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 "[o]ne of the most robust experience-based cortical dynamics" (Grill-Spector, Henson & Martin, 2006)

LO — Non-repeated / Repeated
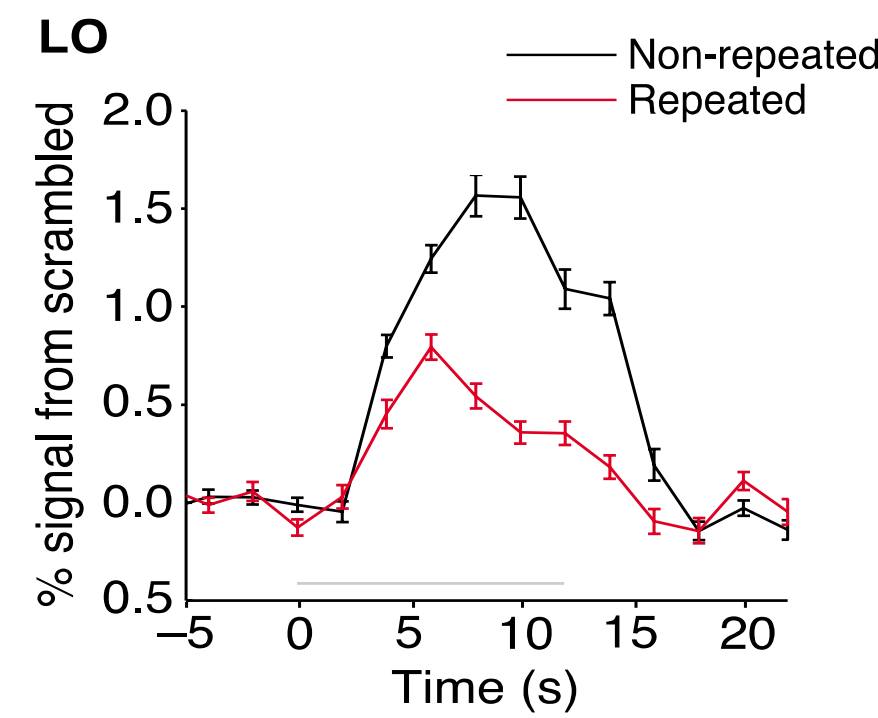
Despite being a basic and widely used paradigm in adults, repetition suppression has not been systematically investigated in infants.

