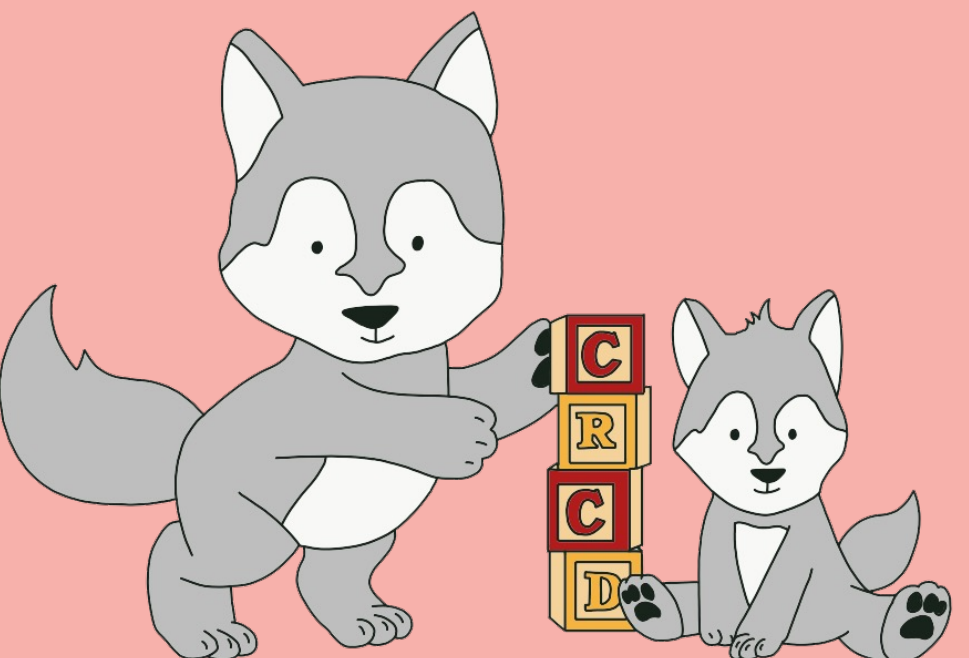


Neural Correlates of Specialized Face Processing in Infancy

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Introduction

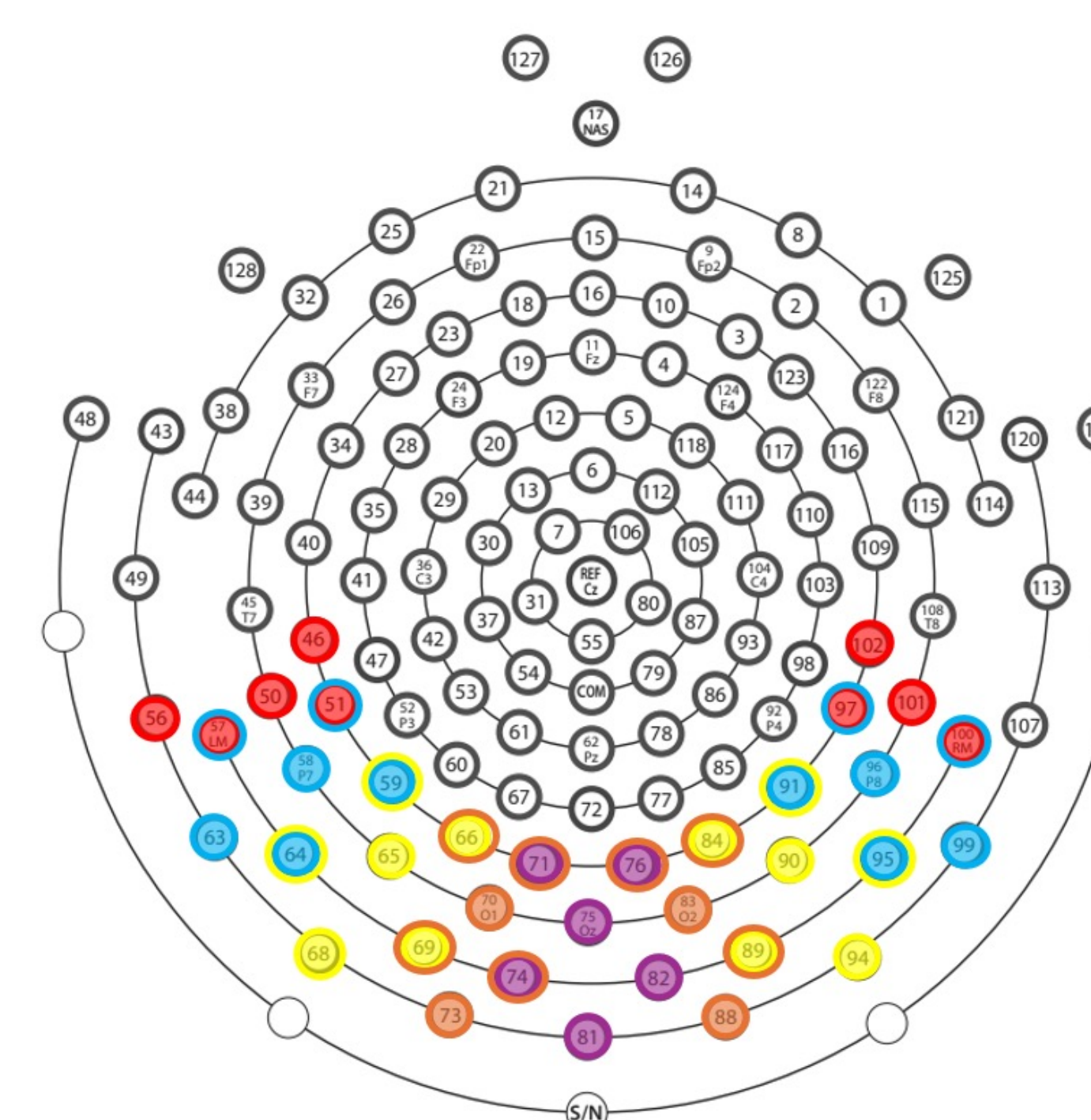
Neural responses to human faces become increasingly specialized over development^{1,2}

