Gesture Reflects Language Development: Evidence From Bilingual Children

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Abstract

There is a growing awareness that language and gesture are deeply intertwined in the spontaneous expression of adults. Although some research suggests that children use gesture independently of speech, there is scant research on how language and gesture develop in children older than 2 years. We report here on a longitudinal investigation of the relation between gesture and language development in French-English bilingual children from 2 to 3 1/2 years old. The specific gesture types of iconics and beats correlated with the development of the children's two languages, whereas pointing types of gestures generally did not. The onset of iconic and beat gestures coincided with the onset of sentencelike utterances separately in each of the children's two languages. The findings show that gesture is related to language development rather than being independent from it. Contrasting theories about how gesture is related to language development are discussed.

Keywords

gesture; bilingualism; language development

When asked what language is, most people would probably say that language is what people speak. They would be in noble company—most scholars since the beginning of philosophical inquiry have assumed that language is conveyed solely by the vocal-auditory pathways. However, there is a growing awareness that language, at least for adults, is deeply intertwined with gestures made with hands and arms (e.g., Kendon, 1980; Krauss, Chen, & Purima, 1996; McNeill, 1992). We report here on a study that investigated when gesture becomes linked with spoken language in human development.

CONCEPTIONS OF CHILDREN'S GESTURE AND SPEECH ONSET

Adults use hand and arm gestures a great deal of the time when speaking, but little is known about how young children use gestures in relation to speech. Studies of

children under the age of 2 suggest that they use gestures in ways that are distinct from speech. For example, children point before they talk, and some children are reported to use more gestures than speech at this age (Iverson, Capirci, & Caselli, 1994). Other children have been observed to use gestures to refer to things until they learn the appropriate words and then to drop the gestures shortly thereafter (Acredolo & Goodwyn, 1988). These findings paint a picture of young children using gesture independently of language, primarily to compensate for an inability to talk (Petitto, 1992).

The view that gesture and language are independent means of communication presents a paradox, however. If young children abandon gesture once they begin to talk, then when do they begin to gesture while speaking? This question becomes especially pressing in light of the fact that adults gesture with as much as 80 to 90% of the words they speak in spontaneous expression (Mayberry & Shenker, 1997; McNeill, 1992). An alternative possibility is that gesture is a part of language and hence develops with it.

One roadblock to understanding the relation between gesture and language in human development has been the highly diverse definitions of gesture used across studies with young children. In the developmental literature, all sorts of bodily actions are encompassed by the term gesture, including behaviors such as play sequences with objects (Bates, Benigini, Bretherton, Camaioni, & Volterra, 1979) and facial displays such as sniffing and panting (Acredolo & Goodwyn, 1988). Although these kinds of nonvocal actions may be used symbolically by young children and presage the ability to talk, they fall outside the definition of gesture commonly used in research with adults, namely, hand and arm movements that are neither actions on objects nor body adjustments (as in scratching an arm; Ekman & Friesen, 1969; Kendon, 1980). An overly broad definition of gesture in developmental research can obscure researchers' ability to see how gesture and spoken language are related in development.

In our laboratory, we have observed that the complexity and frequency of gestures made by adults and older children are highly related to the complexity and frequency of their spontaneous language. The relation holds during both fluent speech and stuttering (Mayberry, Jaques, & DeDe, 1998; Mayberry & Shenker, 1997). In order to investigate how very young children use gesture in relation to their language development, we turned to bilingual children, who are exposed to two languages from birth. We reasoned that bilingual children would offer us a double opportunity to investigate children's gesture development in conjunction with language development. This is because bilingual children often develop their two languages at an uneven pace (see Nicoladis & Genesee, 1997, for a review). This uneven pace is likely due to the amount of time spent speaking each language on a daily basis (Pearson, Fernández, & Oller, 1993). If a child spends most of the day with a French-speaking mother and less time with an English-speaking father, for example, then the child's French development will probably be in advance of his or her English development. Note that this dual, but unequally paced, language development allowed us to tease apart the relation of gesture to the child's development across different cognitive skills.

LANGUAGE AND GESTURE DEVELOPMENT

Three hypotheses about the nature of gesture in relation to language are found in both the developmental and the adult research literature. Each hypothesis makes different predictions about how gesture may relate to language development in bilingual children. First, gesture can serve as a substitute for spoken language, as demonstrated by the sign languages that have evolved within deaf communities worldwide (Chamberlain, Morford, & Mayberry, 2000). Thus, if a primary function of gesture is to compensate for an inability to speak, then one would expect gesture use to diminish as a child's spoken language develops. In the case of a bilingual child, the decline might occur twice, once in each of the child's two languages. A second possibility is that gesture is linked to maturation of cognitive skills that are separate from language but that develop within the same time frame. If this were the case, then each bilingual child would exhibit an identical pattern of gesture use when speaking his or her two languages; frequency of gestures would be independent of the rate at which each language was developing and independent of whether the child was engaged in speaking or not. The third possibility is that a young child's gesture use is specifically linked to growth in language. If so, then the child's gesture use would change in a contingent fashion linked to his or her language development. Again, the relation might be demonstrated twice, once as each of the child's two languages develops.

