CHAPTER 7

Psychoeducational Assessment

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KEY POINTS

- Psychoeducational evaluation of children with hearing loss can be used to assess cognitive, language, and academic skills as well as to diagnose secondary challenges including learning disabilities, intellectual disabilities, and behavioral issues. Evaluation provides an understanding of the child as an individual and a learner in order to better support the child in the educational setting.
- An effective psychoeducational evaluation integrates formal test results with the child's history, previous evaluations, behavioral observations, and parent and teacher experience with the child in order to provide a better awareness of a child's functioning across multiple dimensions—cognitive, linguistic, academic, and/or emotional/behavioral—that affect ability to access curriculum and learn in school.
- Although standard intellectual, academic, and behavioral instruments can be used successfully to assess children with hearing loss, the choice, administration, and interpretation of tests are all dictated by the child's level of hearing loss and language proficiency. For this reason the clinician performing the evaluation should have experience with the evaluation of children with hearing loss who use listening and spoken language to communicate. The psychologist must be knowledgeable in choosing and interpreting tests with children with hearing loss.
- Use of inappropriate instruments and uninformed interpretation of tests with children with hearing loss can result in erroneous conclusions and diagnoses. The central challenge for the psychologist in performing psychoeducational evaluation for this population lies in determining to what degree the child's struggles reflect language delay secondary to the hearing loss, and to what degree the problems may reflect comorbid disorders.
- In order to be useful, the results of the evaluation must be communicated to a diverse audience that includes parents, teachers, other clinicians, and the student. The clinician needs to be

aware of the varied needs of all these individuals in report-writing as well as face-to-face communication.

INTRODUCTION: WHAT IS PSYCHOEDUCATIONAL ASSESSMENT?

This chapter discusses the psychoeducational evaluation of children with hearing loss who use listening and spoken language (LSL) as their method of communication. There are a number of guides for the psychoeducational assessment of children with hearing loss (Braden, 2005; Metz, Miller, & Thomas-Presswood, 2010; Sattler & Hardy-Braz, 2002), but although these resources mention children who communicate orally, the emphasis is on children who use some form of sign language as their primary method of communication. There is limited information available on the assessment of children who use LSL to communicate and learn.

When children with hearing loss are identified early, fitted with appropriate hearing technology, and provided with family-centered early intervention services from properly trained professionals, most are able to progress at age-appropriate rates (Kennedy et al., 2006; Moeller, 2000; Yoshinaga-Itano, Sedey, Coutler, & Mehl, 1998), and require fewer special education services by the time they enter elementary school. Many positive outcomes are associated with early identification and intervention, including better language, speech, and social-emotional development, than later-identified children; more typical rates of cognitive development; and lower parental stress as the child acquires language and increases communication (Dornan, Hickson, Murdoch, Houston, & Constantinescu, 2010; Geers, 2006; Niparko et al., 2010; Yoshinaga-Itano & Gravel, 2001).

Likewise, children who receive cochlear implants early and receive high quality early childhood services often develop similarly to typical peers (Geers & Hayes, 2011; Geers & Sedey, 2011) and may never be referred for psychoeducational evaluation. As Edwards (2007) notes, however, children with hearing loss and other comorbid diagnoses are increasingly receiving cochlear implants, and additional problems may become apparent after a child is implanted. Often, there is a question of differential diagnosis of intellectual disability, a language disorder in addition to the hearing loss, attentional issues, or specific learning disorder. Psychoeducational evaluation has a role in the assessment and diagnosis of all of these conditions.

Psychoeducational evaluation is often identified as "testing." It is better defined, however, as the process of using a combination of tests, measurements, and observations to develop a better understanding of a child's functioning across multiple dimensions—cognitive, linguistic, academic, and/or emotional/behavioral—that affect ability to access curriculum and learn in school (Pohlman, 2008). Psychoeducational evaluation typically includes some measure of general cognitive potential as an anchor to help determine what expectations may be appropriate for a child's academic and/or linguistic functioning. Cognitive processing, including memory, visual or auditory processing, or visual-motor ability may also be assessed. Evaluation usually addresses academic skill development in the areas of reading, written expression, and mathematics. For children with hearing loss, language proficiency is addressed, from basic interpersonal communication to higher-level oral and written discourse skills. Finally, the evaluation may include an assessment of behavior, including adaptive behavior skills, social-emotional functioning, activity level, attention, and executive skills.

Psychoeducational assessment is different from both classroom assessment and group-administered standardized assessment. Unlike classroom evaluation (i.e., quizzes, chapter tests, etc.), psychoeducational testing is standardized. Standardization in test procedure and the availability of norms allows comparisons both with other children and with other tests taken by a specific child. (See Chapter 2.) The student can be compared to typical children of the same age or grade level to determine whether skills and abilities are at expected levels of development. It is also possible to compare the student's abilities across various skill areas. Finally, standard scores allow an assessment of the child's growth and development over time (Table 7–1).

Unlike group standardized testing, psychoeducational assessment is conducted in a one-on-one setting with the student, so that the clinician is able to make observations about the child's behavior and functioning that may help to pinpoint areas of specific strength and weakness in cognitive and academic skills.

In the public setting, psychoeducational evaluation is an important tool in determining the child's eligibility for a range of special education services. Besides assisting with educational diagnosis, psychoeducational evaluation may suggest appropriate therapeutic interventions such as speech therapy or occupational therapy. In both public and private

Table 7–1. Using Standard Scores

Comparisons		Examples
Across children	Comparisons with hearing peers	• Is the child intellectually gifted? • How similar are the child's language skills to those of his or her hearing peers? • Is this child's activity level typical for children of the same age and sex? • Is the child ready to transition into a general education setting?
Within the child	Comparisons across skill areas	• Is the child's memory as strong as would be expected given his or her cognitive ability? • Is the child's language ability commensurate with his or her intelligence? • What are the child's areas of academic strength and weakness?
	Comparisons across time	• Is the child making progress toward "closing the gap" with hearing peers in language? • Has the child made expected growth in reading skills over the past year?

school contexts, evaluation also provides a better understanding of the child as a learner and communicator and allows teaching to be individualized to the needs of the child. It can also monitor the progress of the child in language acquisition and academic skills development, and can be a useful tool in assessing when or the degree to which a child is ready to transition into a general education setting.

ISSUES AND CONSIDERATIONS IN CONDUCTING PSYCHOEDUCATIONAL EVALUATION WITH CHILDREN WITH HEARING LOSS

Limitations of Tests and the Necessity of Multiple Sources of Information

In interpreting psychoeducational tests, it is important to remember that tests are powerful but imperfect tools. Every test incorporates some level of measurement error, so that formal tests scores are best considered an estimate of the child's true abilities. The observations and judgment of the clinician are crucial in interpreting the meaning of test scores.

Ethics require that a diagnosis is never made on the basis of a single test (American Psychological Association, 2010). A good psychoeducational evaluation uses and integrates multiple sources of data, including not only current test results, but also behavioral observations, parent and teacher reports, and results of previous testing. Because the assessment of children with hearing loss can be especially challenging, the evaluator may elect to use a battery that will include selected subtests or portions of several different tests.

