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ASSESSING ASL

Comprehension, Narrative, and Phonological Awareness

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> "A real voyage of discovery consists not of seeking new landscapes but of seeing through new eyes." ~ Marcel Proust

Formal methods of signed language assessment are fundamental to the provision of an equitable education for bilingual deaf children (Enns & Herman, 2011). Not only does valid assessment form a crucial aspect in effective language teaching and planning, the ability to successfully monitor students' language and academic progress can play a powerful role in the legitimization and public acceptance of bilingual programs. Although there are many assessments for evaluating the influence of spoken language skills on learning, there are few comparable assessments of deaf children's signed language ability for educational use (see Herman, 1998, Hoffmeister, 2000, Mann & Prinz, 2006, Singleton & Supalla, 2011). For assessments to be useful to educators, standardized norms for monitoring phonological acquisition and receptive and expressive signed language skills in young deaf children are needed. By identifying norms for language development, signed language development can be monitored to ensure that deaf children acquire language structures (e.g., vocabulary, syntax, and grammar) at rates comparable to those for hearing children. The work we report on in this chapter was initiated to fill this gap with the goal to develop effective tools for monitoring the normative process of American Sign Language (ASL) acquisition in deaf children. These assessments will help educators monitor whether the ASL acquisition of a given child is delayed, advanced, or developing normally.

In the past, the assessment of signed language abilities in deaf children was generally not considered necessary because it was deemed unrelated to their academic programming. In programs focusing on a monolingual approach, there was no recognition of signed languages as separate languages, even those

incorporating sign systems of a spoken language (e.g., Signed English, Total Communication). So signed language assessments were either not done at all or were done using informal measures (Hoffmeister, Kuntze, & Fish, 2013). As educational programming shifted to incorporate a cultural perspective on Deaf people and bilingual programming in the 1980s, more emphasis was placed on assessing and monitoring children's signed language skills. However, the development of signed language abilities was seen primarily as a way of enhancing spoken and written language skills. For this reason, formal assessments typically consisted of simply adapting existing spoken language tests by administering them in signed language. Using translated tests is problematic because they are not developed for deaf children or signed languages, the norms based on spoken languages often do not apply to signed languages, and translated tests may not be assessing the same things in another language (Woll, 2016). For example, naming body parts is often used to assess preschool English vocabulary, but in ASL, simply pointing to the body part represents the name/sign, so the test item does not measure the same developmental construct and level of vocabulary acquisition. In general, the results of these translated assessments were not accurate and often did not focus on relevant or appropriate structures of signed languages.

It was only through the strong advocacy of pioneers, like Hoffmeister (2000), who believed in the legitimacy of signed languages and the benefits they could contribute to children's learning that tests specifically designed to assess children's abilities in signed languages were developed. There has been increased research interest over the past decade to create tests specifically developed and designed to assess signed languages and to fit with the visual learning needs of deaf children. As only a few of such signed language tests have been developed, the variety of assessments available is limited in comparison to tests for spoken language, particularly regarding different components of language (receptive, expressive, phonology, vocabulary, syntax, and discourse). Research regarding signed language assessment is only possible due to increased knowledge and data related to signed language acquisition (Baker & Woll, 2009) because identifying atypical development cannot occur until there is a solid understanding and definition of the typical developmental sequence. As a result, test development is not possible in signed languages where limited linguistic research is available. The connection between signed language acquisition research and the development of practical assessment tools continues to be strengthened and extended across signed languages in the creation of important experimental and formal measures. The increased accuracy of these measures contributes to determining a more complete picture of children's overall linguistic abilities to more effectively guide their literacy development and academic learning.

The purpose of administering a signed language assessment with deaf children varies and includes both educational and research objectives (Enns & Herman, 2011). Often, the purpose of assessment is to determine overall signed language proficiency, or the level of knowledge of particular aspects of signed language.