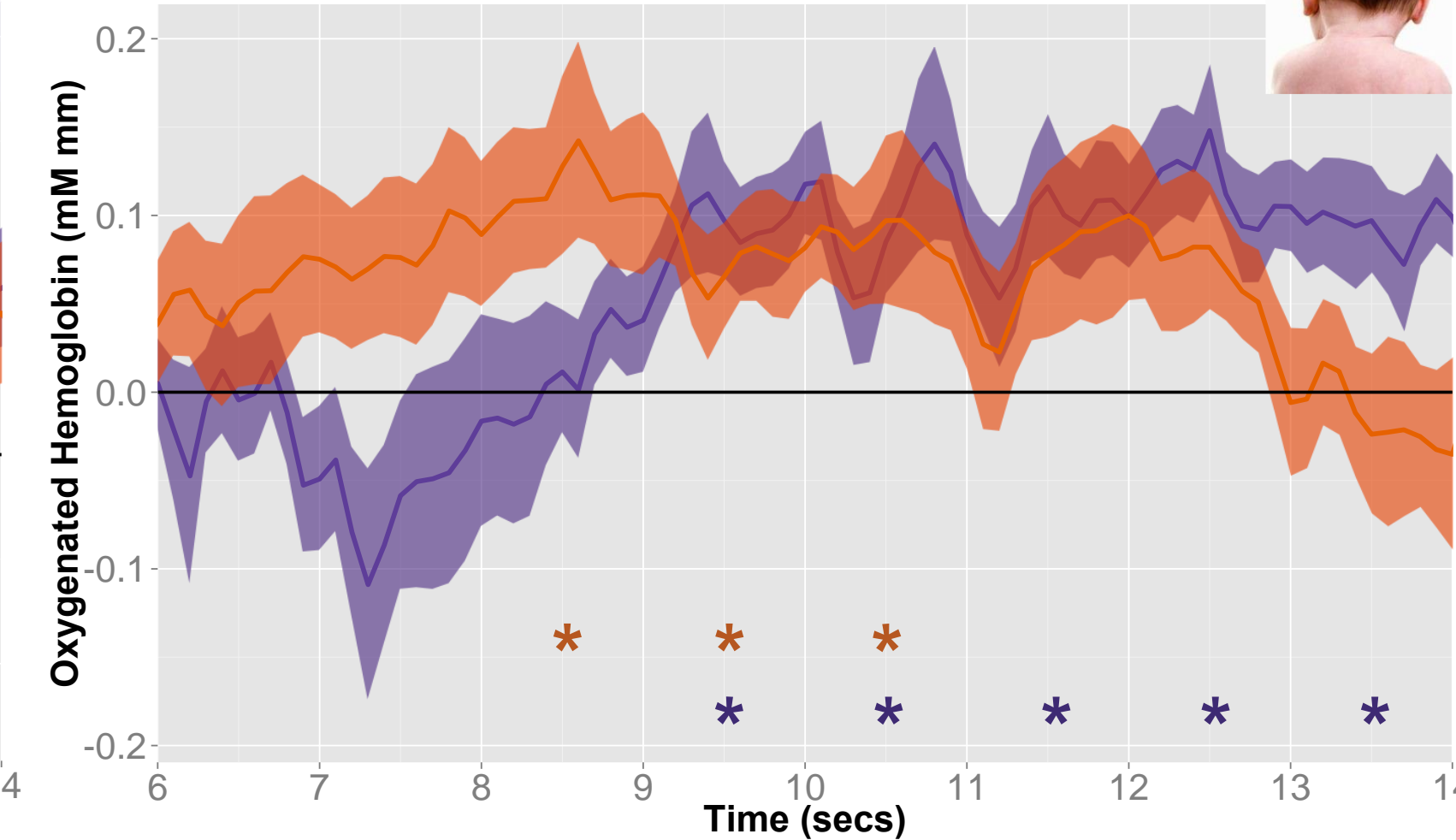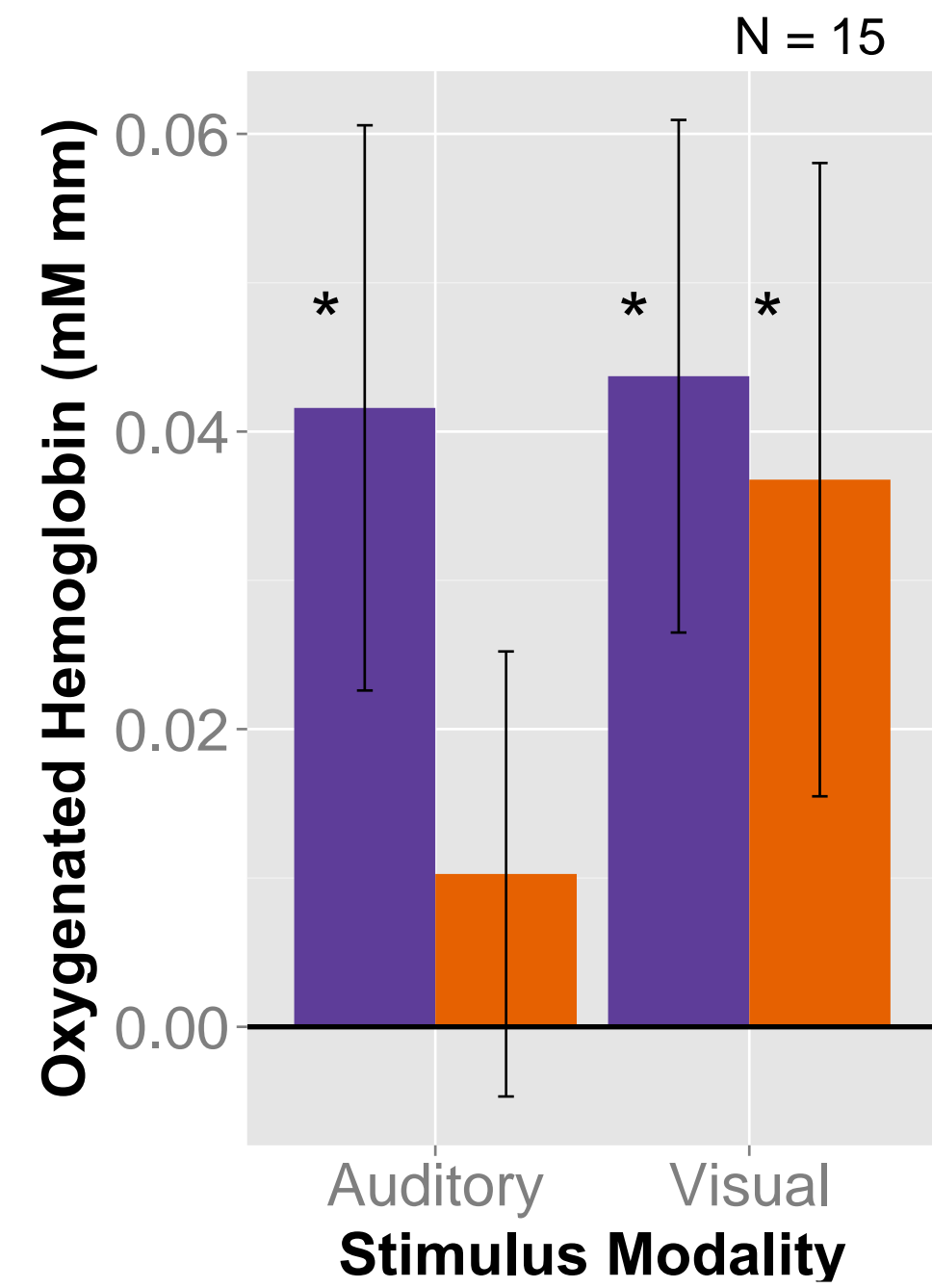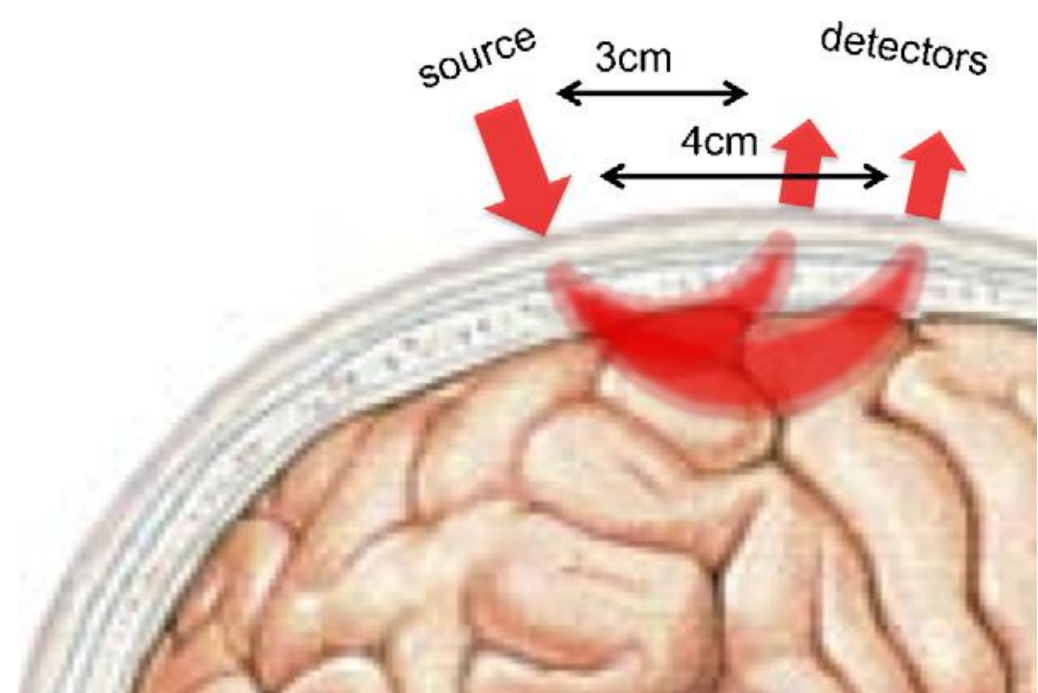Does the infant sensory cortex (temporal, occipital) exhibit repetition suppression?

