# Chapter 2
# Prelinguistic Communication Development

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**Abstract** The prelinguistic stage is viewed as the time period between birth and when a child or adult begins to use words/signs meaningfully. It is a time when children typically increase their ability to communicate with others, first using eye gaze, attending, and social-emotional affect and later adding gestures and other nonverbal means to communicate. This stage builds the foundation for later developing skills such as using words (or signs) and combining them into sentences to communicate, as well as understanding and gaining appreciation of the nuances of successful communication. For children, youth, and adults with autism spectrum disorder (ASD), the skills typically learned during this stage can be critical to helping these individuals be effective and successful communicators throughout their lives. Individuals with significant developmental disabilities including ASD can have substantially protracted prelinguistic periods of communication and language development. For some, a singular reliance on prelinguisitic communication may continue into adolescence or adulthood. Others may fail to develop productive communication altogether. Knowledge of prelinguistic skills, their developmental hierarchy, and their impact on children's and adults' current and future ability to communicate are key factors to be considered in assessing and intervening with children, youth, and adults with ASD. In this chapter, current research related to prelinguistic communication skills will be highlighted, along with challenges faced when examining prelinguistic skills, and the research and practice implications of looking at and intervening in the area of prelinguistic communication.

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## 2.1 Current Research on the Topic

Prelinguistic skills are often viewed as the underpinning on which many other communication and social skills are built. Indeed, the early use of communicative means (e.g., gaze, gestures, vocalizations, words) shows a strong relationship with later language skills in children with developmental delays (McCathren, Yoder, & Warren, 2000) and those with ASD (Zwaigenbaum, Bryson, & Rogers, 2005). Children in the first year of life typically interact with their caregivers by intently gazing at the adult, and using sounds and oral motor imitations (e.g., wide mouth opening, protruding tongue) that help maintain engagement. In addition, they exhibit fussing and crying behaviors. These behaviors provide the infant with a means to express an emotional response to events or situations and to keep the attention of the adult. Initially, these behaviors are not intentional, but are more reflexive and responsive. Infants at this point are characterized as being in the preintentional stage, as they have not yet learned consistent ways to communicate their needs and wants to their caregivers. For example, infants first cry because they are hungry, wet, or uncomfortable and not because they realize if they do, their caregivers will react. Gradually, as infants begin to recognize that caregivers react when they exhibit particular behaviors, they learn how to communicate for specific purposes.

By the end of the first 6 months, infants consistently use a combination of behaviors across modalities such as vocalizations, facial expressions and visual orienting (Yale, Messinger, Cobo-Lewis, & Delgado, 2003) and they use them reciprocally with their caregivers (Feldman, 2003). Up to this time point, infants have been actively engaged in dyadic interactions with their caregivers where their focus is the caregiver. These face-to-face opportunities encourage sharing affect and attention. Infants begin to respond and participate with their caregivers in social routines such as "peek-a-boo" or "this little piggy" where the child is initially passive, moving toward a more active role, and eventually initiating the social routine. These exchanges are viewed as *joint engagement* rather than *joint attention*, an important distinction particularly for children with ASD. Whereas joint engagement involves the adult and child interacting together, it does not necessarily include the child or adult *actively* drawing the partner's attention to an object or action, although an object may be part of the play. For example, during a game of peek-a-boo, when a mother holds a small blanket in front of her face, the focus is on getting the child to pull down the blanket to find her, not on the blanket itself. In contrast, joint attention includes triadic interaction where one person is purposefully trying to get another person to look at an object or event. For example, when a father points to an airplane in the sky, he wants his child to look at it and enjoy the experience with him. The critical nature of joint engagement to the language learning process is evident as children increase their ability to join in shared communicative interactions with people and objects (Adamson, Bakeman, & Deckner, 2004). In addition, as the child continues to develop, both vocal (e.g., sounds, sound combinations) and nonverbal acts (e.g., facial expressions, and later

gestures) become more consistent and the child gains control over when to produce them. For example, infants may initially produce a "raspberry" sound (blowing out while sticking out the tongue) when spitting out food. As caregivers attend to and perhaps laugh at or imitate the action, the infant eventually with practice produces the act in imitation and later spontaneously, as a means of gaining or keeping the adult's attention. In parallel, as the child is gaining more oral motor control, there is a fairly predictable development of sounds in the child's inventory.

As reported by Smith, Goffman, and Stark (1995), typically developing infants produce reflexive sounds for the first few months, move on to comfort or cooing sounds between 2 and 4 months, begin to produce longer series of syllables and prolonged vowels and consonants with much vocal play between 4 and 6 months, produce reduplicated babbling (e.g., bababa) between 7 and 9 months, and use more varied and complex babbling (e.g., badaba) and their first words somewhere between 10 and 12 months. As children gain additional oral motor control, they are more capable of producing particular sounds and eventually are able to use word approximations ("baba" for bottle) and consistent words.

### *2.1.1 The Onset of Intentionality*

A shift from preintentional to intentional communication is a major milestone for all children and adults and is critical to the development of higher-level communication skills (Brady, Marquis, Fleming, & McLean, 2004; Tomasello, Carpenter, & Liszkowski, 2007). A child's rate of intentional communication is predictive of language outcomes and higher rates of nonverbal intentional communication are related to improved language outcomes (Calandrella & Wilcox, 2000). Typically developing 12-month-olds communicate intentionally about once per minute, whereas 18-month-olds do so about two times per minute, and 24-month-olds communicate intentionally about five times per minute (Wetherby, Cain, Yonclas, & Walker, 1988). Therefore, a slow rate of intentional communication may be indicative of current and future communication deficits. For example, when Stone, Ousley, Yoder, Hogan, and Hepburn (1997) compared the communicative rates of 2½- to 3½-year-old children with ASD or other developmental disabilities (DD), the children with DD had similar rates of communication as typically developing 12-month-olds; however, the children with ASD had significantly lower rates. Rate of communication and parent response contingency have also been associated with higher expressive language in children with disabilities (Brady et al., 2004). Brady and colleagues (Brady et al., 2004; Brady, McLean, McLean, & Johnston, 1995; Brady, Steeples, & Fleming, 2005; McLean, Brady, & McLean, 1996) have suggested that a limited range of communicative functions is related more to an individual's level of prelinguistic development rather than a particular disability.