Evaluator Qualifications

Psychoeducational assessment of a child with a hearing loss is a complex process that requires an understanding of the dynamics of hearing loss and amplification, a familiarity with language and academic skills development in children with hearing loss, and an awareness of how these issues impact evaluation results. The clinician should have experience with the evaluation of children with hearing loss and in particular should have experience in working with children with cochlear implants. The psychologist should also be knowledgeable in choosing and interpreting tests with children with hearing loss. In the absence of this expertise, the evaluator would benefit from consultation with an expert or working under the supervision of a knowledgeable practitioner (Krouse & Braden, 2011).

Planning the Evaluation

The assessment of the child begins with a clear definition of the referral question. Referral may originate with a therapist, an educator, or a parent, and may result from disappointing progress in the child's development of language and/or academic skills or concerns about the appropriateness of the child's current educational placement and/or services. Parents or educators may be seeking an assessment for Attention-Deficit/Hyperactivity Disorder (ADHD) or a specific learning disability. There may be explicit or unspoken questions about whether the child has an intellectual disability or is exhibiting symptoms of an autism spectrum disorder. It is important to spend adequate time with parents and teachers or therapists in order to fully understand their concerns about the child and what questions are to be addressed by the evaluation.

The second step in preparing for the evaluation is the review of records (Table 7–2). It is important to review the child's birth history, the cause of hearing loss if known, and the age at diagnosis. Knowledge of the child's history with amplification—for example, when amplified or implanted and how consistently the device was or is worn—is essential in assessing whether a language delay is attributable to lack of access to sound or to processing deficits intrinsic to the child. Similarly, it is crucial to know the child's history of therapeutic intervention and education. The difficulties of a child who was implanted early and had consistent LSL services since implantation would be interpreted very differently from a child who was implanted late, has been taught using Total Communication, or has had minimal intervention after implantation. Finally, the psychologist should examine any previous evaluation records, including psychoeducational reports and speech and language evaluations.

In evaluating a child with hearing loss, it is vital that the clinician understand the level of the child's current auditory ability. Children with hearing loss vary widely in their unaided loss, method of amplification, aided detection, and ability to use hearing to comprehend speech. Some children with cochlear implants are able to function quite well using audition alone, but other children may need to use speechreading to supplement listening to a greater or lesser extent. In evaluating a child with hearing loss, the evaluator will need to ensure that the child's equipment is working properly and to be aware of the degree to which the child depends on speechreading. A quiet room with good lighting is also essential.

Some prior knowledge of the child's language competence is also necessary for planning the evaluation, choosing a test battery, and interpreting tests. For a child with communication competence close to that of hearing peers, a standard test battery and standard administration is generally possible. For a child with significantly delayed or impaired language, however, both test administration and interpretation will be affected, with concerns raised about the child's ability to understand instructions and comprehend test items as well as ability to adequately demonstrate the skills or knowledge he or she possesses.

Table 7–2. Case History Review

Review of History
• Prenatal and birth history
• Presence of any illnesses or additional disabilities
• Attainment of major developmental milestones
• Cause of hearing loss
• Age of diagnosis of hearing loss
• History of amplification
• Type of current amplification
• Consistency of use of amplification
• Educational/therapeutic history
• Previous psychoeducational evaluations
• Previous language evaluations

Use of Accommodations and Modifications in Testing

To obtain an accurate assessment of the student's abilities and skills, the clinician may sometimes elect to make changes to the test format, administration, or con-

tent. The term **accommodation** is used to describe an alteration of environment, format, or equipment that allows an individual with a disability to gain access to content. A key principle is that accommodations should affect features of the test that are related to the disability but should not change the construct being measured. The term **modification** is used to describe a change in the administration or actual content of the test made in such a way that both students with disabilities and typical students would potentially benefit (Case, 2008). In practice, it can be difficult to differentiate between accommodations and modifications when testing children with hearing loss. For example, in a test of math reasoning in which word problems are administered orally, providing items in print is an accommodation aimed at decreasing the degree to which the auditory comprehension of a child with hearing loss affects the result. However, this accommodation also provides the stimulus to the student for a longer period of time, making fewer demands on the child's working memory as well as compensating for processing slowness, changes that might also improve the performance of a typical child being administered the test. Accommodations by definition alter standardized testing procedures, and there is usually no way of knowing exactly how or to what degree they affect the validity of the resulting scores (Sattler & Dumont, 2004).

In spite of these concerns, accommodations can provide important diagnostic information, particularly for children with complex needs and/or serious language delays (Sattler & Dumont, 2004). They should, however, be used as infrequently as possible and only to the degree necessary. Case (2008) provides a summary of possible accommodations, with an analysis of the degree to which each accommodation would be likely to change the construct measured. If the clinician elects to use accommodations, he or she will need to record and justify the use in the evaluation report and interpret the resulting scores in light of the accommodations. If accommodations are used, the resulting score should be interpreted with caution, as a rough estimate of the student's true ability in the construct being measured. The more that the clinician deviates from standardized procedure, the more likely it is that scores obtained may be inflated.

Behavioral Observations

Observations of the child are a fundamental aspect of the psychoeducational evaluation, providing information about the child that is not available from test scores. Through observation and interaction with the child, the psychologist will gain important information about the child's speech and language skills (Table 7–3). The clinician can also develop a sense of the child's ability to interact with an adult in a cooperative fashion, motivation to perform well, and ability to engage with a cognitive task: Does the child enjoy problem-solving? Is the child self-confident or a "discouraged learner"? By observing the child as he or she engages in various kinds of problem-solving and academic tasks, the psychologist can observe the student's level of organization, how the student approaches tasks, and whether the student uses any kind of compensatory strategies.

It is also important to observe the child's activity level, attention, and task focus during testing, both within and between tasks. The child's level of attention during various activities can be diagnostic. Sometimes children will be particularly restless or inattentive when the area of deficit is being assessed; behavior may regress during tasks that are challenging because the student has learned that difficult tasks can be avoided by oppositional behavior or emotional outbursts. Finally, careful observation can discern strengths of the child, such as sense of humor, intellectual curiosity, interpersonal skills, perseverance, or frustration tolerance, which can be used to offset or compensate for areas of weakness. All of the above are qualities that can only be assessed by observation, rather than by formal test results.

ble 7–3. Behavioral Observations

nterpersonal kills	• Eye contact • Cooperation with an adult • Affect and emotional responsiveness • Self-confidence • Sense of humor
Language and audition	• Ability to use listening to understand speech • Accommodations necessary for comprehension (speechreading, print) • Speech intelligibility • Language comprehension • Expressive abilities • Conversational skills • Language pragmatics
Cognition	• Ability to engage with a cognitive task • Level of organization • Perseverance and frustration tolerance • Use of compensatory strategies
Attention and task–focus	• Activity level • Visual vs. aural distractibility • Daydreaming • Need for cues or redirection

COGNITIVE ASSESSMENT

Formal testing in a psychoeducational evaluation generally begins with an intelligence test that will provide a measure of the child's general nonverbal intellectual potential. Intellectual testing provides information about the child's cognitive strengths and weaknesses and assesses for the presence of processing deficits that can affect learning. This score will also act as an anchor that will offer the evaluator some sense of where the student should be functioning linguistically and academically.

