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Chapter 9

Language Assessment of Deaf Learners

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Abstract

Most deaf children are at risk for language delay because their access to speech is compromised or early input from fluent sign language users is lacking. Research has found that some deaf children have language impairments that pose additional barriers to language acquisition. Since language paves the way to later learning, optimal development is critical. This chapter reviews the reasons for assessing language development in preschool and school-age deaf children and focuses on the challenges that face staff when carrying out an assessment, the skills and knowledge needed, appropriate assessment methods, and interpretation of findings. Although standardized tests are used increasingly with oral deaf children, their use and interpretation are problematic. Such tests are inappropriate for signing children, for whom few measures exist. The chapter concludes by considering how language assessment findings relate to the language learning environment of the classroom.

Keywords: language assessment, deaf, sign language, language impairment, standardized test, language learning

Why Assess Language Development in Deaf Children?

Spoken language has become increasingly attainable for deaf children in recent years. Due to the changing context of deafness (Mayer & Leigh, 2010), it is now possible to identify childhood deafness at a much earlier stage than was previously possible; as a result, newborn hearing screening has increasingly become routine practice in many parts of the world (e.g., United Kingdom: Pimperton & Kennedy, 2012; United States: Green, Gaffney, Devine, & Grosse, 2007; Switzerland: Metzger, Pezier, & Veraguth, 2013; Taiwan: Huang, Chiang, & Shiau, 2013; Chile: Krauss, Heider, Sierra, & Ribalta, 2013). Identification of deafness soon after birth provides opportunities for earlier intervention, and a priority for all services is the provision of appropriate amplification. Deaf children now benefit from increasingly sophisticated amplification options, including bilateral cochlear implants and digital hearing aids that offer far better auditory access than was previously possible. There is also widespread recognition of the need for interventions to support families in developing their deaf child's communication, although the precise nature of such interventions, at least in the United Kingdom, is less well defined (Rees, Mahon, Herman, Newton, & Craig, 2014). Despite these advances, deaf children continue to be at risk for language delay, with corresponding consequences for mental health, literacy development, and academic achievement.

Sarant, Holt, Dowell, Rickards, and Blamey (2009), summarizing research over the previous 15 years, reported that many deaf children start school with a language delay of at least one year and have a generally slower rate of language acquisition, averaging approximately half that found in the hearing population. Research has found that children with cochlear implants have higher levels of language than have previously been observed among hearing aid wearers (e.g., Boons et al., 2012; Geers, Strube, Tobey, Pisoni, & Moog, 2011). Implantation before the age of

one leads to speech intelligibility and language development that parallels hearing children's development, at least at the early stages of development (Dettman, Pinder, Briggs, Dowell, & Leigh, 2007; Leigh, Dettman, Dowell, & Briggs, 2012). Outcomes for children implanted later are more mixed: although speech perception and production are often good, language delays may persist (Leigh et al., 2012). Although some longitudinal research is emerging in this area, more is needed that follows children with implants into their secondary education to monitor the long-term effects.

One consequence of earlier diagnosis and better amplification is that deaf children are increasingly placed in mainstream schools (Consortium for Research into Deaf Education, 2013; De Raeve et al., 2012; Uziel, Sillon, & Vieu, 2007). Many of these children present with clear speech and competent conversational skills, skills that effectively mask subtler underlying problems with language comprehension (Archbold & Mayer, 2012). Those who do present with good spoken language may be perceived as needing relatively little support. However, minimal or no support then continues into secondary education, despite the substantial increase in curriculum demands, and carries consequences for poor outcomes. Harris and Terlektsi (2011) looked at reading and spelling in older deaf children (12 to 16 years) with either cochlear implants or digital hearing aids. The children with digital aids were found to perform at a higher level than those with implants. Children with digital aids were more often in specialist education settings, whereas those with implants tended to be in mainstream schools. The authors suggest that it may be the lack of support provided in mainstream schools that accounted for the implanted children's poorer literacy skills. Although Harris and Terlektsi (2011) did not focus specifically on language, it is the language deficit that underpins literacy that is widely acknowledged to be at the root of the literacy problem for deaf readers (see Marschark, 2002). Others (Mukari, Ling, & Ghani, 2007) have also

stated the importance of providing ongoing support for deaf children with implants, despite the improved access to speech provided by the device. Without regular language monitoring, the need for support cannot be determined.