Although typically associated with very early childhood, for some individuals communicative intent can emerge later in life. Numerous investigations have documented and profiled nonsymbolic intentional communication in preschool-

aged children, adolescents, and adults with developmental disabilities including ASD (McLean, McLean, Brady, & Etter, 1991; Ogletree, Wetherby, & Westling, 1992; Wetherby, Yonclas, & Bryan, 1989). Findings have been mixed on communication rate with some studies reporting rates comparable with normative expectations (Ogletree, Wetherby & Westling, 1992; Wetherby et al., 1989).

The ability to use varied types of communicative functions also plays a role in predicting children's later language skills. Bruner (1981) indicated that infants and toddlers should be using the following major communicative functions by 12 months of age:

- Social interaction: sustaining or initiating a social game or routine, seeking or providing comfort, teasing, showing off.
- Behavior regulation: regulating the behavior of others to obtain an object, getting them to carry out an action, or stopping someone from doing something.
- Joint attention: directing others' attention in order to comment on an object or event, providing information on an object or event, or acknowledging shared attention to an object or event.

Children with typical development show an increase in the number of communicative functions used within these three major areas with increasing age (Crais, Douglas, & Campbell, 2004; Wetherby et al., 1988). For interpreting the current literature, terms such as *imperative* or *instrumental* act to regulate behavior, and *declarative* or *referential* act to gain joint attention, are also often used. In terms of a hierarchy of the emergence of functions, social interaction acts and behavior regulation acts seem interspersed in early development with joint attention acts following closely (Crais et al., 2004). In a longitudinal study of 12 typically developing children from 6 to 24 months, Crais and colleagues (2004) reported that 8 of the infants first produced protests (e.g., physical action like arching the back to resist something or pushing away objects), whereas the other 4 infants either requested an action (e.g., reaching to be picked up) or sought attention (e.g., flapping arms or banging while smiling and looking at the parent).

As infants develop from the middle to end of their first year they begin to share attention to objects and other events with their caregivers and move to triadic engagement (De Schuymera, De Grootea, Strianoc, Stahle, & Roeyersa, 2011; Mundy, Sullivan, & Mastergeorge, 2009). A major skill that develops through triadic engagement is following the gaze of others, which opens up opportunities for the infant to learn from other people about the world around them (Rozga et al., 2011). Attention monitoring is also learned and includes the child shifting attention between the referent and the caregiver so the child can determine whether the caregiver is noticing the referent the child wants and/or the communicative act the child produced.

Another major skill attained during triadic engagement is the use of joint attention. In contrast to requesting, where the child wants the object or action requested, in joint attention the child is communicating to gain social attention from the caregiver. Joint attention acts demonstrate the child's abilities to coordinate attention to both people and objects. Two types of joint attention are highly

critical: first, the child's ability to attend to others' bids for joint attention (response to joint attention [RJA]) and second, the child's ability to initiate bids for joint attention from others (IJA). As observed by McLean and Snyder (1978) and later by Sameroff and Fiese (2000), children learn to respond to and use gestures and words within joint attention acts, thus adding to their understanding and ability to use communication. As suggested by many (e.g., Klin, Jones, Schultz, & Volkmar, 2005; Tomasello, Carpenter, Call, Behne, & Moll, 2005), infants engaging with objects and others is also critical for their development of the ability to understand others' thoughts and goals. Thus, the emergence of RJA and eventually IJA presents major milestones for children with and without disabilities.

Older children, adolescents, and adults who are prelinguistic communicators may vary from young, typically developing children with respect to RJA and IJA. Qualitatively, their responses to the joint attention bids of others may be slow and require increased effort on the part of the communicative partner, while quantitatively IJAs are most often significantly reduced if not absent (McLean, McLean, Brady, & Etter, 1991; Ogletree et al., 1992).

### *2.1.2 Hierarchy of Gesture Use*

Because gestures play a large role in children's early intentionality and their later communication skills (and are often limited or absent in some children and adults with ASD), understanding the developmental emergence of gestures is vital. Gestures are one of the most consistent early indicators of intentionality and, therefore, are instrumental in helping children express their wants and needs to others (Crais et al., 2004). Between 6 and 10 months, children begin to use gestures to communicate with others, such as reaching to be picked up or to gain objects, or pushing away objects (Carpenter, Nagell, & Tomasello, 1998; Crais et al., 2004; Parladé & Iverson, 2010).

Gestures are defined as actions used with *the intent to communicate* and are commonly expressed using the fingers, hands, and arms, but can also include body motions such as bouncing for "horsie" or facial features such as lip pouting (Iverson & Thal, 1998). In contrast, just reaching or grabbing for an object is not considered *communicative* unless the child is using the action to *signal* to someone else their intention. Therefore, acts are typically not considered a gesture unless they are: (a) accompanied by eye contact or a vocalization/verbalization aimed toward another, (b) repeated, (c) used with a body posture oriented toward another, or (d) used within a social exchange (e.g., dyadic interaction like storybook reading) where clear reciprocity has already been established between the child and caregiver (Iverson, Capirici, Volterra, & Goldin-Meadow, 2008).