The cognitive assessment of children with hearing loss has historically been controversial. Individuals with hearing loss tend to score similarly to hearing peers on nonverbal IQ measures. For example, a review of 324 studies of intelligence scores of individuals with hearing loss found a mean nonverbal IQ of 97.14, very close to the mean of 100 (Sattler & Hardy-Braz, 2002). Individuals with hearing loss, however, even when educated orally, often score significantly below average on verbal intelligence measures, typically greater than 15 points or one standard deviation below the mean (Braden, 2005; Krouse & Braden, 2011). Administration of the verbal sections of intelligence tests has been seen as unfair for individuals with hearing loss, and the recommendation has sometimes been that the verbal subtests not be administered. Yet, modern conceptualizations of intelligence posit that verbal ability is a key component of general intelligence, and verbal skills

are seen as being integral to higher-order thinking (Horn & Cattell, 1966; Krouse & Braden, 2011). Success in school tends to be much more closely correlated with verbal IQ scores than with nonverbal IQ scores, and children with hearing loss have historically had low reading scores and poorer academic outcomes (Sattler & Hardy-Braz, 2002).

The above issues indicate that both verbal and nonverbal portions of intelligence tests provide valuable information and should be administered to children with hearing loss, but that the two domains be interpreted differently. In general, it is recommended that the nonverbal portions of intelligence tests be interpreted as the best estimate of general intelligence, and that the verbal score be interpreted as a measure of acquired language (Akamatsu, Mayer, & Hardy-Braz, 2008; Braden, 2005; Simeonsson, Wax, & White, 2001). Since verbal and nonverbal scores are seen as assessing different domains in children with hearing loss, a "Total IQ" that combines the two is not considered an unitary ability and should not interpreted as such (Flanagan & Kaufman, 2009).

Measures of Intelligence

Most modern intelligence tests are based on the Horn-Cattell-Carroll (CHC) model of intelligence (McGrew, 2005). With the use of this model, the verbal subtests are seen as tapping **crystallized intelligence**, defined as the individual's store of acquired knowledge and ability to reason and communicate verbally. The nonverbal abilities include **fluid reasoning,** defined as the ability to recognize patterns and use inductive and deductive reasoning to solve novel problems not taught in school, and **visual-spatial processing**, defined as the ability to perceive, analyze, and think with visual patterns, including the ability to mentally manipulate, store, and recall visual representations. Two other key cognitive abilities tapped by modern intelligence tests are **short-term/working memory**, the ability to hold information in mind while using it to solve problems, and **processing speed,** the ability to perform simple cognitive tasks quickly and accurately, requiring focused attention and concentration.

In the assessment of the nonverbal skills of a child with hearing loss, administration of the nonverbal subtests of one of the comprehensive intelligence tests usually provides adequate measures of nonverbal fluid reasoning, visual-spatial reasoning, and processing speed. However, for a child with minimal language skills, behavioral issues, suspected intellectual disability, motor limitations, or other complex issues, a specialized nonverbal cognitive test may be used by itself or to supplement the standard intelligence test.

The Wechsler family of intelligence tests, including the Wechsler Preschool and Primary Scale of Intelligence, 4th Edition (WPPSI-IV; Wechsler, 2013), normed for children ages 3 through 7;11; the Wechsler Intelligence Scale for Children, 4th Edition (WISC-IV; Wechsler, 2003a), normed for ages 6 through 16;11, and the Wechsler Adult Intelligence Scale, 4th Edition (WAIS-IV; Wechsler, 2008), normed for individuals 16 and older, are the most widely researched and commonly used tests for evaluating individuals with hearing loss (Braden, 2005). Each of the Wechsler scales provides a verbal score as well as scores for working memory and processing speed. The WISC-IV and the WAIS-IV provide a Perceptual Reasoning Index that incorporates both fluid reasoning and visual-spatial ability, while the WPPSI-IV provides separate index scores for fluid reasoning and visual-spatial reasoning. Krause and Braden (2011) provide evidence for the reliability, as well as preliminary evidence for the validity, of the WISC-IV with students with hearing loss.

The Stanford-Binet, 5th Edition (SB-5; Roid, 2003) is an intellectual measure normed for individuals age 2 years through adulthood. It includes measures of fluid reasoning, knowledge, quantitative reasoning, visual-spatial processing, and working memory, with each domain measured with both verbal and nonverbal subtests. The nonverbal general intelligence scale thus represents all of the primary areas of the CHC model. It is notable that the SB-5 is one of the only intelligence tests that includes a nonverbal measure of crystallized intelligence (Braden & Athonasiou, 2005; Roid & Pomplun, 2005).

The Woodcock-Johnson, 3rd Edition (WJ-3; Woodcock, McGrew, & Mather, 2001) is a set of tests, normed for individuals aged 3 years through adulthood, which assesses general intellectual ability, specific cognitive abilities, oral language, and academic achievement. The intellectual battery includes a "low verbal" scale of general intelligence. A drawback for use with students with hearing loss is that, while it is possible to obtain a score for visual-spatial processing with nonverbal subtests, the fluid reasoning scale includes both verbal and nonverbal subtests (Schrank, 2005).

The Kaufman Assessment Battery for Children, 2nd Edition (KABC-II; Kaufman & Kaufman, 2004) is grounded in dual theoretical foundations, the CHC model as well as the neuropsychological model that includes sequential and simultaneous processing, learning, and planning (Kaufman, Kaufman, Kaufman-Singer, & Kaufman, 2005). Similar to the WJ III, the KABC-II includes a nonverbal general intelligence score, but the structure of the composite scores does not afford an easy assessment of verbal versus nonverbal abilities.

Accurate assessment of a child with a hearing loss may necessitate the use of a nonverbal intellectual test. Available tests include the Leiter-III (Roid, Pomplun, & Koch, 2013), the Wechsler Nonverbal (WNV; Wechsler & Naglieri, 2006), the Universal Nonverbal Intelligence Test (UNIT; Bracken & McCallum, 1998), and the Comprehensive Test of Nonverbal Intelligence, 2nd Edition (CTONI-2; Hammill, Pearson, & Wiederholt, 2009). Each of these tests is designed to be culturally neutral and nonlanguage dependent in both instructions and content. In addition, some of these tests are designed to have reduced motor demands, making them useful with children who have cerebral palsy or other motor impairments.

