The pointing gesture and language learning

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Abstract

The production of pointing gestures in infancy is a key social-cognitive and communicative milestone that has been found to predict later vocabulary development. Yet very little is known about: 1) how infants learn to point, if they learn at all; 2) whether early pointing abilities develop in step with early vocal communicative abilities; 3) whether the two communicative modalities explain the same or different variance in later vocabulary development. We attempted to address these questions with a series of studies that used training methods to explain development and considered individual differences between infants. These studies highlight the value in considering both communicative modalities in tandem in order to fully understand language development.

Keywords: Pointing, parenting, learning, vocabulary, babble.

The development of pointing

The development of the pointing gesture has theoretical importance since it marks the onset of triadic communication (where the parent and child communicate about some external entity). Thus, while infants are able to communicate with parents dyadically from the start, and even can associate word forms with common objects from 6 months, they arguably have no intentional control over reference until they being to point. Indeed, for many 1-year-olds, pointing is *the* way to direct others' attention.

Yet there are few accounts of the developmental origins of pointing and even fewer studies that directly test these accounts. In contrast to early proposals that it is a ritualized communicative act, recent theorists have suggested that pointing emerges spontaneously regardless of input (Butterworth, 2003). Another possibility is that infants find it natural to extend the index finger in reaction to (and later toward) interesting things very early on and, with time, they observe that others use the gesture in order to communicate, whereupon they imitate the use of the gesture for this function (Cochet & Vauclair, 2010). We attempted to test these competing accounts by asking parents to expose their infants to more pointing gestures and measuring whether this caused these infants to begin pointing sooner than their peers in a control group (who had extra experience with musical activities).

102 infants of 9-, 10-, or 11-months of age were seen at the beginning, middle, and end of a one-month period and tested for declarative pointing and gaze following. Infants' *ability* to point with the index finger at the end of the study was not affected by the training but was instead predicted by infants' prior ability to follow the gaze direction of an adult. The *frequency* with which infants pointed indexically was also affected by infant gaze following ability and, in addition, by maternal pointing frequency in free play, but not by training. In contrast, infants' ability to monitor their partner's gaze when pointing, and the frequency with which they did so, was affected by both training and maternal pointing frequency in free play. These results suggest that prior social cognitive advances, rather than adult socialization of pointing per se, determine the developmental onset of indexical pointing, but socialization processes such as imitation and adult shaping subsequently affect both infants' ability to monitor their interlocutor's gaze while they point and how frequently infants choose to point.

Pointing and babbling as predictors of vocabulary learning

Just as the onset of pointing marks the transition to triadic communication, first words mark the transition to conventional communication. There are vast and persistent individual differences in the rate at which children learn words and these differences have consequences for later academic achievement and social wellbeing. Consequently, a large body of work has developed looking at the factors that explain or predict individual differences in lexical development. However, different strands of developmental research have tended to focus on one type of predictive factor or another in isolation, despite calls for a more integrated approach to the study of early word learning (Hall & Waxman, 2004). So, for example, a recent meta-analysis showed that infants' use of the pointing gesture predicts word learning. A quite separate literature has explored how babbling is related to lexical development. And yet a third literature has looked at how socio-econimc status (SES, often measured as maternal education) impacts on language development.

We were interested to address two questions. First, to what extent are communicative developments in the gestural and vocal domains correlated? Second, what best predicts vocabulary development when vocal, gestural and SES factors are considered simultaneously? Drawing on an existing longitudinal dataset of naturalistic video-recorded dyadic interaction, we coded for the mother's level of education, the onset of babble (two stable consonants) and the onset of index finger pointing on a single sample of 46 infants. A parental report, the MacArthur Bates Communicative Development Inventory, was used to measure the infant's expressive and receptive vocabulary

knowledge at 18 months and was validated by checking infants' word use in the video recordings. Babble onset and pointing onset were not correlated. Nor was babble onset correlated with maternal education. However, infant pointing was moderately correlated with maternal education ($r=.035, p<0.05$. See Rowe & Goldin-Meadow for similar findings). Furthermore regression analyses revealed that pointing onset was a significant predictor of receptive vocabulary whereas babble onset was a significant predictor of expressive vocabulary at 18 months. Maternal education was a significant predictor of both vocabulary outcome measures. These findings highlight how pre-linguistic vocal and gestural abilities, while often produced in an integrated fashion early on, are not synchronized in terms of their development and moreover make independent but equal contributions to word learning.

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