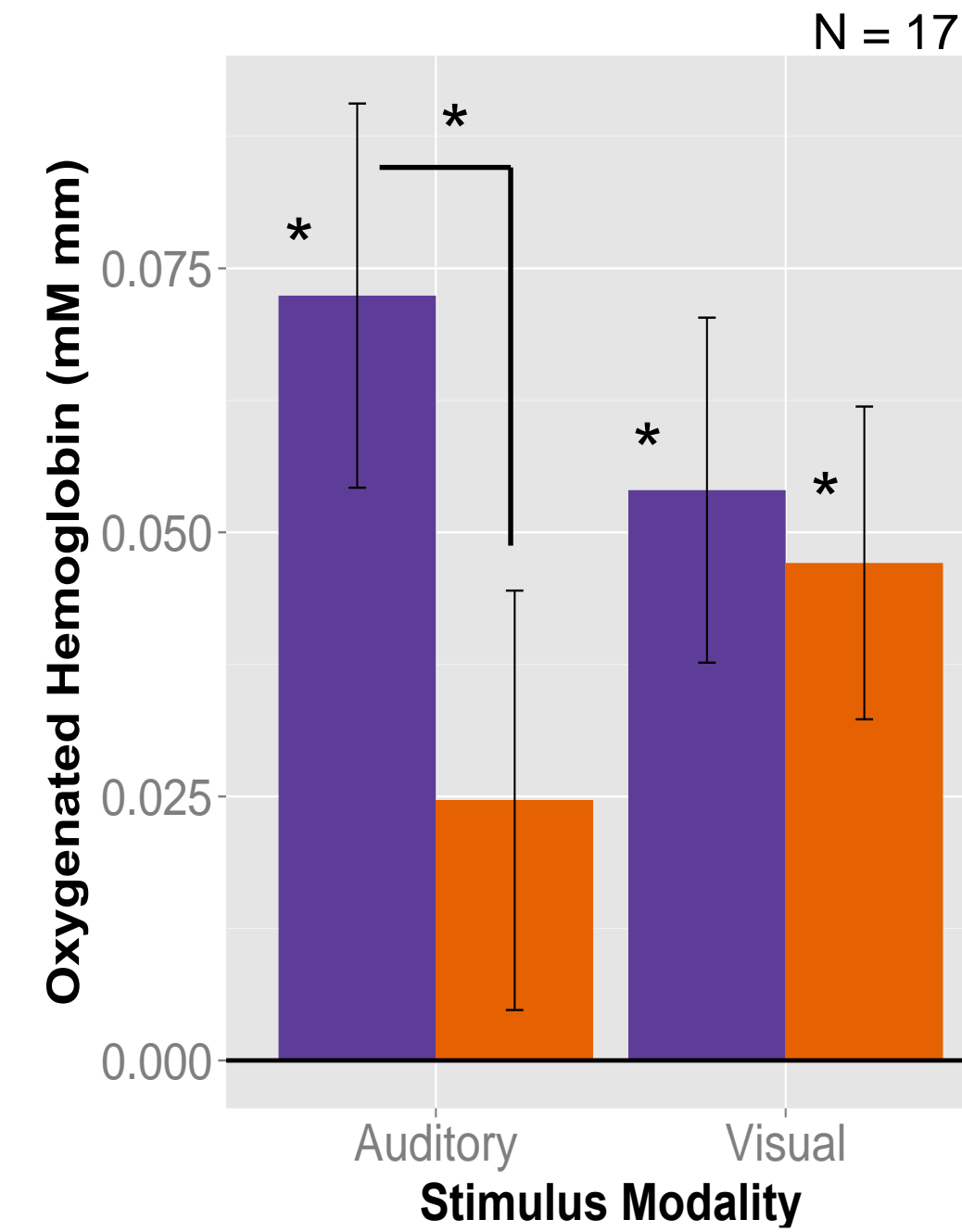