Chapter 6
Individualized Assessment of Prelinguistic Communication

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Abstract One of the tenets put forth by the National Joint Committee for the Communication Needs of Persons with Severe Disabilities (NJC) is that all people communicate (ASHA Suppl 23:73–81, 2003). This is a powerful statement that shapes assessment and intervention practices for individuals communicating at the prelinguistic communication level. It is powerful because it puts the onus on practitioners to learn how each individual communicates. This premise can shift attention away from documenting one's communication limitations and toward describing extant communication behaviors. These extant behaviors often include idiosyncratic and socially undesirable behaviors that serve communication functions. The focus of this chapter is on discussing strategies that have been developed and implemented to describe communication in individuals with Autism Spectrum Disorders (ASD) who communicate primarily with prelinguistic forms, including gestures, vocalizations, and idiosyncratic forms of communication.

Three complementary assessment strategies will be discussed. The first strategy is *informant report*—an invaluable strategy that capitalizes on learning about how an individual communicates from those who interact with the individual on a regular basis and therefore know her or him best. The second strategy is *direct observation* of the learner in naturally occurring contexts in order to confirm and supplement information gained through informant report. The third strategy presented will be *structured observation* designed to probe a variety of communication responses. This third strategy could include functional analysis of communication behaviors; however, this strategy is discussed more completely in Chap. 7 in this volume. Therefore we will not repeat information on functional analysis here. Following discussion of all three strategies, examples of how using each strategy led to development of a profile of communication strengths and needs for two children with autism will be presented.

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6.1 Current Research on Assessment Strategies

6.1.1 Informant Report

Informant report is a strategy that has been used extensively to evaluate early communication behaviors (Brady & Halle, 1997; Dale, 1996; Rowland & Fried-Oken, 2010; Wetherby & Prizant, 1989). One of its main benefits is efficiency. Caregivers and other communication partners who frequently interact with the learner have extensive knowledge about how she or he communicates across a variety of situations. Questionnaires and interviews have been developed that help guide responses to provide maximum information about an individual's communication. Several specific instruments that have been used with children with autism will be highlighted in this section.

In addition to efficiency, an added benefit to informant report is that it enlists the help of caregivers and other communication partners and thus initiates a collaborative approach to intervention. Through participation in an interview or questionnaire, informants such as parents and caregivers learn about the behaviors that are viewed as potentially communicative, and start to recognize and respond more to these behaviors. In addition, by asking caregivers to provide this essential information, professionals demonstrate respect for caregivers' unique knowledge that has been gained over years of experiences. The process can contribute to building a relationship between professionals and caregivers that leads to collaborative construction of socially valid goals.

The Inventory of Potential Communication Acts (IPCA) (Sigafoos et al., 2000) is one example of an informant interview that has been used with individuals with autism. The IPCA was designed to obtain information about potentially communicative behaviors in individuals with severe disabilities. These individuals often have sensory limitations and physical limitations in addition to cognitive limitations. Their communication may take idiosyncratic, nontraditional forms including forms that are deemed inappropriate or challenging. The 54 questions on the IPCA are worded in such a way that it encourages those completing the interview to indicate how individuals respond to different real-life situations. For example, one question asks, "Please describe how (*name of individual*) greets you or others." At the conclusion of the interview, the assessor compiles the various responses into a grid that organizes the behaviors according to 10 different communicative functions: *social convention, attention to self, reject/protest, requesting an object, requesting an action, requesting information, comment, choice making, answer*, and *imitation*. The behaviors are considered as potentially communicative because they may represent consistent responses to communicative situations that are not always described as communication in the traditional sense. For example, someone may tense their body, rock and hum loudly when favorite objects are taken away. This response would be listed as a potential communication act that serves a protesting function for the individual.

The IPCA has been used in research studies that included children with autism (e.g., Braddock et al., 2013; Keen, Sigafoos, & Woodyatt, 2001; Keen, Woodyatt, & Sigafoos, 2002). Braddock and colleagues (2013) used the IPCA to describe nonverbal communication in a group of 17 young children with ASD. According to the parent-completed IPCAs, the children in this study most often communicated with informal motor behaviors including body movements and gestures during communicative situations.

