Differences in Repetition Suppression across Sensory Systems in 6-month-olds: Using NIRS to Compare Infant and Adult Neural Function

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Do infants have the same basic functional neural organization as adults?

Repetition suppression (RS) is “[of] one of the most robust experience-based cortical dynamics” (Grill-Spector, Henson & Martin, 2006). Despite being a basic and widely used paradigm in adults, repetition suppression has not been systematically investigated in infants. Does the infant sensory cortex (temporal, occipital) exhibit repetition suppression?

Near Infrared Spectroscopy (NIRS)

Hitachi ETG-4000, 24 channels recorded (probe separation of 3cm) 12 channels over left hemisphere, centered above ear 12 channels centered over the occipital cortex, above inion Channels or ROIs selected a priori based on average infant MRIs: 7 channels over temporal, 5 channels over occipital cortices

Experiment 1

Auditory: words

Visual: faces

Experiment 2

Experiment 3

Summary

Like the adult literature:
1. Auditory stimuli produce responses in temporal cortex
2. Visual stimuli produce responses in occipital cortex
3. Repetition produces an attenuated response in temporal cortex

However, we find modality and developmental differences:
3. Repetition (even across blocks) does not produce an attenuated response in occipital cortex
4. The infant occipital cortex elicits robust responses to repeated stimuli of multiple types (faces, fruits)

Ongoing…

Coregistration with average infant MRI

Methods

Block design: 1 stimulus/second for 8 seconds, jittered 4-9 second baseline 2x2 design: auditory (two syllable familiar words) x visual (smiling faces); uniform (1 stimulus 8 times) x variable (8 different stimuli) Auditory: blanket, bottle, story, apple, cookie, baby, doggie, diaper Visual:

Auditory Visual Stimulus Modality

Auditory Visual

N = 15

Oxygenated Hemoglobin (mM mm)

N = 15

Oxygenated Hemoglobin (mM mm)

Oxygenated Hemoglobin (mM mm)

Oxygenated Hemoglobin (mM mm)

N = 15

N = 15

Faces Fruit

Stimulus Type

Ongoing…

Coregistration with average infant MRI

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