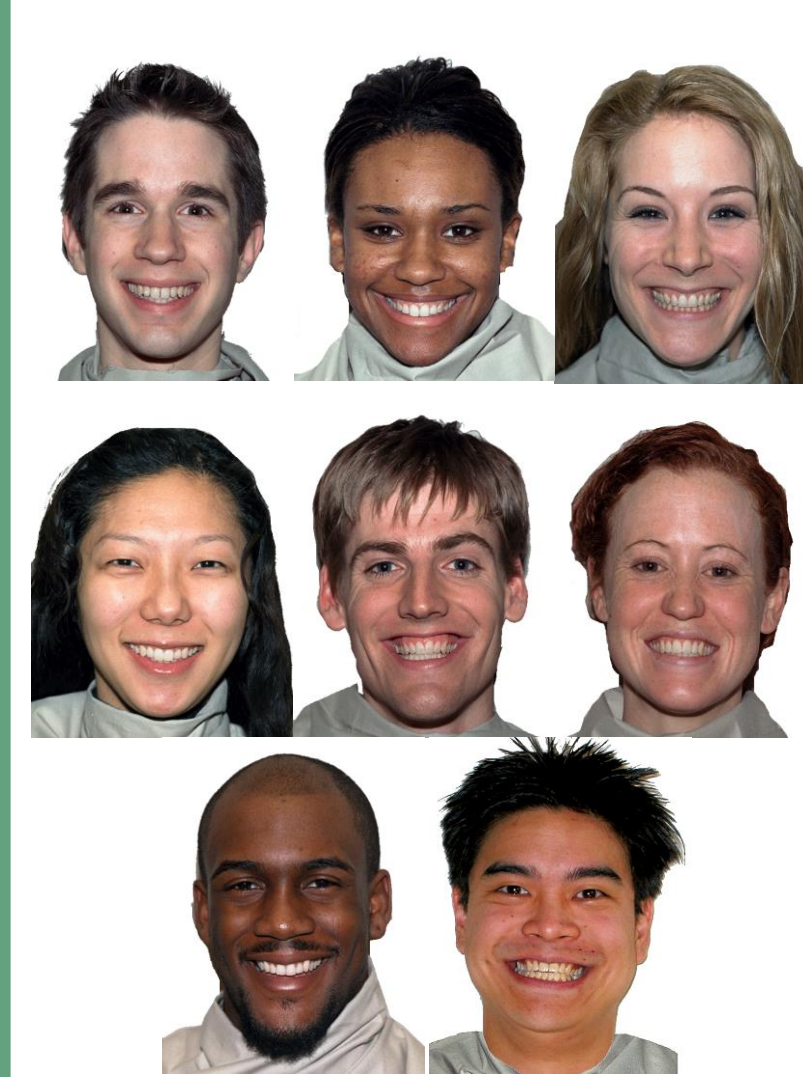## Near Infrared Spectroscopy (NIRS)