Studies by Keen and colleagues specifically compared information from the IPCA to information gained from other sources in an attempt to validate the IPCA. Keen et al. (2002) compared teachers' responses obtained with the IPCA to researchers' observations of participants' communicative forms and functions, as well as participant responses to structured communication probes (e.g., choice-making opportunities). Across the eight participants, a low degree of overlap was found between IPCA information gathered from teachers compared with data gathered through researcher observations and structured communication probes. The range of verified behaviors (communicative forms and functions) for direct observation was 4–19 %, although when a more lenient standard of partial overlap in communicative behaviors was used, the range of verification was 23–85 %. The authors concluded that as only some of the teachers' interpretations of behaviors as communicative could be verified, use of tools such as the IPCA should be supported by additional information gained through observational data to provide a more comprehensive profile of a child's communicative behavior.

It is not particularly surprising that there would be discrepancies between reported and observed communication, however. While some caregivers may be highly attuned to potential communicative responses and report many behaviors as being potentially communicative, other caregivers may not be as attuned and thus may provide fewer examples in their responses to the IPCA. Also, since many different forms may be used to convey the same function (e.g., someone can reject by pushing away, shaking head to signify "no", screaming, etc.) and the same form may be used for different functions (e.g., shaking one's head can mean "I don't want it" or "that's not right"), it would be rare that information from informant interviews would overlap entirely with direct observation or scripted interactions. Instead, one may consider the different sources of information as providing complementary information, as in a triangulated model of assessment (Brady & Halle, 1997; Ogletree & Fischer, 1996; Siegel-Causey & Bashinski, 1997). To illustrate, consider the situation where a caregiver reports that a child protests by withdrawing to his/her bedroom, whereas a teacher reports that the same child protests by screaming. Communicative forms can be highly context specific, as this case demonstrates, and the child may need to acquire a number of different forms to communicate the same function across a variety of settings. Consequently, gathering information from a range of settings, from multiple informants and by using a variety of data-collection procedures can provide a more complete picture of the child's communicative behavior.

Another questionnaire that is frequently used with families who have a child with autism is the Caregiver Questionnaire that accompanies the Communication

and Symbolic Behavior Scales Developmental Profile (CSBS DP™). The CSBS DP is a comprehensive assessment tool that includes a behavior sample and checklist in addition to the questionnaire The CSBS DP was standardized with very young children (6–24 months) but the information from the questionnaire may also be valuable with older prelinguistic communicators. It contains 41 multiple choice items and 4 open-ended questions, reflecting seven different language predictors: emotion and eye gaze, communication, gestures, sounds, words, understanding and object use. It should take most parents about 15–20 min to complete.

Several examples illustrate different ways in which information from the CSBS DP Caregiver Questionnaire has been used in clinical autism research. Green and colleagues (Green et al., 2010) used raw scores from the Caregiver Questionnaire as an outcome measure and showed that children who participated in a clinical trial of their parent-mediated early intervention showed significant gains on these scores compared to a control group (Green et al.; Keen, Couzens, Muspratt, & Rodger, 2010). Similarly, Keen et al. showed significantly more gains on scores from the Caregiver Questionnaire by children with ASD who had a professionally-supported, as opposed to self-directed, intervention. Paul and colleagues (Paul, Campbell, Gilbert, & Tsiouri, 2013) used participants' scores on the "words" section of the questionnaire as a means of showing the level of word productions by participants in their intervention study. These studies illustrate how scores from the CSBS DP Caregiver Questionnaire could also be used in clinical settings, to document current communication and potentially reflect changes over time from the perspective of the parent.

The Communication Matrix is another tool available to obtain communication information from informants (Rowland, 2011; Rowland & Fried-Oken, 2010). Like the other instruments mentioned, the Matrix also relies on caregiver information, but uses technology to gather and summarize information. Parents or other familiar caregivers answer a series of questions on a computer and the answers are then organized into a profile that shows how the individual currently communicates according to a developmental continuum. Responses are organized by communicative functions: *refuse, obtain, social* and *information*. Based on the responses obtained, the computer program generates a profile that indicates the individual's current stage of communication according to one of seven levels: Level I is pre-intentional behavior, Level II is intentional behavior, Level III is unconventional communication, Level IV is conventional communication, Level V is concrete symbols, Level VI is abstract symbols and Level VII is language. Responses are also summarized according to how frequently they occur. For example, results from the Matrix might indicate that an individual *frequently* communicates with pre-intentional means such as body rocking to express discomfort, and *sometimes* will use gestures to communicate requests or protests. In this case, it could be said that the individual had "mastered" the level of pre-intentional behavior and was at an "emerging" level for intentional communication. This information can be very helpful in terms of educational programming because the educational team can identify goals that aim at increasing the use of emerging behaviors across multiple

environments, as well as goals aimed at helping individuals learn new communication behaviors.

