The Emergence of Social Attention: Maintenance, Disengagement, and Orienting of Attention to Social and Nonsocial Events from 3 to 6 months

James Torrence Todd, Kasey C. Soska, Amanda Costales, & Lorraine E. Bahrick

FLORIDA INTERNATIONAL UNIVERSITY

Introduction

In typical development, maintaining attention and efficiently disengaging attention to look to social events (social orienting) promotes perceptual, cognitive, and language development (Bahrick and Todd, 2012; Bahrick & Lickliter, 2012, 2014). In contrast, children with autism show impaired maintenance and disengagement of attention to social events (Dawson et al., 2004). Characterizing the trajectory of social attention, particularly in infancy, is critical to early identification of developmental disorders of attention, including autism. Cross-sectional data indicate that a preference for social events (longer looking and fewer looks away) emerges gradually between 2 to 8 months of age, and is evident as early as 3 months (Bahrick et al., submitted). However, longitudinal data assessing individual differences in multiple attention skills is needed to more accurately describe the trajectory of social attention across infancy.

Using our new nonverbal individual difference measure, the Multisensory Attention Assessment Protocol (MAAP; Bahrick & Todd, submitted), it is possible to assess individual differences in multiple indices of attention, including attention maintenance, disengagement, and orienting, to dynamic social and nonsocial events across the lifespan. Findings from the MAAP have demonstrated an increase in maintenance of attention to social (but not nonsocial) events between 2 to 6 years of age, but little to no change in speed of disengagement or orienting. Here we assessed the early development of social and nonsocial attention by presenting the MAAP to infants at 3 and 6 months of age in a longitudinal design. In particular, we sought to determine whether greater attention maintenance and faster disengagement latencies would emerge between 3 and 6 months, and whether this would be true for social and nonsocial events.

Methods

Thirty-eight infants were tested at 3 months (*M* = 90.96 days, *SD* = 5.17), and 6 months of age (*M* = 181.30, *SD* = 4.56; data collection ongoing). In the MAAP, trials of a 3 s central visual event (animated shapes) were immediately followed by two side-by-side lateral events (12 s), one in synchrony with its natural soundtrack (Figure 1). Lateral events were either social (two women speaking) or nonsocial (two objects striking a surface). On half of the trials, the central stimulus remained on during the lateral events (overlap trials providing competing visual stimulation), while on the other half the central stimulus was turned off (no overlap trials). Measures of attention maintenance (duration; proportion of available time looking to lateral events), disengagement (speed; latency to shift attention to lateral events on overlap trials), and orienting (speed; latency to shift attention to lateral events on no-overlap trials) were calculated.

Figure 1. Static images of the social and nonsocial events.

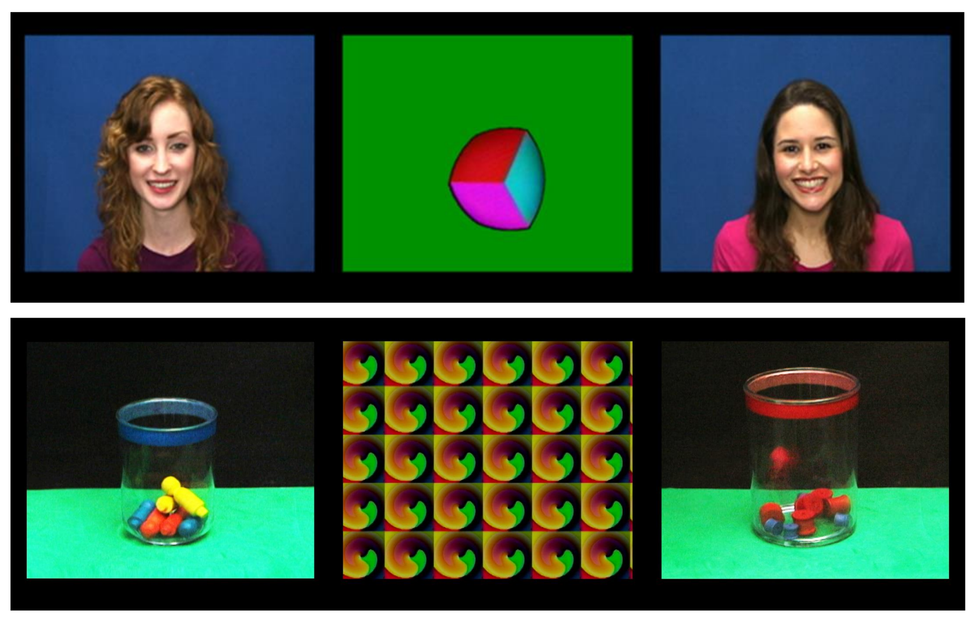


Figure 2. Mean proportion of available looking time (PALT) and latency to shift attention (RT) as a function of age (3, 6 months) and event type (overall, social, nonsocial). Error bars depict standard error of the mean.