In addition to comprehensive cognitive tests, it may be useful to assess the child's skills in specific processing areas. Visual-motor integration is a key skill for learning to print and write and is often assessed using The Beery-Buktenica Developmental Test of Visual-Motor Integration, 6th Edition (Beery, Buktenica, & Beery, 2010). The psychologist may also elect to administer a memory scale, such as the Children's Memory Scale (CMS; Cohen, 1997). The CMS provides an assessment of the child's abilities in auditory/verbal versus visual memory, as well as short-term versus long-term memory. However, this test is not designed to be administered to individuals with hearing loss, and interpretation of the auditory/verbal memory tasks is problematic with children who have hearing loss and/or language delay. The psychologist will need to

interpret results tentatively, especially in the auditory/verbal areas, in light of the student's ability to hear and understand the stimuli. Finally, a test of phonological processing such as the Comprehensive Test of Phonological Processing, 2nd Edition (CTOPP-2; Wagner, Torgesen, Rachotte, & Pearson, 1999), may be helpful in assessing children suspected of having dyslexia. Again, this test does not have data to support use with children with hearing loss and the experienced clinician will need to rely on clinical judgment in interpreting the results of the test.

Practical Considerations in Cognitive Testing

Sattler and Dumont (2004) provide extensive instructions for administering the WISC-IV and WPPSI-III Perceptual Organization (nonverbal) scales to children with hearing loss, including written task instruction, instructions for pantomiming directions, and examples for extra practice. In my experience of administering the Wechsler tests to students with hearing loss who use LSL, however, this author has found that significant modifications or accommodations are not typically necessary for the nonverbal portions. On occasion, extra practice items may be effective in helping students learn the task. For older children, this can often be accomplished by dropping back and administering earlier items normed for younger children. The Digits Backwards (repeating strings of digits in reverse) subtest can sometimes be difficult to explain to young children with limited language who may not understand the word "backward." In this case it can be helpful to use print to explain the task.

Interpreting Cognitive Test Results

In interpreting intelligence test results, the nonverbal composite score is considered to be the best estimate of the child's general intellectual potential, as discussed in an earlier section. In general, the more consistent the scores are across nonverbal subtests, the more confidence the evaluator can place in the resulting composite score as a valid measure of the child's intellectual potential (Flanagan & Kaufman, 2009). When subtest scores are significantly different from one another, the profile may reflect the presence of processing weaknesses, and the nonverbal composite score may not be an adequate measure of the child's potential. Additionally, although the subtests measuring working memory and processing speed provide important information, it is important to remember that scores on these subtests are often depressed in children with a variety of problems, including ADHD, learning and memory problems, and hearing loss (Pisoni et al., 2008). These scores should not be considered a measure of general intelligence for children with hearing loss.

LANGUAGE ASSESSMENT

Although an in-depth assessment of a child's language skills is typically undertaken by the speech-language pathologist, a standard psychoeducational battery provides a great deal of data about a child's language proficiency that may not be tapped in standard language tests such as the Clinical Evaluation of Language Fundamentals, 5th Edition (CELF-V). Specifically, the verbal scales of the standard

intelligence tests provide information about the child's complex language and discourse skills. The student's ability to comprehend and respond to questions of increasing length and complexity, store of verbal knowledge, and ability to express ideas and complex thoughts in words are crucial to functioning in an academic environment.

An understanding of the historically poor academic outcomes for children with hearing loss may be provided in the concepts of basic interpersonal communication skills (BICS) and cognitive-academic language proficiency (CALP; Cummins, 2008). BICS refers to primary, face-to-face language interaction that occurs in home or social settings. This language is typically about the here-and-now and uses basic, high frequency vocabulary, and relatively simple sentence structures. In contrast, CALP is the language that allows individuals to communicate about topics that are distant in time and space. It uses low frequency, abstract, and often technical vocabulary as well as complex sentence structures. Academic areas including math, science, and social studies require skills such as conceptual and categorical thinking, consideration of evidence, manipulation of information, and logical argument that necessitate CALP. Although BICS can be used to read and write about familiar topics, as a child progresses through school CALP is increasingly required to discuss, read, and write about academic content. While children with hearing loss, especially children with good access to sound using cochlear implants or hearing aids, typically have adequate BICS, they are often weak in CALP, explaining the common experience of disappointing academic progress (Akamatsu et al., 2008).

Assessing Academic Language Skills

Akamatsu and colleagues (2008) argue that verbal portions of published intelligence tests are generally a good measure of CALP, and that while general intelligence in individuals with hearing loss is best estimated by a nonverbal measure, the verbal scores provide an important measure of the student's academic language, including the ability to comprehend increasingly complex sentence and question forms, the ability to express complex thoughts and ideas in words, verbal knowledge, vocabulary, and verbal reasoning skills.

For children with hearing loss, the difference between the child's nonverbal and verbal scores on an intelligence test has traditionally been seen as a useful index of the gap between the student's intellectual potential and the level of his or her language development. Ideally, we would like to see the verbal and nonverbal scores of children with hearing loss as small as possible. For comparison purposes, in typical hearing children the difference between the WISC-IV Perceptual Organization (nonverbal) Index and Verbal Comprehension (verbal) Index is generally less than 10 points. A difference of 10 to 12 points, depending on the age of the child, would be considered statistically significant, and differences of 20 or more points would be seen in less than about 6% of children (Wechsler, 2003b).

In addition to the information about language skills provided by the verbal portions of intelligence tests, commonly used academic achievement tests such as the Wechsler Individual Achievement Test, 3rd Edition (WIAT-III) and the Woodcock-Johnson III Tests of Achievement (WJ III) include measures of receptive

and expressive language, which may be helpful in assessing the child's language skills as applied in a classroom situation. At the same time, some of these may be redundant with similar tasks on language tests such as the CELF-5 (Semel, Wiig, & Secord, 2013). For example, many of the WIAT-III Oral Language tasks, such as repeating oral sentences, are shorter versions of CELF-5 subtests. If the child is being administered a language test as part of the assessment battery, administration of these language portions of the achievement test may be unnecessary.

Practical Considerations

For children with receptive language weaknesses but some reading ability, comprehension of verbal items on intelligence tests can be improved by providing the test items in print as well as orally. This accommodation provides a visual stimulus and makes the stimulus available to the student for a longer period of time, but the child still must comprehend the question, have the necessary information, and express the knowledge in words. Provision of items in print is best accomplished by presenting each test item on a separate index card (Sattler & Dumont, 2004). In certain cases, it may be helpful to test limits on verbal items by simplifying the wording of questions, although this is a modification that clearly changes the content of the test. Because the above practices deviate from standardization procedures, the validity of the obtained score will be affected to a greater or lesser degree. If the clinician is trying to gain an accurate comparison of the verbal abilities of the student with those of hearing peers (for example, to determine the child's readiness to transition into a general education setting), standardized procedures must be followed. For a student with delayed language, however, these adaptations can provide some discrimination of whether the child's poor performance reflects language comprehension deficits versus deficits in acquired knowledge. They can also result in useful information about what kinds of accommodations (such as use of print) may be helpful to the child in the classroom.

ASSESSMENT OF ACADEMIC SKILLS

Individually-administered academic achievement tests allow an in-depth assessment of a student's acquired academic skills and abilities. Comprehensive academic achievement tests are typically organized around the domains delineated in the Individuals with Disabilities Education Act (IDEA): basic reading (word recognition and decoding), reading comprehension, math reasoning, math computation, written expression, and oral language. The most commonly used tests are conormed with cognitive tests (for example, the WIAT-III with the WISC-IV). This means that the intelligence test and the achievement test are normed on the same sample of test-takers, facilitating comparison of scores across the two measures.