When parents or other caregivers complete a Communication Matrix, the information is logged in to a centralized database. Recent reports have summarized data from this database for children with autism (Rowland, 2011; Rowland & Fried-Oken, 2010). Approximately 23 % of the 12,500 Matrices completed and entered into their database were from individuals with autism. The authors compared profiles generated for children with autism to individuals with Down syndrome (DS) and deaf-blind individuals. The patterns for the children with autism and DS were similar for many functions, but both of these groups had very different profiles from children with deaf-blindness. Some interesting differences between the individuals with autism and those with DS were that children with DS had higher levels demonstrated for *requests new objects, greets people, offers/shares, directs attention* and *names things/people*. These differences correspond to strengths and weaknesses reported in the literature for these two populations (Brady, Bredin-Oja, & Warren, 2008; Singer-Harris, Bellugi, Bates, Jones, & Riossen, 1997; Wetherby, Prizant, & Hutchinson, 1998). In particular, deficits in joint attention behaviors have been consistently observed in children with ASD, resulting in the use of fewer social communicative functions (Mundy, Gwaltney, & Henderson, 2010).

Bruce and Vargas (2007) also used the Communication Matrix to describe expressive communication levels in their 17 participants — two of whom had autism. These authors reported the highest level for the children with autism to be between Levels III and V for one child and between VI and VII for the other. Level III (unconventional communication) includes body movements, vocalizations, facial expressions and gestures such as tugging on people. Level IV, conventional communication, includes pointing and looking from a person to a desired object. Levels V-VII indicate variations in symbolic communication from concrete symbols that physically resemble their referents to abstract language use. The variations in scores reported by Bruce and Vargas reflect differences in levels used for different communication functions. This study illustrates how the levels captured by the Communication Matrix provide useful information about the communication levels reported by parents in authentic contexts. Consumers of this research would know that these participants were still using unconventional communication for some functions but using conventional communication forms such as natural gestures or even language for other functions.

In summary, the instruments summarized in the preceding section provide socially valid information in an efficient manner. However, as illustrated in the results of the Keen et al. (2002) study, informant data do not always mirror data from other sources. Therefore additional strategies are needed to provide a complete picture of a child's communication abilities and needs, providing guidance regarding intervention planning.

6.1.2 Direct Observation

Directly observing an individual in her or his own environments can provide invaluable information about how the individual communicates within those environments, leading to further analysis about how contextual variables influence communication. For example, caregivers may identify a number of ways in which someone communicates with prelinguistic gestures and vocalizations, but the individual may only produce these behaviors under certain conditions (e.g., Day, Horner, & O'Neill, 1994; Haring & Kennedy, 1990). Direct observations can help identify where, when and with whom someone communicates.

Direct observations require considerable time and resources; hence, this practice may be more likely to occur in research studies than in actual practice. For example, Brady and colleagues (Brady, Herynk, & Fleming, 2010) completed direct observations of 30 children's communication across 2 hours of classroom instruction, dispersed across 2 days and across different activities to obtain a sample of communicative behaviors across typical activities. Eleven of the children had autism and all of the observations occurred within their preschool classrooms. Using a hand-held computer, trained observers recorded the communication acts directed to the child by teachers as well as communication by the students with minimal verbal skills. Results showed that children infrequently initiated communication during classroom activities — mean initiation rate was once every 10 min. When child initiations were recorded, however, teachers usually responded. Child responses to adult initiations were observed more frequently — once every 2 min — indicating that most communication exchanges were initiated by the adult and responded to by the child. Live observations were used in this study and observers were not able to reliably determine the functions of interaction using this method.