Iverson and Thal (1998) categorized two primary types of gestures: deictic and representational. *Deictic* gestures call attention to or indicate an object or event, such as pointing to or holding up an object to show someone. As suggested by Iverson and Thal, these gestures are interpreted by their context and can be used

across a range of objects and events. Deictic gestures are frequently divided into two types: contact and distal (Brady et al., 2004). Contact gestures include touching or "contacting" the object or caregiver, such as pulling on an object held by another or pushing away a caregiver's hand, and are considered "early" gestures and appear between 7 and 9 months. Most children as they increase their communicative skills begin to use additional kinds of gestures and forms of communication (words, sentences, signs) and therefore become less dependent on contact gestures.

In contrast, distal gestures do not require contact with the caregiver or the object and include pointing or waving "bye bye" and typically appear later (10–-12 months). One important distinction that needs mentioning, however, is that a few distal reaching gestures (e.g., reaching for an object, reaching to be picked up) actually challenge the typical progression of contact gestures preceding distal gestures. One reason reported by Crais et al. (2004) may be that although reaching is typically considered distal, it is also contextually bound to the actions within which it consistently occurs.

In regard to contact and distal gestures, there are children and adults (e.g., those with intellectual disability or ASD) who continue to use contact gestures (e.g., taking someone's hand to place it on a door knob to signal "going out") well past when other typically developing children stop using them (Paul, Chawarska, Klin, & Volkmar, 2007). For example, as children with language impairment get older, they use gestures more than their typically developing peers and are very likely doing so to compensate for their oral language deficits (Evans, Alibali, & McNeil, 2001). Stone et al. (1997) documented that 3½- to 4½-year-old children with ASD used significantly more contact gestures than did children with DD who were matched on chronological and mental age, developmental quotient, and expressive vocabulary (as well as gender, race, and maternal education). As suggested by Brady et al. (2005), many children with DD use prelinguistic gestures and vocalizations as their main means of communication and do so far into the toddler and preschool years.

In adults with DD, McLean and colleagues (Brady, McLean, McLean, & Johnston, 1995; McLean et al., 1991) documented that those who used distal gestures communicated more often and for a wider range of functions than did the adults who only used contact gestures. Brady and colleagues (Brady et al., 1995; Brady et al., 2004; Brady et al., 2005; McLean, Brady, & McLean, 1996) have also noted that children and adults with disabilities who primarily use contact gestures and vocalizations seldom communicate for joint attention or to make comments. In comparison, children and adults who use distal gestures are more likely to produce comments and requests.

In typically developing children, the first deictic gestures often emerge between 7 and 9 months of age (Carpenter et al., 1998; Crais et al., 2004). They often first appear as ritualized gestures to indicate refusal (e.g., pushing away), open-handed reaching, reaching to be picked up, or consistent attention-getting body movements such as repeated leg and arm flailing (Carpenter et al., 1998; Crais et al., 2004). As reported by Thal and Tobias (1992), deictic gestures comprise about 88 % of the gesture repertoire of young infants and toddlers.

*Representational* gestures make up the other major type of gestures, and they indicate both reference and a particular semantic content. Iverson and Thal (1998) categorized representational gestures into object-related and conventional gestures. Object-related gestures denote some feature of the referent (e.g., flapping the arms to represent a bird flying) that are often called "symbolic" gestures (Acredolo & Goodwyn, 1988). Conventional gestures are commonly used in a particular culture and are therefore defined by the culture (e.g., waving "bye", finger to lips for "quiet"). They typically represent some action or concept rather than a specific object. Reflecting cultural specificity, some gestures (e.g., the "okay" sign used in the US) may be viewed as offensive in some European countries; therefore knowledge of cultural conventionality is important for users (and assessors). Representational gestures begin to appear around 12 months of age (Acredolo & Goodwyn, 1988) and are typically seen after the emergence of a few deictic gestures (Crais et al., 2004). This kind of gesture typically emerges within familiar routines and games that caregivers use to engage and entertain their child (Goodwyn & Acredolo, 1993; Iverson & Thal, 1998). Games and routines such as "patty-cake" or pretending to eat and blowing to signal "hot food" contain multiple interactive opportunities for children to observe and imitate representational gestures.

Individual variability in the emergence and range of representational gestures between 10 and 24 months has been documented across studies (Crais et al., 2004; Goodwyn, Acredolo, & Brown, 2000). In a longitudinal study of typically developing children from 6 to 24 months of age, Crais et al. documented that the representational gestures used by the children were highly specific to the modeling of their parents. For example, gestures such as "touch down", "high five", "pretending to sleep" or using a forefinger to the lips and saying "sh" (e.g., asking for quiet, pretending a baby doll was sleeping) were only seen in those children whose parents actively demonstrated them. The strong influence of modeling can be seen in one family who never wanted to give their child the impression that they did not want him to talk, therefore they never used the "sh" signal, nor did he. Zinober and Martlew (1985) suggested that compared to deictic gestures, representational gestures are highly dependent on modeling by caregivers, and their use is more reflective of parents' cultural beliefs and practices.

### *2.1.3 Importance of Gestures to Facilitating Language Skills*

Iverson and Goldin-Meadow (2005) have suggested that gestures allow children to communicate ideas that they may have difficulty expressing verbally and therefore, the use of gestures can facilitate language learning. Gestures both precede and are highly related to language development. Indeed, initial gestural representations found in children's early repertoires appear later in the children's verbal lexicons (Iverson & Goldin-Meadow). Similarly, in examining sentences, Iverson and Goldin-Meadow documented that the use of gesture-plus-word combinations predicted the onset of two-word combinations.

