Tutorial

Use of Gesture Development in Profiling Children’s Prelinguistic Communication Skills

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Purpose: Comparing children’s skills across and within domains of development has become a standard in providing early intervention services. Profiling a child’s strengths and challenges can help in making decisions regarding eligibility, diagnosis, and intervention. Profiling is particularly important for children who are not yet talking, due to the variability in production skills and the lack of guidelines as to which children are “at risk” for communication deficits versus those who are “late talkers.” One area underutilized in profiling is gesture development, despite the fact that research has indicated that the amount and type of gesture use can help in early identification and is predictive of later language.

Method: To guide practicing professionals and researchers in using gesture development to profile children’s communication skills, this article provides an overview of the types of gestures and their development, describes assessment methods and tools to document gesture development, pinpoints behaviors and factors important in identifying children with disabilities, and ends with brief examples of using profiling in assessment and intervention planning.

Conclusions: Gesture use should be an important component in profiling children’s communication skills, and this type of profiling can enhance both the assessment and intervention process.

Key Words: prelinguistic communication, gesture development, gesture assessment

Current recommended practices within early intervention focus on comparing a child’s skills across and within domains to provide a clearer picture of the child’s overall development and to identify more specifically the child’s relative strengths and challenges (Crais & Roberts, 2004; McCathren, Warren, & Yoder, 1996; Wetherby, Prizant, & Hutchinson, 1998). This type of developmental “profiling” is not only required by law (Individuals with Disabilities Education Improvement Act of 2004) but is also thought to provide the best overall portrait of the child. Profiling a child’s strengths and challenges is necessary across the spectrum of early intervention services, including screening, evaluation to determine eligibility, assessment to identify intervention plans, implementing interventions, and monitoring child progress to document change (or lack of change) and the need for program modification. At each step, a child’s profile of skills should be utilized to help families and professionals make the most informed decisions.

In early intervention services, profiling typically consists of broad developmental domains such as cognitive, motor, social, communicative, and adaptive/self-help skills. For example, if a child has deficits in all or most domains, both diagnosis and intervention planning would be aimed toward seeking explanations and intervention strategies for these more global deficits. In contrast, for the child who has communication-only deficits, more specific diagnoses and interventions would be considered.

Within the area of communication, there is also a strong imperative to compare a child’s strengths and challenges for both comprehension and production across syntax, phonology, semantics, morphology, and pragmatics (Paul, 2007). Although these linguistic components are often viewed separately for practical purposes, it is important to acknowledge the dynamic and interactive associations among the components as well as their transactions with the contexts surrounding them (Chapman, 2000; Mitchell, 1995). In addition, the child’s linguistic skills are built on a foundation of prelinguistic skills that may serve as both an indicator of the child’s current skill level and a strong predictor of the child’s potential for language competence in later years. For very young children, especially those who are not yet talking, it is important to identify the key components of prelinguistic communication that can serve as indicators of immediate and future development. For example, amount of prelinguistic communication...
has been shown to be predictive of later symbolic communication in children with developmental delays (Calandrella & Wilcox, 2000; McCathren et al., 1996). In addition, individual components of prelinguistic development such as vocal behaviors, vocabulary comprehension, symbolic play, gesture use, initiating and responding to joint attention, parental interactions, and familial history of language and/or learning impairments have been identified as strong indicators of later language development in both children with typical development (Hadley & Holt, 2006; Morissette, Ricard, & Decarie, 1995; Mundy et al., 2007; Stoel-Gammon, 1999) and those with atypical development (Baron-Cohen, 1989; Calandrella & Wilcox, 2000; McCathren et al., 1996). Further, prelinguistic means are the primary avenue to express early intentionality in typically developing children (M. Carpenter, Nagell, & Tomasello, 1998; Craig, Douglas, & Campbell, 2004), and the ability to signal one’s intentions is highly predictive of the development of higher level communication in children with disabilities (Brady, Marquis, Fleming, & McLean, 1991). Thus, by examining the child’s prelinguistic skills, we can identify the child’s unique profile of communication strengths and challenges. This profile can then be used to facilitate decision making in both assessment and intervention planning.

One area important to prelinguistic communication that has gained recent attention in the developmental literature is that of gesture development. There are numerous studies across a variety of disciplines extending the knowledge base regarding gesture development and its link with later language skills (Capirci, Iverson, Pizzuto, & Volterra, 1996; M. Carpenter et al., 1998; Iverson, Capirci, & Caselli, 1994; Thal & Tobias, 1992, 1994; Thal, Tobias, & Morrison, 1991). Gestures are one of the most consistent early indicators of intentionality and thus can provide a window into the child’s developing communication skills (R. L. Carpenter, Mastergeorge, & Coggins, 1983; M. Carpenter et al., 1998; Craig et al., 2004). Further, in children who are identified as “late talkers,” gesture use has been predictive of which children will or will not “catch up” eventually to their peers (Thal et al., 1991). In addition, there is increasing evidence that gesture development can be a key distinguishing feature to help differentiate children with typical development from those with various types of disabilities (Mundy, Kasari, Sigman, & Ruskin, 1995; Zwaigenbaum et al., 2005).

The strong associations between gesture development and the emergence of language make it imperative that we assess gesture development in young children with language delays, and use the assessment information in intervention planning. Many studies, however, have only examined a limited number of gestures. Furthermore, few researchers have translated these findings in ways that make them optimally useful for clinical assessment or intervention. In an attempt to link research and practice, this article provides an overview of the literature related to types of gestures and their developmental course, briefly describes current assessment methods and tools used to document gesture development, pinpoints behaviors and factors important in identifying children with disabilities, and ends with examples of how profiling could be used in assessment and intervention planning.

Types of Gestures and Early Development

Gestures are actions produced with the intent to communicate and are typically expressed using the fingers, hands, and arms, but can also include facial features (e.g., lip smacking for “eating”) and body motions (e.g., bouncing for “horsie”) as described by Iverson and Thal (1998). Iverson and Thal distinguished between two primary categories of gestures: deictic and representational. Deictic gestures establish reference by calling attention to or indicating an object or event (Bates, 1976). As noted by Iverson and Thal (1998), these gestures can only be interpreted by their context and can be used with a variety of objects and events (e.g., reaching for a cup, pointing to a dog running).