In contrast, videotaped observations were analyzed in several research studies focusing on children with autism. As discussed above, Keen et al. (2001) directly observed four students with autism and compared the communication acts observed during snack time, toy play or small group situations, to the information provided in teacher-completed IPCAs. In another study, Keen, Sigafoos, and Woodyatt (2005) also followed IPCA assessments with direct observation, but this time with the goal of determining the degree of teacher responsiveness to prelinguistic communication acts. Eight children with autism were included in the study and researchers observed communication during 10-min segments across three different activities for each child (e.g., music, gross motor). This was repeated across 3 days, yielding a total of 90 min of direct observation. Their results indicated a great deal of variability across the different observations, with a range of 3–62 % child communication acts responded to by their teacher. Responses included verbal acknowledgements as well as compliance acts (e.g., giving an object to the child following a reach request). It was interesting to note that, although there was substantial variability, there was some consistency in the functions to which teachers responded. The function responded to most often was *social convention*, whereas the function least often responded to was *protest/reject*. While Keen

et al. demonstrated variability across different observations, Meadan, Halle, and Kelly (2012) also found variability across different observers. They examined judgments made by groups of observers of the communicative intent of three young children with ASD in relation to the functions of requesting and rejecting. They found observers who were familiar with the child and had formal knowledge of communication and language development were more accurate and confident in their judgments than those unfamiliar and without this formal knowledge.

Another technique that has recently been developed to collect communication data is the Language ENvironment Analysis (LENA^{TM}) system. LENA consists of a Digital Language Processor (DLP) and language analysis software. The DLP is a small, lightweight (2.5 oz) device that records the language environment and the vocalizations of the person wearing the device. The DLP can be secured inside a vest or T-shirt that can then be worn by children with ASD. Adults can also be assigned a DLP in order to capture more broadly the adult language within the child's environment. Once recordings have been made, the LENA software is used to analyze the audio file, providing data on child vocalizations, adult vocalizations and vocal interactions. A number of studies have successfully used the LENA system with young children who have ASD (see Brady et al., 2015; Dykstra, Sabatos-DeVito, & Irvin, 2013; Warren et al., 2010). While prelinguistic communication behaviors that involve non-speech vocalizations or non-verbal communicative forms are not readily captured by LENA, this technology may still be beneficial. Used in conjunction with other assessment approaches, the LENA system could provide useful information about the child's language environment. It may also help to improve our knowledge and understanding of what is occurring for children during the transition from prelinguistic to more intentional and symbolic forms of communication.

Information from direct observations could be used during staff training to alert teachers to the many missed opportunities to respond to student communication acts. For example, Sigafoos, Kerr, Roberts, and Couzens (1994) first documented baseline rates of communication opportunities for children in special education classrooms based on direct classroom observations. Few opportunities were initially observed. Interventions included consultation with teachers during which teachers and researchers jointly generated ways to use three evidence-based intervention strategies in the classroom: missing-item, interrupted-chain, and delayed-assistance. These strategies were reviewed prior to each intervention observation. Following the observations, feedback was provided to each teacher about the number and types of opportunities just observed. Results showed that each teacher increased the number of communication opportunities they provided during intervention, when compared to baseline rates.

These examples illustrate how direct observation can provide valuable information that adds to the overall assessment data. Results from direct observations in authentic contexts are likely to differ from the information obtained through informant reports, partly because there is a limit to the contexts that are observed. Caregivers and teachers provide information based on knowledge they have from a multitude of contexts that they engage in throughout the day, but direct

observations typically sample within contexts where communication is likely to occur at school or at home. The following section describes how a third strategy, *structured observation,* further adds to the picture of communication abilities derived from assessment.

6.1.3 Structured Observation

As stated above, directly observing individuals in their natural environments requires considerable resources. It also involves a bit of luck and careful timing to observe the range of different possible communication functions. For example, individuals request when there is something that they want. Similarly they communicate joint attention when there is something novel or noteworthy to comment upon. If opportunities for these and other functions are not present during the naturalistic observation, those specific communication functions will not be observed. The question remains, however, if individuals would produce these behaviors, given the opportunities.

The purpose of structured observations is to provide opportunities for specific communication functions, thus increasing the chances of observing a variety of communication functions. A number of scripts for different types of structured observations have been developed and used to assess individuals with minimal verbal skills (see Kasari, Brady, Lord, & Tager-Flusberg, 2013, for a description). In this section we will describe the basic principles of structured interactions and highlight a few that have been used with individuals with autism and minimal verbal skills.

