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Attention engagement in early infancy

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ABSTRACT

We report a longitudinal study investigating developmental changes in the structure of attention engagement during early infancy. Forty-three infants were observed monthly from 2 to 4 months. Attention engagement was assessed from play interactions with parents, using a coding system developed by Bakeman and Adamson (1984). The results indicated a developmental transition in attention engagement at 3 months: after this age infants engaged for longer periods and in a wider variety of states. Most infants displayed person engagement at 2 months, passive joint engagement at 3 months, and object engagement at 4 months. To address whether emerging abilities of attention engagement allow infants to follow the attention of social partners, we compared attention engagement to performance on an experimental measure of attention control (reported by Perra & Gattis, 2010). Analyses revealed a positive relation between passive joint engagement and checking back, suggesting that changes in passive joint engagement reflect the development in attention control.

1. Introduction

Visual attention changes significantly across the first year of life. The earliest of several changes is an increase in alertness, and as a result, an increase in attention engagement (Colombo, 2001; Ruff & Rothbart, 2001). Attention engagement allows individuals to process information from the environment and is a significant topic in developmental psychology because it is thought to support infant attention to the visual and mental foci of other people, a process known as joint attention (Bakeman & Adamson, 1984; Oakes & Tellinghuisen, 1994; Richards, 1998; Ruff & Rothbart, 2001). Joint attention in turn supports many aspects of cognitive development, including language and other forms of communication. Together these results suggest that attention engagement may play a pivotal role in early cognitive development (Carpenter, Nagell, & Tomasello, 1998; Morales et al., 2000; Mundy et al., 2007).

In a landmark study, Bakeman and Adamson (1984) examined infants' ability to coordinate attention between a social partner and a shared object of interest, such as a toy. They observed infants interacting with their mothers and with peers on four occasions at roughly equal intervals longitudinally from 6 to 18 months. They defined six states of engagement – unengaged, onlooking, person engagement, object engagement, passive joint engagement, and coordinated joint engagement – and identified the ages and conditions in which infants demonstrated each of those states. In order to achieve coordinated joint engagement, an infant must be capable not only of engaging with people and with objects, but critically must also be capable of coordinating attention between the two. In both passive joint engagement and coordinated joint engagement, the infant and social partner focus attention on the same object. In coordinated joint engagement, however, infants move

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beyond passive joint engagement by also directing attention to the social partner, switching back and forth between these two foci.

Bakeman and Adamson reported that from 6 to 18 months, infants decreased in the amount of time spent in person engagement, and increased in the amount of time spent in coordinated joint engagement. In addition, infants demonstrated both passive joint engagement and coordinated joint engagement more frequently with skilled social partners (their mothers) compared to unskilled social partners (their peers). Although most infants demonstrated both passive joint engagement and coordinated joint engagement at each of the observed ages, the average time spent in coordinated joint engagement was minimal (less than 10%) until 15 months. Importantly, subsequent longitudinal studies have documented relations between engagement states and later cognitive and communicative abilities, much like the role of joint attention (e.g., Adamson, Bakeman, & Deckner, 2004; Nelson, Adamson, & Bakeman, 2008; Trautman & Rollins, 2006).

In the years since Bakeman and Adamson's study, observational and experimental studies of infant attention have identified an important transition in infant attention around the second to third month of life. This transition includes an increase in alertness, a decrease in obligatory attention or "sticky fixation," and a corresponding increase in disengagement, a process that allows infants to terminate attention to one specific stimulus and explore more aspects of the visual environment (Butcher, Kalverboer, & Geuze, 2000; Colombo, 2001; Hunnius & Geuze, 2004; Hunnius, Geuze, & van Geert, 2006; Lavelli & Fogel, 2005; Ruff & Rothbart, 2001). As a result of these changes, infants are increasingly able to control their attention and explore their environments visually. Observational and experimental evidence also suggests that infants are able to utilize their expanding attentional abilities to monitor and even follow the attention states of others in some, specifically constrained situations that have been called precursors to joint attention or social attention (Amano, Kezuka, & Yamamoto, 2004; Legerstee, Markova, & Fisher, 2007; Striano, Stahl, Cleveland, & Hoehl, 2007; Tremblay & Rovira, 2007). For example, as early as 6 weeks, infants show some ability to discriminate when an adult does or does not divide attention between an object and the infant (Striano et al., 2007).

At around 3 months, infants begin to follow the attention of social partners (D'Entremont, Hains, & Muir, 1997; Gredeback, Fikke, & Melinder, 2010; Perra & Gattis, 2010). Perra and Gattis (2010) tested 1- to 4-month-olds longitudinally on a task measuring two aspects of social attention, proximal attention following and checking back. An experimenter faced the infant and held two puppets, one near each of his shoulders, and thus within the infant's visual field. The experimenter engaged the infant's attention, and slowly turned his head toward one of the two puppets, and continued looking at the puppet for 10 seconds, all whilst speaking softly in infant-directed speech to maintain the interaction. Perra and Gattis considered two dependent measures of social attention. *Proximal attention following* referred to infant looks to the same puppet as the experimenter. *Checking back* referred to infant gaze alternations between the experimenter and the puppet at which the experimenter was looking, and was only considered when proximal attention following had been demonstrated. The longitudinal analyses revealed that at the group level, proximal attention following and checking back both emerged at 3 months. Perra and Gattis proposed that the development of proximal attention following and checking back at this age is a consequence of changes in attention disengagement that allow infants to disengage from one stimulus, whether face or target, and shift it to another.

Collectively, the findings on attention engagement and attention control thus suggest that infants are able to disengage and shift attention, as well as follow the attention of a social partner, by 3 months. We were interested in whether infants are therefore also capable of joint attention engagement at this age. Bakeman and Adamson's study first examined attention engagement at 6 months. From 6 to 18 months, coordinated joint engagement increased, but passive joint engagement remained stable – infants spent approximately one-fifth of their time in passive joint engagement, suggesting that the latter ability was not changing during the ages in their study. We hypothesised that passive joint engagement should emerge around 3 months, the same age at which previous studies have demonstrated an increase in attention control and attention following (e.g., Butcher et al., 2000; Perra & Gattis, 2010).

We conducted a longitudinal study investigating how attention engagement changes from 2 to 4 months, and whether those changes are related to the infant's developing ability to follow the attention of a social partner. Infants were observed in a naturalistic play situation, and attention engagement was coded using Bakeman and Adamson's engagement states. Because a subset of the infants had also participated in a measure of proximal attention following and checking back (reported in Perra & Gattis, 2010), we were able to compare engagement states with Perra and Gattis' measure of attention control. We reasoned that if passive joint engagement is a consequence of the emerging ability to control attention, passive joint engagement with caregivers should be related to the control of social attention. Because checking back required a greater degree of attention control than proximal attention following, we focused on the relation between it and passive joint engagement. We hypothesised that passive joint engagement in play situations would be positively associated with checking back in the experimental measure of attention control.

2. Method

2.1. Participants

Forty-three infants (16 girls) were recruited through parenting classes. Infants were from a city in the UK. Seventeen additional infants participated but were excluded from analyses due to failure to attend a session or failure to complete a session due to drowsiness or crying. The study received approval from the Department of Psychology Research Ethics