For children who use sign language to communicate, the visual accessibility of signs has the potential to facilitate language development, subject to sufficient and timely exposure. This is evidenced by deaf children in deaf families where sign language is used, who develop language at the same rate as hearing children acquire spoken language (see Morgan & Woll, 2002; Schick, Marshark, & Spencer, 2006). However, for the majority of deaf children, sign language exposure from hearing parents who are not themselves fluent signers means that exposure to signing is delayed and from poor language models (Marschark, 2002; Mayberry, 2007; Woolfe, Herman, Roy, & Woll, 2010). Research on deaf signing children with hearing parents has shown that these factors lead to poorer comprehension and morphological skills that vary more widely when compared to native signers (Kyle, 1990; Mayberry, 2007; Newport, 1990). These findings further highlight the importance of language assessment for signing deaf children.

Between 30% and 40% of deaf children are known to have additional disabilities ranging from visual impairments to learning disabilities and autism spectrum disorders (Edwards, 2010). Although many such children are now receiving cochlear implants, these children have poorer outcomes for language development (Cupples et al., 2014; Holt & Kirk, 2005), so careful monitoring is needed.

Some researchers have documented the co-occurrence of language impairments in children who have hearing loss. Gilbertson and Kamhi (1995) and Norbury, Bishop, and Briscoe (2001) both investigated primary-aged children with mild to moderate sensorineural deafness and found some of their participants to have language impairments. Gilbertson and Kamhi reported this to be

the case in half of their sample, whereas Norbury and colleagues found 22% with language impairments (mainly younger participants). These figures are higher than the 7% reported among the hearing population (Tomblin et al., 1997). Other researchers have also investigated oral deaf children with suspected language impairments. Hawker and colleagues (2008) studied six children with implants whose spoken language outcomes were lower than expected, and Murphy and Dodd (2010) described in greater detail an older oral deaf child with a language impairment.

There has also been research investigating language impairments in deaf children who sign (Mason et al., 2010; Morgan, Herman, & Woll, 2007; Quinto-Pozos, Forber-Pratt, & Singleton, 2011). Differentiating the language delay that frequently occurs in the majority of signing children in hearing families from language impairment presents particular challenges (Hermans, Knoors, & Verhoeven, 2010), but in some countries the availability of standardized language measures with deaf norms has made this possible (Herman, Holmes, & Woll, 1999; Herman et al., 2004; Woolfe et al., 2010). Mason and colleagues used a cutoff of -1.5 standard deviations on standardized measures of sign language comprehension and production to determine language impairment. On this basis, Mason and colleagues (2010) estimated the prevalence of language impairment among their sample of signing children to be 6.4%, a figure more comparable to the prevalence noted previously for hearing children (Tomblin et al., 1997).

In cases where language impairment coexists with deafness, language assessment has diagnostic significance in helping professionals, families, and children to better understand the nature of these difficulties and in planning more appropriate interventions (Herman et al., 2014). Whereas deaf children with language delay respond to language enrichment programs, children with impaired language require specialist interventions; for many, intervention will need to be long term, although the precise nature of such interventions has not to date been described (Herman et

al., 2014). Nonetheless, there is no doubt that detailed assessment findings to profile a child's strengths and needs can inform individualized interventions. Reassessment is then needed to evaluate whether interventions are effective.

We have presented a number of factors that explain deaf children's struggle to acquire language at the same time as their peers. Although recent research on early language acquisition in children implanted in their first year seems promising, it remains to be seen whether such progress is maintained in the longer term, for which regular assessment is needed. Poor communication is associated with increased emotional and behavioral difficulties in childhood and higher rates of mental health problems in adults (Fellinger, Holzinger, & Pollard, 2012). Delayed language is also associated with lower levels of literacy, with consequences for academic achievement and subsequent employment (Marschark et al., 2006). Assessment is needed to monitor development, diagnose language impairment, and design and evaluate interventions. Assessment findings contribute to the decision-making process for educational placement. For these reasons, deaf children's language development must be monitored regularly throughout their education, whether they communicate using spoken or sign language. For bilingual deaf children who use spoken and sign languages, or indeed additional spoken/sign languages, assessment of all languages is necessary.