Within structured observations, opportunities are provided for intentional, initiated communication acts by creating motivating contexts for communication. Opportunities for requests are often provided through environmental arrangement (Hwang & Hughes, 2000; Kaiser, Hancock, & Nietfeld, 2000). For example, an individual may be given something enticing that is in a difficult-to-open container. This presents motivation for the individual to request help (often through "give" gestures). Another strategy to promote requests is to offer a choice among two or more objects or events (Carter, 2001; Houghton, Bronicki, & Guess, 1987; Stephenson & Linfoot, 1995). In contrast, the hallmark of an opportunity to initiate joint attention is to provide an object, activity, or event that is worth commenting on. For example, the president of the United States recently visited our city and the occurrence of the motorcade motivated verbal and gestural comments by many in the campus community because of the novelty of the event. Within an assessment paradigm, however, it can be very difficult to provide authentic, sincere opportunities for joint attention because novelty or unusualness is likely to differ across individuals. In addition, communicating joint attention is predicated on a desire to share the information with someone. Thus, the communicator must be motivated by the novelty as well as the desire to share the novelty with their communication partner. Brady and colleagues have created numerous tasks designed to provide

opportunities for joint attention, including providing unusual musical instruments, placing food in plastic bags with an imprinted realistic looking bug, and covertly initiating movement by a toy hanging from the ceiling behind the experimenter. Typically, the goal is to ensure that the individual sees the event while the assessor pretends not to notice it, otherwise there is no need to draw attention to the event. We have gone to great lengths to try to provide authentic opportunities for joint attention, partly because lack of joint attention is one of the hallmark characteristics of individuals with autism. Therefore it is essential to document that an adequate opportunity was provided in order to evaluate reaction to the opportunity.

Social validation measures can help determine how effective a particular task is for evoking these different communication functions. Early on, when developing different activities to include in our structured interaction protocols, we "tested" the activities out with individuals of similar ages who had slightly more advanced communication skills than our target population (Brady, McLean, McLean, & Johnston, 1995; McLean, McLean, Brady, & Etter, 1991). If these social validation participants communicated, we considered the tasks to be valid (Wolf, 1978). Even so, individual preferences and interests lead to differential responding across participants. Therefore, we provide multiple opportunities for different functions in hopes that participants will be interested in and motivated by at least a subset of these opportunities.

In research studies, structured observations are typically videotaped for later scoring. There are different ways to score and summarize communication behaviors during structured observations. For example, Kasari and colleagues score each communication response observed during the Early Social Communication Scales (a specific structured observation context described below), then summarize the rates of different forms and functions of communication (Kasari et al., 2014). Brady and colleagues have also employed this strategy and then compared the rates of communication across subgroups, such as those who communicate with some words and distal points versus those who communicate solely with contact gestures such as 'gives' and hand-over-hand gestures (Brady et al., 1995; Brady, Marquis, Fleming, & McLean, 2004).

Recently, we began employing a different strategy to summarize and score responses to scripted opportunities using the Communication Complexity Scale (CSS) (Brady et al., 2012) The CCS was developed to summarize and reference communication according to a developmental continuum. Assessors watch the videotaped scripted opportunities and first identify the highest form of communication that occurs during the activity. Next, the assessors assign a code for that behavior according to the 12-point scale we developed, with 1 reflecting a bodily reaction (such as a startle) and a 12 indicating a two-word/sign/symbol construction that is appropriate for the context and not imitated. Scores between 0 and 5 are pre-intentional (or perlocutionary); scores of 6–10 are intentional (illocutionary) but presymbolic; and scores of 11–12 are intentional symbolic communication acts. After a score is assigned for each activity, we average the highest three forms used to communicate behavior regulation and the highest three forms used to communicate joint attention. At this point in development of the CCS, we do not know if

this average score is better than other types of summary scores such as an overall mean or median score. However, we settled upon this way to average scores because of the fact that some participants only like or respond to a subset of the materials, and we wanted to capture optimal performance during this limited observation.

