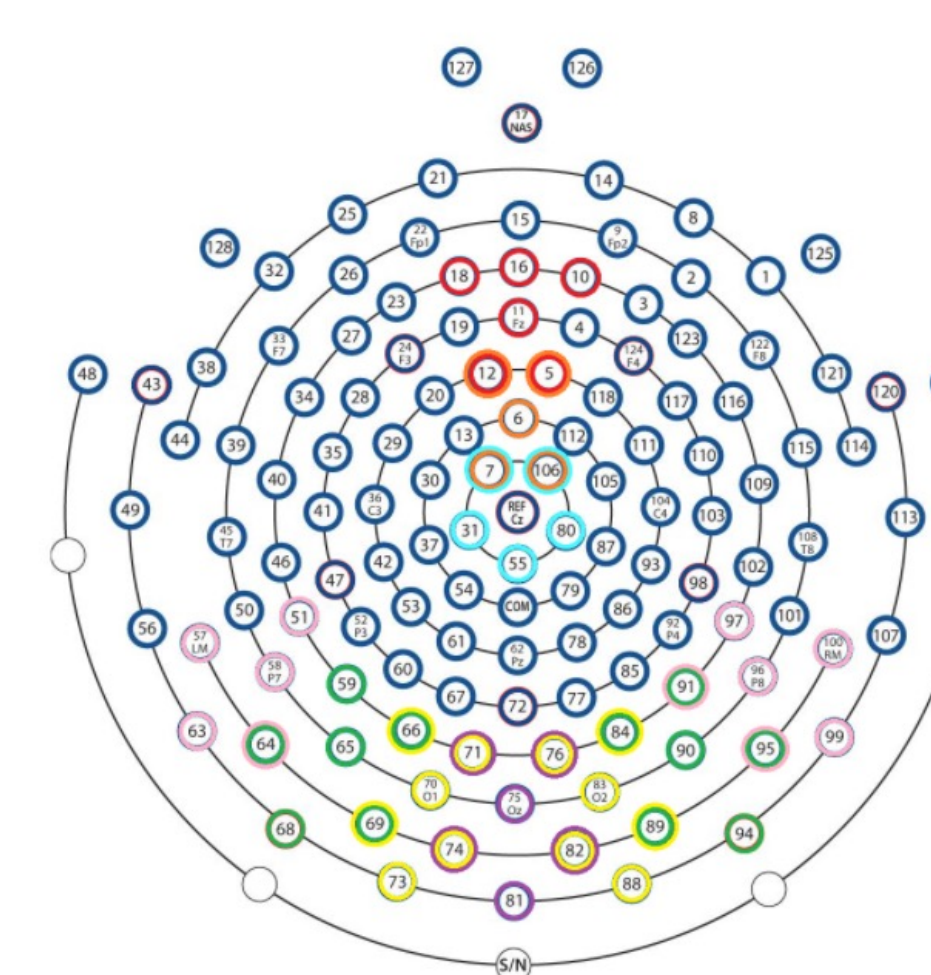
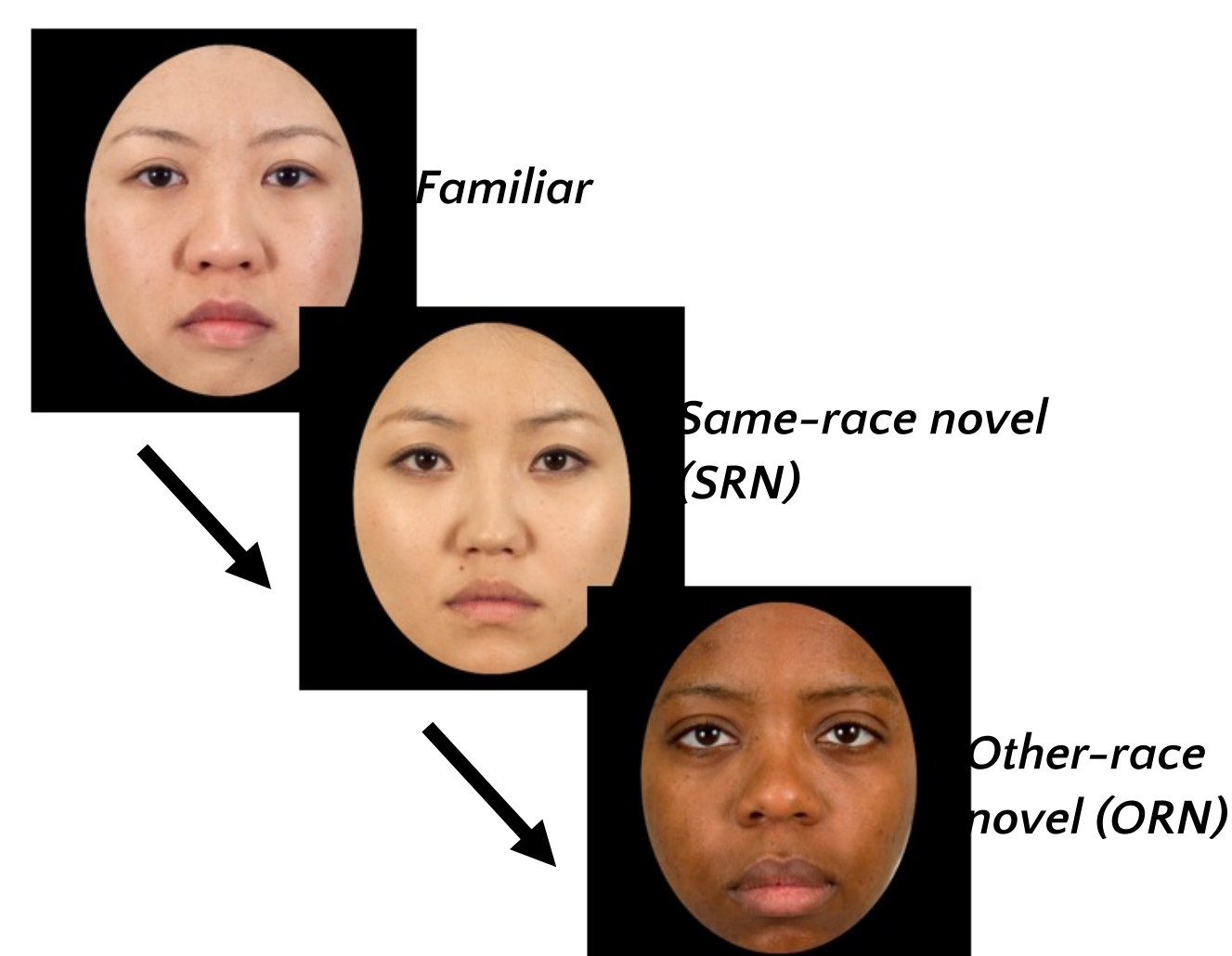
- Examined responses by stimulus type across conditions and electrode clusters

