



# Assessing Individual Differences and Age-Related Changes in Intersensory Processing Across Infancy: A New Method

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## BACKGROUND & MOTIVATION

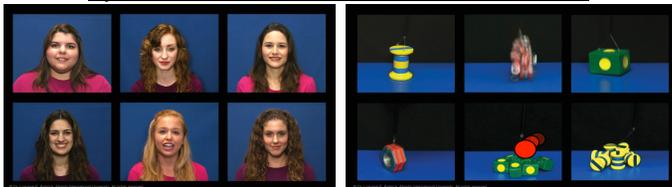
- Coordinating perceptual information across sensory modalities is foundational to cognitive, social, and language development (Bahrick & Lickliter, 2002, 2012)
- Intersensory redundancy: temporally synchronous stimulation across senses
  - Guides selective attention to redundant properties
  - Allows perception of unified multimodal events (e. g., sight and sound of one person speaking)
  - Promotes separation from unrelated, concurrent stimulation (e. g., other voices and moving faces)
- Typical methods for assessing intersensory processing use gross measures of looking time and few trials; lead to group-based inferences

## NEW METHOD:

### Intersensory Processing Efficiency Protocol (IPEP)

- Assessment of individual differences in intersensory processing (Bahrick et al, 2013)
- Intersensory processing efficiency reflected by speed and accuracy
- Nonverbal method, useable across the lifespan

### Dynamic Video Stimuli: Social and Nonsocial Events



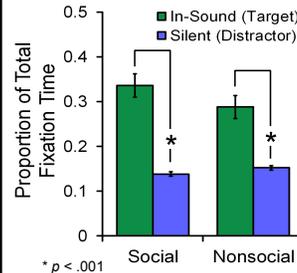
- 48 8 s trials: Social=women reciting stories, Nonsocial=objects banging
- One sound-synchronized target amidst 5 silent distractors
- Eye-tracked using Tobii X120 to derive total fixation time on target AOI when in-sound & frequency and speed to fixate target AOI

## PARTICIPANTS

- 37 infants tested cross-sectionally at 3, 6, 9 and 12 months of age
- Useable fixations:  $M = 52.6\%$  ( $SD = 17.9$ ) per infant

## RESULTS: INTERSENSORY MATCHING

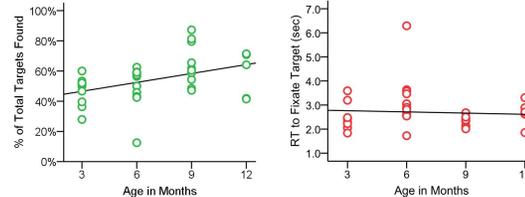
### Infants Attend to Sound-Synchronized Target in Social & Nonsocial Events



- Fixated event longer when in-sound target than when same event was silent distractor (accuracy-matching),  $M = 10.8\%$  difference ( $SD = 7.9$ ),  $t = 8.14$ ,  $p < .001$
- Fixation difference greater for social compared to nonsocial events,  $F = 6.26$ ,  $p = .018$

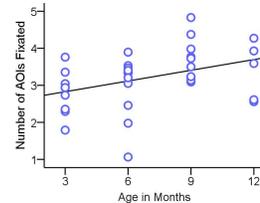
## RESULTS: AGE-RELATED CHANGES

### Older Infants Fixate Targets More Frequently, But Not Faster



- With increasing age, infants found targets more frequently (accuracy-selection),  $r = .41$ ,  $p = .012$
- No age-related change in reaction time to fixate target (speed),  $r = -.07$ ,  $ns$

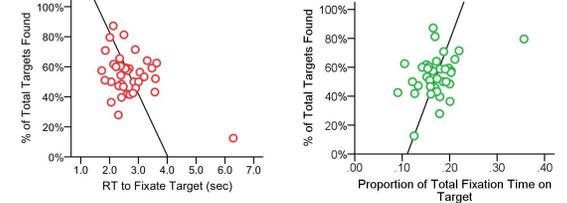
### Older Infants Look to More Events



- With increasing age, infants fixated more AOIs per trial,  $r = .39$ ,  $p = .017$
- Age-related changes in selecting target were due to more frequent attentional shifting between AOIs with age

## RESULTS: INDIVIDUAL DIFFERENCES

### Speed and Accuracy Were Interrelated



- Individual infants who found more targets (accuracy-selection) also located them more quickly (speed),  $r = -.47$ ,  $p = .004$ , and fixated them longer (accuracy-matching),  $r = .38$ ,  $p = .02$ —controlling for # of AOIs fixated or for age

## CONCLUSIONS

- Infants demonstrate intersensory matching in a task with:
  - Multiple concurrent distractors, simulating “noise” of natural environment
  - Continuous streams of social and of nonsocial multimodal stimulation, similar to real-world events
  - Brief exposure, requiring efficient visual foraging
- With increasing age, infants demonstrate better intersensory processing through more frequent attentional shifting
- Across age, infants demonstrate individual variability and interrelations among three intersensory skills (speed, accuracy of selection, and accuracy of matching)
- IPEP provides a new, fine-grained individual difference measure of intersensory processing, useable across lifespan
- Potential for characterizing developmental trajectories and relations with social, cognitive, and language skills

## REFERENCES

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