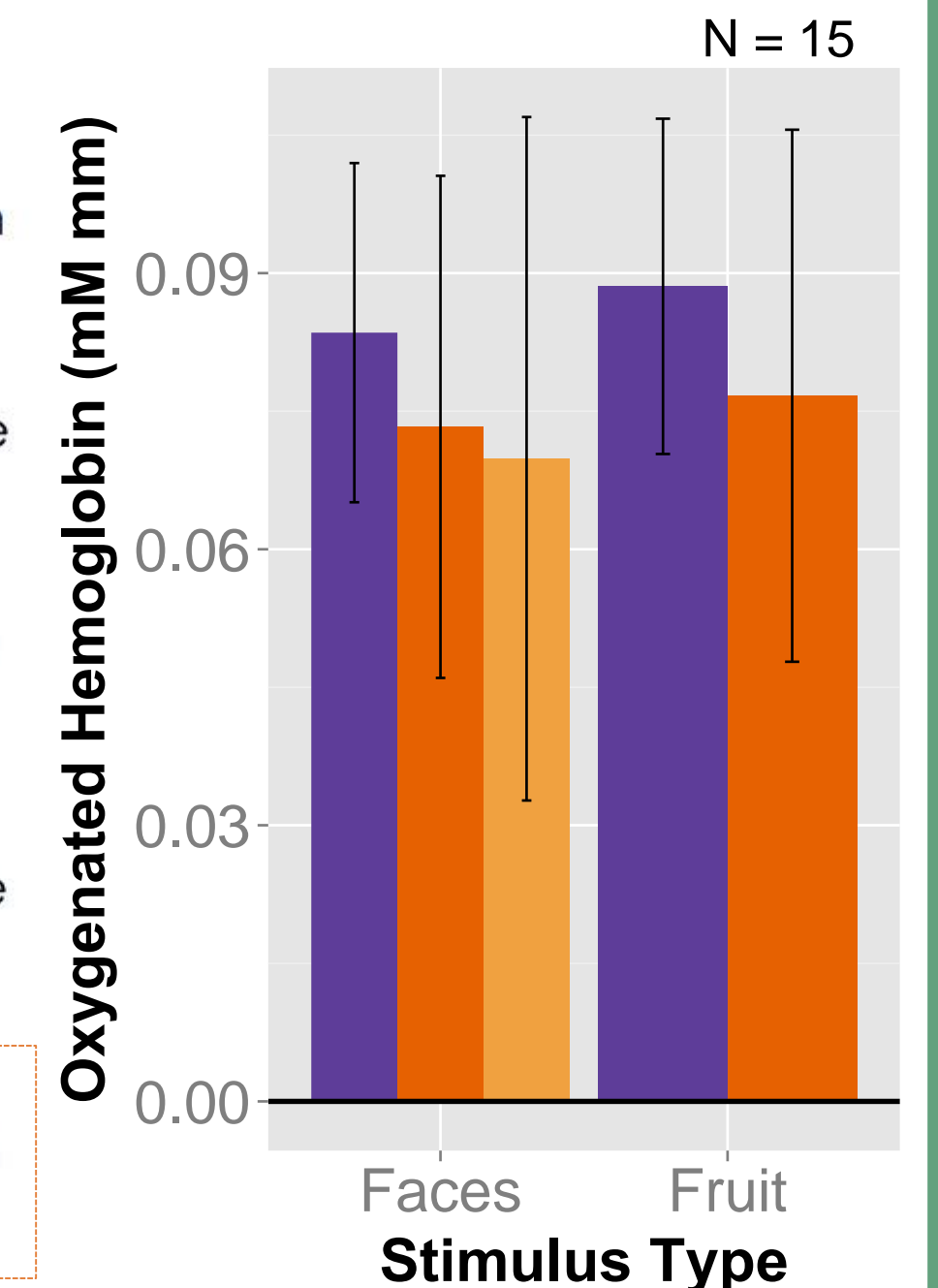