



Intersensory Matching to Social Events at 1 Year and Its Developmental Growth Predict Receptive Vocabulary at 18 Months

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BACKGROUND & MOTIVATION

Detecting intersensory redundancy—synchronized stimulation across the senses—fosters a unitized perception of multimodal events (e.g., the sights and sounds of a speaking person). It also forms a foundation for object-label mapping (synchronous object labelling and gesturing, which is highly salient to infants) and thus is a crucial building block for language development (Bahrack & Lickliter, 2012). Documenting how the development of intersensory matching supports the development of language requires indexing fine-grained individual differences in intersensory matching within a longitudinal approach.

The Intersensory Processing Efficiency Protocol (IPEP; Bahrack, Soska, & Todd, in press) addresses this need by assessing individual differences in the speed and accuracy of intersensory processing. Participants are shown six dynamic visual events. Only one is acoustically synchronized with an accompanying soundtrack, emulating the task of localizing an audio-visual event within a noisy environment.

Previous research found developmental relations between language-learning skills (receptive language on the Mullen Scales of Early Learning) at 6 months and growth in intersensory matching on the IPEP from 6-12 months (Soska, Todd, & Bahrack, 2016). The present study examines subsequent development in intersensory matching (12-18 months) and its relation to 18-month receptive vocabulary (using the MacArthur Bates Communicative Development Inventories, MCDI).

METHOD

Intersensory Matching:

Infants ($N=20$) from a larger longitudinal study received the IPEP to assess intersensory matching. In the IPEP, infants viewed 48 8-s trials of a 2x3 grid (Figure 1) of dynamic social (women speaking; 24 trials) and nonsocial events (objects striking a surface; 24 trials). On each trial, a natural soundtrack was synchronous with one target event and asynchronous with five distractor events. Fixations were recorded using a Tobii X120 eye-tracker (useable data $M=55.8\%$). Intersensory matching was scored as the proportion of total looking time (PTLT) to the target event averaged across trials.

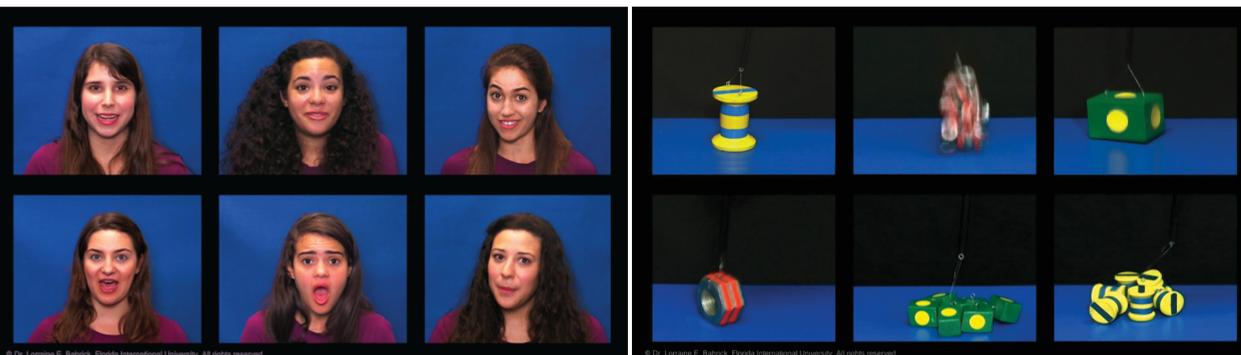


Figure 1. Static images depicting the dynamic social (left) and nonsocial (right) events shown to infants in the IPEP.

Receptive Vocabulary:

Parents also completed the MCDI at 12 and 18 months. Receptive vocabulary was indexed as number of words understood.

RESULTS

Intersensory matching (PTLT) from 12-18 months increased from $M=.169$ to $.180$ for social events and from $M=.166$ to $.185$ for nonsocial events. Receptive vocabulary increased from $M=84.0$ to 206.8 words understood from 12-18 months.

We assessed the following three predictors of 18-month vocabulary size: vocabulary growth from 12-18 months, 12-month intersensory matching, and intersensory matching growth from 12-18 months. Vocabulary growth from 12-18 months, as expected, predicted 18-month vocabulary (Table 1; Model 1, $p<.001$). Intersensory matching (PTLT) at 12 months and 12-18-month PTLT growth each independently and significantly predicted 18-month vocabulary (Model 2, $ps<.01$). High PTLT at 12-months and larger 12-18-month PTLT growth were associated with larger 18-month vocabulary (predicting a sizeable 30% additional variance in 18-month vocabulary), even after controlling for 12-18 month vocabulary growth. In contrast, intersensory matching to nonsocial events (at 12 months and 12-18 month growth) showed no relations to receptive vocabulary, $ps>.8$.

	Model 1	Model 2
Vocabulary Growth (12-18mos)	$\beta=.64^{***}$	$\beta=.86^{***}$
PTLT Social (12mos)	—	$\beta=.75^{**}$
PTLT Social Growth (12-18mos)	—	$\beta=.74^{**}$
R^2 change	—	.30 ^{**}
Total R^2	.40 ^{**}	.71 ^{***}

Note: ** $p<.01$, *** $p<.001$. Values represent standardized betas.

Table 1. Hierarchical analyses of change showing receptive vocabulary at 18 months 1) is predicted by the baseline amount of growth in receptive vocabulary from 12-18 months (Model 1), and 2) is predicted by PTLT at 12mos and growth in PTLT to social events from 12-18 months (Model 2).

CONCLUSIONS

Intersensory matching to social but not nonsocial events at 12 months and its development across 12-18 months predicted receptive vocabulary six months later. Both 12-month social intersensory skill and subsequent growth (from 12-18 months) were unique predictors, above baseline vocabulary growth. This research highlights the importance of a longitudinal approach to characterizing the developmental relations between early intersensory processing skills and language development. These findings also reveal that fine-grained measures of individual differences in intersensory processing (assessed by the IPEP) predict language acquisition.

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