For all deaf children, the aims of assessment are broadly the same:

- To obtain an accurate sample of the child's communicative repertoire that represents the communicative contexts the child regularly encounters;
- To determine whether language is developmentally age-appropriate;
- If acquisition is not proceeding as expected, to provide a differential diagnosis and profile strengths and development needs to inform intervention;

- To provide a baseline for reevaluation.

Before addressing each of these in turn, we consider the skills required to carry out a valid and accurate language assessment.

Challenges in Assessment

When planning a language assessment, a number of decisions must be made:

- Which areas of language should be assessed?
- What assessment methods should be used?
- How should the assessment be conducted and by whom?

Answering these questions requires a specific set of knowledge and skills. In this section, we consider the specialist knowledge and skills needed by professionals to fulfill this role, although we note at the outset that in many cases no single professional will possess all of them. Therefore, in many settings, and in particular with deaf children who sign or who have additional difficulties, assessment will require a team approach (Herman, 1998). Team members include speech and language therapists, teachers of the deaf, deaf staff, mainstream teachers, and other specialists, as well as parents. Each team member makes his or her own contribution to the assessment process. For the remainder of this chapter, we will refer at times to the “language assessment professional” and at others to the “language assessment team.”

The communication difficulties encountered by deaf children have been widely documented and span a range of language domains, including phonology, morphology, semantics, syntax, and pragmatics. It is beyond the scope of this chapter to review all of these, and the interested reader is directed to Lederberg, Schick, and Spencer (2013) for a review of the language achievements of deaf children. Some professionals who carry out assessments with deaf children,

such as speech and language therapists, have a firm background in the linguistic structure of spoken language and ways in which it may be compromised by different communication disabilities, including deafness. Language assessors also require extensive knowledge of typical patterns of language acquisition in both spoken and sign language (Easterbrooks & Baker, 2002). This knowledge provides an essential backdrop to determining whether observed deficits are due primarily to deafness or may be explained by additional difficulties.

For any individual deaf child, one, several, or all areas of communication may be affected. Although in principle assessment should be comprehensive and detailed, too much time spent on assessment places a burden on staff and children alike and takes time away from the child's education. Therefore, an important first step is identifying priorities for assessment before deciding on the appropriate method. Prioritizing involves taking account of the child's history and current circumstances as well as communication needs of particular concern to the child, parents, or teacher. Knowledge of the individual child, consultation, and information sharing within the assessment team is essential in assembling the necessary background information.

Thereafter, the language acquisition professional needs to have a sound understanding of testing principles (Jamieson & Simmons, 2011), familiarity with a range of assessment methods, and a high level of skill in communicating flexibly and effectively during the assessment process. Flexible communication includes using spoken communication, sign language, or sign support, according to each child's communication preference. If testers lack the necessary communication skills, identifying and training staff with the appropriate skills to deliver the assessment is an option.

For language testing with deaf children, testers need to know how to optimize the test environment so the child is not disadvantaged. This includes ensuring that the test environment is

quiet and free from distractions, conducive to the needs of a hearing aid or implant user, and that any amplification devices used are fully functional at the outset. Testers also need to provide full visual access to speech reading or signing as needed, achieved by appropriate face-to-face seating and adequate lighting. Testers should be aware of the need to establish eye contact with the deaf child prior to delivering test instructions. In some cases, deaf children may require more explanation of what is needed. Additional practice items can also be helpful in ensuring that children understand the task demands before starting the test proper. Use of gesture, signs, and other cues such as writing may also be helpful in explaining what is involved.

Assessment Methods

The assessment approach must be planned with reference to the child's age and the presence of additional difficulties. In most cases, a combination of formal and informal methods is appropriate (Jamieson & Simmons, 2011).