For educators, key purposes of assessment are to guide instruction and to monitor progress (Stiggins, 2002). Assessment should be comprehensive and address a range of language features, as well as the use of language in various contexts. Such assessment requires knowledge of signed language acquisition, so that assessment can focus on the components and structures of signed language that are most indicative of delays or disorders in development (Quinto-Pozos, Singleton, & Hauser, 2017). This can be accomplished through both formal and informal measures, as long as they accurately identify language strengths and difficulties (i.e., provide diagnostic information). Several different tests are often needed to provide a complete picture of a child's signed language abilities so that appropriate programming and instruction can be determined.

The following section outlines three ASL tests for assessing specific components of language including receptive and expressive ASL grammar knowledge and ASL phonological awareness. The tests are described separately, according to each of the language components, but test results must be considered in combination and compiled to form a complete picture of a child's language abilities.

Test Descriptions

ASL Receptive Skills Test

The *ASL Receptive Skills Test (ASL-RST)* (Enns, Zimmer, Boudreault, Rabu, & Broszeit, 2013) measures children's (ages 3–13 years) comprehension of ASL morphology and syntax. The test was adapted from the *British Sign Language Receptive Skills Test* (Herman, Holmes, & Woll, 1999) through a series of phases, including consultation with experts, development of new test items, videotaping of ASL stimuli, and re-drawing of picture responses. Two rounds of pilot testing were administered with native signing children (deaf children of deaf parents) to establish appropriate stimuli and distracter items and the accurate developmental ordering of test items. Following the first round of pilot testing (with 47 children in Canada and the United States), revisions were needed for 23 of the original 41 pilot test items, and four new items were added to assess understanding of the more complex structures of role shift and conditional clauses. The second round of pilot testing revealed that modifications to previous test items and the new test items made the test more challenging and more clearly distinguished children's skills at different ages. Analysis comparing age and raw score showed a significant correlation and high r value (r (34) = 0.821, $p < .001$). Final modifications included deleting three test items (considered redundant) and re-ordering test items to more appropriately reflect the developmental sequence of ASL acquisition (for more detailed information regarding the adaptation process, please see Enns & Herman, 2011).

The *ASL-RST* uses a vocabulary check (20 items) that precedes the main test of 42 items. The purpose of the vocabulary check is to ensure that the child

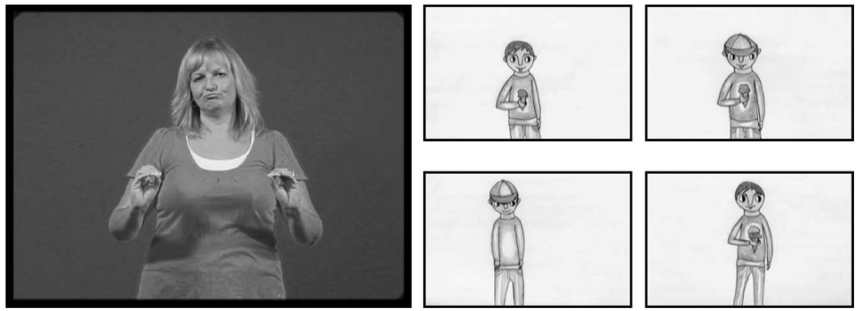

FIGURE 15.1 Example of ASL-RST Test Item

knows the signs used in the test, and therefore any incorrect responses can be attributed to not understanding the ASL morphology and syntax. The *ASL-RST* assesses eight grammatical structures: (1) number/distribution, (2) noun-verb distinction, (3) negation, (4) spatial verbs, (5) handling classifiers, (6) size-and-shape classifiers, (7) conditional clauses, and (8) role shift. The original test format (video of stimulus items and picture book of responses) was revised by digitizing the picture responses and incorporating them into the test USB (Figure 15.1). This eliminates the need for the picture book, and the child is not required to shift eye gaze between the computer screen and the picture book, thus reducing distractibility errors.