Familiarization phase (20s accumulated looking)



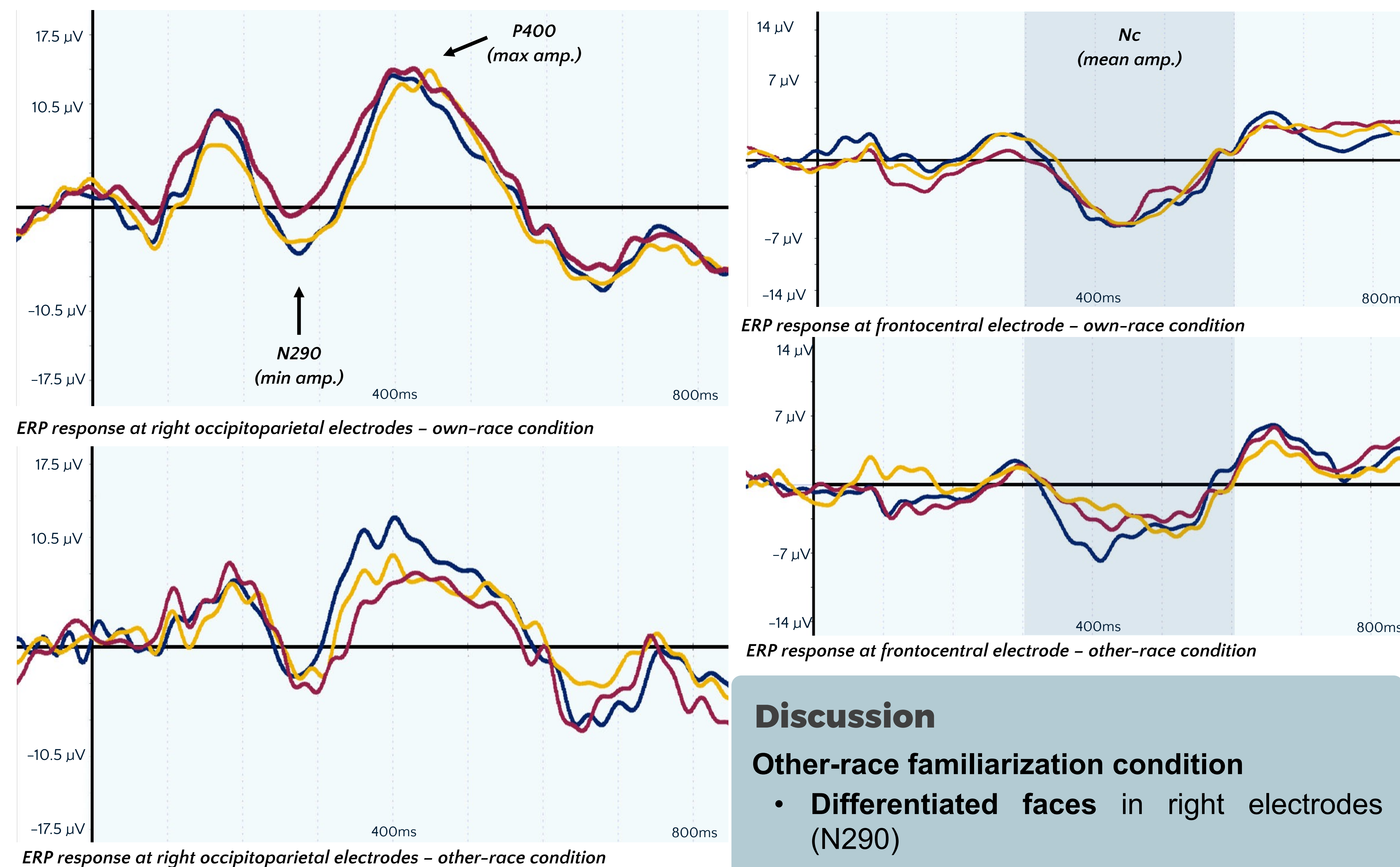
128-channel EEG system on infant participant