Language sampling is widely used for an informal assessment of language development. In the hands of a skilled language acquisition professional, a language sample can yield much useful information and provide a preliminary screen of the child to guide the selection of further formal measures. It is important to observe children communicating in a range of contexts to establish their preferred mode of communication and the ways they adjust their communication with different conversation partners. This is particularly important for deaf children who use sign language or sign support. We mentioned previously that many are exposed to a range of communication modes from people with different levels of skill in each. As a result, deaf children are often adept at modifying their communication to meet the needs of the person they are communicating with. For example, the child may use signing that more closely follows spoken

language (e.g., Sign Supported English) when communicating with a hearing person, particularly one who is less fluent in sign, whereas he or she may revert to full sign language structures when among deaf signers (Erting, 1988).

The skills of the communication partner are also important. An oral deaf child observed with someone who has experience of deafness may appear to be a more proficient communicator than when seen with an individual who has minimal experience. Sampling only one of these situations fails to capture the child's full communicative repertoire; indeed, the information derived may say more about the skills of the conversation partner than the child. Language samples should be drawn from everyday communication situations and include interactions with deaf and hearing adults and children to build a full picture of the child's communication abilities. Analysis of data serves to identify an individual child's strengths and weaknesses and to guide decisions about areas requiring further assessment.

Formal assessment is needed to make comparisons with typical development, for which norm-referenced assessments are generally used. However, few assessments have been developed for deaf children, and hardly any provide deaf norms. As a result, professionals who work with deaf children rely on assessments that have been developed and standardized on children who are not deaf and who have language learning backgrounds that are very different from those of deaf children. Use of such tools can be appropriate for some deaf children, particularly those who use spoken language. Since so many are increasingly schooled in mainstream classrooms and are expected to keep up with their hearing peers, comparison with hearing norms is relevant.

For children who use sign to communicate, hearing norms are never valid. Translating spoken language assessments into sign language, or using key word signs when carrying out a test of spoken language, is clearly a violation of the established test procedure; as a result, standard

scores cannot be applied. There is a strong case for assessments to be developed specifically for sign language and standardized on deaf children (Singleton & Supalla, 2011). In some cases, a test developed for one sign language can be successfully adapted to another (Haug & Mann, 2008). However, even this entails careful consideration of the differences between the source and destination sign languages and cultures, new norms must be collected (Enns & Herman, 2011), and further work is needed to establish the psychometric qualities of the adapted test (Haug & Mann, 2008).

Developing tests of sign language acquisition also raises questions about the nature of the standardization sample—that is, whether all deaf signers or only native signers should be included. Although native signers form a more homogeneous group, sign language tests are needed for the majority of deaf children who are not native signers. Some researchers have addressed this issue by developing and piloting early versions of a test on native signers but collecting normative data on a wider sample that includes native and nonnative signers (Herman et al., 1999). Others, such as Anderson and Reilly's (2002) adaptation of the MacArthur Communicative Development Inventories (CDI; Fenson et al., 1994) to American Sign Language and Woolfe, Herman, Roy, and Woll's (2010) adaptation of the same measure to British Sign Language (BSL), have argued that measures of sign language development should be based solely on children in deaf families, since their exposure more closely approximates that of hearing children acquiring spoken languages.

There is also the separate issue of accessing sufficient numbers of participants to derive meaningful norms. It is accepted that norms in tests of spoken languages should be based on large numbers of native users, should reflect a significant proportion of the population size, and should capture normal variability. However, the population of deaf children is much smaller (2 to 3 per 1,000 births, Vohr, 2003), so it is impossible to obtain data on such large numbers. Restricting test

development to native signers further reduces the population to be sampled, carrying the inherent danger that small samples are more prone to sample bias (Prezbindowski & Lederberg, 2003).

Woolfe and colleagues (2010) initially collected data from deaf parents on their deaf and hearing children's BSL vocabulary acquisition to develop BSL norms on the CDI. Although both deaf and hearing children in deaf families are considered native signers, hearing children are likely to be bilingual from an early age, whereas deaf children tend to be initially monolingual (Herman & Roy, 2000). Indeed, Woolfe and colleagues (2010) observed differences in the trajectories of BSL vocabulary development between their young deaf and hearing native signers; as a result, they presented data only on their deaf participants. They collected repeated datasets from 29 deaf children in all. Although a small number, this represented approximately 30% of the estimated number of deaf children born to deaf parents in the United Kingdom of the designated age group and as such is a much larger proportion of the potential population than is found in any other test standardization.