The child's raw score (out of a possible 42 items) is converted to a standard score (mean = 100; standard deviation = 15) to determine categorization into Above Average, Average, and Below Average according to same-age peers. The normative (standardization) sample is based on 203 children throughout Canada and the United States. Deaf children from hearing families were included in the standardization sample; however, only if they had been exposed to ASL by age 3 or younger (according to parental report or attendance in ASL preschool program). All 203 children were deaf and had a non-verbal IQ of 70 or above (or where formal testing was not available, were determined to be functioning within the average range intellectually by school personnel). There were 77 native signers and 126 nonnative signers (acquired <3 years old), 106 females and 97 males, and the ages ranged from 3 to 13 years. Testing took place in the children's schools and was administered by deaf and hearing researchers with fluent ASL skills. We recognize that our sample of 203 children may be limited in how accurately it represents the overall population of deaf children, and for this reason, future research will involve additional testing and data collection to expand our sample. However, statistical analyses of the standardization data revealed that the test is reliable (showed internal consistency) and is a valid measure of developmental changes in ASL comprehension.

ASL Expressive Skills Test

The *ASL Expressive Skills Test (ASL-EST)* (Enns, Zimmer, Broszeit, & Rabu, 2019) is an adaptation of the *British Sign Language Production Test* (Herman *et al.* 2004), which involves a narrative elicitation task through the use of a language-free story on video (Spider Story). Specifically, the child watches the video story and then spontaneously re-tells the story, including answering three comprehension questions. The child's responses are video recorded and analyzed according to specific scoring guidelines. Analysis and scoring focus on narrative content/structure (events in the story and story development), as well as ASL grammar, including spatial verbs, agreement verbs, aspect, manner, and role shift. *ASL-EST* testers must be trained (attend a mandatory training workshop) to ensure that they have the necessary skills to score the narratives accurately and consistently.

An important aspect of developing the *ASL-EST* was to create additional versions of the test, or parallel video-based stories that would elicit comparable narratives. Having alternate elicitation videos allows for re-testing students without them becoming familiar with the story over repeated viewings. Creating additional video stories also facilitated updating the original Spider Story, from the BSL test, to incorporate American cultural features and improve the video quality. The two new stories, "Home Alone" and "Tiffany's Breakfast", follow the basic narrative structure of the Spider Story. Each story consists of similar events (a series of back-and-forth interactions between protagonist and antagonist) but with slightly different settings, characters, and consequences. There are also parallels between the objects and actions in each of the stories that allow for opportunities to elicit the same kinds of grammatical structures (spatial verbs, agreement verbs, aspect, manner, and role shift). Pilot testing of the three stories/versions of the test was conducted with a sample (n = 47) of typically developing ASL signers aged 4–12 years. The results of pilot testing confirmed the effectiveness and reliability of the scoring guidelines, as well as equivalency across the three test versions.

The *ASL-EST* was standardized on a sample of 215 deaf children attending schools for the deaf in Canada and the United States between the ages of 3.5 years and 13.9 years. The sample was not exactly gender balanced, with 125 girls and 90 boys, but no statistical evidence for differences in test performance based on gender were found (ANOVA Sig = 0.933, greater than 0.05). Also, most of the children (n = 144) had at least one deaf parent, with the remaining 71 children having nondeaf parents. Again, no statistical evidence was found for differences in test performance between children with deaf parents or nondeaf parents (Asymp. Sig = 0.659, greater than 0.05). It is important to keep in mind that the sample was selective and only children with early exposure to ASL (before the age of 3 years) were included. The purpose of this selection was to have a normative sample that represents what achievements are possible when children have early and rich full access to language, or are acquiring ASL age-appropriately.

In order to check if the test was measuring what it was designed to measure (children's ASL abilities), scores (based on the categories of average, above average, below average) from the *ASL-EST* were compared with the same children's scores on the *ASL Receptive Skills Test* using a Pearson's correlation. A highly significant correlation (0.91, $p < 0.01$) was found, suggesting good concurrent test validity. Inter-scorer reliability was assessed by having 10% (30 videos) of the data independently scored by two different trained testers and comparing the results. Statistical analysis using Pearson's correlation resulted in a highly significant correlation of 0.87 ($p < 0.01$), indicating inter-scorer reliability was very good.