In considering why gestures may facilitate language development, Iverson and Goldin-Meadow (2005) argue that firstly, the child's use of gestures may signal to the caregiver that the child is ready for enhanced input. For example, Goldin-Meadow and Singer (2003) documented that adults alter their input to children in response to the gestures produced by the child. Secondly, Iverson and Goldin-Meadow contend that gestures also lessen the demand on memory in that gestures are likely easier to produce than words. It has been hypothesized that gestures are first produced at a time when the child has not yet fully gained control over the oral mechanism in terms of speech production. The third explanation for why gestures facilitate language learning is that gestures may be a way for children to try out new meanings before they are produced in speech, and there is evidence that the act of using a gesture can impact learning a concept (Wagner & Goldin-Meadow, 2004). Thus, if the child can use a representation of the word in gestural form, it may help fill out the meaning of the word while the child acquires the word form.

Gestures can also facilitate labeling by the caregiver and may provide, as Goldin-Meadow, Goodrich, Sauer, and Iverson (2007) suggest, a "timely word-learning model" for the child, and thereby children can elicit input that they need to guide their own learning. Some suggest that commenting by the child (e.g., vocalizing and/or pointing to an object to show it, or verbalizing) has a strong relation to receptive language. When children comment, caregivers usually respond by labeling the object or providing added input to the child (Brady et al., 2005; Tomasello, 1999). Thus, children who comment more often will have increased chances to gain input from caregivers.

In prelinguistic adolescents and adults, gestural forms often occur as part of a broader communicative profile characterized by vocal immaturity (McLean et al., 1991; Ogletree et al., 1992). Accordingly, for these individuals, it would appear that gesture is a less complicated and possibly more effective alternative to intelligible speech.

### *2.1.4 Links Between Prelinguistic Skills and Current and Later Language Skills*

Some prelinguistic skills are also concurrently predictive of a range of skills. For example, early gesture use is strongly related to concurrent comprehension skills in both children with typical language skills (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979) and those with language deficits (Thal & Bates, 1988; Thal, Tobias, & Morrison, 1991). Similarly, gesture use in children with ASD is also associated with current language skills. In particular, joint attention skills are highly predictive of comprehension and production skills in both typically developing children (Slaughter & McConnell, 2003) and those with ASD (Charman et al., 2003). Social interaction acts also are predictive of expressive vocabulary in typically developing

children (Mundy & Gomes, 1998) and children with ASD (McEvoy, Rogers, & Pennington, 1993; Mundy, Sigman, Ungerer, & Sherman, 1986).

Gesture use is also predictive of later language skills. For example, early gestures are strongly related to receptive and expressive production in the second year of life in both typically developing children (Bates, Benigni, Bretherton, Camaioni, & Volterra, 1979) and those with disabilities (Thal et al., 1991; Thal & Bates, 1988). Further, a limited variety of gestures in 9-12-month-old children has also been associated with a later diagnosis of ASD (Colgan et al., 2006). Rowe and colleagues (Rowe & Goldin-Meadow, 2009; Rowe, Özçaliskan, & Goldin-Meadow, 2008) have documented in typically developing children that the number of gestures used at 18 months of age was significantly related to the size of the children's receptive vocabularies at 42 months. In addition, frequency of requesting and commenting are predictive of later vocabulary size (McDuffie, Yoder, & Stone, 2005; Mundy, 1987; Sigman & Ruskin, 1999; Stone & Yoder, 2001). Vocabulary comprehension and symbolic play skills are also associated with later language skills (McCathren, Warren, & Yoder, 1996).

For children with Down syndrome, Mundy, Kasari, Sigman, and Ruskin (1995) observed that those who frequently requested using gestures and vocalizations had higher language scores a year later than those who had limited requesting. Mundy and colleagues (Mundy et al., 1995; Mundy & Thorp, 2006) also reported that both IJA and RJA acts were significantly related to later language and social skills. Lower rates of IJA and RJA were also seen in young children with ASD and were not accounted for by a lower number of communicative acts overall (Stone et al., 1997). And in at-risk 12-month-olds (younger siblings of children with ASD) who were themselves later diagnosed with ASD, deficits in RJA, IJA, and requesting acts were documented (Rozga et al., 2011). Rozga and colleagues suggested these deficits may hamper the children's abilities to generate social experiences for themselves--thus leading to deficits in language skills.

Another factor important for later language and social skills is the combination of gestures and vocalizations. As children develop, their nonverbal communications begin to be more varied and more complex, they can communicate for more reasons, and they learn to coordinate gestures and vocalizations to communicate (Wetherby et al., 1988). This ability to coordinate aspects of communication can have important implications for social engagement with caregivers. For example, coordinating nonverbal cues with vocalizations can heighten the salience of and the ability of caregivers to interpret the communication, as well as respond appropriately to it (Stone et al., 1997; Yoder & Warren, 1999). In work by Goldin-Meadow and colleagues (Rowe & Goldin-Meadow, 2009; Rowe, Özçaliskan, & Goldin-Meadow, 2008), the number of gesture-plus-speech combinations the children used at 18 months was a strong predictor of their sentence complexity at 42 months. Further, the first production of a gesture-plus-speech combination has been shown to be predictive of the age of the first two-word combination (Iverson, Capirici, Volterra, & Goldin-Meadow, 2008; Rowe & Goldin-Meadow, 2009). When children (including those with ASD) combine gestures and vocalizations, they can also more effectively share joint attention with their caregivers (Parladé, 2012; Winder,

Woziniak, Parladé, & Iverson, 2013). This vocal-gesture combination can serve as a potent stimulus for the caregiver and can help set up an opportunity for joint attention (Parladé, 2012).