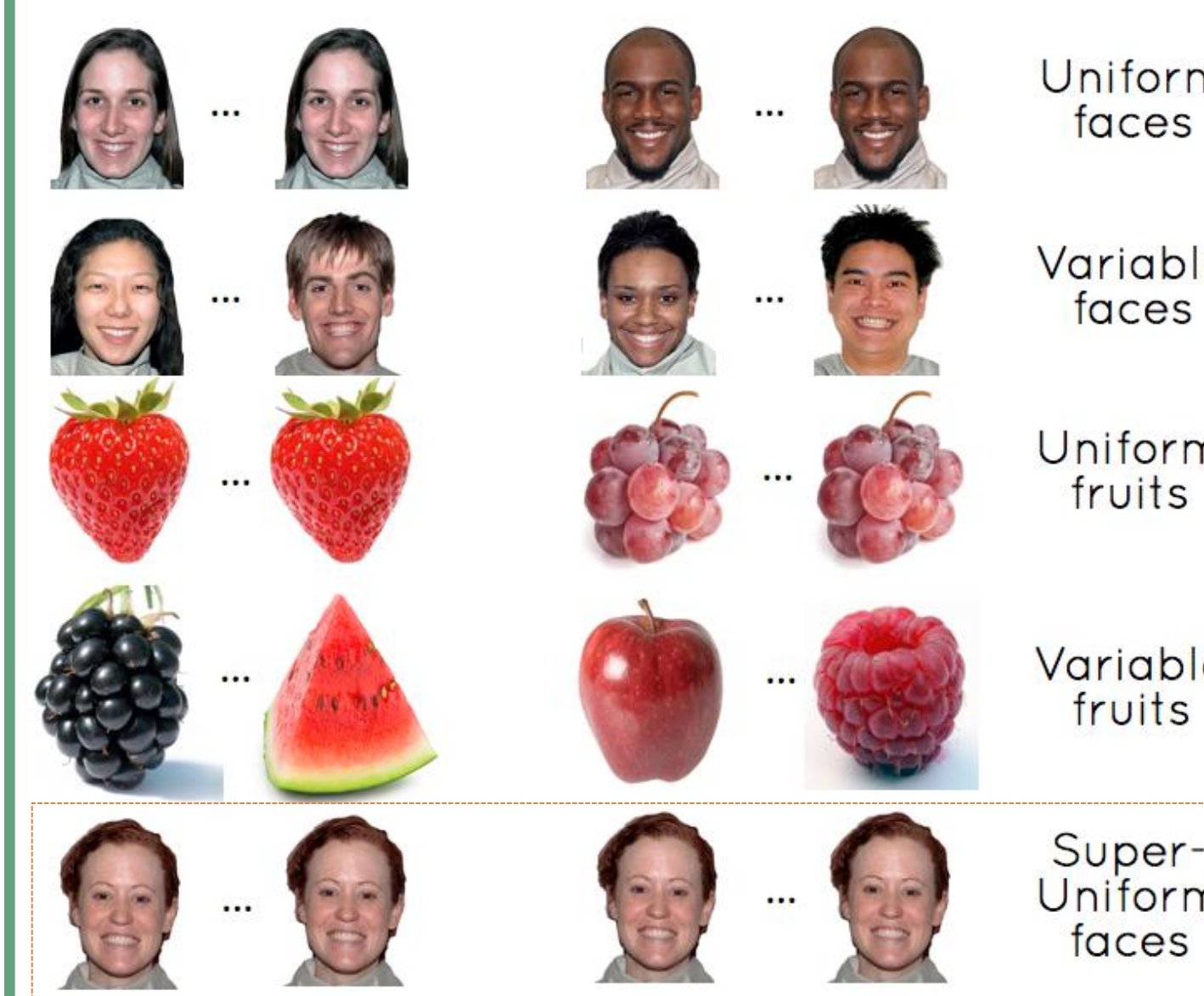source — 3cm — detectors — 4cm