Use of academic achievement tests allows a comparison of the child with hearing students of the same age or grade. Because the tests are individually administered, the evaluator is able to observe the child engaged in a variety of academic tasks, providing an assessment of key academic subskills, as described in Table 7–4. The clinician can also discern the impact

Table 7–4. Academic Subskills

Reading	Math	Written Expression
Phonemic awareness	Number sense	Sound–symbol association
Sound–symbol association	Quantitative reasoning	Graphomotor ability (printing/writing)
Decoding	Math facts	Spelling
Fluency	Math procedures	Capitalization and punctuation
Reading vocabulary	Math concepts	Written language structure
Factual comprehension	Word problems	Ideas and content
Inferential comprehension		

of language delay versus processing deficits, as well as the effects of attention, motivation, persistence, and so forth, on the child's performance. This deeper and more nuanced assessment of the child's reading, writing, and math skills can be used to pinpoint areas of specific deficit and allow an individualized and targeted approach to remediating specific skill deficits.

The choice of an academic achievement battery will depend on the referral question as well as the language proficiency of the child. In general, the closer the student is to being at age- and grade-expectation, the more standard the battery can be. For example, a student who is in a full-time LSL day program and is being considered for mainstreaming should be administered the achievement test conormed with the cognitive test used, without modifications or accommodations, in order to obtain a clear assessment of how this child's abilities compare with typical peers in a general education setting. On the other hand, students with language delays or who are suspected of having learning disabilities may require a more complex, cross-battery assessment in order to tease out issues of language proficiency as well as academic strengths and weaknesses.

A central issue for clinicians in choosing appropriate tests for children with hearing loss is that of the item format of the test (Overton, 2006). Published tests use various formats for assessing skills and knowledge. Input format refers to the way the child is presented with the items. The input format may be visual (print and/or pictures) or auditory (the examiner asks a question or presents a verbal stimulus). Output format refers to the way the child is asked to respond. The child may be allowed to give a nonverbal response, such as pointing to a picture or word in print, or may be required to write or verbalize a response. The response may be a forced choice within a closed set of responses, or it may be open-ended. The student may be able to respond in one or a few words, or may be required to provide longer response. Test instructions themselves may contain complex language, or may use simple language and afford visual demonstration. For a child with a serious language delay, tests that are heavily language-loaded may not actually tap the skill or knowledge that the instrument

is designed to test (i.e., memory, reading skill, math competence), but may rather primarily reflect the level of the child's acquired language.

For children whose delayed language affects reading and writing skills, the use of a diagnostic reading or written expression tests incorporated into one of the newer language tests such as the OWLS-II (Carrow-Woolfolk, 2012) or the CELF-5 (Semel et al., 2013) can be useful. These tests target the lexical/semantic, syntactic, supra-linguistic, and pragmatic aspects of reading and written expression and allow an analysis of how deficits in specific language areas are affecting literacy.

BEHAVIORAL ASSESSMENT

A complete understanding of a child with hearing loss often requires the use of one or more behavioral measures. Behavioral measures fall into three general categories: tests assessing general emotional and behavioral functioning; tests tapping attention, task focus, and executive functioning; and tests that assess adaptive skills. There is overlap, however, among the tests.

Behavioral tests are generally in the form of questionnaires designed to be completed by the child's teachers and parents. Self-report forms are available for children who have adequate reading skills, generally upper elementary and high school age. Potential problems with the use of behavioral inventories include inter-rater reliability and possible response bias (Reynolds, Livingston, & Willson, 2006). A well-developed test will include scales that assess whether the rater tended to either exaggerate or deny problems in the child, or was inconsistent in responding, indicating possible problems with the rater's comprehension of items. Best practices across all of these measures call for the tests to be completed by multiple observers in multiple settings (Barkley & Edwards, 2006; Reynolds et al., 2006). Thus, the child's behavior should be rated in the home as well as by several raters in the school environment, if possible. The clinician can have greater confidence in the results of testing when two or more sources of information are available and provide generally consistent ratings. When the use of multiple raters results in conflicting data, it is useful to resolve the differences, possibly by interviewing the raters. Questioning the informant about specific items can help determine whether differences are due to confusion or misunderstanding by the rater, to biased responding, or to a true difference in the child's behavior from one environment to another (Harrison & Oakland, 2003b).

Measures of General Behavior

General or "omnibus" behavior rating scales tap a broad range of emotional and behavior symptoms. They are sensitive to both internalizing problems such as anxiety and depression and externalizing problems such as hyperactivity and oppositional or aggressive behavior. Behavior rating scales are commonly used for clinical diagnosis and educational classification (Reynolds et al., 2006). However, they can also be useful in better understanding and managing behavioral issues in the classroom. For example, a child who presents with aggressive or oppositional behavior may be found to have underlying depression or anxiety.

The Behavior Assessment System for Children, 2nd Edition (BASC-2; Reynolds & Kamphaus, 2004) is a multimethod, multidimensional instrument used to evaluate behavior and self-perceptions of children and young adults ages 2 through 25 years. It includes parent and teacher rating scales, a self-report scale for older children and adolescents, a structured developmental history form, and a form for recording and classifying directly observed classroom behaviors. The BASC-2 includes items that tap both positive, adaptive behaviors and negative, problematic, or clinical behaviors. It yields quantitative composite scales, including adaptive skills, internalizing problems, externalizing problems, and school problems. The BASC-2 Manual states that it can be used to assess behavioral and emotional issues in children with sensory impairments such as hearing loss, but also asserts that the interpretation of test scores for these children requires specialized training and expertise.

The Achenbach System of Empirically Based Assessment (ASEBA; Achenbach, 2009) is a comprehensive system that assesses competencies, adaptive functioning, and behavioral, emotional, and social problems in individuals ages 1½ years through adulthood. There are forms for parents, caregivers, and teachers as well as a self-report form. The ASEBA is administered as paper-and-pencil behavioral inventories that yield quantitative scores. It also includes open-ended questions that offer opportunities for respondents to document their own concerns about the child as well as their perceptions of the child's strengths and weaknesses, providing information that may not be captured by quantitative scores alone. The ASEBA has been used in a number of clinical studies that involve children with hearing loss (see, for example, Barker et al., 2009; Vostanis, Hayes, Du Feu, & Warren, 1997).

Measures of Activity Level, Attention, and Executive Ability

Although general behavioral tests include scales that tap hyperactivity, impulsivity, and attention, tests that specifically assess for hyperactivity and attention deficit are often helpful in evaluating children for ADHD. The Conners 3rd Edition (Conners, 2008) is an assessment system that includes long and short forms for parents, teachers, and self-report. An early childhood version is also available. The Conners-3 includes quantitative scales that tap activity level, inattention, impulsivity, and executive function. There are also scales tapping associated problems such as family and peer relations, as well as scales tapping common comorbid disorders, including conduct disorder and oppositional defiant disorder.