Finally, specific types of gestures can also be predictive. For example, early pointing is predictive of later advanced language skills in typically developing children (Harris, Barlow-Brown, & Chasin, 1995; Morissette, Ricard, & Decarie, 1995), those with Down syndrome (Franco & Butterworth, 1996), and children with ASD (Baron-Cohen, 1989). There also have been links with early pointing and a greater number of different gestures used and greater comprehension (Butterworth & Morissette, 1996). Specifically, the onset of pointing has been correlated to object-name comprehension (Harris et al., 1995). In the work of Stone et al. (1997), few children with ASD pointed, but if they did, their number of request and comment points was very similar. A key feature of communicative pointing is that it not only sets up joint attention with others, but it also impacts what communication partners look at and possibly what they choose to act on and talk about.

For individuals who never acquire many of these early skills or language, terms like "non-linguistic", "nonsymbolic", "minimally verbal" or "emergent symbolic" may best describe their communicative abilities. If these communicators present with ASD, their manifestation of the condition will likely be more severe, and they will often exhibit concomitant significant intellectual deficits. Indeed, Ogletree (2008) has used a categorization of communicative abilities in adults with ASD describing nonverbal, emergent verbal, and verbal communicators. According to Ogletree, nonverbal communicators, though nonspeaking, can have expressive abilities that include nonsymbolic and symbolic means. In contrast, emergent verbal and verbal communicators express themselves with speech of varying complexity and may also use other nonsymbolic and symbolic communication modalities.

Although few research studies have examined the emergent communicative abilities of adolescents or adults with ASD, some early investigations have included these groups in their participant pool. Findings from two large studies shed light on the communicative forms and functions typically observed in these populations. One additional effort describes both expressive and receptive abilities. Brady et al. (1995) sampled the communication of 28 adults with severe disabilities (5 of whom were diagnosed with ASD or a pervasive developmental disorder). Participants were presented with enticing communicative opportunities designed to evoke comments and requests. During communication sampling, participant initiations were followed by experimenter responses suggestive of communication breakdown (e.g., feigning misunderstanding of the participant's intent). Among the participants, all were reported to communicate with intentional nonsymbolic gestures. Participants primarily communicated to request but also commented on occasion. Participants also repaired communicative breakdowns by repeating, recasting, and to a lesser degree adding to communicative acts.

Using surveys, McLean et al. (1996) generated descriptive profiles of 211 adults with severe disabilities. Individuals charged with their care completed

questionnaires for 94 adults who presented with ASD or characteristics consistent with the diagnosis. Responses revealed that only 20 % of the adults were nonsymbolic (only 6 % unintentional) while 80 % used some form of symbolic communication. Sixty-one percent of the participants were described as using combinations of words and symbols.

The studies mentioned above, though not exclusive to adolescents or adults with ASD, bring into focus some general expectations specific to this population's range of expressive abilities. A recent larger study provides more detailed information about both the expressive and receptive communication of adolescents and adults with severe disabilities including ASD. Snell et al. (2010) reviewed 116 intervention studies published between 1986 and 2006 that addressed communication in persons with severe disabilities. Selected research articles included one or more participants with severe disabilities (defined as an IQ of 44 or below and aligned language and chronological ages) and featured intervention efforts specific to one or more areas of communication performance (defined as the ability to understand or produce communication messages). Findings were reported on efforts with 185 participants with intellectual disabilities, ASD, or multiple disabilities. Although some studies did not report the ages of participants, at least 85 were over the age of 12. Of particular interest to this chapter section is Snell et al.'s presentation of participants' pretreatment communication levels, expressive mode use, and receptive communication abilities.

Snell et al. (2010) reported that the majority of participants had pretreatment expressive communication best described as either prelinguistic or characteristic of emerging language. In contrast, a very small number of participants ($n = 7$) used multiple nonecholalic words and slightly more ($n = 11$) used echolalia. Pretreatment expressive modalities included speech, aided and unaided augmentative and alternative communication, and gestures with or without vocalizations. A wide range of pretreatment receptive language abilities were described. For example, participants from some studies were characterized as nonresponsive with receptive language ages (RLA) less than 9 months. In other studies, participants followed simple directions (RLA 9–18 months), understood single words (RLA 18–30 months), and even understood grammar (RLA greater than 30 months).

Snell et al.'s (2010) work is consistent with that reviewed thus far in that it describes a wide potential range of fairly conventional emergent communicative abilities. Those who interact regularly with adolescents or adults with severe disabilities including ASD know that the communicative repertoires of this population often extend beyond conventional expectations. Therefore, unconventional forms are also important to consider.

For decades, persons with ASD (regardless of age) have been recognized for their use of unconventional communication. Specifically, researchers have studied challenging behavior and echolalia as potential means of expression. Many studies have included adolescents and adults with ASD. Challenging behaviors such as self-stimulation, stereotypy, self-injury, physical aggressiveness, and disruptiveness have long been associated with the diagnosis of ASD (Horner, Carr, Strain, Todd, & Reed, 2002). Increasingly, these behaviors have been viewed within

contexts to determine their potential communicative value (Carr & Durand, 1985; Rogers, 2001). While not always used communicatively, challenging behaviors are now recognized as possible means of expressing messages such as the need to escape, protest an action, refuse an object, request an action or object, or draw attention to self or others (Carr & Durand, 1985; Mirenda, 1997).