Deictic gestures are often divided into contact and distal gestures (McLean, McLean, Brady, & Etter, 1991). Contact gestures require contact between a child and object/caregiver, such as giving a toy or pushing away an adult’s hand, and are considered “early” gestures. Distal gestures, in contrast, require no contact with the caregiver/object, such as pointing and reaching, and are typically later appearing (10–12 months). One distinction that needs to be made, however, is that a few distal gestures (e.g., reaching toward objects, reaching to be picked up), in fact, defy the typical progression of contact gestures preceding distal gestures. One explanation, noted by Craig et al. (2004), may be that although reaching is considered distal, it is also more contextually bound to the actions from which it emerges (e.g., grabbing, being lifted up).

The earliest deictic gestures have been reported to emerge between 7 and 9 months of age (M. Carpenter et al., 1998; Craig et al., 2004), depending on the setting (e.g., laboratory vs. home) and the methodology (e.g., experimental design, naturalistic observation, or parent report). Deictic gestures often first appear as open-handed reaching, reaching to be picked up, ritualized gestures to indicate refusal (e.g., pushing away), or consistent attention-getting body movements such as repeated leg and arm flailing (R. L. Carpenter et al., 1983; Craig et al., 2004; Thal & Tobias, 1992). As noted by Thal and Tobias (1992), deictic gestures account for nearly 88% of the gesture repertoire in young infants and toddlers.

The second major type of gestures, representational gestures, both establish reference and indicate a particular semantic content. They often appear around 12 months of age (Acredolo & Goodwyn, 1988; Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979) and typically after the emergence of a few deictic gestures (Craig et al., 2004). Using Iverson and Thal’s (1998) categorization, representational gestures can be object-related gestures that signify some feature of the referent (e.g., cupped hand to mouth to represent “drinking,” “sniffing” a flower), referred to by some as “symbolic” gestures (Acredolo & Goodwyn, 1988). They can also be culturally defined conventional gestures that are used socially (e.g., waving “bye,” finger to lips for “quiet”) and represent some action or concept rather than a specific object.

It has been well documented that representational gestures emerge within familiar games and routines that parents and other caregivers utilize to engage children (Acredolo & Goodwyn, 1988; Caselli, 1990; Goodwyn & Acredolo, 1993; Iverson & Thal, 1998; Werner & Kaplan, 1963). Games
and routines such as “Itsy Bitsy Spider” or exaggerated blowing and hand waving to signal “hot food” contain many interactive opportunities for the child to observe and produce representational gestures. These gestures are then extracted from their ritualized routines and extended to novel instances and in novel contexts (Werner & Kaplan, 1963). For example, Caselli’s (1990) young son first “danced” to music in a social routine, whereas later he used it to request turning on the radio. As suggested by Werner and Kaplan (1963), this “decontextualization” may serve as a rehearsal for the same phenomenon employed later with words. Similarly, when a child generalizes a gesture to a new context, Goodwyn, Acredolo, and Brown (2000) indicate the gesture has gained “context flexibility.”

Crais et al. (2004) noted a good deal of individual variability in the emergence of representational gestures, and Goodwyn et al. (2000) reported a range of forms of representational gesture types used between 10 and 24 months. In Crais and colleagues’ (2004) longitudinal study, parents were asked over an 18-month period to indicate on a series of forms when and in what context different gestures emerged. Although all the deictic gestures listed on the forms were exhibited by all the children in at least one context in the study, some of the children never exhibited one or more of the listed representational gestures. For the children who never used particular representational gestures, their parents reported that they themselves did not use the gestures. For example, one family noted that they never used the forefinger to the lips to signal “hush” in any context (e.g., asking for quiet, pretending a baby doll was sleeping) as they did not want to give their child the impression that they did not want him to talk. In contrast, parents who reported playing frequently with their children in pretend ways (e.g., pretending to sleep, smacking lips to signal eating) had children who also used these gestures. Zinboer and Martlew (1985) argued that when compared to deictic gestures, representational gestures are more dependent on modeling by caregivers. Their use therefore may be more reflective of parents’ cultural beliefs and practices than are deictic gestures, and, as noted, professionals need to be mindful of individual variability across children and families. Thus, representational gesture use appears to be affected by social context, the amount of direct parental input, and family beliefs.

Object-related or symbolic gestures are also important components of symbolic play acts and are strongly related to language skills. Indeed, the level of symbolic play exhibited by young children has frequently been shown to predict later language skills (Lyytinen, Laakso, Poikkeus, & Rita, 1999; Lyytinen, Poikkeus, Laakso, Eklund, & Lyytinen, 2001). For example, Lyytinen and colleagues (2001) observed that symbolic play skills at 14 months of age were predictive of receptive and expressive language at both 24 and 42 months. In addition, for both typically developing children (Bates, Breherton, & Snyder, 1988) and those with developmental delays (Kennedy, Sheridan, Radlinski, & Beeghly, 1991), higher levels of gestural production and play maturity have been associated with higher levels of comprehension. Thus, examining a child’s use of gestures along with other related communicative domains may provide additional information about the child that can be used for clinical decision making.

An additional aspect important in the development of gesture use is the communicative function of the gesture. We know from the work of Bruner (1981) that young children’s early communicative acts can be divided into three functional categories: behavior regulation (e.g., requesting objects, protesting), social interaction (e.g., greeting, showing off), and joint attention (e.g., showing, commenting). Studies by R. L. Carpenter et al. (1983) and Crais and colleagues (2004) have documented the order of emergence of common communicative functions. Across their studies, the median age of protest acquisition was 6–7 months; requesting objects, 7–9 months; requesting actions, 8–9 months; commenting on actions, 9–10 months; commenting on objects, 9–10 months; answering, 15 months; and requesting information, 15 months. Although this sequence of emergence was the “most common,” not all children followed the same order.