Increasingly seen as associated with ADHD, executive skills are defined as those abilities that allow people to regulate behavior in order to solve problems and complete tasks, including planning, organization, time management, working memory, and metacognition (Dawson & Guare, 2010). These skills are typically impaired in individuals with ADHD, although some research has found that children with hearing loss also tend to be delayed in developing executive skills (Hauser, Lukomski, & Hillman, 2008). The Behavior Rating Inventory of Executive Function (BRIEF; Gioia, Isquith, & Kenworthy, 2000) is a behavioral inventory that taps executive skills, includ-

ing behavioral regulation skills (such as emotional control and inhibition) and metacognitive skills (i.e., planning and organization, organization of materials, task initiation, working memory, and self-monitoring). Forms are available for parents and teachers, and there is a preschool version.

Measures of Adaptive Behavior

Adaptive behavior is defined as those age-appropriate skills necessary for people to live independently and to function safely and appropriately in daily life. Adaptive behavior assessed by common tests include practical and self-help skills; ability to follow home and school rules and routines; behaviors affecting health and safety; communication and social skills; and self-direction, including emotional self-regulation and ability to engage in goal-directed behavior. At younger ages, motor skills may be tapped; for adolescents and adults, work-related skills are assessed. Children with sensory impairments, language and learning impairments, ADHD, and intellectual disabilities may all demonstrate some degree of impairment in adaptive behavior skills (Harrison & Oakland, 2003b). Adaptive behavior scales can be used for diagnosis, for assessment of strengths and limitations, and to document and monitor an individual's progress over time.

In assessing the adaptive behavior of children with hearing loss, it is important to determine the degree to which items are influenced by the language proficiency of the child. While adaptive behavior scales typically include subtests that specifically tap communication skills, some items in other scales may also require language ability. For example, an item under "community use" may ask if the child can provide his or her address or follow directions to a nearby place. An item under "social skills" may ask if the child can name three classmates, state whether he or she is happy or sad, or apologize when he or she has hurt someone. Thus, for a child with limited language, a low score in one of these domains may reflect the language delay rather than a true weakness in the named domain. When a child with hearing loss receives low scores on an adaptive behavior scale, the clinician is encouraged to examine the individual items, following up with the rater if necessary, in order to determine to what degree the low score reflects language delay versus true limitations in a given domain.

The Adaptive Behavior Assessment System, 2nd Edition (ABAS-II; Harrison & Oakland, 2003a) is a comprehensive, multi-informant, norm-referenced assessment of adaptive skills for individuals ages birth through 89 years. The ABAS-II is a behavioral inventory with forms for parents, teachers, and adults. Some preliminary data exists regarding use with children with hearing loss. The performance of a sample of 19 deaf and hard of hearing children was compared with a matched control (Harrison & Oakland, 2003b). The authors draw the conclusion that children with hearing loss do not demonstrate major deficits in adaptive behavior as measured by the ABAS-II, but they may exhibit slightly lower adaptive functioning as well as deficits in specific skill areas such as communication.

The Vineland Adaptive Behavior Scales, 2nd Edition (Vineland-II; Sparrow, Ciccheti, & Balla, 2005) is a multimodal and multi-informant, norm-referenced assessment of adaptive behavior. While the Vineland-II, like the earlier editions, includes survey and expanded interview forms that are administered in a semistructured interview format with a parent or caregiver, it also includes parent/caregiver and teacher rating forms.

SPECIFIC DIAGNOSTIC ISSUES

Intellectual Disability

Diagnosis of intellectual disability in children with hearing loss can be a challenging task, particularly when the child is preschool age. In order to be diagnosed with an intellectual disability, a child must exhibit very significant deficits (greater than two standard deviations below the mean) in cognitive functioning, as well as significant deficits in two or more areas of adaptive behavior (American Psychiatric Association, 2013; Schalock, Borthwick-Duffy, Buntinx, Coulter, & Craig, 2010). For the child with a hearing loss, inappropriate interpretation of intelligence test scores, in particular using IQ scores that incorporate verbal skills, can result in erroneous diagnoses. In addition, even when the verbal score is discounted as a measure of intelligence, a child's nonverbal cognitive score can be depressed by a number of factors, including fine motor weakness, specific visual processing deficits, slow processing, and deficits in attention and task focus. These factors can be more pronounced in very young children who may have limited exposure to school-like tasks, immature self-regulation skills, and delayed communication skills.

For the above reasons, cognitive assessment of a child with hearing loss suspected of intellectual disability should include multiple cognitive measures, including a nonverbal intelligence test. A full scale IQ that includes verbal subtests should never be used as a measure of intellectual ability. It is important that the test used have an adequate "floor," that is, a sufficient number of items at the lower levels of the test such that a reliable discrimination can be made. When clinicians are using the Wechsler tests, children ages 6;0 to 7;11 who are suspected of having cognitive limitations should be administered the WPPSI-IV rather than the WISC-IV. As noted in a previous section, scores on adaptive behavior tests require careful interpretation in order to ensure the child's observed adaptive deficits are not primarily reflective of language delay.

In general, functioning across areas tends to be fairly uniformly depressed in children with intellectual disabilities (Flanagan & Kaufman, 2009), while a pattern of inter-subtest scatter, with some scores at or near age-expectancy and other scores well below expectation, will throw a diagnosis of intellectual deficiency into doubt. Consistent test results across multiple measures as well as across time lend confidence to obtained scores.

Learning Disability

The diagnosis of learning disabilities in children with hearing loss is a complex topic that is beyond the scope of the present chapter, but some comments may be helpful. Flanagan and Mascolo (2005) state best practice for all children in the diagnosis of learning disabilities currently involves the use of both Response to Intervention (RTI) and the Pattern of Strengths and Weaknesses Model (PSW). The older Discrepancy Model, however, is still sometimes used. The Discrepancy Model compares a student's cognitive

ability as measured by the full scale IQ score to the student's skills in a specific academic area (for example, mathematics) as measured by an academic test. If the student's achievement test score is lower than the full scale IQ score by a predetermined number, usually one to 1½ standard deviations, the student can be diagnosed with a learning disability in that area. The Discrepancy Model, however, is difficult to apply with children with hearing loss because the full scale IQ cannot be considered an accurate measure of the student's cognitive potential. Furthermore, the nonverbal IQ score for a child with a processing deficit in a given area, such as visual-spatial reasoning, may also be compromised. For example, a child who has difficulty in math may also earn a lower nonverbal IQ score due to weakness in visual-spatial skills, resulting in a minimal ability-achievement discrepancy that might erroneously be interpreted as a lack of evidence for a learning disability.