Another unconventional behavior, echolalia, is also important to take into account. Echolalia has been described as the repetition (including intonation patterns) of others' language (Tager-Flusberg, Paul, & Lord, 2005). Echolalia can be offered immediately after an individual hears the language of others, or it can occur after a period of delay. It has been suggested that echoing in individuals with ASD is evidence of a holistic or gestalt language processing style that may represent initial movement to the development of more generative language (Prizant, 1983). In fact, a number of verbal adolescents and adults with ASD have used echoic speech over their course of language acquisition (Le Couteur, Bailey, Rutter, & Gottesman, 1989). For the purposes of this brief review, it is sufficient to note that echolalia occurs and may serve communicative functions (e.g., requesting, attention getting, and escape) in persons with ASD with minimal generative verbal abilities (Prizant & Duchan, 1981; Prizant & Rydell, 1984). Current research has both explored techniques to quantify echoic speech behaviors (van Santen, Sproat, & Presmanes Hill, 2013) and suggested that some types of echolalia may be related to limited inhibitory control (Grossi, Marcone, Cinquegrana, & Gallucci, 2013). Research has continued to explore the potential meaning of echolalia, but has done so within a broader interactional framework, noting echolalia's role in the accomplishment of limited conversational goals, for example, eluding a conversational partner's injunction, re-directing a partner's attention, or maintaining playful conversational attunement (Sterponi & Shankey, 2014). Thus with this population, analyzing and interpreting their communicative repertories, including unconventional behaviors, may help in both assessment and intervention planning.

### *2.1.5 Impact of Caregivers on Communication*

For both children and adults who are in the prelinguistic stage, caregivers play a large role in facilitating communication skills. Both the characteristics of the child/adult with a disability (e.g., age, output, readability, disability) and those of the caregiver (e.g., education level, income level, parenting style) impact caregiver-child/adult interactions through a transactional process. For example, when a child produces limited vocalizations, caregivers are less responsive in producing vocalizations to the child (Yoder & Warren, 2001) and similar findings are seen with adults (Olney, 2001). As documented by many, as children communicate more, their caregivers have more opportunities to provide input (Calandrella & Wilcox, 2000; Yoder, 2006; Yoder & Warren, 2002). In addition, as children become more competent in their communicative skills with age, caregivers' input typically increases both in frequency and complexity. For example, as infants begin to

babble, caregivers see this as a sign that their child is ready for higher-level language and they increase the complexity of their language (Warlaumont, Richards, Gilkerson, & Oller, 2014). Mothers have been shown to increase both the amount that they talk and the diversity of the words they use as their children age (Rowe, Pan, & Ayoub, 2005). For example, in a study of parent-child interactions at 15 months of age, mothers whose children were most communicative (e.g., sounds, gestures, words) produced more words and diversity of words in response to their children (Abraham et al., 2013). In addition, from a transactional perspective it was assumed the mother's early input had influenced the child's output, and subsequently the reverse was happening. Level of intentionality is also important, as mothers of toddlers with developmental disabilities respond more consistently to their children's intentional communications than they do their preintentional behaviors (Yoder & Munson, 1995). Specifically, when children use gestures such as reaching and pointing, their caregivers respond with additional input that can facilitate their child's language development (Calandrella & Wilcox, 2000; Yoder & Warren, 2002).

Unfortunately, older individuals who are prelinguistic can live in nonresponsive communicative environments where partners are not sensitive to the potential value of less obvious communicative behaviors. Olney (2001) notes the importance of evaluating and responding to even the most nuanced movements within the contexts they are offered to build supportive communicative settings.

Caregiver characteristics such as level of education, income level, and parenting style also impact the child's communication skills (Duncan & Brooks-Gunn, 2000; Hart & Risley, 1995; Rowe et al., 2005). Rowe and colleagues (Rowe et al., 2005) documented that mothers with higher income and educational levels used more diverse and complex language (than did mothers whose education and income were lower) and also had children who exhibited superior language skills. In a study of rural children and their mothers with low incomes, additional factors that impacted the mothers' input were the mothers' knowledge of child development, maternal responsivity, as well as the child's temperament (Vernon-Feagans et al., 2008). In terms of maternal style, mothers who had a more facilitative style (e.g., less directive, more responsive to the child's focus) typically had children who later had larger vocabularies and higher reading skills (Fewell & Deutscher, 2004; Masur, Flynn, & Eichorst, 2005). As noted by Sameroff (2010), parenting styles are a result of multiple factors including the parents' psychological functioning, personality, religion, culture, their knowledge of child development, and the way they were raised by their own caregiver/s.

Caregivers' use of prelinguistic acts can also be influential. For example, maternal gesture input can impact the child's gesture use (Capone, 2007; Iverson et al., 2008) and later language use (Hahn, Zimmer, Brady, Swinburne Romine, & Fleming, 2014). Goodwyn et al. (2000) documented this type of influence by training parents to produce either gestures and words together, or focus on spoken labeling, compared with parents who did not receive any training. At the study's end, parents who used gestures and words together had children whose gesture repertoires were larger than the other two groups of children. Thus, caregivers can

provide their children with input that helps them move from preintentional to intentional communication. As infants (and adults) move out of the preintentional and into the intentional stage, they gain much more control over their environment.

For individuals with ASD, prelinguistic behaviors are critical and recognizing their characteristics and hierarchy of development can be beneficial for researchers and clinicians in assessment and intervention planning. The range of predictors of concurrent and later skills can also be challenging to researchers and clinicians.

