The current study examined the relationship between infant sustained attention and infant EEG oscillations. We measured infant theta, alpha, and beta rhythm activity 

- The alpha effect started to emerge at 10 months and became well established at 12 months.
- The current study also aimed to determine the cortical generators of the infant theta and alpha effects found during sustained attention.
- Cortical source analysis was conducted with infant MRI models.
- The theta synchronization effect was localized to the orbital frontal, temporal pole, and ventral temporal areas.
- The alpha desynchronization effect was localized to the brain regions composing the default mode network (DMN) including the posterior cingulate cortex and precuneus, medial prefrontal cortex, and inferior parietal lobe.

Conclusion: The current study established a connection between infant sustained attention and EEG oscillations, and demonstrated how this connection developed from 6 to 12 months of age.

Methods

- Participants: 6 (N=15), 8 (N=17), 10 (N=14), and 12 (N=13) months of age.
- Procedures: Infants were watching dancing Sesame Street characters. These characters might dance and sing at one location, move from one location to another on the screen, or disappear as it was moving across the screen. We only used the data collected when the character appeared on the screen.
- EEG & ECG acquisition and analysis: EGI GSN and HGSN 124 electrodes nets + 2 EOG + 2 ECG. The EEG data were segmented into 1s epochs. They were categorized into three attention phases: preattention/stimulus-oriented, sustained attention, and attention termination based on HR changes. Fast Fourier Transform was applied on EEG epochs with 1s-width Hannning window and 50% overlap, and power was calculated for the theta (2 – 6 Hz), alpha (6 – 9 Hz), and beta (9 – 13 Hz) frequency bands.
- Cortical source analysis: Realistic infant MRIs from the Neurodevelopment MRI Database – appropriate average MRI templates.

The tips for Figure 1a:
1. Red means greater power and blue means lower power.
2. You will see the age effect by comparing the maps vertically.

Tips for Figure 3a:
1. "Red" means greater source activity for the theta rhythm during sustained attention than attention termination.
2. The attention effect is clearly shown for 8 and 12 mos.
3. The attention effect is predominately shown in the Orbital frontal, temporal pole, and ventral temporal regions.

References