The behavioral temptations portion of the CSBS (Wetherby & Prizant, 2002; Wetherby & Prizant, 2003) is another structured assessment protocol commonly used with children with autism. Specific opportunities to produce behavior regulation communication acts (e.g., requests), joint attention communication acts (e.g., comments) and social interactions such as greetings are embedded within play activities that are similar to those described for the Brady et al. protocols (2008, 2012). Keen et al. (2010) used the CSBS to assess expressive communication observed in children with autism who participated in one of two types of intervention — parent mediated or professionally mediated. Gains in raw scores were reported following intervention for participants in both interventions. Presumably, the raw scores represented the totals across different areas of communication, including rates of communication, gaze shifts, use of sounds in communication, word use, and language comprehension. Positive gains in these raw scores indicate gains made in at least some of these areas, relative to individual starting points. Although both intervention groups showed positive gains on the CSBS behavior sample, the group differences were not significant. In contrast, scores on the CSBS Caregiver Questionnaire did show significant group differences, with more gains found for the professionally supported group. This may reflect differences in observed communicative behaviors across different contexts and communicative partners, as the CSBS behavior sample is conducted by a clinician within a clinical setting. Even though activities and play contexts are designed to encourage a range of communicative functions, this still occurs within a limited time frame and context. Caregivers on the other hand can draw on knowledge of the child's communicative behaviors across a variety of settings over time when completing the questionnaire.

The Early Social Communication Scales (ESCS) is another assessment that provides opportunities for children to initiate communication. As in the other assessments discussed, the experimenter sets up specific opportunities for joint attention, behavior regulation, and other communication acts during play routines. For example, the assessor engages the child in a tickle game (walk mouse, creep mouse) then pauses to see if the child will request continuation of the game. This assessment has also been used extensively with children with autism (Lawton & Kasari, 2012; Roos, McDuffie, Weismer, & Gernsbacher, 2008). Kasari and colleagues (Kasari, Paparella, Freeman, & Jahromi, 2008) used the frequencies of joint attention communication acts observed during the ESCS and during mother-child interactions as one of the outcome measures in a randomized control trial study. The study found that children with autism who participated in an intervention that focused on teaching joint attention and symbolic play had significantly better growth in joint attention compared to children in a control group.

Thus, results from structured observations can provide information on frequencies of different forms and functions of communication acts as well as indicate how an individual communicates according to a developmental continuum. An advantage, particularly for research purposes, is that the context is stable over time. The information gathered through structured observations provides information that complements the information from caregiver reports and direct observations. The three assessments described in this chapter (the CCS, the ESCS and the CSBS) are intended to sample a range of communication functions. In clinical settings, it may be helpful to provide more focused structured observations to follow up on information from other sources or to evaluate results of a particular intervention. For example, interventionists may provide specific opportunities, such as choice-making opportunities, to specifically probe requesting. Following a course of intervention, the choice-making protocol could be re-administered to evaluate change after intervention. Specific probes such as these would be valuable if the team was not interested in describing how a learner communicated multiple functions, but rather wanted to document changes in the forms used by a learner to communicate a specific function (requesting a choice) over time. One may also view the functional analysis paradigms described in Chap. 7 as versions of scripted interactions because they also provide opportunities to communicate under conditions typically associated with challenging behaviors.

6.2 Implications for Research and Practice

Together, caregiver questionnaires/interviews, direct observations in authentic contexts and structured observation assessments provide complementary and comprehensive information about how a child communicates. When this information is considered together, it can also lead to identification of meaningful communication goals for children with autism who communicate prelinguistically. The following are two case examples offered to illustrate how educational or rehabilitative teams could use this comprehensive assessment information.

Case 1 Boniface is a 6-year-old child who has autism. Prior assessments have placed him below the first percentile on standardized assessments of communication. In fact, past evaluations describe him to be "untestable" with standardized language or cognitive assessments intended for his age. Boniface is in a first grade classroom in his neighborhood public school. He is supported with a paraprofessional in addition to special education, speech language pathology and occupational therapy services.