In an attempt to examine both deictic and representational gestures (including some conventional gestures) and their developmental course from early to later infancy, Crais and colleagues (2004) followed 12 typically developing, English-speaking, monolingual, Caucasian, middle-class children from 6 to 24 months of age using a parent report methodology with monthly researcher home visits. The gestures targeted represented Bruner’s (1981) three broad communicative functions along with more specific subcategories of each: behavior regulation (i.e., requesting objects, requesting actions, protesting), joint attention (i.e., commenting, requesting information), and social interaction (i.e., representational gestures, attention seeking, social games). Through these methods, Crais and colleagues were able to identify a variety of gestures categorized by communicative function. A list of the gestures used by all 12 children by the end of the four age ranges (9–12, 12–15, 15–18, and 18–24 months) is provided in Table 1. However, because the data characterize only the 12 English-speaking monolingual, Caucasian, middle-class children and families who participated in the study, and there was a good deal of variability among the 12 children, caution is warranted when applying these data to individual children from other demographic and geographic populations.

### Tools and Methods Used in the Assessment of Gestures

Multiple methods are available for assessing the use of gestures in young children, ranging from standardized tests to more informal approaches. A brief discussion of standardized instruments is presented first, followed by additional strategies for taking a more informal approach.

#### Standardized Assessment Tools

Although many practitioners and test developers recognize that gesture development is an important aspect of overall communication skills, a sizeable body of research from which to draw developmental information has emerged only in recent years. Thus, most current assessment tools have not focused specifically on gesture development. Indeed, most
### TABLE 1. Gestures categorized by communicative function seen in 12 typically developing children age 9–24 months (Crais et al., 2004).

<table>
<thead>
<tr>
<th>Function</th>
<th>9–12 months</th>
<th>12–15 months</th>
<th>15–18 months</th>
<th>18–24 months</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Behavior regulation</strong></td>
<td>Protest</td>
<td>Request objects</td>
<td>Protest</td>
<td>Request objects</td>
</tr>
<tr>
<td></td>
<td>Child uses body to signal refusal/protest (e.g., arching body away when held in adult’s arms)</td>
<td>Child looks at object, then adult, and then object again (or vice versa)</td>
<td>Child shakes head “no”</td>
<td>Request objects</td>
</tr>
<tr>
<td></td>
<td>Child pushes away an object with hand(s)</td>
<td>Child reaches while opening and closing hands (e.g., being picked up, wants windup toy wound)</td>
<td>Child reaches while opening and closing hand to get an object</td>
<td>Request actions</td>
</tr>
<tr>
<td></td>
<td>Request objects</td>
<td>Child gives an object to an adult to get help (e.g., have it opened, fixed)</td>
<td>Child points to get someone to do something (e.g., open a door, carry them to another room)</td>
<td>Request actions</td>
</tr>
<tr>
<td></td>
<td>Request actions</td>
<td>Child makes contact with an adult’s hand to gain object</td>
<td>Child takes the hand of an adult to guide his or her hand or body to do something (e.g., takes hand of adult and brings it toward stomach to get tickle)</td>
<td>Request actions</td>
</tr>
<tr>
<td></td>
<td>Child reaches to be picked up</td>
<td>Child points to an object or event</td>
<td>Child does an action to get it to happen again (e.g., bounces up and down for “horsie”)</td>
<td>Request actions</td>
</tr>
<tr>
<td></td>
<td>Child does an action to get it to happen again (e.g., bounces up and down for “horsie”)</td>
<td>Child points to picture in book for adult to name it</td>
<td>Child uses conventional gesture of excitement (e.g., “high five” or “touchdown”)</td>
<td>Request actions</td>
</tr>
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**Note.** The gestures listed were seen in all 12 study children by the age ending the time period (e.g., 12 months for the 9–12-month period). Due to the expected variations in parenting style and in individual children, caution should be taken in utilizing this information to apply to children who differ substantially from the 12 participating children, who were White, English-speaking, monolingual, and middle class.

tests have few items related to gestures and/or lack normative data. Sample tools that include a small number of items related to gestures are the Bayley Scales of Infant and Toddler Development—Third Edition (Bayley, 2005), Clinical Evaluation of Language Fundamentals Preschool—Second Edition (Wiig, Secord, & Semel, 2004), Preschool Language Scale, Fourth Edition (Zimmerman, Steiner, & Pond, 2002), and the Receptive-Expressive Emergent Language Test, Third Edition (Bzoch, League, & Brown, 2003). Although these few items can provide information as to whether a child is using any gestures, they typically fail to indicate which gestures might likely be seen first or what communicative
Informal Assessment Approaches

For prelinguistic children, frequency, type, and function of gesture use should be examined and can be sampled in interactive play contexts with caregivers and other adults. During caregiver–child interaction, professionals can watch for (and/or ask the caregiver about) the reasons the child communicates intentionally (e.g., to get something, to protest something). In addition, professionals can set up situations that encourage the child to communicate her or his needs. Use of “temptations” such as those provided in the CSBS-DP (Wetherby & Prizant, 2002) is one example of how to use common toys to provide contexts in which gestures are likely to be used, and then document the communicative functions used by the child. For example, the professional can demonstrate a toy for the child (e.g., blow bubbles and close the container, or wind up a toy and let it run down), then give it to the child, and wait for the child to indicate wanting it or wanting something done with it.

In terms of representational gestures, a professional can ask caregivers to describe and demonstrate social games that they play with their child, and “social” gestures they and their child use. Given that representational gestures may not be a part of some parent interaction styles, professionals need to be mindful of using assessment tools that include them or interpreting results from such assessment tools without asking whether these types of gestures are used in the home. Asking families about their individual practices and creatively considering all types of social interactions can help professionals evaluate both the child’s opportunities and use of gestures. In this way, we may be more responsive to the ethnic, linguistic, and cultural background of the family and tailor the assessment process and information gathered to each child and family (Barrera & Corso, 2002).

An additional informal means for examining gesture development in prelinguistic and early-linguistic children is to consult a list of commonly used gestures such as that provided in Table 1 and identify which gestures a child may be using. The list provides some “rough” hierarchical information on gesture development in the study children that may be useful for professionals in informal observations and/or gaining parental report. However, due to the expected variations in parenting style and in individual children, caution should be taken in utilizing this information to apply to children who differ substantially from the 12 participating children, who were all English-speaking, White, monolingual, and middle class.