A LONGITUDINAL STUDY OF GESTURE AND BILINGUAL DEVELOPMENT

To test these alternative hypotheses, we conducted a longitudinal study of 5 first-born boys who were exposed to French and En-

glish from birth (Nicoladis, Mayberry, & Genesee, 1999). Four children had English-speaking mothers and French-speaking fathers, and 1 had the reverse. The children were videotaped in conversation with their mothers and, on separate occasions, with their fathers at 6-month intervals between the ages of 2 and 3 1/2 years. The conversations were transcribed and coded for language (i.e., French or English) and gesture use (i.e., the type and rate of gesture and whether or not it accompanied speech). We used a definition and classification scheme that accounts for gesture use by adults (Ekman & Friesen, 1969; McNeill, 1992). To estimate the children's level of development in each language, we used a measure commonly used in child language research, mean length of utterance. For children just beginning to speak, the higher the mean length of utterances in each language, the more developed the language.

Characteristics of Young Children's Gestures and Language Expression

From the beginning of our observations, the children's gesture use was similar to that of adults in many ways. At 2 years of age, the children produced 81% of their gestures while speaking. By 3 1/2 years, they produced 90% of their gestures while speaking. The children did not abandon gestures as they learned to talk. To the contrary, their gesture frequency increased as their speaking frequency increased with age. Clearly, gesture is a phenomenon associated with language. These findings rule out the hypothesis that young children use gesture primarily to compensate for an inability to speak.

Although the children primarily gestured when speaking, as do adults, there were notable differences in the types of gestures they used in comparison to adults. We studied the three kinds of gestures, iconics, beats, and pointing, that children and adults produce. Iconic gestures depict some aspect of spatial images, actions, people, or objects; beat gestures are hand and arm movements that emphasize spoken words or mark the structure of discourse (Ekman & Friesen, 1969; McNeill, 1992). As Figure 1 shows, the most common kind of gesture used by the children was the point. By contrast, adults use iconic and beat gestures when speaking to a far greater extent than do 3-year-olds.

Gesture Typology and Language Development

The types of gestures the young bilingual children produced when speaking changed as their languages developed. The frequency of gesture types that have been observed in prespeaking children, such as pointing, reaching, waving bye-bye, and clapping, did not correlate for the most part with language development in either of the children's two languages. By contrast, the frequency of gesture types that are commonly used by adults when speaking—iconics and beats—did correlate with language development across the age range from 2 to 3 1/2 years. The children began to produce iconic and beat gestures while speaking only after their utterances became longer than two words. As a result, utterances accompanied with iconic or beat gestures were more linguistically complex than utterances accompanied with points or no gestures at all (see Fig. 2). These findings rule out the hypothesis that gesture is linked to maturation of cognitive skills separate from language.

Three of the 5 children developed their two languages at an uneven pace, providing the necessary evidence to determine whether gesture is linked to development in a language-specific fashion. By the end of the study, 2 children were

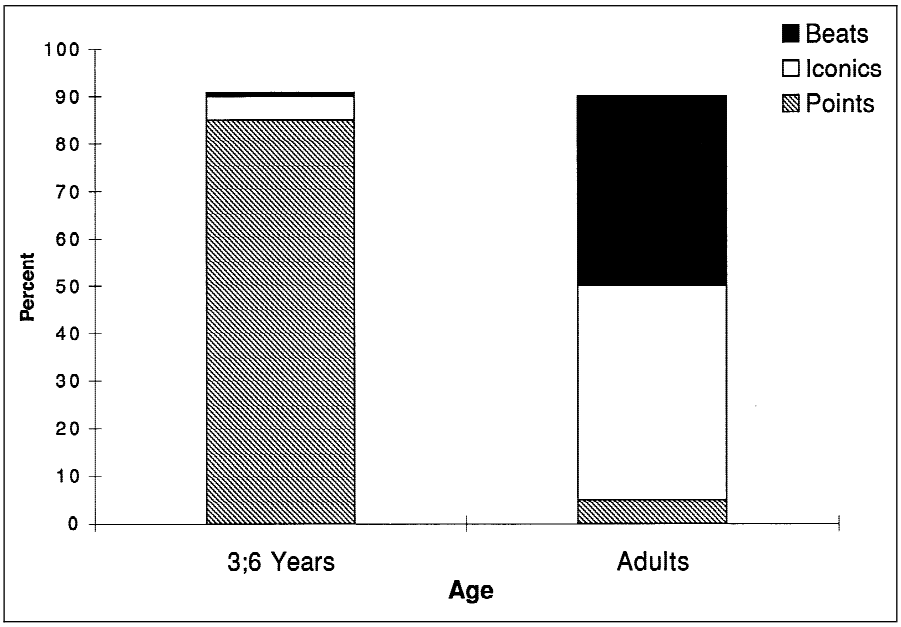

Fig. 1. Gesture types accompanying speech. The graph shows the relative proportions of different kinds of gestures (points, iconics, and beats) co-produced with speech, separately for 3.5-year-old children (Nicoladis, Mayberry, & Genesee, 1999) and adults (Mayberry & Shenker, 1997).

