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Communication in the second and third year of life: Relationships between nonverbal social skills and language



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ABSTRACT

We aimed to investigate developmental continuities between a range of early social and communicative abilities (including gestural communication) and language acquisition in children aged between 11 and 41 months. Initiation of joint attention and imitation were strongly correlated to language comprehension and production. Moreover, the analysis of different communicative gestures revealed significant relationships between language development and the production of symbolic gestures, declarative pointing (declarative informative pointing in particular), and head nodding. Other gestures such as imperative pointing, showing, and head shaking were not found to correlate with language level. Our results also suggest that distinct processes are involved in the development of language comprehension and production, and highlight the importance of considering various characteristics of children's early communicative skills.

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The ability to interact intentionally with a communicative partner emerges early in human development, before language acquisition, and infants' social interactions gradually exhibit increasing coordination of attention with others (e.g., Carpenter, Nagell, & Tomasello, 1998). Moreover, it has been shown that joint attention skills assessed in the second year of life are closely associated with later, higher-order social skills (e.g., Kristen, Sodian, Thoermer, & Perst, 2011; Vaughan Van Hecke et al., 2007), in particular theory of mind abilities (e.g., Charman et al., 2000). Because it shapes infants' social and linguistic environment, gestural communication may have a privileged role in these developmental relationships. The degree of proficiency in the use of communicative gestures has been especially claimed to predict language comprehension and production (e.g., Colonnese, Stams, Koster, & Nook, 2010). However, the characteristics of the language–gesture relationship may vary according to the nature of gestures, starting with the classical distinction between symbolic and deictic gestures (e.g., Liszkowski, 2008). The production of symbolic gestures, which decreases as speech develops (e.g., Acredolo & Goodwyn, 1988; Rodrigo et al., 2006), has been argued to facilitate the early stages of language acquisition (e.g., Goodwyn, Acredolo, & Brown, 2000); whereas pointing gestures may play a primary role in different milestones of language development, including in the ability to combine several words (e.g., Capirci, Iverson, Pizzuto, & Volterra, 1996; Rowe & Goldin-Meadow, 2009), explaining why the frequency of pointing, produced in combination with words or vocalizations, increases during the second year of life (e.g., Özçalışkan & Goldin-Meadow, 2005; Guidetti, 2002).

In addition, a pointing gesture can convey different meanings, depending on the context and on whether the pointing serves an imperative or declarative function (e.g., Bates, Camaioni, & Volterra, 1975; Tomasello, Carpenter, & Liszkowski, 2007). Imperative pointing is used to obtain an object or to request a specific action from the adult (Colonnese, Rieffe, Koops,

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& Perucchini, 2008), while the goal of declarative pointing is to share an interest with the recipient about an object, event or location (declarative *expressive* pointing, Liszkowski, Carpenter, Henning, Striano, & Tomasello, 2004) or to provide the recipient with information he/she needs about a specific referent (declarative *informative* pointing, Liszkowski, Carpenter, & Tomasello, 2008). The difference between the imperative and declarative functions of pointing has been supported by the study of behavioural markers such as hand shape, hand preference and vocalizations (Cochet, Jover, Oger, & Vauclair, 2014; Cochet & Vauclair, 2010; Liszkowski & Tomasello, 2011), which suggests that the two types of pointing may have distinct origins. Imperative pointing has been hypothesized to develop from non-communicative reaching actions (e.g., Cochet et al., 2014) through a process of ontogenetic ritualization (Tomasello & Call, 1997), while the development of declarative pointing may rely on early social-cognitive abilities, including imitation abilities (Camaioni, Perucchini, Bellagamba, & Colonnese, 2004). The hypothesis of distinct origins of imperative and declarative pointing raises the question of their respective roles in language acquisition. Distinguishing between the different functions of pointing is therefore necessary to investigate further the relationship between gestures and language development and determine to what extent this relationship concerns declarative gestures, and especially informative pointing, rather than imperative ones. Declarative informative pointing seems to share several characteristics with language, by both contributing to and reflecting (1) the understanding of others' attentional and knowledge states (Meng & Hashiya, 2014) and (2) the development of cooperation abilities (e.g., Brownell, Ramani, & Zerwas, 2006; Liszkowski, 2005). In addition, theory of mind abilities (ToM), measured with standard tasks (e.g., Sally-Ann test) in children between 3 and 4 years of age, appear to be significantly related to the production of informative pointing, but not to the production of expressive pointing (Cochet, Jover, Rizzo, & Vauclair, 2016). Although little is known about the role of informative pointing at earlier stages of development, the production of this gesture during toddlerhood might be closely associated with the development of language and ToM.

The goal of the present study was thus to investigate, with a mixed longitudinal design involving two sessions, whether advancement in early communicative skills was significantly associated with the later emergence of language. While several studies have highlighted the existence of close links between early joint attention skills and language acquisition (e.g., Colonnese et al., 2008), to our knowledge there have been no studies so far focusing at the same time (1) on several dimensions of social and communicative development, such as joint attention, gestural communication, imitation and cooperation abilities and (2) on several communicative gestures, including different functions of pointing. We therefore aimed at exploring the relationships between gestural communication (focusing especially on imperative, declarative-expressive and declarative-informative pointing, as well as on symbolic gestures), language development (by differentiating comprehension from production), and social and cognitive abilities like imitation and joint attention (by distinguishing between children's initiating and responsive behaviours). We investigated the dynamics of these relationships both at the same point in time and across development in children from 11 to 41 months of age.

Based on previous work, reviewed above, we expected: joint attention and imitation abilities might correlate with the production of symbolic gestures and declarative pointing, but not with the production of imperative pointing. Early use of declarative pointing (declarative informative pointing in particular) might correlate with language comprehension and production, whereas early use of imperative pointing might not correlate with language development, or with language comprehension only; the production of declarative informative pointing might also correlate with the development of cooperative abilities. More generally, children's responsive behaviours might correlate with language comprehension while children's initiating behaviours might correlate with both language comprehension and production.

1. Method

1.1. Participants

Fourteen children (3 boys and 11 girls) were tested with their mother in the Baby and Child Lab (<https://developmentlab.wp.st-andrews.ac.uk>) of the School of Psychology in the University of St Andrews. They were recruited in day nurseries, in parent & toddler groups and through advertisement via the Baby and Child Lab website. One child was finally excluded from the data because her language score reached the maximum of the scale used, and may therefore not have been representative of her actual linguistic abilities. Eight children were tested twice. For their first visit, children were between 11 and 33 months of age ($N = 13$; $M = 21$ months 8 days; $SD = 7$ months 6 days). Eight of these came back for the second visit about 10 months later ($M = 10$ months 14 days; $SD = 1$ month 5 days), when they were between 21 and 41 months of age ($N = 8$; $M = 29$ months 9 days; $SD = 7$ months 1 day). The 5 other children could not come for the second visit due to moving house or other reasons for unavailability.

1.2. Procedure

Prior to the experiment, the experimenter explained the research goals to the parents in the testing room, who then completed an informed consent form and filled in the parental questionnaires. Meanwhile, the child was encouraged to familiarize himself/herself with his/her environment. Most of them were seated on cushions on the floor and played with toys offered by the experimenter. The parent was then encouraged to interact with his/her child during this warm-up period to make him/her feel secure. For those children who could be tested twice, the procedure was identical for the two sessions (T1 and T2).

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