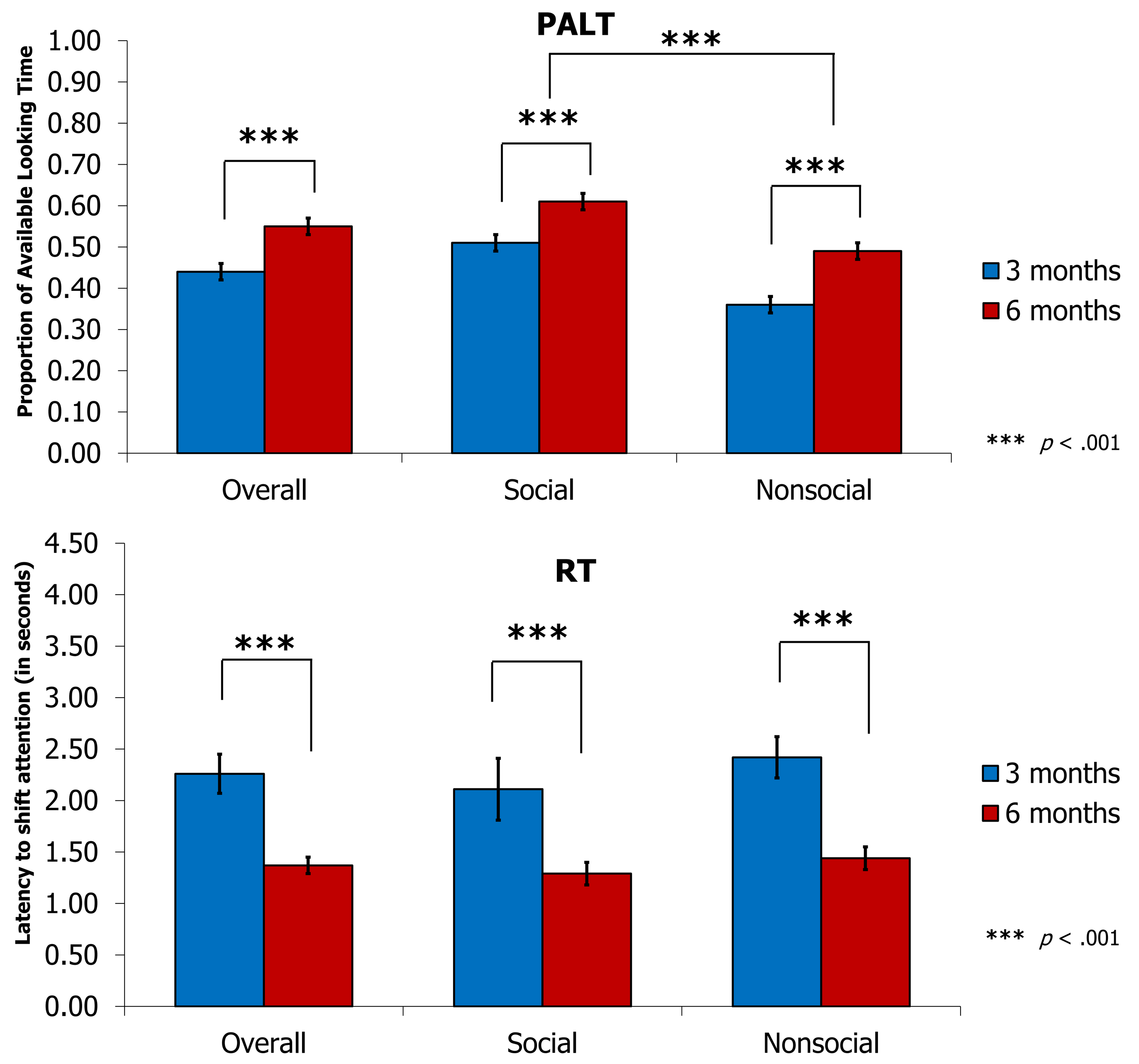
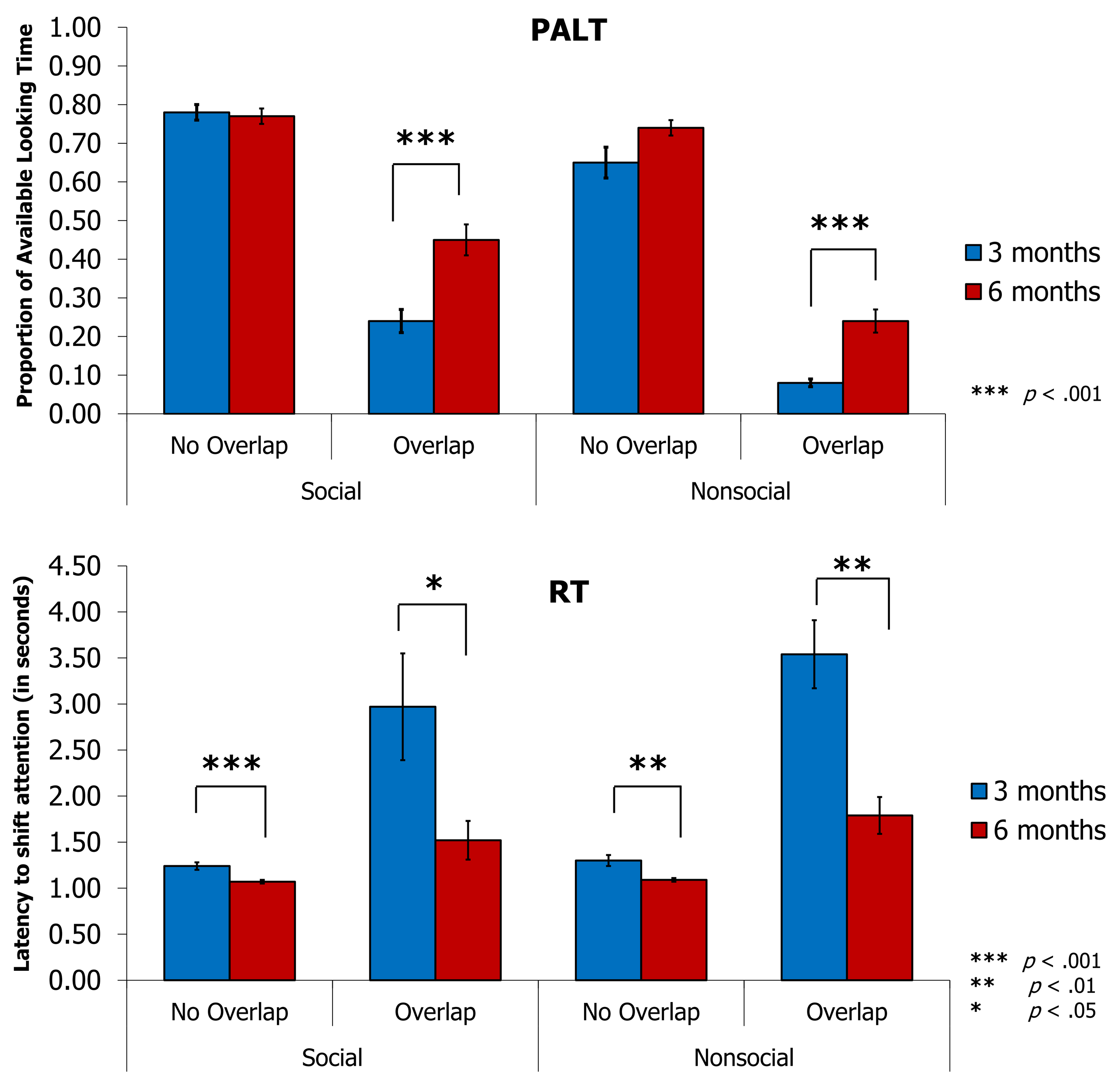