Behaviors and Factors Important to Identifying Children With Disabilities

When documenting gesture use in children with or at risk for disabilities, professionals should consider several important aspects of and transitions within gesture development, from both an assessment and an intervention planning perspective. The following section provides a discussion of these aspects and transitions, and can serve to guide further the informal process of documenting gesture development.

Frequency of Gesture Use

The frequency of overall intentional communication is an important factor in identifying children with communication deficits. In the presence of responsive adults, 12-month-olds
typically communicate intentionally about one time per minute, 18-month-olds about two times per minute, and 24-month-olds about five times per minute (Wetherby, Cain, Yonelis, & Walker, 1988). Therefore, a slow rate (or lack) of intentional communication may signal deficits. To express their intentions, 12-month-olds primarily use gestures and/or vocalizations, 18-month-olds use a combination of gestures, vocalizations, and words or word approximations, and 24-month-olds use primarily words or word combinations (Wetherby et al., 1988). In addition, the amount of gesture use by infants and toddlers is related to later verbal development (Acredolo & Goodwyn, 1988; Bates, Shore, Bretherton, & McNew, 1983). Specifically, Acredolo and Goodwyn (1988) documented that children with more representational object gestures (e.g., flap arms for “bird” or sniff for “flower”) reached the 10-word verbal vocabulary level earlier than those with fewer gestures. Several studies also have indicated that the sheer number of gestures and the number of different gestures used by children in their first 2 years of life are predictive of later language levels (Butterworth & Morissette, 1996; Calandrella & Wilcox, 2000). Further, as was documented by Watson, Baranek, and Crais (2005), the total number of gestures used at 9–12 months in children later diagnosed with autism was predictive of the communication subscores on the Vineland Adaptive Behavior Scales (Sparrow, Cicchetti, & Balla, 2006) at preschool age.

Amount of gesture use can also help differentiate children with typical development from those with various developmental disabilities such as autism (Zwaigenbaum et al., 2005) and Down syndrome (Mundy et al., 1995). For example, parents retrospectively have reported less babbling and gesturing during early development in children with autism compared to typically developing children (Ornitz, Guthrie, & Farley, 1977). The early retrospective reports of these behaviors, however, did not discriminate children with autism from children with mental retardation (Hoshino et al., 1982). Recent work by Watson et al. (2005) using retrospective video analysis of 9–12-month-old infants from three groups (those later diagnosed with autism, those with other developmental disabilities, and typically developing children) confirmed these earlier reports of infant gesture use. Their results indicated that the two groups with disabilities could not be differentiated from one another at 9–12 months on the amount of their gesture use, but both groups had significantly fewer gestures than the typically developing infants. Osterling, Dawson, and Munson (2002) also observed less gesturing in both children with autism and developmental disabilities at 1 year of age; lack of appropriate gestures between 12 and 24 months was one characteristic that distinguished between children with autism and children with typical development (Adriani et al., 1993). Further, some studies have also shown that there are nonverbal communicative differences within groups of children with autism that are associated with later language and social skills (Charman et al., 2003; Stone & Yoder, 2001). Thus, assessment of the number or rate of gesture use by young children can help in identifying those children at high risk for persisting language and communication deficits.

Specific gestures (especially pointing) have also proven to be a strong predictor of later language skills in children with typical development (Morissette et al., 1995), children with Down syndrome (Franco & Butterworth, 1996), and children with autism (Baron-Cohen, 1989). The early onset of pointing has been linked with greater numbers of different gestures used and increased comprehension, particularly object name comprehension (Butterworth & Morissette, 1996; Harris, Barlow-Brown, & Chasin, 1995). Thus, documenting the frequency of specific types of communicative gestures is critical to estimates of both current functioning and future potential in communication skills.

**Communicative Function**

The communicative function expressed by children’s gestures can also be used to help in decision making about a child’s developmental status and need for intervention. In terms of order of emergence across functional categories, behavior regulation and social interaction acts are typically seen before joint attention acts (R. L. Carpenter et al., 1983; Crais et al., 2004). By age 12 months, at least two different functions and two acts for each function were most often observed, and by 15 months, all three functions were used consistently with a variety of means (R. L. Carpenter et al., 1983; Crais et al., 2004). Indeed, a limited variety of intentional communicative acts in infants and toddlers as they near 24 months of age has been shown to be linked (along with other key behaviors) to later diagnosis of autism and other developmental disabilities such as Down syndrome and fragile X syndrome (Lord, 1995; Stone et al., 1999). Further, an analysis of videotapes of 9–12-month-old infants who were later diagnosed with autism revealed that a limited variety of social interaction gestures was what differentiated them from the typically developing infants, not the frequency of social interaction gestures (Colgan et al., 2006). Thus, a limited variety of communicative gestures may indicate risk for communicative disorders as early as 12 months of age.

The pattern of use of specific functions can also provide assistance in making differential diagnoses among children. Numerous reports of the communication of preschool-age children with autism have noted the preponderance of acts used for behavior regulation, the limited number related to social interaction, and few (or no) joint attention acts (McEvoy, Rogers, & Pennington, 1993; Mundy & Crowson, 1997). In fact, this pattern of communicative functions has been found to discriminate with a high degree of reliability between children with autism and children with other developmental disabilities (Mundy, 1995; Osterling & Dawson, 1994). Further, limited use of joint attention gestures early in life has been predictive of later diagnosis of autism (Mars, Mauk, & Dowrick, 1998; Osterling & Dawson, 1994), whereas children with Down syndrome do not show the same deficit in joint attention gestures when compared with typically developing children who are matched on mental age (Mundy, Sigman, Kasari, & Yirmiya, 1989). Interestingly, Mundy and colleagues (1995) also found that children with Down syndrome show a greater use of gestures related to social interaction and joint attention than behavior regulation. Similarly, Mundy et al. (1989) demonstrated that children with Down syndrome readily pointed to comment or show objects to others, but these children rarely pointed to make requests.
Further, in examining the gestural skills in children with Down syndrome, several studies (e.g., Caselli et al., 1998; Singer Harris, Bellugi, Bates, Jones, & Rossen, 1997) have reported that these children have a "gestural advantage" when compared to typically developing children with equivalent lexical comprehension and production skills. They also use more symbolic gestures and pretending than the comparison children. Because children with Down syndrome are older than typically developing children with similar verbal skills, they have had more social experiences than the control children, and that may account for their relative advantages in gesture use. In children with Down syndrome, gestures also serve as an effective means of communication for a longer period of time than is seen in typically developing children. Their developmental profile of gesture use differs not only from children with autism, as mentioned above, but also from children with other forms of intellectual disability. For example, children with Down syndrome (at least those with mental ages up to 17–18 months) use more gestures when compared to children with Williams syndrome who were matched for chronological age, comprehension, and production (Harris et al., 1995); thus, gesture use tends to be a strength for these children when compared to children with other disabilities. In contrast, children with Williams syndrome have been observed to produce referential speech before beginning to use communicative gestures (Mervis & Bertrand, 1993).

