Speed, Accuracy, and Duration of Multisensory Attention to Social Events at 6 Months Predicts Social Competence at 18 Months

James Torrence Todd, Myriah E. McNew, Elizabeth V. Edgar, Janelle Miller,
Nicole E. Barroso, Lorraine E. Bahrick, and Daniel M. Bagner

Introduction

We explored infant multisensory attention skills to social events—matching synchronous faces and voices of women speaking, maintaining and shifting attention to a speaker—as a basis for the development of social competence in toddlers. Early prediction of social competence is important for identifying social-emotional problems and implementing early childhood interventions. Selective attention to social events and detecting audiovisual synchrony (e.g., uniting the face and voice of a speaker; intersensory processing) are critical foundations for typical social development (Bahrick, 2010; Feldman, 2007). We developed the Multisensory Attention Assessment Protocol (MAAP; Bahrick et al., accepted for publication) to assess individual differences in attention to audiovisual social and nonsocial events in infants and toddlers. In the present study, we assessed whether measures of multisensory attention to social events on the MAAP at 6 months would predict standardized social competence domain scores on the Infant-Toddler Social Emotional Assessment (ITSEA), a parent report of social-emotional behaviors (Carter & Briggs-Gowan, 2006), at 18 months. We predicted that more flexible and efficient processing and attention to synchronous faces and voices at 6 months would predict higher social competence scores at 18 months.

