Development of Intersensory Perception of Social Events:
Longitudinal Trajectories across 6-24 Months of Age

Myriah E. McNew, James Torrence Todd, Elizabeth V. Edgar, & Lorraine E. Bahrick

Florida International University

Corresponding author:
mmcnew@fiu.edu

Introduction

Intersensory perception—coordinating stimulation across multiple sensory modalities— guides attention to unitary multimodal events and provides a foundation for language and social development (Bahrick & Lickliter, 2012). Intersensory perception develops rapidly across infancy. However, until recently, the development of intersensory skills has been characterized by group-level data (using intermodal preference or habituation methods). Thus, the relative competencies of individual children and developmental pathways to outcomes remain poorly understood.

The Intersensory Processing Efficiency Protocol (IPEP; Bahrick et al., 2018) was developed to address this gap (see Figure 1). It is a fine-grained, individual-difference measure of intersensory processing appropriate for nonverbal participants. The IPEP assesses the accuracy of detecting a sound-synchronous target event (e.g., a speaking face) among five distractor events. The present study assessed developmental trajectories of intersensory processing accuracy (locating and fixating the target event) using SEM-based latent growth curve modeling.

Figure 1. Static image depicting the dynamic social events shown in the IPEP

Methods

The IPEP was administered to 94 infants longitudinally at 6, 12, 18, and 24 months of age. In the IPEP, on each of the 24 trials, participants view a 2x3 grid of 6 dynamic visual events (women speaking), one in synchrony with its natural soundtrack (target event), and the others out of synchrony with the soundtrack. Eye tracking (Tobii X120) was used to derive two measures of intersensory processing accuracy: (1) intersensory matching (proportion of total looking time to the target event; PTLT) and (2) intersensory selection (proportion of trials on which the target event was fixated; PTTF).

Results

SEM-based latent growth curve modeling was used to assess longitudinal change across age for intersensory matching (Figure 2a) and intersensory selection (Figure 2b). Both models exhibited good model fit, indicating hypothesized growth models accurately represent the observed data (see Table 1 for model fit indices). Both measures of accuracy exhibited significant linear growth across age (Figure 3). Estimated slopes and intercepts are presented in Table 1. Intersensory matching increases from below chance levels at 6 months to greater than chance levels by 24 months. In addition, children find the target event (intersensory selection) on less than half of the trials (45%) at 6 months but find the target on nearly 60% of trials by 24 months.

Table 1. Intercept and slope coefficients, and model-fit statistics for growth curve models of intersensory matcing (PTLT) and accuracy

	Matching (PTLT)	Selection (PTTF)
Intercept	0.510***	0.450***
Linear Slope	-0.020	0.042***
Quadratic Slope	0.009*	--
Model chi-square[1]	4.07 (p=.131)	4.25 (p=.514)
SRMR[2]	0.072	0.098
RMSEA[3]	0.102	0.000

Note: *p<.05, **p<.01, ***p<.001.
[1]Model chi-square is a measure of the degree of misfit between observed and expected covariance matrices (small, non-significant values indicate good model fit).
[2]SRMR is the standardized root mean square residual (< .08 indicates good model fit).
[3]RMSEA is the root mean square error of approximation (< .06 indicates good model

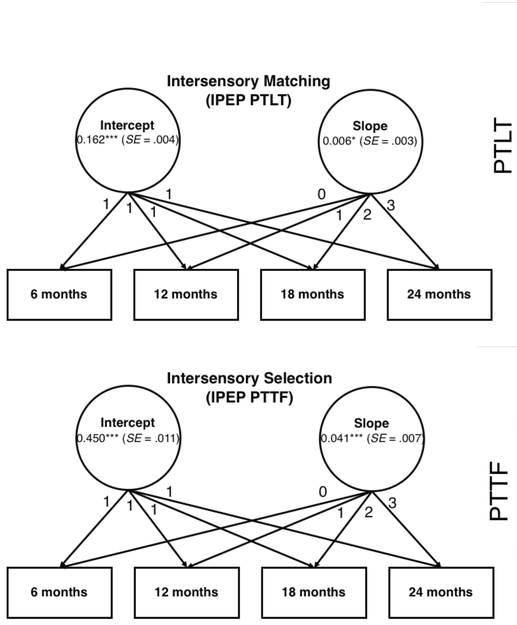

Figure 2. SEM latent growth models for PTLT (top) and PTTF (bottom). Intercept and slope estimates are provided in circles. Standard errors are in in parentheses. *Note*: *p<.05, ***p<.001

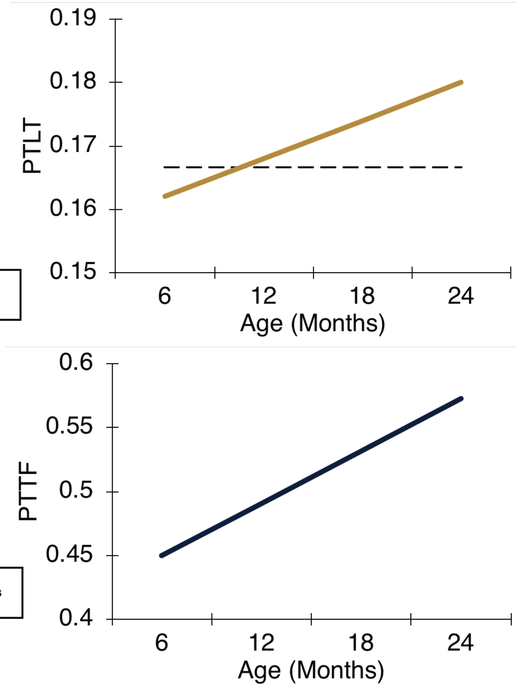

Figure 3. Latent growth curves for PTLT (top) and PTTF (bottom). The dotted line indicates chance looking to the target. Both variables exhibited significant linear growth across age.

Discussion

Findings provide some of the first evidence of longitudinal growth in intersensory processing skills across infancy. Results demonstrate increasing accuracy of intersensory processing between 6 and 24 months of age, with infants finding the matching faces and voices on more trials and spending a greater amount of time fixating the matching faces and voices across age. Future research will use individual trajectories to predict children's social and language outcomes.

References

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