Use of specific functions of gestures also plays a role in predicting later language skills. For example, joint attention skills have been shown to predict comprehension and production skills in typically developing infants and toddlers (Mundy et al., 2007; Mundy & Gomes, 1998), as well as young children with autism (Charman et al., 2003; Mundy, Sigman, & Kasari, 1990) and those with other developmental disabilities (Yoder, Warren, & McCall, 1998). Infants typically begin to use joint attention gestures such as “showing” and “giving” objects around 8 to 12 months and “pointing” between 9 and 14 months (M. Carpenter et al., 1998; Crais et al., 2004); thus, failure to use joint attention behaviors in the 2nd year of life may be indicative of developmental deficits. In addition, frequency of requesting and commenting are predictive of later vocabulary size (McDuffie, Yoder, & Stone, 2005; Mundy, 1987; Sigman & Kushnir, 1999; Stone & Yoder, 2001). Use of social interaction gestures is predictive of expressive vocabulary in typically developing children (Mundy & Gomes, 1998) and children with autism (Charman et al., 2003; McEvoy et al., 1993).

Use of Gestures Paired With Eye Gaze and/or Vocalizations

Bruner (1977) suggested that, initially, the behavioral basis for referential skills occurs through eye gaze and motor movements. Somewhere between 8 and 9 months, infants begin to use eye gaze to direct other’s attention, and with experience the child gains more efficient means, such as gestures and words. The emergence of joint attention abilities in the 9-month-old is a key landmark in communicative competence (M. Carpenter et al., 1998; Saxon, Frick, & Colombo, 1997). However, using eye gaze consistently to alter others’ behavior is acquired over months and does not occur frequently until 12 months of age (M. Carpenter et al., 1998).

Early in development, infants also use vocalizations combined with gestures to communicate. Between 8 and 12 months, gestures and gesture/vocal combinations predominate; approximately half of deictic gestures exhibited between 8 and 11 months are accompanied by vocalizations (R. L. Carpenter et al., 1983). With increasing age, the use of gestures or vocalizations alone decreases as gesture-vocalization combinations increase until a point when they predominate at 15 months (M. Carpenter et al., 1998; Wetherby et al., 1988). Even as children enter into the one-word stage, gestures (with or without vocalizations) continue to play a prominent role. Thus, the transition to a predominant use of gestures combined with other means of communication (eye gaze and/or vocalizations) can be a sign of advancing communicative sophistication. Indeed, Mundy et al. (1995) documented that both children with typical development and those with Down syndrome who frequently combined gestures with vocalizations to request concurrently had higher levels of expressive language.

Transition From Contact to Distal Gestures

The move from contact to distal gestures reflects the shift in ability from dealing with objects as “things-of-action” to “objects-of-contemplation” (Werner & Kaplan, 1963). As McLean and colleagues (1991) suggested, the transition from contact to distal gestures may be related to the symbol acquisition process, and children or adults who use only contact gestures may be manifesting a pervasive symbolic deficit. The question then becomes one focused on whether the lack of (or delay in) distal gestures may signal a concurrent lack or delay of language. Certainly in observing children on the autism spectrum, there are examples of children who use primarily contact gestures with little to no pointing or other distal gestures (Lord & Pickles, 1996). This population by definition is one with language and social deficits.

In addition, some young children with autism may show an overall deficit in early means to communicate (e.g., eye gaze or early gestures such as showing, giving, or pointing) and yet use means that are typically later to develop such as taking someone’s hand to lead the person to an object or manipulating another’s hand to open a door. For example, parents of 2-year-olds with autism are less likely than parents of 2-year-olds with other developmental disabilities to report the coordination of gaze with other behaviors in requesting, and more likely to report that their children use contact gestures such as using another person’s hand as a tool (Lord, 1995). Although these “leading or manipulating” gestures are used communicatively, they are still viewed as presymbolic and may continue to be used long after the time that children typically are using symbolic and conventional behaviors such as gestures and words (Wetherby et al., 1998). Thus, the transition from the use of contact to distal gestures and the developmental hierarchy of gestures used are important developmental markers to consider.

Transition From Gesture to Word Use

The transition from the use of gestures (with or without vocalizations) to a predominant use of words is another stage
that needs monitoring. As the data from Crais and colleagues (2004) indicated, both deictic gestures and some representational gestures precede the emergence of words. In their study, common early representational gestures included waving “bye-bye,” “dancing” to music, and “hugging” objects. There are numerous links between gesture development and the emergence of language (for an excellent review, see Capone & McGregor, 2004). Indeed, Bates and Dick (2002) describe language and gesture as “close family.” Bates and colleagues (Bates & Dick, 2002; Shore, Bates, Bretherton, Beeghly, & O’Connell, 1990) also argued that before the use of words to name, children produce “recognition” actions associated with objects (e.g., cup to lips, phone to ear). They suggested that these early recognitory gestures, or what Acredolo and Goodwyn (1988) call “gestural labels,” serve as “gestural names” in the same manner as early verbal naming. Others (Acredolo & Goodwyn, 1988; Iverson et al., 1994; Namy & Waxman, 1998) suggested that these early symbolic gestures are also used for requests (e.g., Caselli’s son who “danced” to request turning on the radio).

By 16 months, infants use both words and representational gestures interchangeably to name objects. However, by 20 months they have almost stopped using representational gestures as names for objects or object categories in favor of the use of words (Iverson et al., 1994; Namy, Acredolo, & Goodwyn, 2000). Later in development, gestures and words again emerge in a parallel nature as seen when gesture-word and/or gesture-gesture combinations accompany or precede word combinations (Iverson & Goldin-Meadow, 1998). As word combinations become more prevalent, however, gesture-word and gesture-gesture combinations decline.