## 2.2 Challenges When Examining Prelinguistic Skills

There are a host of challenges facing researchers and clinicians when examining prelinguistic skills, ranging from assessment context issues to selecting intervention targets. As suggested by Parladé (2012) and Wetherby (2006), measuring social communication behaviors is difficult as there is so much variability in the interaction context, the social partner, the individual child, the information source, and the properties of the assessment tool. One of the challenges that impacts both assessment and intervention decisions is the context of data gathering. Contexts for examining prelinguistic skills have ranged from standardized to non-standardized, examiner administered to parent report, and designs may be longitudinal or cross-sectional. Many studies have included examiner-administered standardized assessments such as the Autism Diagnostic Observation Schedule-2 (Lord, Rutter, DiLavore, Risi, Gotham, & Bishop, 2012), and for young children, the Communication and Symbolic Behavior Scales-Developmental Profile (Wetherby & Prizant, 2002) and Early Social-Communication Scales (ESCS) (Seibert, Hogan, & Mundy, 1982). These tools typically include stimuli such as exciting toys or events (e.g., wind-up toy, balloon, animated toy suddenly activating) that the examiner uses to engage the child (Kasari, Sigman, Mundy, & Yirmiya, 1990; Mundy et al., 1986; Stone et al., 1997; Wetherby et al., 2004). The advantages of using examiner-administered standardized tools are the structured protocol, the similarities across administrations in terms of the type and number of opportunities/prompts for communication, and the standardization sample of children. Standardized measures can also diminish clinician or parent variability that may be more of a factor in observational or parent report measures, respectively. However, the limitations include the unfamiliarity of the examiner and the setting, which can have an impact on the child's performance. Indeed, the work of Fuchs, Fuchs, Power, and Dailey (1985) indicates that although preschool and school-age children without disabilities perform equally with familiar and unfamiliar examiners, children with communication difficulties perform more poorly with unfamiliar examiners.

Other means to examine communication skills may include videotaped examiner-child or caregiver-child interactions, followed by coding of the observed behaviors. Other methods have included caregiver report measures such as the MacArthur-Bates Communicative) Development Inventory (CDI) (Fenson et al., 2007), naturalistic observation or caregiver guided observations or a combination

(Crais et al., 2004). The benefits of using parent report include the potential to gather a more representative sample, as parents spend more time with the child than professionals, are familiar to the child, and provide a familiar context. In addition, the parent has multiple opportunities to see the child across contexts. Naturalistic observation typically involves videotaping the child and caregiver at home during some "usual" interactions such as playing with toys and then coding the behaviors observed (Capirci, Iverson, Pizzuto, & Volterra, 1996; Crais et al., 2004; Iverson & Goldin-Meadow, 2005; Parladé, 2012). Guided caregiver observations may include a checklist of typical gestures along with definitions and examples and detailed instructions about what is and is not a gesture (Crais et al., 2004) and having caregivers document the targeted behaviors and when they see them over some timeframe. The benefits of these measures include familiarity of partner and context, as well as opportunities to see the child in her/his usual surroundings, which may allow the child's full repertoire to be observed. Indeed, there is some evidence that children produce more vocalizations and gestures when at home versus in a laboratory setting (Iverson, Capirci, & Caselli, 1994; Lewedag, Oller, & Lynch, 1994). The drawbacks of naturalistic settings are the lack of structure and ability to control the context, thereby not always having similar numbers of opportunities for some types of behaviors.

A final method of data gathering is the use of retrospective video analysis (RVA). RVA entails gathering home video footage of children before diagnosis or, for some families, even before concerns arise (Baranek, 1999; Colgan et al., 2006; Osterling & Dawson, 1994, Watson, Crais, Baranek, Dykstra, & Wilson, 2013). Most studies include children who are later diagnosed with ASD or another DD and a group of children who are typically developing. Through the use of rigorous guidelines, these videos can be coded by "blind" observers to look for differences across groups. The drawbacks to RVA are that caregivers may select the video footage to capture or avoid (e.g., camera turns off when child becomes fussy or acts in unusual manner); not all behaviors desired may be observed; and sound quality/camera angle may at times make coding difficult. However, the strengths of RVA include the natural setting and familiar adults (or siblings) as well as the range of contexts that can be included (e.g., meal times, outdoor play, floor play).

The challenge in employing only one measurement method may be that children differ in which prelinguistic means they use (and how frequently) in one setting/context versus another. For example, in gesture use, few studies have combined standardized and non-standardized methods, and few have included both parent report and naturalistic means. However, a few studies have used combined methods (Crais et al., 2004; Parladé, 2012; Rowe & Goldin-Meadow, 2009). For example, a recent study by Parladé (2012) included both structured versus naturalistic contexts in examining social communicative behaviors in 14- and 18-month-olds who were at high risk for an ASD diagnosis (younger siblings of children with ASD) or low risk for ASD with a negative family history. As documented by Parladé, there was very little correspondence between the joint attention behaviors (fewer) seen on the ESCS and the larger number of joint attention behaviors displayed in the naturalistic sampling context. As suggested by Parladé, different contexts may afford

differential opportunities for specific functions. For example, more behavior requests than joint attention behaviors were seen in the context of the ESCS with its elicitation probes, whereas in the naturalistic setting behavior requests and joint attention acts were equally represented. As an explanation, Parladé argued that children with ASD may show more "sticky attention" to the kinds of objects often used in elicitation tasks in tools like the ESCS (e.g., bubbles, windup toys) and therefore demonstrate more behavior requests to get the toy activated than joint attention to share interest. Thus, sampling contexts in standardized settings may need to provide additional opportunities for joint attention acts.

The issues of differential responses relative to the familiarity of the partner and context are also important. As discussed by Crais et al. (2004) when considering Carpenter et al.'s (1998) study of 24 typically developing children seen in a lab setting, despite monthly observations and elicitations from 9 to 15 months, 9 of the 24 children never *gave* declaratively, 4 never *pointed* declaratively, 3 never *gave* imperatively, and 9 never *pointed* imperatively. In contrast, in the Crais et al. (2004) study where children were observed monthly in their homes interacting with their caregivers, all 12 children displayed all four of the above gestures. These differences across studies argue for the use of multiple methods for gaining information about children's communicative behaviors, mirroring Tager-Flusberg et al.'s (2005) and Crais, Watson, and Baranek's (2009) recommendations to expand the context of assessment to include more natural communication samples. In addition, as noted by Parladé (2012), combining the results of standardized assessments and parent report with observational data from the home setting improved substantially the diagnostic predictability for the high- and low-risk groups of children studied. For detailed discussions of various assessment approaches for prelinguistic communicators, see Chaps. 5 and 6.