Gervain et al., 2011

J. Adam Fenster

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

N = 15

Oxygenated Hemoglobin (mM mm)

Time (secs)

Stimulus Modality — Auditory / Visual

❖ 0.05 < p < 0.1   For all participants, M = ??, SD = ?? months

--- **Uniform**   ---- **Variable**

Experiment 2

N = 17

Oxygenated Hemoglobin (mM mm)

Stimulus Modality — Auditory / Visual

Experiment 3

Uniform faces
Variable faces
Uniform fruits
Variable fruits
Super-Uniform faces

N = 15

Oxygenated Hemoglobin (mM mm)

Stimulus Type — Faces / Fruit

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:

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…
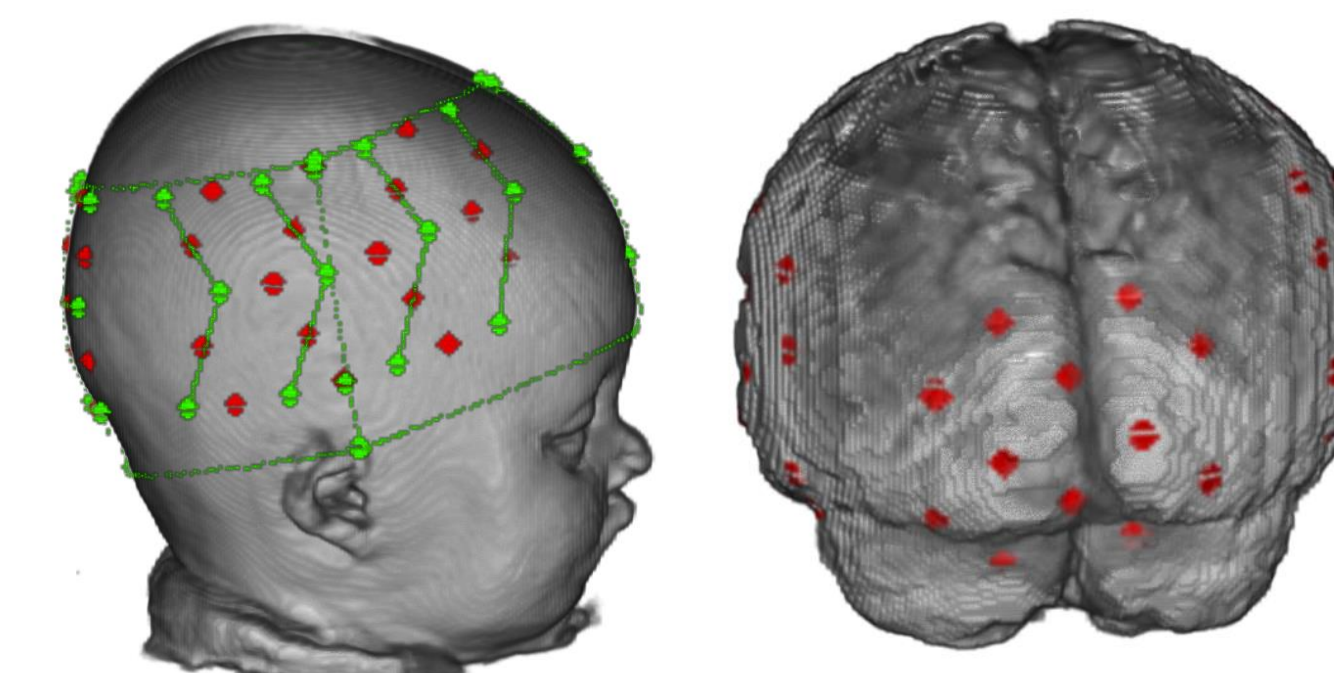
Coregistration with average infant MRI

Acknowledgements

Rochester Baby Lab