In sum, a variety of aspects and transitions related to gesture development and use should be considered in assessment and intervention planning for young children at risk or with established communication deficits. Since gesture use is key to children’s early and continuing communicative development, facilitating gesture development and use in children with limited or no gestures may be beneficial.

Examples of Profiling Gesture Use for Decision Making in Assessment

For children at risk for or with communication deficits, profiling the use (or lack of use) of gestures with other communicative skills can help professionals make key decisions in both assessment and intervention planning. For example, the pattern of gesture use across communicative functions (i.e., behavior regulation, joint attention, social interaction) can help distinguish (in conjunction with other information gathered) between children with different types of disabilities (Mundy, 1995; Osterling & Dawson, 1994).

To illustrate how profiling may be useful in making both assessment and intervention decisions, two children, “David” and “Sam,” who were both 24 months old and were referred to a university clinic because of parental concerns about their delayed language skills will be highlighted. By parent report, neither boy was producing any words nor had a significant birth or medical history. Both boys had hearing within normal limits and did not have a history of middle ear infections. Although David’s parents were concerned about both his expressive and receptive communication skills, Sam’s mother reported that she thought he had very good comprehension skills. To provide a contrast of two different types of assessment measures, the boys were assessed with the Receptive-Expressive Emergent Language Test, Third Edition (REEL–3; Bzoch et al., 2003), which has a limited focus on gestures, and the MacArthur–Bates CDI, Words and Gestures (Fenson et al., 2002), which provides a more detailed look at gesture use. Although both boys were older than the specified age range of the normative sample for the Words and Gestures Inventory (8–16 months), it was selected for use because of the boy’s reported expressive language delays and to gather information across a range of prelinguistic skills (i.e., phrases understood, vocabulary production, early gestures, and later gestures) and to get a detailed look at their vocabulary comprehension skills. Within the CDI, the “early gestures” category includes both common gestures (e.g., reaches to be picked up or waves “bye-bye”) and a list of six social games. The “later gestures” category includes functional play items (e.g., pushes truck or throws ball), pretend play items (e.g., feeds or hugs doll/stuffed toy), and imitation of adults (e.g., sweeps with broom or bangs with hammer). These items can give a preview of the child’s play skills as well as his or her ability to imitate the actions of others. The overall results from the testing for both boys appear in Table 2. As can be seen from the testing, both boys scored below the first percentile on the REEL–3 on their overall language abilities; however, where David’s receptive and expressive scores were similar, Sam’s receptive score placed him within the average range. Clearly, there were also differences on the CDI confirming David’s poorer comprehension skills, but also indicating that he had deficits relative to Sam in his gesture, play, and imitation skills.

As suggested previously, although these measures were very helpful in narrowing down some of the challenges that David and Sam face, the area of gesture use can be explored further to help with decision making. From the parent interviews about the boy’s communication skills and informal play scenarios set up to examine their functions and means to express their intentions (see early discussion about informal methods), further information about the boy’s use of gestures was gathered. Overall, David’s functions and means of communicating were more limited than Sam’s. For example, David signaled wanting to play “tickle” games by pulling up his shirt (e.g., social interaction), and used few additional means to communicate other thanfussing when he did not want something (i.e., behavior regulation), reaching to be picked up (i.e., behavior regulation), and taking an adult’s hand to get desired objects (i.e., behavior regulation). In addition, he had very limited eye contact except during the tickle games; did not show, give, or point to objects or events; rapidly flipped through books, refusing to look at them with others; and had some unusual play behaviors (e.g., licking toys, hanging toys repeatedly, lacking functional play with toys). In contrast, Sam used a wide variety of gestures to make

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1The names of the children in this section are all pseudonyms, and the children represent hypothetical situations for the purposes of clinical decision making.
requests, protest, engage in social games and routines, and direct others’ attention to things that interested him. He frequently engaged the professionals and his parents by showing them toys, and played readily and functionally with all the toys. He also demonstrated some symbolic play with the trucks, using gestures and sound effects to illustrate the farmer getting in to drive, falling out of the truck, then being injured.

In addition, since there is a strong relationship across gesture production, play maturity, and comprehension (Bates et al., 1988; Kennedy et al., 1991), the professionals also looked for individual variations in the children’s skills in each area. David, whose skills were low across all three areas, may have underlying global deficits affecting all three skills, whereas Sam, who exhibited poor skills in only one area (i.e., production), is more likely to have a specific deficit. In addition, because symbolic play has been shown to be predictive of both later receptive and expressive language skills (Lyytinen et al., 1999, 2001), David’s lack of symbolic play and Sam’s creative symbolic play provided the professionals with added information for decision making in assessment and intervention.

Further, looking within the domain of gestures for delays or variations can also help in decision making in assessment. For example, examining the type of gestures (e.g., deictic vs. representational, contact vs. distal) used by the child can inform clinical practice. To illustrate this point, David, who produces only a few deictic gestures and no representational gestures, is clearly delayed in this area of gesture development. Similarly, he uses only contact gestures but no distal gestures and therefore is less advanced in this type of gesture use. In addition, when David uses what might be viewed as a “higher level” gesture (e.g., taking an adult’s hand to guide him or her to an object) but not “lower level” gestures such as showing or giving, his gesture use shows a nontypical pattern of development.