Considering the age of the child to be assessed, Prezbindowski and Lederberg (2003) reviewed a range of measures suitable for the earliest stages of language acquisition. Since very young deaf children cannot cooperate with formal testing, assessments that rely on observation and parental report are used, including parental diaries and checklists. Parental diaries can offer rich insights into a child's communication but require the parents to provide consistent and accurate information. This can be an issue in some cases, for instance for signing children if hearing parents do not know sufficient sign language themselves.

Parent checklists such as the CDI (Fenson et al., 1994) are more reliable and have been used successfully with deaf children. Mayne and colleagues (2000a) collected normative data on

the CDI based on 202 deaf children aged 8 to 37 months, and as we noted previously some sign language versions have also been developed (Anderson & Reilly, 2002; Woolfe et al., 2010).

Although parent checklists have their place in the assessment of very young children, they become less accurate for the later stages of acquisition when language is too extensive to report, in which case direct testing methods are preferable (Prezbindowski & Lederberg, 2003). A wide range of formal assessments examining different language domains is available for use with preschool and school-aged hearing children, some of which are also used with oral deaf children. The interested reader is directed to Jamieson and Simmons (2011) for a review of formal tests that are commonly used.

Before using any language assessment developed for hearing children with an oral deaf child, testers need to review the test items to evaluate their suitability. This includes considering the phonological, morphological, and speech-readability characteristics of the language used. For example, test items that focus on morphological inflections used in English to mark plurals or tenses may lead to low scores in deaf children who are less able to detect acoustically non-salient phonemes such as /s/. Alternatively, asking a deaf child to select “sock” from an array of toys that also includes “doll” challenges a deaf child’s speech perception skills, since both words appear similar when speech-reading. In both of these examples, results may be indicative of difficulties with speech perception rather than language comprehension.

The test response mode also deserves consideration. Some tests require nonverbal responses such as picture selection; others rely on spoken responses. For deaf children with unclear speech, poor intelligibility is likely to contribute to lower test scores. Tester familiarity with the speech patterns of deaf children is therefore important for scoring accuracy.

A final consideration when carrying out a test is where to start and when to finish testing. In most tests, items are organized in order of difficulty and testing often starts at an item prescribed in the test manual and determined by the child's age. The problem for deaf children who have delayed language is that the starting point is often too high and gaps in vocabulary can make it difficult to establish basal scores (Zemann, 1999). Alternative attempts to estimate a starting point for each child may become arbitrary and can lead to further consequences: Starting the test at too low a level runs the risk of fatiguing deaf children, as they are then expected to attempt more test items than other children. Conversely, starting too high can be demotivating for a child who cannot achieve early success (Zemann, 1999).

Interpreting Assessment Findings

Once the tester has completed administering the test, it is important to reflect on the assessment process in light of what was said previously. When scoring results and applying hearing norms, the assessor must remember that deaf children have very different language experiences from those of hearing children; therefore, the value of hearing norms must be considered on a case-by-case basis. For children who have had a late diagnosis of deafness and/or late provision of effective amplification, standard scores should be interpreted particularly cautiously and explained within the context of the child's circumstances. When interpreting test scores, the tester must therefore review a range of factors related to the child's age at diagnosis of deafness, use of amplification, communication environment, presence of other disabilities, family factors, and so forth.

With respect to signing deaf children, for whom relatively few standardized measures exist, some researchers have presented an approach to evaluating deaf children's test performance when

using nonstandardized tools. Herman and colleagues (2014) describe the development of new measures designed to investigate and characterize language impairments in their signing deaf participants. For newly developed tests of sentence repetition and vocabulary, there were no norms available, so a control group was needed to aid interpretation of assessment results. The authors describe how they matched children with suspected language impairments with a group of typically developing deaf children on variables such as age, gender, and parental hearing status. In many cases, the controls attended the same schools as the language-impaired participants, so language exposure was more closely matched. In other words, for this study, comparison of language-impaired deaf signers, almost all of whom were from hearing families, with other children who were also nonnative signers was key. In this way, the performance of language-impaired and non-impaired participants could be compared and the value of the different experimental measures determined, prior to their standardization.