Methods

Thirty-seven infants were administered the MAAP at 6 months, and caregivers completed the ITSEA when infants were 18 months. The MAAP assesses three multisensory attention skills: duration of attention maintenance, speed of attention shifting, and intersensory processing accuracy (detecting temporal synchrony uniting faces and voices). Each trial begins with a silent 3 s central visual event (animated shapes) immediately followed by two lateral events (12 s) of women speaking, one synchronous with her natural soundtrack (see Figure 1). On half of the trials, the central event remains on throughout the lateral events (high competition) and on the other half of the trials, it is turned off (low competition). For this study, we focused on performance on low competition trials, as high competition trials appeared too difficult at 6 months. We calculated measures of attention maintenance (proportion of available time looking to lateral events), shift speed (reaction time to look from central to lateral events), and intersensory processing (proportion of total looking time to audiovisual synchrony, or accuracy of intersensory matching).
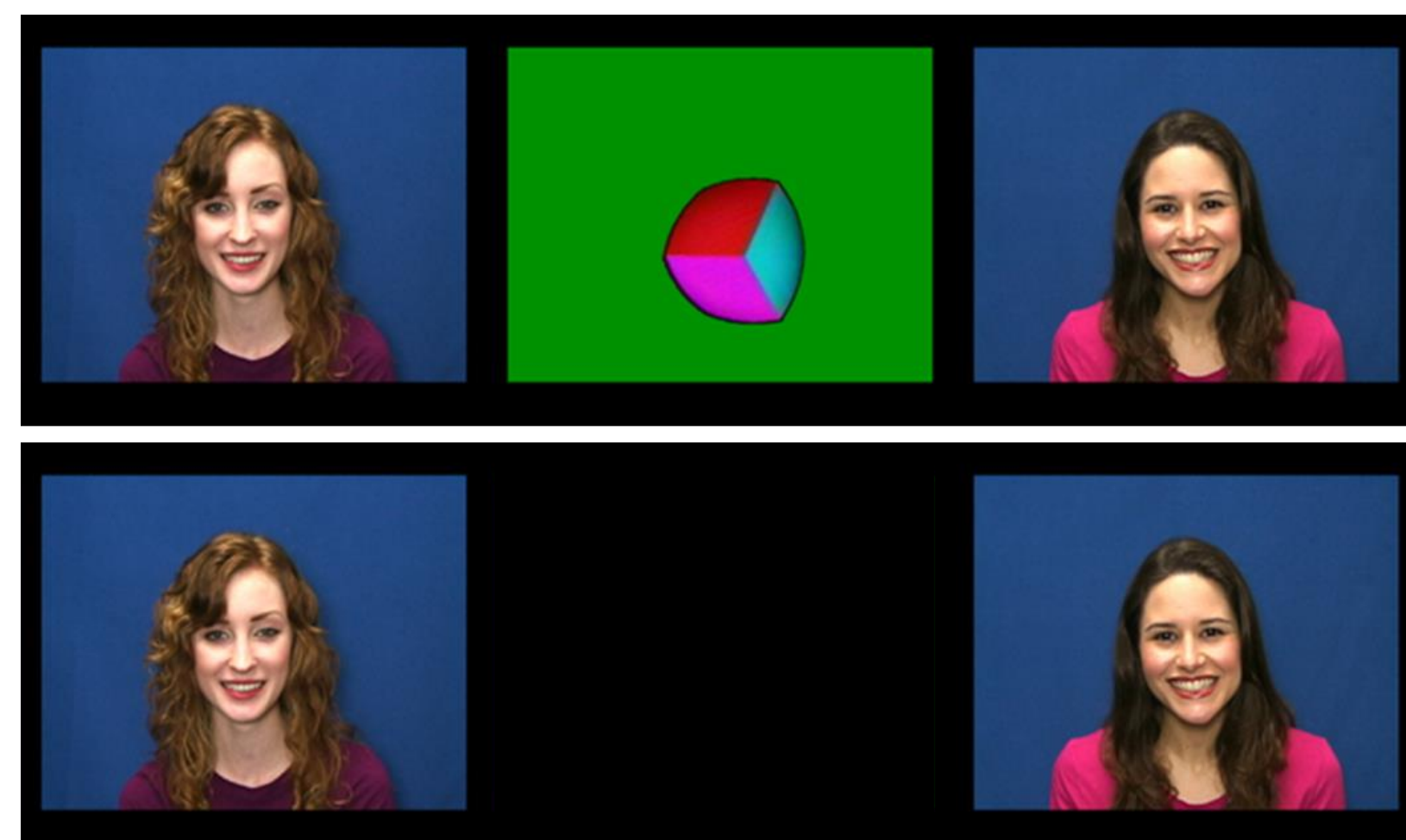