- Investigated using **event-related potentials (ERPs)**: segments of electroencephalography time-locked to an event
- Face-specialized components in infancy**
- May represent precursors to adult face-specialized component, the N170^{3,4}
 - Inversion effect evidenced by greater amplitude to inverted compared to upright faces
 - Lateralized response to right scalp⁵
- N290** – increasingly more selectively activated to faces over first year^{1,2}
- P400** – mixed findings on face sensitivity, demonstrates inversion effect in some studies^{1,2,6}

Magstim-EGI EEG Net



Parietal and Occipital Electrode Clusters



Data Analytic Plan

- N290** – Minimum amplitude and latency to peak from 250-350ms after stimulus onset at parietal and parietal-occipital electrode clusters
- P400** – Maximum amplitude and latency to peak from 300-500ms at medial occipital-inion electrode clusters
- Repeated Measures ANOVAs** – Examined responses with stimulus orientation (2: inverted, upright), type (2: face, house), and electrode cluster as within-subjects factors, age (3: 12, 18, 24) as a between-subjects factor

Objective

To examine developmental change in ERP responses associated with face-processing (i.e., N290, P400) to upright and inverted face and non-face stimuli in 12-, 18-, and 24-month-olds

Method

Participants: 20 infants in preliminary analyses (5 12mo, 9 18mo, 6 24mo)
EEG recording: Magstim-EGI high-density 128-channel EEG system
Stimuli: upright and inverted faces, houses