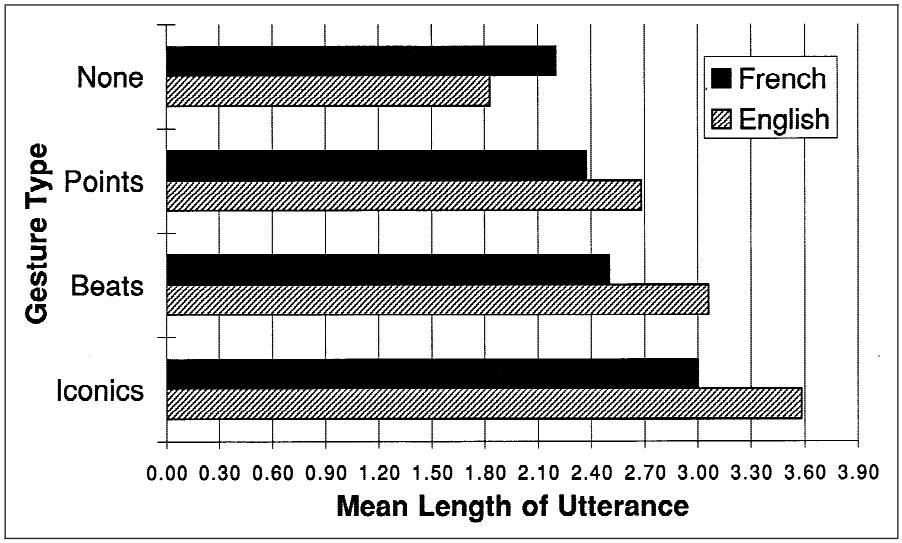

Fig. 2. Average length of the spoken utterances accompanied by no gesture, points, beats, and iconics among 2- to 3-year-old bilingual children. Results are shown separately for utterances in French and English.

producing multiword utterances in English but only single- and two-word utterances in French; each child produced iconic and beat gestures when speaking multiword English utterances but never did so when speaking one- to two-word French utterances. Another child, whose French was more advanced than his English, showed the reverse pattern: He produced iconic and beat gestures when speaking multiword French utterances but rarely did so when speaking one- to two-word English utterances. Finally, 2 children showed comparable development in French and English and produced similar gesture types when speaking their two languages. No child ever used gesture to compensate when speaking the less-developed language. These findings support the hypothesis that gesture is linked to development in a language-specific fashion.

This study provides a clearer picture of how gesture relates to the onset of language expression. As they begin to talk, children continue to use the kinds of gestures they used before speaking, primarily points. Once they begin to talk, they gesture mostly when speaking, just as adults do. When they begin to produce sentencelike utterances, young children begin to produce new kinds of gestures, gestures that adults use when speaking—iconics and beats. The fact that young children's initial use of iconic gestures is primarily associated with sentencelike utterances is a significant observation. The world's signed languages have evolved from iconic gestures. Together, these two observations suggest that iconic gestures may be a central feature in the development of languages, from both an individual and an evolutionary standpoint.

FUTURE DIRECTIONS

Although humans have probably gestured since they began to speak (Armstrong, Stokoe, & Wilcox, 1995), it is surprising how little is known about the nature and function of gesture in relation to language expression, especially in light of the fact that humans gesture nearly as often as they speak. One major impediment to understanding the relation of gesture to language has been a lack of uniformity in the definitions, classification schemes, and nomenclature used in research investigating gesture. The tendency to label most nonvocal behavior and all manner of hand and arm movement as gesture and then to categorize it all as nonverbal, and hence nonlinguistic, obscures what gesture is and what functions it serves. This tendency makes gesture very difficult to track in relation to language expression. Overly broad definitions of gesture may be one reason why contradictory hypotheses about how gesture and language are related abound. However, this state of affairs is characteristic of new fields of inquiry, where the initial questions must focus on what constitutes the nature of the phenomenon under study. This was certainly the case 20 years ago, when researchers first began to investigate sign languages, which were considered to be collections of ad hoc pantomime at the time. Hundreds of studies have since shown that sign languages are highly organized and are, in fact, full-fledged languages. Could it be that the gestures people make when speaking are highly organized in a systematic relation to language expression?

From a developmental standpoint, a multitude of important questions await careful investigation. For example, when exactly does the child's gesture use become fully adultlike? What linguistic and nonlinguistic factors guide the development of the child's gesture use toward full maturation? To what degree is the developmental course of gesture and language subject to individual differences as well as cross-linguistic and cross-cultural differences? Finally, and perhaps most intriguing, why does gesture play such a prominent role in the spontaneous language expression of children and adults?

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Note

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