The IPCA was completed through an interview conducted with his mother. The results of the IPCA indicated the profile of communicative acts summarized in Table 6.1. As can be seen in this grid, most of Boniface's reported communication acts were nonsymbolic gestures and movements (e.g., plopping on the floor when asked to complete a task such as brushing teeth; and grinning when his Dad

Table 6.1 Summary of responses for Boniface's IPCA

Behavior	Social communication	Attention to self	Reject/protest	Request object	Request action	Comment	Choices
Grins	X (greets)						
Stares				x			x
Leads				x	x		
Fusses			x				
Hums						x (happy)	
Laughs						x	
Cries		x					
Rocks						x (bored)	

approached him). The IPCA indicated some potentially intentional communication acts, predominantly to request highly desirable items (e.g., leading Mom to a shelf that was out of reach and contained a favorite electronic game). However, it was also reported that Boniface frequently stood in front of desired objects and just waited until someone noticed he was there.

Based on this information, the team decided to observe Boniface at school in three different contexts. First they observed him during a required task — putting on his coat and mittens before going outside. Second, they observed him during snack time that was conducted in a group format. Teachers offered food items to each child in turn, holding the food up but out of reach of the child, and then waited for the children to request their snack. Graphic symbols were available to all children during snack time. Third, they decided to observe the end of a "free play" context where children were required to put their toys away. Boniface typically played with one electronic game and was usually still engaged with the toy when teachers signaled it was time to put the toys away. Each context was observed over 3 days to sample responses. The total direct observation time across the 3 days was approximately 45 min. Teachers recorded antecedent events, any communication attempts made by Boniface and the consequences for these events using an Antecedent, Behavior, Consequence (ABC) recording sheet (Ellingson, Miltenberger, Stricker, Galensky, & Garlinghouse, 2000). The observations indicated that Boniface reliably cried and pulled away when required to put on his coat. On two occasions, he looked directly at his teacher when he began to cry and then looked away. During snack time, it was observed that Boniface looked over towards the graphic symbols on two out of six choice opportunities and attempted to grab the snack foods during all six opportunities. During the toy clean-up context, Boniface initially cried when the toy he was playing with was taken away, then he stood in front of the toy on the shelf, jumped up and down and flapped his hands. On two occasions he also looked from the teacher to the toy and vocalized while jumping.

The assessment also included a structured observation using protocols developed by Brady and colleagues (2012). The assessment was videotaped and then scored using the CCS scoring system described above. The three highest communication acts observed across the structured context were two 7 s (give gestures), and a 6 for a triadic eye gaze. All three of these communication acts occurred during behavior regulation tasks, yielding a score of 6.67. The highest communication acts during joint attention tasks were two 4 s (vocalizing while looking at the novel event) and a 3 (looking without vocalizing), yielding a 3.67 for joint attention. These scores indicate that Boniface is beginning to use intentional communication acts to request objects, and is using pre-intentional communication during joint attention tasks.

To summarize, Boniface infrequently communicated intentionally during the structured observations. He used pre-intentional communication during classroom observations and at home based on the IPCA. Follow-up discussions with Boniface's mother indicated that he does occasionally give objects to request help at home and look back and forth between his mother and an object he wants on

occasion. His mother did not consider these as communication when completing the IPCA. However, these communicative gestures (giving and triadic eye gaze) were not observed during classroom observations. This information allowed the team to discuss ways to promote more intentional communication acts across school and home environments as well as ways to introduce symbolic communication during highly motivating tasks identified through the classroom observations. The team decided to allow Boniface to request additional time with a favorite toy by selecting a symbol for "more play" after the first announcement of "time to clean up." Boniface's Mom decided that when she observed a triadic eye gaze at home she would verbally map this behavior by saying "oh you want ____" and pointing to the object before giving the object to him. In addition, the team decided to give many more opportunities for Boniface to use the "give" gesture by providing toys and food that required assistance and waiting at least 5 s before prompting a response or giving the food or toy to him. These strategies were introduced to complement other communication goals — such as learning to discriminate symbols — and to promote communication throughout the day.