An investigation of the relationship between children's ages and total test scores revealed a weak linear relationship (R-Square Linear = 0.619). These findings were supported with both Pearson and Spearman's rho coefficients and the results were 0.787 and 0.767, respectively, which were slightly better (greater than 0.70). These statistical analyses point out the considerable variability that occurred in children's scores at each age level. For this reason, percentiles, rather than standard scores, are used when comparing individual scores to the norms. Percentiles are based on mean scores, and the range of scores around the mean, at each age level, for the Total score, and the sub-sections of Grammar, Role Shift, Questions, and Narrative. The younger children are grouped by one-year age ranges (4-, 5-, and 6-year olds), whereas the older children are grouped in two-year (7- to 8-year olds) or multi-year (9 years and older) ranges. The reason for this is because rapid language development occurs in these younger years, but development levels out as children get older. Also, grouping the ages together allows for larger numbers of participants in each group, which provides a more reliable basis for the means and percentiles. As noted previously, there was considerable variability within the groups, particularly for the younger ages; however, the *ASL-EST* is an effective measure for assessing and diagnosing the strengths and weaknesses of children's expressive ASL abilities.

American Sign Language Phonological Awareness Test

The American Sign Language Phonological Awareness Test (ASL-PAT) (McQuarrie & Cundy, 2019) is a computer-based test designed to assess children's (4–13 years) awareness of the phonological structure of ASL (i.e., the sublexical parameters of handshape [HS], location [L], and movement [M]). The ASL-PAT measures a child's ability to identify phonological similarity relations (i.e. discriminate minimal contrasts) in signs across three comparison conditions: signs with three (HS + L + M), two (HS + M, L + M, and HS + L), or one (HS, M, or L) shared parameters.

Test Construction. McQuarrie's (2005) receptive-based phonological similarity judgment task (picture matching-to-sample) was used as a prototype in developing a downward extension of the measure more suitable for 4- to 13-

year-old children. Test construction began in 2012 as part of a larger project on dual language literacy development. The aim was to develop a signed language phonological measure that was quick to administer for educators, yet sensitive enough to discriminate young children's phonological knowledge based on age, and to distinguish native and late-learners of ASL. A first draft of the ASL-PAT (24 test items) was developed within this project. To ensure validity in the development of the assessment, a large pool of potential test items was constructed and vetted by a team of Deaf native ASL users who were knowledgeable about child signed language development and were able to suggest representative and age-appropriate content. The items were then pilot-tested on a group of 12 deaf children (four children in each of the youngest age categories). The purpose of the pilot test was to evaluate the feasibility, usefulness, and usability of the test items, and to examine the effectiveness of the instructions, items, and item delivery method (see McQuarrie, Abbott, & Spady, 2012 for more information regarding test development and design). Building on the knowledge acquired in this phase of test development, a final version of the ASL-PAT was optimized by including 48 test items that best predict phonological awareness in ASL and are most sensitive to developmental differences in phonological awareness. A four-year norming study for the ASL-PAT is currently underway. Data is being collected from multiple schools with a high number of DHH students in Canada and United States. To date (year 3 of the study) 175 children have been tested; a subgroup of deaf children of deaf parents will be used to establish normative scores for each age group (Group 1: ages 4–4:11, Group 2: 5–5:11, etc.). At time of writing, we anticipate that a one-year extension to this project will be necessary due to school closures related to the COVID-19 pandemic.

Test Procedures. The testing procedure consists of five phases: (1) log in and background demographic questionnaire, (2) vocabulary check, (3) instruction video in ASL, (4) Part 1 practice trials and test block, and (5) Part 2: practice trials and test block. The testing takes about 15–20 minutes for each test-taker.

Log in/Questionnaire: An identification number is assigned to each user on log in. A brief questionnaire including background information (e.g., date of birth, gender, age of onset, age of exposure/acquisition, use of hearing technologies, and age of implantation) is completed online by the test administrator.

Vocabulary Check: The test begins with a vocabulary check in the form of a picture dictionary presented as a 5 × 5 grid picture display. Children are instructed to name each picture in ASL. If a child is uncertain or unable to generate a sign for a picture item, a video prompt of the sign is available by clicking on the picture. Prompted items are subsequently added to the end of the picture display and retested without the video prompt prior to beginning the test. It is essential that children associate the correct sign with each test pictures prior to taking the test; thus, if a child was unable to name all items, testing would be discontinued at this point.