Some score profiles commonly seen in children with hearing loss can be diagnostic. A child who has a language delay attributable to hearing loss but no other processing issues will, in an appropriate education setting, typically be able to acquire the mechanics of academic skills but will struggle in academic areas that require language. Thus, the student will demonstrate adequate skills in the areas of phonics and word recognition, math computation, and written language mechanics such as letter formation, capitalization, and punctuation. However, reading vocabulary may be limited and the student will struggle with literal and especially inferential comprehension. In math, he or she is likely to have difficulty with math concepts and especially word problems. In writing, the student will exhibit problems with syntax and grammar as well as poor elaboration (Geeg & Hayes, 2011). In contrast, a child with hearing loss who also has processing deficits or learning disabilities is likely to exhibit deficits in mechanics that are not attributable to language delay, such as sound-symbol association, grapho-motor skills, math computation, and retention and recall of previously learned skills and information.

Error analysis can be an important tool in interpreting the results of academic testing. The evaluator examines the incorrect responses of the student in an effort to determine where the breakdown occurred: Did the child appear to have the requisite information but have difficulty expressing the information coherently? Did the child's math errors reflect a lack of automaticity with math facts, a tendency to make careless errors, or with lack of acquisition of procedures such as regrouping? Table 7–5 demonstrates how analysis of students' spelling errors may lead to hypotheses about the nature of their difficulties.

COMMUNICATING RESULTS

The psychoeducational report is an essential vehicle for documenting and communicating the results of a psychoeducational evaluation. The task of the psychologist in writing the document is complex, as readers are likely to be diverse, including other psychologists, clinicians such as physicians or speech-language pathologists, teachers, and parents, who all have differing degrees of sophistication and knowledge. A comprehensive psychoeducational report will summarize background information as well as any previous test results. It should provide behavioral observations and a description of any adaptations or modifications in standardized test administration. It is helpful to provide results in both a tabular summary of test scores, which may be useful to other clinicians, and a narrative interpretation of scores that is understandable to nonprofessionals. A discussion of how the child's hearing loss and language delay, if any, affects the results is particularly useful for educating professionals who may not be familiar with this population. The conclusions section should integrate current and past results, discuss the child's strengths as well as areas of concern, and provide diagnostic impressions, if applicable. A useful report offers broad recommendations for further evaluation and/or services, as well as specific practical recommendations for therapists and teachers.

In addition to a written report, the psychologist generally provides verbal feedback to parents. This is a valuable opportunity to further interpret and clarify evaluation results, resolve misunderstanding, and answer questions. Tact and sensitivity are required when there is the possibility of a new diagnosis in addition to the hearing loss. Some parents may suspect their child is struggling with additional issues and welcome confirmation of their suspicions. For other parents, however, the diagnosis of a second problem is a significant emotional blow that may be challenging to accept (Edwards, 2007). Parents may react with denial, anger, or anxiety, and unresolved mourning issues around the original hearing loss may present themselves. The clinician must be ready to respond with patience, empathy, and understanding in order to assist the parents in the process of accepting the additional diagnosis and acting to meet the needs of their child.

Although psychologists less frequently provide feedback directly to students, a discussion of the evaluation results can be a valuable experience for the child who has adequate communication skills. Talking with students about their strengths and weaknesses can actually normalize and destigmatize areas of struggle, put-

Table 7–5. Analysis of Spelling Errors

Type of Error	Example	Possible Interpretation
"Typical" errors	"ruff" for rough	Child is spelling word phonetically, shows adequate phonetic knowledge
	"rideing" for riding	Child is not applying spelling rule
Errors indicating possible processing weakness	"bog" for dog	Possible orthographic error—child reverses d and b
	"guass" for guess	Possible phonics error; child may have inadequate sound-symbol association
Errors specific to hearing loss	"sharsh" for charge	Possible auditory discrimination error; child may not be hearing word adequately
	"chart" for charge	Possible lexical/semantic error; child may be unfamiliar with the word and substituting a similar, familiar word

ting borders around the areas of difficulty. Students with greater self-knowledge have improved ability to advocate for themselves (Pohlman, 2008). With students with hearing loss, it can be useful to employ visuals and print in this process. Rather than attempting to provide an exhaustive account of the evaluation, it can be more effective to focus on a few key points that are easily understandable to the student, keeping the explanation simple and clear and checking frequently for comprehension.

SUMMARY

This chapter explained the process of psychoeducational evaluation of children with hearing loss, with an emphasis on children who use LSL as their method of communication. Although issues related to the use of sign language are not relevant for this population as they may be with other students with hearing loss, language proficiency is still a crucial focus in evaluating these students. The central challenge for the psychologist in performing psychoeducational evaluation for this population lies in determining to what degree the child's struggles reflect language delay secondary to the hearing loss, and to what degree the problems may reflect comorbid disorders. This question will affect choice of tests, test administration, and interpretation of results. With an adequate grasp of the issues involved in hearing loss, cochlear implants, and language acquisition, as well as an understanding of how these interact with other processing and behavioral issues, the psychologist will be able to provide assessments that are useful in understanding the child as an individual and a learner, supporting the child in the educational setting, and helping the child to be successful.

CASE STUDIES

Kris (Intellectual Disability)

Kris was born 6 weeks premature and experienced severe neonatal complications. She spent one month in the newborn intensive care unit, during which time she was on a respirator and received ototoxic medication. Kris has cerebral palsy. She did not walk until she was 3 years old and continues to demonstrate gross and fine motor weakness. At 3 months of age she was diagnosed with a profound hearing loss and was fitted with hearing aids. She received a cochlear implant when she was 5 years old. Although Kris initially received early childhood services through an LSL early childhood program, after the age of 3 years, she attended rural public schools, with inconsistent services and communication modalities.

Kris was administered a psychoeducational battery in her home school when she was 6 years old. Administration of the WISC-IV resulted in a nonverbal score in the borderline range, with reported verbal and full scale scores in the severely delayed range, below the 1st percentile. An adaptive behavior measure yielded similar scores, and Kris' academic skills were found to be at or below the kindergarten level. Based on the Full Scale WISC-IV and adaptive behavior scores, Kris was given a diagnosis of multiple disabilities, including hearing loss and intellectual disability. Her home school recommended placement at the State School for the Deaf, where she would learn American Sign Language (ASL). However, Kris' parents did not agree that Kris was intellectually limited and they requested an independent evaluation.

When Kris was seen for the independent evaluation, she presented as a friendly, spunky little girl with an engaging sense of humor. Testing with the WISC-IV was seen as inappropriate due to the motor demands and timed nature of some of the subtests. Evaluation with a nonverbal intelligence test with minimal motor demands resulted in a measured IQ in the low average range, which was seen as a more accurate and appropriate estimate of Kris' intellectual potential than the previous WISC-IV Full Scale IQ. Administration of an adaptive behavior measure resulted in a low score in the area of conceptual abilities, reflecting language and academic delays, but Kris' practical and social skills scored at the lower limits of the average range. Kris' academic delays were seen as reflecting, to a large degree, lack of access to instruction due to her language delay.

Kris was enrolled in a full-time LSL day program. With consistent and intensive speech and listening services, she began making steady growth in audition and language acquisition. Oral motor weakness has limited her speech, but her receptive language skills are relatively well developed. Intensive teaching of academics in a small-group setting helped her to develop literacy and math skills. Although both Kris' language and academic skills continue to be delayed when she is compared with typical peers, she is expected to transition into a mainstream school with resource room assistance for middle school.

