Early Markers of Language and Attention: Mutual Contributions and the Impact of Parent–Infant Interactions

Maria A. Gartstein · Jennifer Crawford · Christopher D. Robertson

Abstract This study was conducted to explore the contribution of attentional skills to early language, and the influence of early language markers on the development of attention, simultaneously examining the impact of parent–child interaction factors (reciprocity/synchrony and sensitivity/responsivity), including their potential moderator effects. All children were between 6 months and 12 months of age, and about equally distributed between genders (33 males, 32 females), with caregivers’ ages ranging from 28 years to 45 years ($N = 65$). Maternal perceptions of infant attentional skills (duration of orienting, or persistence of attention, and perceptual sensitivity—the infant’s ability to selectively attend to subtle stimuli) and an early marker of language (vocal reactivity: use of vocalizations across a variety of activities), along with observations of parent–child interactions, provided the basis for the present evaluation. Infant duration of orienting emerged as the primary predictor of vocal reactivity, with the contribution of perceptual sensitivity approaching significance. Infant vocal reactivity explained significant amounts of variance for duration of orienting and perceptual sensitivity. Parent–infant interaction factors contributed to the prediction of early attentional skills, with responsivity/sensitivity explaining a significant portion of perceptual sensitivity variance, and synchronicity/reciprocity emerging as a significant predictor of duration of orienting. Observed contribution of the vocal reactivity * responsivity/sensitivity interaction to predicting infant perceptual sensitivity provided preliminary support for the proposed moderation.

Keywords Infancy · Language · Attention · Parent–child Interactions

M. A. Gartstein (✉) · C. D. Robertson
Department of Psychology, Washington State University, P.O. Box 644820, Pullman, WA 99164-4820, USA
e-mail: gartstma@wsu.edu

J. Crawford
Pacific Graduate School of Psychology, Palo Alto, CA, USA
Introduction

Recent studies have suggested that attentional deficiencies and impulsivity, identified as symptoms of Attention Deficit/Hyperactivity Disorder (ADHD), may reflect consequences of individual differences observed as early as the first year of life [1–3]. Ruff and Rothbart proposed that some children possessed excessive reactivity, and/or inhibitory controls that are insufficient relative to the strength of activation (i.e., reactivity) [2]. These inhibitory controls were conceptualized as emerging based on a foundation of attentional skills, such as attentional persistence or duration of orienting, individual differences in which have been identified as early as infancy [4]. Parent–child interaction factors also deserve mention in this context, given considerable evidence suggesting that child attention is influenced by sensitivity and responsivity in the interactions [5, 6]. Development in other areas, such as language/communication, is likely to play a role in shaping a trajectory of either adequate attention, or difficulties in this domain (e.g., symptoms of ADHD).

The infancy period is dominated by the development of the orienting/investigative system of attention, later followed by the development of the executive attention system [3]. Manifestation of the orienting/investigative system has been reliably observed and measured by 3 months of age. The development of this attentional system is characterized by extensive visual exploration and manipulation of the environment and is most frequently evaluated through observations of infant duration of looking. Duration of looking has been described as reflecting the amount of information processing taking place within an individual [7]. The second attentional system associated with executive attention is thought to first “come online” by the end of the first year of life, providing opportunities for goal-oriented activity and behavioral inhibition [3, 8]. Perceptual sensitivity refers to an infant’s ability to detect slight, low intensity stimuli in the environment [9] (e.g., sound of an airplane passing overhead, change in room temperature), and has been described as contributing to self-regulation later in childhood, demonstrating relationships with indices of executive attention (i.e., the second attentional system) for school-age children [10]. The executive attention system has also been most closely linked with language development, in particular, with the ability to generate verbal cognitions to control action [11, 12].

As children begin to speak, their thought processes also undergo rapid development. Some argue that it is through the development of such thought processes linked to language that behavior ultimately comes to be self-directed [13]. Language is one of the tools that enable the emergence of self-awareness and the voluntary control over one’s actions [14], and as such, would be expected to facilitate the development of attention-based inhibitory control, enabled by the second attentional system [13].

Infants, especially early in the first ear of life, can not be described as producing language per se, however, they often express themselves vocally, and these early vocalizations have been linked with language production [15]. Holowka and Petitto concluded that early vocalizations, or babbling, represent the onset of productive language capacity in humans, based on the observed mouth asymmetry. Specifically, right mouth asymmetry during babbling was deemed as evidence for left hemisphere control over these vocalizations, similar to language production [15]. Even prior to this groundbreaking work, multiple hypotheses have been generated to help explain the predictive nature of prelinguistic vocalization to later spoken language [16, 17]. In the present study, parents were asked to report regarding their infants’ vocal reactivity, because of their ease of observation of these behaviors, and their ability to report in a reliable and valid manner regarding this, and other domains of infant reactivity [4, 9].