Figure 3. Means for the proportion of available looking time (PALT) and latency to shift attention (RT) as a function of age (3, 6 months), event type (overall, social, nonsocial), and trial type (no overlap, overlap). Error bars depict standard error of the mean.



Results

Overall, infants showed longer maintenance and faster latencies to shift attention to the lateral events at 6 than at 3 months (see Figure 2, *p*s < .001). Also, infants at both ages showed longer maintenance to social than nonsocial events at both ages (Figure 2: PALT, *p*s < .001). No differences in speed of disengagement or orienting to social vs. nonsocial events was evident (Figure 2: RT, *p*s = .24).

These main effects were qualified by interactions. Longer attention maintenance at 6 than at 3 months for both social and nonsocial events was observed for trials requiring disengagement (overlap trials; Figure 3: PALT, *p*s < .001), but not for trials requiring no disengagement (no overlap trials). Although faster latencies to shift attention to social and nonsocial events were evident at 6 than at 3 months (*p*s < .03), the improvement with age was greater for trials requiring disengagement (overlap trials; Figure 3: RT).

Finally, infants at both ages showed shorter attention maintenance to the lateral events on trials requiring disengagement (overlap trials) than on those that did not (no overlap trials; Figure 3: PALT, *p*s < .001). Infants at both ages also showed longer latencies to disengage than orient attention (Figure 3: RT, *p*s < .001).

Conclusions

These findings demonstrate overall improvements in basic indices of attention across early development, including longer attention maintenance (duration) and faster shifting of attention (speed) at 6 months than at 3 months. Infants also showed an overall "social preference", with longer maintenance to social than nonsocial events at both ages. Further, at both ages, there was evidence of the attentional "cost" of competing visual stimulation from the central event. Infants showed reduced attention maintenance and slower latencies to shift attention on trials with competing stimulation. Further, at both ages, attention maintenance was high on trials with no competing visual stimulation, and thus improvements in maintenance were evident only in trials with competing stimulation from the central event. Together, these findings demonstrate the MAAP to be a simple but powerful tool for assessing multiple attention skills in early infancy. Ongoing research will extend these findings to older ages and characterize individual differences in the trajectories of social vs. nonsocial attention, with implications for early identification of atypical attention trajectories in disorders such as autism.

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