Tracy (Language Weakness in a Mainstreamed Student)

Tracy was initially seen for evaluation when she was 10 years old. Tracy has a progressive hearing loss and used hearing aids until she was 5½ years old, when she received a cochlear implant. She had consistent LSL early childhood services, attended a self-contained hearing-impaired classroom in kindergarten, and was mainstreamed in first grade. She began to struggle in the mainstream in 3rd grade, repeated 4th grade, and at the time of the evaluation had services that included a teacher's aide in the classroom, regular sessions with an itinerant teacher of the hearing impaired, twice weekly speech/language therapy, and academic tutoring, but was still struggling. Tracy's mother described her as being "burned out and frustrated" in school.

Tracy presented as an attractive, sociable youngster who demonstrated intelligible speech and good conversational skills. Evaluation indicated she was functioning in the average to above-average range of nonverbal intellectual functioning. There was no evidence of processing deficits in memory, visual functioning, or attention and task focus. Tracy demonstrated a strong language base and good basic communication skills. However, her academic language skills scored significantly lower than her nonverbal ability, and she was found to be weak in vocabulary, receptive and expressive discourse, and the ability to use higher level conjunctions. Her academic mechanics—reading decoding, math computation, spelling—were well-developed, but her reading comprehension was weak and she had difficulty with word problems in math. She performed poorly on classroom tests, and her writ-

ten expression tended to be simple and limited in content. The assessment team concluded that Tracy's language skills were not adequate to access curriculum in a general education setting as she moved into the middle grades.

Tracy attended an LSL day school for 3 years, with an intensive focus on developing vocabulary, higher-level oral language, reading comprehension, and oral and written discourse. At the end of the third year, psychoeducational evaluation indicated that Tracy's academic language skills and vocabulary were now at or close to age-expectancy. All of her academic skills, including reading comprehension, written expression, and math reasoning, scored within normal limits for her grade level, and she had developed greater self-confidence and poise. Tracy was able to successfully transition back into her home school district with minimal support. She is currently attending college.

Mack (ADHD and Behavior)

Mack is a funny, animated 9-year-old boy with red hair and freckles. He was born 5 weeks premature but did not experience any severe neonatal complications. Mack was diagnosed with a profound hearing loss at 11 months, was fitted with hearing aids, and received a cochlear implant shortly thereafter. He received LSL early child services but transitioned into a public school early childhood special education program at age three. Mack's parents felt that his progress slowed after he was placed in the cross-categorical classroom, and they sought placement in an LSL day program when he was 5 years old. In the LSL program, Mack was described as a cheerful and sociable little boy, but he also displayed very frequent explosive and disruptive behavior in the classroom that affected his availability for learning. He also exhibited a high activity level, impulsivity, and difficulty staying on task. Psychoeducational evaluation indicated that Mack's nonverbal intellectual ability was in the average range. He was a talkative child who demonstrated good pragmatic language and conversational skills, but it was discovered that his language skills were not as well developed as casual interaction would suggest. Behavioral evaluation indicated the presence of ADHD. Mack was also found to have significant deficits in visual-motor integration and graphomotor skills. His emotional breakdowns in the classroom were seen as reflecting impulsivity and deficits in self-regulation, as well as having the function of avoidance of frustrating activities such as writing. Mack was diagnosed with ADHD by his pediatrician and began taking stimulant medication with good benefit. Strategies to address his behavioral problems as well as to improve his attentional skills were implemented in the classroom. Mack's language and academic skills have shown excellent growth over time, and he has developed a strong interest in music and a real talent in dramatic performance.

Jeremy (Learning Disability)

Jeremy is a 7-year-old boy whose hearing loss was discovered in a newborn screening. He received his first cochlear implant at 15 months and a second, bilateral implant 2 years later. Jeremy received early childhood services in an LSL program and transitioned into a kindergarten program in his neighborhood public school, while continuing to receive speech and language therapy outside the school day. Jeremy's teacher and speech therapist reported that Jeremy was a motivated child who worked hard and was eager to participate in the classroom and in individual therapy sessions. Even so, Jeremy's progress in acquiring academic skills was slow, and he was functioning far below grade level in reading, writing, and math. Evaluation was sought to determine the cause of his delays.

Results of psychoeducational evaluation indicated that Jeremy was a child of average intellectual potential who was able to use thinking skills to solve visually presented problems. His language skills were seen as adequate to support him in the general education classroom. However, Jeremy demonstrated processing deficits that were seen as having a negative impact on his ability to acquire academic skills. Jeremy was found to have very significant weakness in working memory. He had difficulty holding information in mind, storing it in long-term memory, and retrieving it. Jeremy's visual-spatial skills were also found to be weak. He demonstrated problems with the integration and synthesis of part-whole relationships as well as directionality. These weaknesses resulted in Jeremy struggling to perceive, learn, and reproduce visual symbols such as letters, numerals, and mathematical symbols. The combination of limitations in both visual-spatial processing and working memory were seen as affecting phonemic awareness and sound-symbol association in reading.

The psychoeducational evaluation recommended that Jeremy receive special education services through his public school to address his weaknesses in early reading and math skills. Specific recommendations were made for helping his teacher address Jeremy's learning issues in the mainstream classroom. In addition, his parents elected to pursue private tutoring with a reading specialist. With these interventions, Jeremy is making rapid progress in developing reading and math skills.

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CHAPTER 8

Literacy Assessment

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KEY POINTS

- Literacy outcomes for children with hearing loss as a group continue to lag behind peers with normal hearing, despite advances in amplification technology.
- Literacy consists of emergent literacy, word-level literacy, and text-level literacy skills.
- Literacy deficits can be seen in individuals or across domains of literacy.
- A problem-solving approach to literacy assessment provides detailed information about an individual's needs for literacy interventions, effectiveness of specific literacy interventions, and impacts of interventions on general literacy skills.
- Literacy assessment should include both normative comparisons and progress monitoring.

INTRODUCTION

Children with hearing loss have notoriously poor literacy achievement. Although there is wide individual variability in reading and writing outcomes in the population, the average reading level for 18-year-olds with hearing loss is roughly 3rd grade, and this achievement level has been remarkably consistent since the 1970s (Qi & Mitchell, 2012). This finding is particularly alarming in light of technological advances in amplification, including digital hearing aids and cochlear implants. Although a small group of children who received cochlear implants prior to age 2 have demonstrated reading outcomes that fall within the range of normal, professionals have noted that access to sound at an early age does not guarantee successful literacy development (Geers & Hayes, 2011). Given such poor average outcomes for children with hearing loss, it is vital to appropriately assess literacy, as well as emergent literacy skills, including both normative comparisons and progress monitoring. This chapter details a problem-solving approach to literacy assessment for children with hearing loss.

LITERACY ACHIEVEMENT

Attaining proficient literacy achievement requires one to use a complex system of knowledge and skills across a variety of linguistic domains. Skilled reading