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### Introduction

• Infant attention and face perception develop dramatically in the period of 3 to 6 months.

• Electroencephalogram (EEG) and event-related potentials (ERPs) (e.g., the Nc, N290, P400) have been used as measurements of cortical responses in infant attention and face perception studies (e.g., Richards, 2003; de Haan et al., 2002; Halit et al., 2003, 2004). •Typical presentation sequences for infant ERP studies use interstimulus-intervals (ISI) of about 2 - 3 s; however, this presentation rate may be too long to sustain fixation and attention in young infants.

• Using shorter ISIs increasing presentation rate and complexity may facilitate infant sustained attention and engagement in an EEG/ERP study.

• Sustained attention plays an important role in gathering and processing information (e.g., Reynolds & Richards, 2005; Richards & Casey, 1990).

• The relationship between infant attention and face perception is unclear yet.

• In this study, we examined 1) the effect of shorter ISIs on infant EEG/ERP studies (behavioral and ECG measurements of attention and engagement); 2) infant face sensitive ERPs development from 3 to 6 months; 3) the effects of attention on infant face sensitive ERPs.

### **Methods**

### •Participants - The data were collected from infants at 3, 4.5 and 6 months (Total N=16). - 3 months (N=6) - 4.5 months (N=4) 6 months (N=6) •Stimuli •ISI types - Short: 400 – 600 ms - Medium: 600 -1000 ms Long (traditional): 1500 – 2000 ms •*Procedure:*

•ECG & EEG acquisition and analysis

- ECG recording provides HR information

- EGI High-density 128 channel net
- EEG data Filtered with 1 45 Hz
- Peak amplitude and Peak latency were analyzed
- Electrodes were grouped over occipito-temporal regions (e.g., T5, T6, O1, O2, Oz) based upon previous infant research.
- N290 time window (200 400 ms), P400 time window (400 – 600 ms).

## The Effects of Interstimulus Intervals on Infant Attention and Face Perception: An Event-related Potentials Study

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The short ISI condition resulted in more ambiguous face/toy N290 and P400 responses than longer ISI conditions for 3-month-olds.

#### Discussion

- . Behavioral results showed that using short ISI and medium ISI would facilitate infant EEG/ERP research by dramatically improving the number of trials presented during the study.
- 2. Psychophysiological results showed that infant were less attentive and engaged in EEG/ERP experiment as their age increased; medium ISI got infants be more engaged in the experiment. Therefore, medium (600 – 1000 ms) ISI might be recommended for Infant EEG/ERP research

2. **ERPs** results had followings main implications:

a) To our knowledge, this is first study showed larger P400 responses to faces than objects in infants. Thus, P400 should also be treated as a possible precursor to adult N170. Our N290 Results were consistent with previous research (e.g. de Haan et al. 2002; Halit et al., 2003, 2004).

b) This study showed clear N290 and P400 development for infants aged between 3 and 6 mos: peak amplitude increased while latency decreased as age.

c) Attention and face perception results indicated that face perception might be mandatory or automatic from early infants; however, it was not as mature as adults' because attention still had effect on face perception in some degree.

d) ERP results confirmed the feasibility of Medium ISI. Short ISI (e.g., 400-600 ms) may work for infants older than 6 months but not for 3 mos.

However, in 6-month-olds, both short and longer ISI conditions resulted in different ERP responses for face and toy.