Figure 1. Static images depicting the social events on the MAAP on high competition (top) and low competition trials (bottom).

Table 1

Results from regression analyses: 18-month ITSEA social competence domain scores regressed on to 6-month MAAP measures (duration of attention, intersensory accuracy, and shift speed).

6-month Predictors	18-month Social Competence			
	b	*SE*	*b**	*p*
Duration	.50	.27	.25	.08
Accuracy	.76	.32	.33	.025
Speed	-1.02	.30	-.49	.002

Note: *b*: unstandardized regression coefficient, *SE* = standard error of the coefficient, *b**: standardized regression coefficient, *p*: p value.
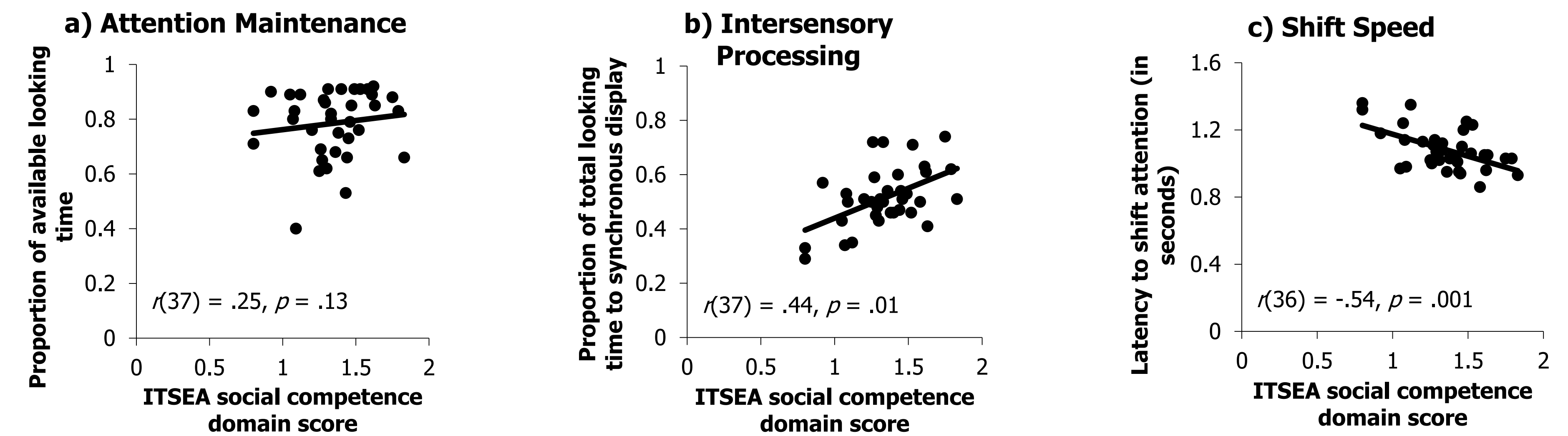

Figure 2. Scatterplots depicting relations between 18-month ITSEA social competence domain scores and 6-month MAAP: a) duration of attention maintenance, b) intersensory accuracy (matching), and c) shift speed to social events low competition trials. Note. *r*: Pearson correlation coefficient, *p*: *p* value.

Results

Correlations between 18-month social competence domain scores and the three 6-month MAAP measures ranged from .25-.54 (see Figure 2 for scatterplots). To assess whether MAAP measures would predict social competence, we regressed the 18-month social competence scores on to 6-month MAAP attention maintenance, speed, and intersensory processing scores. Inspection of regression coefficients (see Table 1) indicated that faster shift speeds to social events and greater intersensory processing (matching synchronous faces and voices) at 6 months significantly predicted higher social competence scores at 18 months ($ps < .025$; longer attention maintenance to speaking faces marginally predicted higher social competence; $p = .08$). Results indicated that the MAAP measures together accounted for nearly half of the variance in social competence scores, $R^2 = .47$, $F(3, 32) = 9.42$, $p < .001$.

Conclusions

Findings suggest that multisensory attention skills in infancy provide a foundation for social competence in toddlers. Basic indices of infant multisensory attention to faces and voices of women speaking predict standardized parent-report measures of toddler social competence. They indicate that early measures of individual differences in social attention on the MAAP can be used to predict individual differences in later social competence. This may aid in identifying infants who are at-risk for social-emotional problems and could benefit the most from early behavioral interventions. Training attention to social events may thus have down-stream effects for improving later social-emotional competence.

References

Bahrick, L. E., Todd, J. T., & Soska, K. C. (accepted for publication). The Multisensory Attention Assessment Protocol (MAAP): Characterizing individual differences in multisensory attention skills in infants and children and relations with language and cognition. *Developmental Psychology*.

Bahrick, L. E. (2010). Intermodal perception and selective attention to intersensory redundancy: Implications for typical social development and autism. In J. G. Bremner & T. D. Wachs (Eds.), *The Wiley-Blackwell Handbook of Infant Development: Vol. 1. Basic Research* (2nd ed, pp. 120–165). Malden, MA: Wiley-Blackwell. doi:10.1002/9781444327564.ch4

Feldman, R. (2007). Parent-infant synchrony: Biological foundations and developmental outcomes. *Current Directions in Psychological Science*, 16, 340–345. doi:10.1111/j.1467-8721.2007.00532.x

Carter, A. S., & Briggs-Gowan, M. (2006). *Infant-Toddler Social Emotional Assessment*. San Antonio, TX: Pearson.