In terms of conclusions about David and Sam, the compilation of test results, parent report, and informal play and observations led to two different sets of outcomes and recommendations. When discussing David, the professionals and his parents shared their mutual concerns about many areas of his development, specifically his low expressive and receptive communication skills, limited and repetitive play skills, and lack of eye contact and social engagement. In addition, the profile of David’s gesture use (i.e., some social interaction and behavior regulation gestures, but no joint attention gestures), added to the other areas of challenge for him, helped direct the discussion toward concerns of autism. This is not to say that all children with this profile of skills and pattern of gesture use have autism; however, the profile of skills and pattern of gesture use have been shown to discriminate between groups of children and can augment other information in making a differential diagnosis. In terms of next steps, it was recommended that David’s parents seek a multidisciplinary assessment to explore the possibilities of an autism diagnosis and to gain more insight into his other skill areas (e.g., cognition, gross and fine motor, and possible sensory issues). In addition, the professionals (based on the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Score/behaviors observed</th>
<th>Percentile rank</th>
<th>Score/behaviors observed</th>
<th>Percentile rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>REEL–3 Receptive Language</td>
<td>&lt;55</td>
<td>85</td>
<td>REEL–3 Expressive Language</td>
<td>&lt;55</td>
</tr>
<tr>
<td>REEL–3 Language Ability</td>
<td>&lt;46</td>
<td>&lt;1</td>
<td>REEL–3 Language Ability</td>
<td>&lt;46</td>
</tr>
<tr>
<td>MacArthur–Bates CDI, Words and Gestures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Phrases understood</td>
<td>5/28</td>
<td>&lt;5 for 16-month-old</td>
<td>345/396 words</td>
<td>—</td>
</tr>
<tr>
<td>Vocabulary comprehension</td>
<td>15/396 words</td>
<td>&lt;5 for 16-month-old</td>
<td>345/396 words</td>
<td>—</td>
</tr>
<tr>
<td>Vocabulary production</td>
<td>0</td>
<td>&lt;5 for 16-month-old</td>
<td>0</td>
<td>—</td>
</tr>
<tr>
<td>Early gestures</td>
<td>3/18</td>
<td>&lt;5 for 16-month-old</td>
<td>18/18</td>
<td>—</td>
</tr>
<tr>
<td>Later gestures</td>
<td>8/45</td>
<td>&lt;5 for 16-month-old</td>
<td>42/45</td>
<td>—</td>
</tr>
<tr>
<td>Total gestures</td>
<td>11/63</td>
<td>&lt;5 for 16-month-old</td>
<td>60/63</td>
<td>—</td>
</tr>
<tr>
<td>Hearing screening</td>
<td>WNL</td>
<td>WNL</td>
<td>WNL</td>
<td>WNL</td>
</tr>
</tbody>
</table>

Note. Both children were 24 months old. REEL–3 = Receptive-Expressive Emergent Language Test, Third Edition (Bzoch et al., 2003); WNL = within normal limits. Dash indicates unable to compute because the MacArthur–Bates Communicative Development Inventories (CDI), Words and Gestures (Fenson et al., 2002) provides normative data for children age 8–16 months only.
dynamic interactive assessments they had conducted) provided many concrete suggestions to his parents about ways to engage David and facilitate his communication skills. The professionals recommended working on enhancing David’s social interaction skills through games, sound making, gestures, and eye contact. Further, they made suggestions about how to extend David’s few behavior regulation attempts to include more vocalizations, gestures, eye contact, and exchanges of toys and objects in play. Finally, ideas for how to expand his play skills were shared with the family.

In interpreting Sam’s profile and making assessment and intervention decisions, consideration of the work of Thal and her colleagues (Thal & Bates, 1988; Thal & Tobias, 1992, 1994; Thal et al., 1991) was very useful. In their study of a group of children who had commensurate productive language delays, Thal and colleagues used profiling of the children’s gesture use and comprehension skills to distinguish between the children who were “late talkers” and those who were “truly delayed.” As noted by Thal et al. (1991), when faced with a child who is 2 years of age and is not yet using words to communicate, identifying whether the child uses gestures and the child’s level of comprehension can help in making predictions about the child’s future language skills. A child who has deficits across gestures, production, and comprehension (like David) would be at higher risk for continued language delay than a child who has production delays only (like Sam). In addition, a child who has a family history of language and/or learning deficits would also be at higher risk for continued language deficits (Hadley & Holt, 2006; Tomblin et al., 1997). Therefore, in discussing the overall results of Sam’s testing, parent information, and observations, the professionals noted all the positive aspects of Sam’s development and confirmed with the parents that Sam had no familial history of language/learning deficits. The professionals shared a brief overview of the literature on “late talkers” with Sam’s parents and discussed how his skills across areas seemed to meet the “late talker” profile. The professionals gave the parents the option of enrolling Sam in intervention but recommended that they first try some consultation (with plenty of resources and support) along with professional monitoring to see if they could give Sam’s production skills a “jump start” without direct intervention. In sum, the profiling of skills across areas of development was able to contribute to the decision-making process regarding these 2 boys, their potential diagnoses, and the future planning for them by the professionals and their families.

Examples of Profiling Gesture Use for Decision Making in Intervention

Gesture profiling can also help in identifying potential targets for intervention. For some children with limited gestures or atypical patterns of gesture development, increasing the frequency and variety of developmentally appropriate gestures may be beneficial. An increased use of gestures may not only help the child communicate more effectively, it can also provide the adults surrounding the child with more child output on which to build language and other communicative exchanges. For example, there is strong research indicating that when children are more communicative, their parents have additional opportunities to provide input (Calandrella & Wilcox, 2000; Yoder, 2006; Yoder & Warren, 2002). Further, mothers of toddlers with developmental delays respond more consistently to intentional communication than to preintentional communication; thus, enhancing children’s abilities to signal their intentions can facilitate parental responsivity (Yoder & Munson, 1995). Indeed, research has documented that when children use gestures such as pointing, their parents respond with additional linguistic input that may facilitate language development (Calandrella & Wilcox, 2000; Yoder & Warren, 2002).