Case 2 Tonya is a 7-year-old child who has autism and Fragile X syndrome. She also attends a regular education classroom in her neighborhood school. A paraprofessional works with the teacher when needed to provide additional supports in the classroom. Tonya's educational team collected assessment information from the IPCA, direct observation and structured interactions. In contrast to Boniface, for Tonya all three sources of information converged on a communication profile that showed many different types of intentional communication acts used to communicate requests and protests and a few instances of comments. For example, Tonya's mother indicated that Tonya sometimes led her Mom to the television when a favorite commercial came on. During the scripted observation, Tonya "showed" an unusual toy to her Mom. In addition to these prelinguistic behaviors, Tonya signed "please" and "help" to request during the classroom observation of snack time and during the scripted observation. However, it was noted that Tonya would use these signs interchangeably and if her first sign was not responded to, she would switch to the other sign. It was not clear that she understood the different meanings of these two signs. Her mother also reported that she had been taught many different signs but mainly used these two signs and used them interchangeably.

Based on combined assessment information, Tonya's team decided to promote more advanced symbolic communication by teaching her to use a speech-generating device within contexts where she was observed to communicate with intentional nonsymbolic gestures, vocalizations or signs. A small, lightweight device was selected that could easily be carried from place to place. Symbols were selected to map onto her existing communication functions. For example, symbols for "look" and "TV" were provided so that Tonya's Mom could model "look TV" when Tonya pointed to something on the television.

These two examples illustrate the importance of collecting multiple sources of information during the assessment process, and considering the information in total. In addition to completing these activities at regular intervals, such as annually, the

assessment components may also be used to inform intervention decisions at more frequent intervals. For example, structured assessments could be given before and after a particular intervention is implemented to see if intervention effects generalize to the structured contexts. One consideration, however, is that some tasks may lose their salience for participants after repeated exposures. For example, the sight of a large (pretend) bug printed on the bag described previously may be unusual and noteworthy when first shown to a child, but is not likely to engender the same response if this task is administered just a few weeks later. For this reason, Brady and colleagues are currently building a compendium of interchangeable tasks that are designed to evoke the same communication functions and can be used across multiple administrations.

Time is another challenge that many intervention teams will face when implementing the intervention approach described in this chapter. In our research, completing all three types of assessment for a given learner requires anywhere from 3 to 5 h, including time to score and summarize results. One variable that affects the amount of time is the talkativeness of the person who is providing the information on the informant report. Some caregivers really appreciate the opportunity to talk about their child's communication and interviews with these caregivers can require an hour or more. In addition, directly observing children who are very low-rate communicators may require more time to see an adequate sample of behaviors. On the other hand, coding scripted interactions for children who are high-rate communicators can take extra time, up to an hour or more. The time commitment is well worth it, however, because of the richness of results derived from these comprehensive assessments. Another challenge can be the collection of information across different contexts that we know can provide unique data on communicative functions and forms. For example, obtaining information about how a school-aged child communicates at home will likely be accomplished through informant interview because home visiting is often not part of the program and direct observation in the home or other community contexts may not be possible. In this context, an image-enhanced interview may help to gain additional information about the child's communication behavior. Photovoice is one type of image-enhanced interview technique whereby caregivers are asked to take photographs of their child based on interview items or themes (Harte, 2009). Having caregivers then describe the photographs and why they took them can subsequently enhance the information provided by caregivers and promote engagement in the development and implementation of intervention strategies. Similarly, video conferencing has been used to assess and coach communication of prelinguistic children with ASD (Boisvert, Lang, Andrianopoulos, & Boscardin, 2010; Venker, McDuffie, Ellis Weismer, & Abbeduto, 2011). Given advances in digital technologies and the availability of mobile digital devices, image-enhanced interviews warrant further investigation and could potentially make an important contribution in the assessment of prelinguistic communication behavior for children with autism.

6.3 Conclusions

In this chapter we have summarized how to combine caregiver assessment with direct observation and structured interaction to gain valuable information about how an individual learner communicates. Unlike the information provided in Chap. 5 on standardized assessments, the information derived from these three sources will not indicate how one's communication compares to other individuals with or without disabilities. Instead, these assessments are intended to both describe extant communication skills and identify treatment goals that relate to and extend the communication skills described.

Thorough, accurate assessment is the key to successful intervention planning and monitoring intervention progress. Thus, the time and effort devoted to the procedures described in this chapter will enhance individualized programming for learners with autism and minimal verbal skills. Further research is needed to develop methods to systematically and efficiently apply these methods across classrooms, habilitation centers and homes. In addition, research is needed to address assessment of receptive as well as expressive communication, and to ascertain how to further adapt assessments and interventions to accommodate sensory or motor limitations that may co-occur with autism.

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