

The role of the parent in infant turn following and anticipation

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Conversations between people rely on the exchange of both verbal (e.g., speech, non-speech vocalizations) and nonverbal (e.g., facial expressions, gestures, movements of the body) information. Successful conversation requires one to be able to follow the current speaker (i.e., identify an ongoing speaking turn) and anticipate who will speak next and when. Before children speak, they already follow turns in conversation (i.e., make a prediction about an upcoming turn and act based on that prediction). Much of the previous research examining eye movements during infant turn-taking behavior has been done using prerecorded conversations between strangers (or hand puppets voiced by strangers) (e.g., Augusti et al., 2010; Casillas & Frank, 2017; Keitel et al., 2013; Keitel & Daum, 2015; Lammertink et al., 2015; von Hofsten et al., 2009), and the focus has often been on verbal behaviors. The conversations infants observe daily, however, typically involve their parent(s), and involve a variety of nonverbal behaviors. In fact, research shows that infants already display a high proportion of latched turns (i.e., vocalizations that occur after a vocalization of the mother without overlap and within a few milliseconds of the end of the vocalization) when interacting with their mother, and mothers produce longer and more frequent successive vocalizations when interacting with younger vs. older infants (Gratier et al., 2015). In the present study, we investigated infants' abilities to follow and anticipate turns in conversation and whether and how they relate to the head orientation of their parent.

Forty-one parent-infant (aged 6-18 months) dyads interacted in a novel live dual eye-tracking setup that allowed us to simultaneously record the gaze of both parent and infant without any screens in between. The parents performed a staged conversation between two hand puppets under two conditions: (1) while always looking at the speaking puppet and (2) while always looking at their child. To examine infant turn following, we computed relative total dwell time on three major areas of interest over the two conditions: the speaking puppet, the silent puppet, and the face of the parent. To examine turn following and anticipation in more detail, we further computed relative total dwell time at the puppets in the four seconds before and after turns started in the conversations.

Overall, infants looked more at the speaking puppet than at the silent puppet, and this was slightly more pronounced when the parent also looked at the speaking puppet. Furthermore, infants looked at the face of their parent less than what would be expected by random viewing behavior for both conditions. Taken together, these results indicate that infants follow turns in conversation and can do so even when contradictory cues (i.e., the origin of speech being the mouth of their parent instead of the mouth of the speaking puppet) are present. When examining gaze to the puppets during turns (Figure 1), we found infants to show looks toward the puppet for which the turn was starting as early as 1.38 seconds before turn start (indicated by the minimum of the solid line for both conditions in Figure 1). Moreover, when the parent looked at the speaking puppet, infants looked toward the puppet for which the turn was starting earlier and looked at it more following turn start than when the parent looked at the infant (as indicated by the crossing point and peak of the solid line being earlier and the peak being higher in Figure 1). Finally, older infants looked more at the puppet for which the turn had started than younger infants, but only when the parent also looked at the speaking puppet, suggesting that older infants were able to utilize their parent's head orientation better than younger infants. We conclude that infants between 6-18 months already follow and anticipate turns in conversation, that infants use the orientation of their parent's head as a source of visual information for following and anticipating turns, and that the extent of this likely increases from early to late infancy. Thus, parents' nonverbal behaviors may help infants navigate social interactions.

Index Terms: turn taking, nonverbal behavior, parent-infant interaction

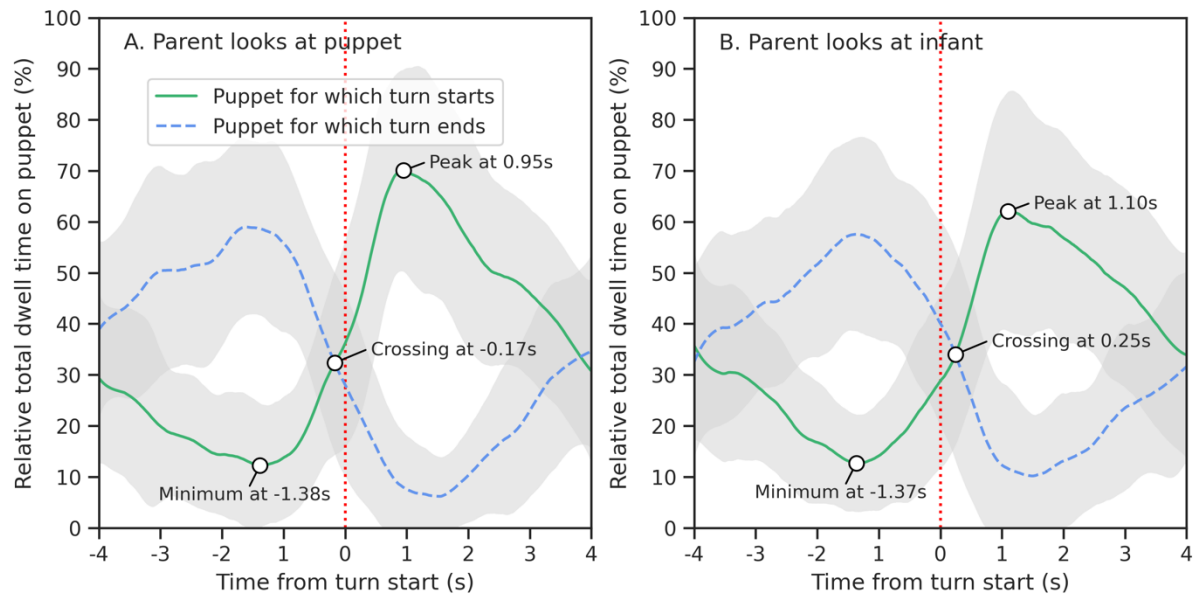


Figure 1: Relative total dwell time on the two puppets during turns for both conditions. Panel A depicts relative total dwell time toward the two puppets starting four seconds before and ending four seconds after turns started averaged across all infants for the parent-looks-at-puppet condition. Panel B illustrates the same for the parent-looks-at-infant condition. Turn start is indicated by the dotted red line at time zero. The solid green line represents relative total dwell time toward the puppet for which the speaking turn was starting, while the dashed blue line represents the same for the puppet for which the speaking turn was ending. The white circles indicate the timing of the minimum, crossing point, and peak of the solid green line. The light gray color represents the standard deviation of the signal.

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