If a child is not producing any gestures, early deictic gestures could be targeted in intervention as they are developmentally appropriate, and most children display some deictic gestures before representational ones. An early goal could be helping the child develop a strong base of gestures and other means to communicate intentionally before moving too quickly to higher levels (e.g., representational gestures or joint attention). The diagram in Figure 1 may prove useful to professionals in assessing and planning intervention related to first or early gestures. The diagram shows the relative relationship of the functions, with those appearing on the same line as relatively equivalent and those appearing above as somewhat more complex. However, each function also has an internal hierarchy dependent on the type of act (e.g., requesting) and the means (e.g., gesture, vocalization, or eye gaze) to accomplish the act. For example, in the Crais et al. (2004) data, overall requesting of objects (and protesting) typically were produced before overall requesting actions. For example, a young child who reaches for an unactivated windup toy and looks at the professional simply may want to hold the toy, whereas later in development the child may use reaching and looking to get the adult to wind it up. As can be seen in Table 1, for the children studied by Crais and colleagues, the relative relationship between the functions also changed depending on the means used to communicate the functions. For example, although children typically used a few behavior regulation and social interaction gestures before joint attention ones, there were gestures that were used for joint attention purposes before using them for other functions. A common example was giving an object to share joint attention, which was typically observed between 9

![Figure 1. Hierarchy of early communicative functions.](image-url)
and 12 months, whereas giving an object to request an action was not seen until 12 to 15 months. Therefore, a child who initially hands over an object for an adult to look at it may later in development seek the adult’s help to do something with it (e.g., wind it or fix it). Thus, early games of back-and-forth turn taking with objects can be a fun way to help develop the idea of sharing an object with another and drawing attention to it. The use of “sabotaged” toys (e.g., missing wheel, broken toy, or teddy bear with Band-Aid on its head) pulled out of a grab bag in alternating turns can be an idea to begin giving (and showing) for sharing joint attention. Later, the same type of activity could be performed but this time with objects that the child needs the adult’s help to manipulate (e.g., closed bubble jar or pop-up with crank).

When planning intervention, professionals should also consider how the developmental hierarchy of contact and distal gestures may affect the acts within functions. For example, joint attention contact gestures (e.g., showing/giving) with objects would likely be seen before distal joint attention gestures (e.g., pointing). Therefore, profiling a child’s gesture use by type of gesture and developmental hierarchy can help identify potential intervention targets. When enhancing any gesture development, however, not only should the various developmental hierarchies be considered, but also the collateral skills that each child brings to the interaction (e.g., motor, attention, cognitive, or social). For instance, modeling may be sufficient for some children, whereas others need hand-over-hand demonstration. For children with physical or cognitive impairments, individual approximations of the targeted gestures can be fostered.

Further, cultural and parenting style variations will be apparent across children and families, particularly with representational gestures; thus, professionals should be mindful of those gestures commonly used by parents and those that are not. In terms of representational gestures, although Table 1 displays varied types used by the study children, this list is not provided to encourage targeting these gestures (and especially not in any particular order) in intervention. The table is provided to help professionals consider the potential relative difficulty of these types of gestures for the study children and think about their own expectations for individual children’s development. A prime example may be the difference demonstrated by the study children in their use of head shakes for “no” (12–15 months) and nods for “yes” (18–24 months). This suggests that professionals should not expect both types of responses from children at a similar age. Thus, professionals may use this type of table (along with individual family beliefs and practices) to consider carefully the types of representational gestures they model for children and parents.

For a child who is using some early deictic gestures (e.g., reaching or showing) but no representational gestures, social games that include these types of gestures (e.g., peekaboo, pat-a-cake, or family-generated games) may be appropriate means to facilitate their use. In addition, targeting early functional play acts such as stirring or drinking through modeling and social play may enhance the child’s play as well as the use of representational gestures. For a child who only uses contact gestures, professionals and parents may consider early distal gestures as targets for intervention (e.g., reaching to be picked up or reaching for objects). In contrast, targeting pointing (rather than reaching) as the first distal gesture would not be recommended because it defies the typical developmental progression in much of the developmental literature (e.g., see Table 1).

For David, who has some early characteristics of autism, his particular pattern of gesture use can guide intervention planning as to the type of gestures that could be targeted. Clearly, joint attention gestures could be an ultimate target, but given that he has few social interaction and behavior regulation gestures, targeting gestures within these two function areas first would typically be better early targets. In contrast, with the pattern of gesture use in some children with Down syndrome (use of social interaction and joint attention gestures with few behavior regulation gestures), clinical targets could include working on behavior regulation gestures as well as other means to express this function. Historically, there have been a number of efforts to increase gesture use in individuals with intellectual disabilities, with most of the training focused on developing behavior regulation acts such as requesting or refusal behaviors (Duker, Dortmans, & Lodder, 1993; Duker & van Lent, 1991). Thus for some children, targeting gestures and communicative functions that are not in their repertoire may be a likely choice for intervention. For other children, however, particularly those with limited gestures and functions, building a strong foundation of more frequent early social interaction and behavior regulation gestures and other means may be a more effective approach than targeting the “missing” gestures or functions.

Conclusions and Implications

The increasing research evidence documenting the strong relationship between gesture use and later communicative skills, the growing recognition of the limited or narrow range of gesture use in some populations of young children (e.g., children with autism or Down syndrome), and the differing patterns of gesture use across populations have helped spotlight the need to both assess and enhance gesture development in children with poor communication skills. Several factors further support the necessity of documenting a child’s gesture use. First, gestures are typically the first signs of intentionality. Second, they are used by children as early means of communication. Third, for some children with communication delays, gestures will continue to predominate over verbal language for an extended period of time. Moreover, the profile of gesture use (compared with other skill areas) can be utilized in making assessment decisions and in intervention planning for children who have or are at risk for poor communication skills. If professionals are to develop accurate and representative profiles of the communication skills of young children, the use of gestures is clearly an important component.

In terms of the future, this article highlights the importance of research to explore additional questions related to gesture development such as the generalizability of the hierarchies of gesture development described, especially for children from other sociocultural groups. Other questions include the relationship of gesture type with other communication skills (e.g., comprehension, production, and play), the
pattern of gesture use across populations of children with disabilities, and the degree to which gestures can be taught and the characteristics of children who might benefit the most from professionals and families targeting gesture enhancement. In addition, the information may help guide the development of tools that could be used to document more effectively gesture use in young children, to aid in both assessment and intervention planning.

In conclusion, this article has attempted to provide (a) guidance to practicing professionals, researchers, and caregivers about the ways that gestures can be categorized and assessed, (b) relevant factors to consider in assessment and intervention, and (c) some examples of how developmental profiling can be used in decision making. If the article has helped enhance the role of gestures in the assessment and intervention process and added to the knowledge base used to enhance research in the area of gestures, the ultimate goals have been achieved.

References


**Individuals with Disabilities Education Improvement Act of 2004**, 34 C.F.R. § 300.7 (2004).