Interpreting test scores initially involves comparison with others who have similar language experiences. Testers must also evaluate the extent to which assessment findings can be generalized to the child's everyday context (Easterbrooks & Baker, 2002). Formal testing is typically carried out under carefully controlled conditions to obtain the best possible picture of a child's language abilities. Yet outside the test situation, the deaf child is rarely in such optimal conditions; therefore, assessment findings may not give a true indication of how the child functions in his or her everyday learning environment.

Young deaf people themselves have described the poor acoustic conditions and difficulties listening in groups that they experience in mainstream schools (Wheeler et al., 2007). Many find it difficult to follow the complex spoken language used in class and require communication support to clarify or repeat what is said. In addition, teachers who lack experience with deaf children expect

them to take advantage of incidental learning, where information is gleaned passively through overhearing what is said (Calderon & Greenberg, 2003). Hearing children readily pick up on communication that is not addressed to them and use this to support their learning. However, this is far more challenging for a deaf child, for whom communication needs to be more explicit. Therefore, the assessor's role extends beyond analyzing test scores and includes explaining how a deaf child's language profile affects his or her ability to understand and contribute to classroom learning. Teachers also need to appreciate the significance of the classroom as a language-learning environment for deaf children. With deaf-friendly classroom management, classroom conversations can support effective development of the deaf child's language acquisition. This includes carefully managing classroom discussions, keeping noise and distractions to a minimum, and repeating and rephrasing key concepts and new terms.

Conclusions and Future Directions

This chapter has presented the case for the regular assessment of deaf children's language from the point of diagnosis and throughout the school years. Assessment is needed to monitor the early stages of language acquisition and to identify children who are failing to acquire age-appropriate language. Assessment is also necessary as the child gets older to ensure that progress is maintained and review the need for support.

Assessment is important in helping to identify deaf children who have language impairments or additional difficulties that affect their learning. In these cases, assessment findings can inform the design of interventions and reassessment serves to evaluate the efficacy of interventions.

Considerable skills and knowledge are required by testers, and particularly in the case of deaf children who sign, language assessment requires additional expertise for which a team approach is recommended.

With advances in earlier diagnosis of deafness and improvements in amplification technology, expectations for deaf children's achievements have been raised (Knoors & Marschark, 2012). The growing use of norm-referenced language assessments forces the comparison of deaf children's achievements more directly with those of hearing children, although there is also the need for skill in interpreting the results of such tests. Interpretation of assessment findings includes their generalizability to the language-learning contexts that deaf children encounter in school.

We have described the assessment of spoken and sign language development using different tests. For children who use both spoken and sign language, there is a need for measures that allow comparisons to be made between these languages. The CDI is one such measure, and work is under way at City University London and the Deafness, Cognition and Language Research Centre at University College London to develop parallel tests for spoken and sign language using the same elicited narrative test format.

There is also a need to look beyond the use of traditional assessments that generate a snapshot of a child's performance at one point in time and focus instead on the nature of the learning process. One potential approach is dynamic assessment. Employing a test-teach-retest paradigm, dynamic assessment focuses on the emerging skills a learner shows when facing a new task and the amount of support required by the assessor for optimal learning (Haywood & Tzuriel, 1992). This approach uses tasks that are slightly above the child's level, thereby enabling the examiner to target skills that are difficult for the test taker. The use of dynamic assessment procedures to detect differences in deaf children's language learning profiles is currently being

investigated within a vocabulary context (Mann, Pena, & Morgan, submitted). A combination of traditional and dynamic assessments can provide professionals working with deaf children with further insights about strengths and weaknesses and guide the development of suitable interventions.

Future developments in language assessment will inevitably include the use of new technologies. Haug, Herman, and Woll (2014) describe the development of a Web-based platform to host different sign language adaptations of the same test to be delivered and standardized via the Internet. Current research techniques such as eye gaze tracking may also have a future role in language assessment of younger deaf children and those with additional disabilities.

In the hands of skilled assessors, a range of informal, formal, and dynamic testing methods is available and is increasingly on the agenda to complement existing approaches.

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