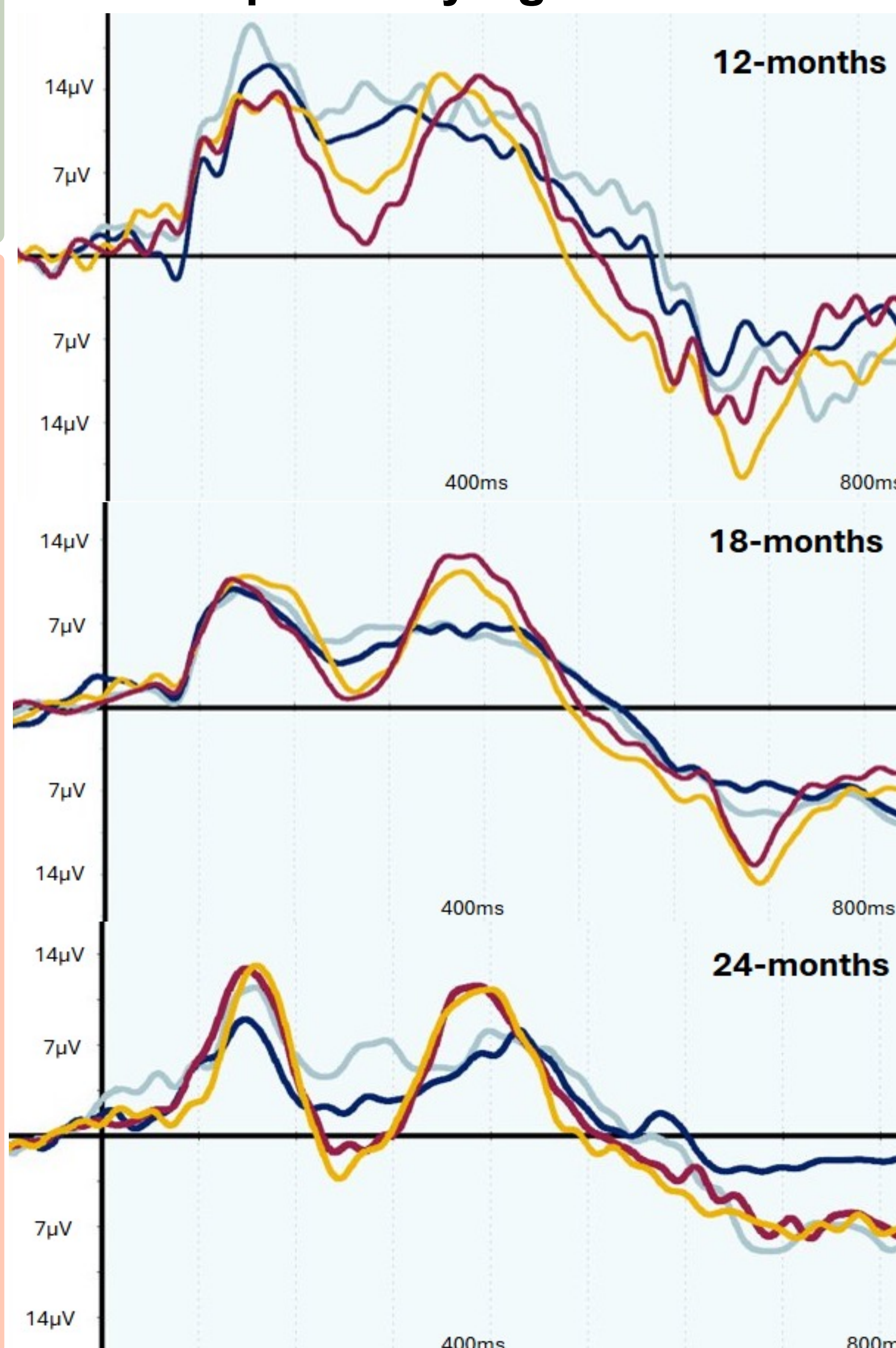


Presented in randomized order with random interstimulus interval of 500-1000ms

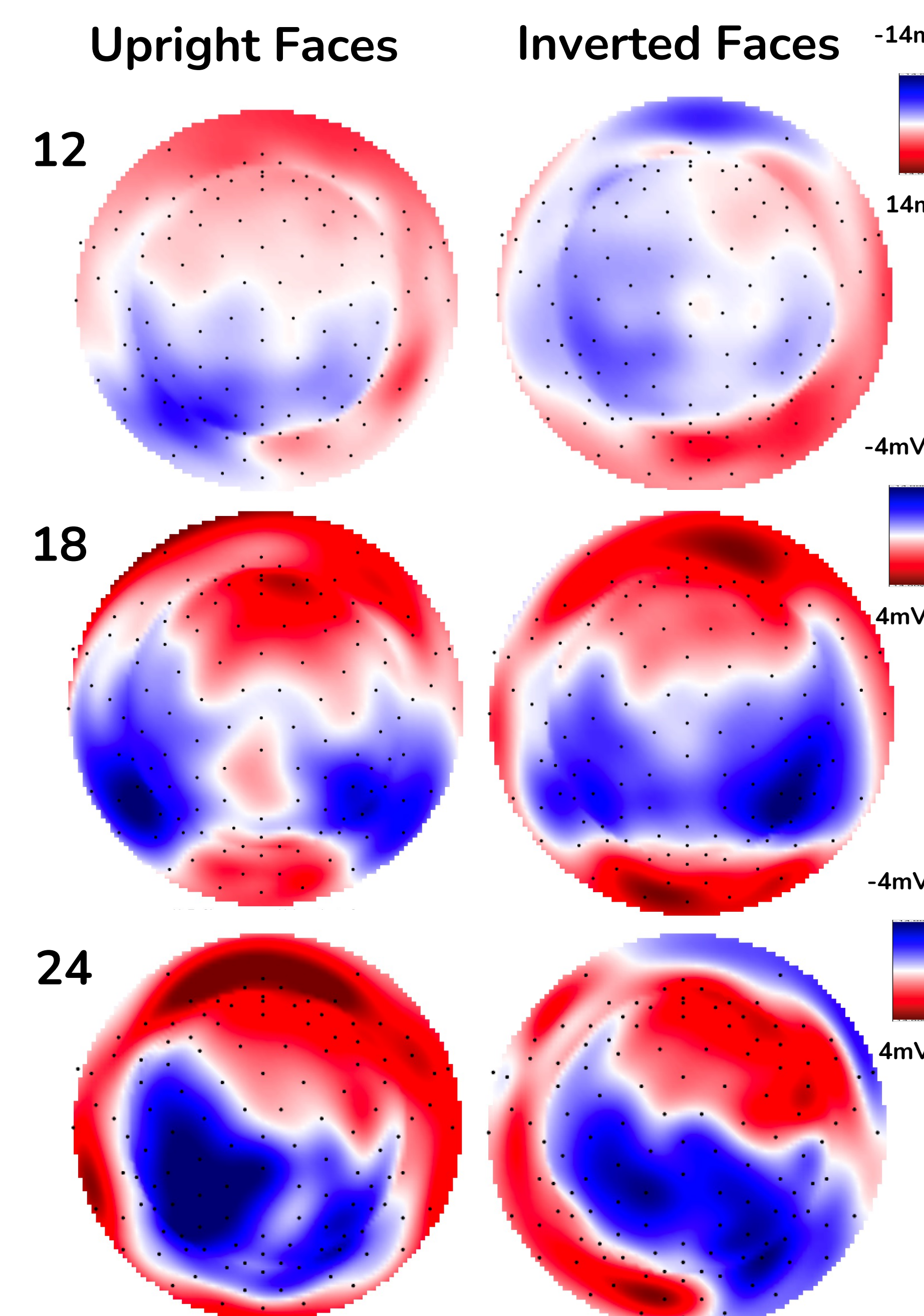
Data Processing:

- 0.10-30 Hz bandpass filtered, video coded for looking
- Segmented 100 ms before to 1000 ms after stimulus onset
- EEG inspected for excessive artifact and poor recording
- Segments of EEG were excluded if >15% of channels were removed
- Participants required to submit at least 10 good trials per stimulus type

ERP Response By Age Up. Face, Inv. Face, Up. House, Inv. House



Topographical Plots of Peak N290 Response to Faces By Age



References

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Results

- N290**
 - Stronger amplitude to faces than houses, $F(1, 17) = 17.59, p < .001$
 - Stronger amplitude to upright than inverted, $F(1, 17) = 15.42, p = .001$
 - Longer latency to faces than houses, $F(1, 17) = 41.40, p < .001$
 - No interactions of stimulus type and orientation
 - P400**
 - Amplitude and latency not modulated by stimulus type or orientation
- ERPs not significantly modulated by age, although emerging effects evident in visual plots**

Discussion

Infants show continued specialization of ERP responses to faces across the second year of life

- N290 stronger to faces compared to houses and upright compared to inverted stimuli across all clusters
 - Longer latency to faces than houses, suggesting greater processing demands for faces
 - P400 amplitudes not impacted by stimulus type**
 - May not be face-specific ERP response
 - More adult-like ERP responses by 24-months**
 - Emerging inversion effect, shorter N290 latencies, and lateralization evident in 24-month ERP plots
 - Preliminary evidence of developmental change of N290 to more adult-like N170 response
- Data collection is ongoing, future analyses will consider developmental change in ERP responses by age in an adequately powered sample**

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