ERP phase: randomized presentation of stimuli



EEG channel map with highlighted electrode clusters

Results – ERP Response by Stimulus Type and Condition (Familiar = Blue, Same-Novel = Gold, Other-Novel = Red)



Results

Own-race condition

- No significant results for any ERPs

Other-race condition

N290

- Amplitude impacted by stimulus type in right parietal, $F(2,8) = 4.89, p = .041$, and right parietal-occipital clusters, $F(2,8) = 4.66, p = .045$
- Non-significant follow-up comparisons
- Shorter latency for SRN/familiar compared to ORN in left parietal cluster, $F(2,8) = 14.98, p = .002$

P400 - No significant findings

- **Nc** - Greater to familiar and ORN compared to SRN, $F(2,8) = 20.08, p < .001$

References

1. Kelly, D. J., Quinn, P. C., Slater, A. M., Lee, K., Ge, L., & Pascalis, O. (2007). The other-race effect develops during infancy: Evidence of perceptual narrowing. *Psychol sci*, 18(12), 1084-1089.
2. Bar-Haim, Y., Ziv, T., Lamy, D., & Hodes, R. M. (2006). Nature and nurture in own-race face processing. *Psychol sci*, 17(2), 159-163.
3. Bauer, T., Hall, C., Bursalıoğlu, A., & Guy, M. W. (2023). Community diversity and the other-race effect in infancy. *Front Psychol*, 14, 1214075.
4. Vogel, M., Monesson, A., & Scott, L. S. (2012). Building biases in infancy: The influence of race on face and voice emotion matching. *Dev sci*, 15(3), 359-372.
5. Balas, B., Westerlund, A., Hung, K., & Nelson III, C. A. (2011). Shape, color and the other-race effect in the infant brain. *Dev Sci*, 14(4), 892-900.
6. Hwang, H. G., Debnath, R., Meyer, M., Salo, V. C., Fox, N. A., & Woodward, A. (2021). Neighborhood racial demographics predict infants' neural responses to people of different races. *Dev sci*, 24(4), e13070.
7. Guy, M. W., Zieber, N., & Richards, J. E. (2016). The cortical development of specialized face processing in infancy. *Child Dev*, 87(5), 1581-1600.

Discussion

Other-race familiarization condition

- Differentiated faces in right electrodes (N290)
- Enhanced processing speed for familiar and SRN faces (N290)
- Reduced attention to SRN (Nc)

Own-race familiarization condition

- Null findings contrast prior work, though qualitative examination of ERPs suggests enhanced N290 to own-race faces
- Preliminary analyses with small sample size
- ~30% of sample is multi-racial, may reflect lack of perceptual narrowing for in-groups

Data collection is ongoing - **future analyses will consider participant race and parent-reported exposure to racial/ethnic diversity**

Broader implications for ORE as a developmental pathway for implicit racial bias, early exposure to diversity in shaping neural responses to own- and other-race faces

Interested in our research?
Scan the QR code to learn more about our work!