## 2.3 Implications for Research and/or Practice

From a research perspective, there are a number of frontiers left to explore relative to prelinguistic communication. One is to quantify clear "red flag" boundaries for a range of prelinguistic behaviors in infants and toddlers. For example, although there are rough guidelines to use to determine when smiling should appear, for behaviors such as the range of consonants that should be produced, when first gestures are used, and when joint engagement is consistently used between adult and infant, most have moderate variation across infants. In these cases it is often easier to use "expected ranges" rather than red flags because many prelinguistic behaviors do not have clear guidelines that unequivocally indicate at what point a child is delayed or disordered. Therefore, to help in diagnosis and intervention planning, additional research is needed to define the upper boundaries or absolute red flags across a range of prelinguistic behaviors.

Yet even though we do not know all the boundaries, gathering information about the use of prelinguistic skills can help differentiate between children with and

without disabilities including ASD. Milestones noted previously in terms of social smiling, sound making, babbling, onset and use of intentionality, onset of gestures, communicative functions, frequency and type of gesture use, and the ability to combine means of communication can all be analyzed for signs of delay or disability. In addition, factors such as non-hierarchical development (e.g., multiple words in a child's inventory, but none used functionally; a child learning letter and number names with limited use of gestures) can help in the diagnostic process as well as to identify areas to target in intervention.

In addition, because of certain patterns of gesture use, distinctions can also be made across disability groups. For example, the work of Watson et al. (2013) and Wetherby, Watt, Morgan, and Shumway (2007) has documented that the lower inventory of gestures of young children with ASD is one variable that can help distinguish them from children with other disabilities. As noted, between 9 and 12 months infants later diagnosed with ASD show patterns of similar number (but less variety) of social interaction gestures when compared to children who are typically developing (TD) and DD; whereas by 15–18 months they use fewer of these gestures than children with TD or other DD (Colgan et al., 2006; Watson et al., 2013). For behavior regulation acts at both 9–12 and 15–18 months, infants with ASD use similar numbers of acts as children with DD, but less than those with TD and more contact gestures (Landa, Holman, & Garrett-Mayer, 2007; Watson et al., 2013; Wetherby et al., 2004). The largest difference across groups appears in join attention acts where infants and toddlers with ASD at both 9–12 and 15–-18 months show no or few acts compared with children with DD or TD (Landa et al., 2007; Watson et al., 2013; Wetherby et al., 2004). Thus, gesture frequency, variety, and type can help make distinctions between children with ASD versus another DD.

Object-related or symbolic gestures are also important components of symbolic play acts and are strongly related to language skills. Looking at gesture and play, for both TD children (Bates, Bretherton, & Snyder, 1988) and those with DD (Kennedy, Sheridan, Radlinski, & Beeghly, 1991), higher levels of gestural production and play maturity have been associated with higher levels of comprehension. Thus examining and profiling a child's use of gestures, along with other related communication domains such as comprehension and play, can provide additional information about a child that can be used for clinical decision making. For example, in a study of siblings of children diagnosed with ASD, Mitchell et al. (2006) noted that neither comprehension nor production of words at 18 months had distinguished the high-risk siblings (those who went on to be diagnosed with ASD) from those at low risk (not diagnosed with ASD). However, the use of gestures did differentiate these groups. Therefore, Mitchell and colleagues argued that gesture use can be more informative than language measures at this age. They further suggest that examining gesture use alone cannot be used as a singular screening measure, but can be combined as part of routine developmental surveillance as the delays in gesture use may be one of the earliest indicators of ASD in these children. Thus, as suggested by Sauer, Levine, and Goldin-Meadow (2010), examining early gesture use can provide clinicians with a mechanism to identify children who may eventually have

persistent language deficits, before the delays are seen in the child's speech. Gestures in turn become a target of any intervention strategy developed to address current and possible future delays in communication skills.

Finally, using prelinguistic behaviors in combination is another means that can be used to identify children with potential disabilities including ASD. As documented by Wetherby et al. (2004), the lack of coordination of eye contact, facial expression, gestures, and vocalizations can be used as a red flag for toddlers with ASD. In addition, Goldin-Meadow and colleagues (Goldin-Meadow, 2008; Rowe & Goldin-Meadow, 2009) observed that gesture-plus-speech combinations predicted the age at which children produced two-word combinations. And Parladé (2012) has recommended examining the ability to combine vocalizations with eye gaze or gestures, and specific gestures such as showing and pointing that my help differentiate young children before the age of 12 months who may be struggling with communication challenges.

For children or adults in the prelinguistic stage of communication, facilitating their use of prelinguistic means in terms of frequency, variety, and types of functions should be a major focus of their educational goals. In addition, as suggested by Brady et al. (2004), facilitating their partners' use and modeling of these means can improve partner interactions thereby enhancing the communication skills of these prelinguistic individuals.

## 2.4 Conclusion

This chapter has highlighted a range of prelinguistic skills important for individuals in the prelinguistic stage of communication development. For individuals in this stage, acquiring a range of these behaviors is critical to current and later communication development. In addition, as the acquisition of many of these skills can enhance the individual's immediate communication effectiveness and efficiency, the transactional effect on communication partners can further advance the individual's skills as partners can be more responsive, providing more models and additional opportunities for the individual to communicate. Thus, clinicians and researchers can and should target these behaviors within both the assessment and intervention context.

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