Instruction Video: At the completion of the vocabulary check, participants watch an instructional video in ASL presented by a Deaf adult native signer. The instructions are child friendly, the parameters of sign formation (HS, M, L) are reviewed, and an example of what the test items look like and what the child is required to do is modeled. The instructions encourage the children to try their best.

Practice and Test Block: Each practice and test question screen consists of a signed cue (video), with three picture items below representing the target/phonological match and two distracter items (see Figure 15.2). Test-takers are required to select the picture that best matches the signed cue along the phonological parameter(s) tested. The test consists of two sections. Part 1 requires discriminating a single parameter match between cue and target (i.e. identifying signs made with the same HS, L, or M). Students complete three practice trial questions (one practice example for each parameter). The students are given feedback on the practice trials. Twenty-four test questions immediately follow this practice. No feedback is provided on test items. Part 2 requires discrimination along two or three shared parameters and includes four practice trials followed by 24 test items. Again, feedback is provided on the practice items, no feedback is provided on test items.

Scoring: An online database records accuracy (correct match – 1; incorrect match – 0) and error response choice for each test item. Overall test performance

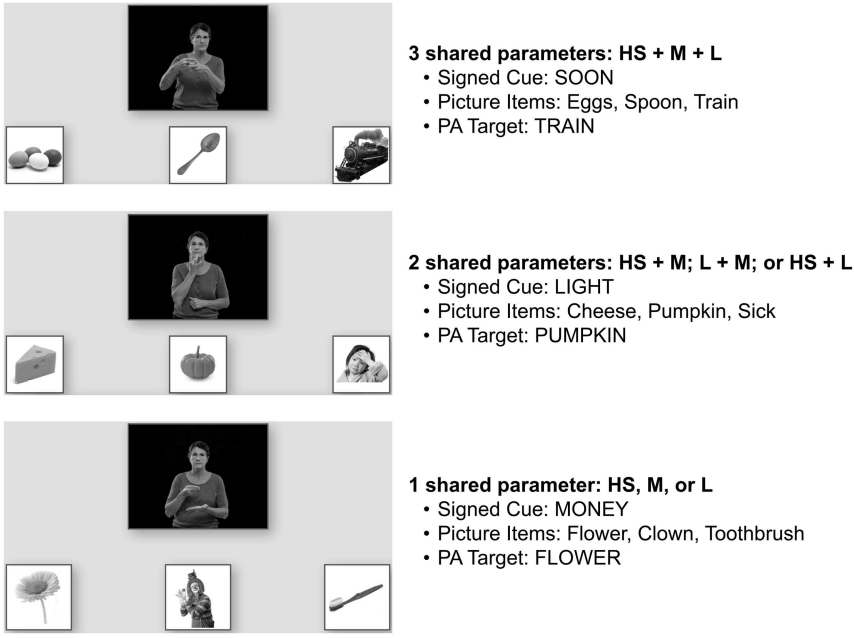

FIGURE 15.2 Example ASL-PAT Test Items

scores are determined by the number of correct responses out of 48. Reaction/response time data is also recorded. Similar to the ASLAI (Hoffmeister, 1999), multiple users can access the assessment at the same time, and all individual user responses are uploaded to a central database in real time. However, given the young age of our test-takers, we have maintained a standard practice of individual administration.

Upon completion of the norming study, the ASL-PAT will be available for teachers and clinicians to provide information on children's sign phonological development and to identify children who lack explicit sign phonological knowledge. Of note, previous versions of the ASL-PAT have been used in various research studies in which the predictive relation between ASL phonological awareness and written/spoken language skills in English was studied. Evidence of positive relationships between signed language phonological awareness and measures of English word recognition and reading comprehension were documented in bilingual deaf students aged 7–18 using the first version of the test (76 test items) (see McQuarrie & Abbott, 2013; see review in McQuarrie & Parrila, 2014). In addition, results from a school-based signed language phonological awareness intervention study (see McQuarrie & Enns 2015; 2018) document a clear functional relation between explicit instruction in ASL phonological awareness and increases in sign vocabulary and print vocabulary learning in young (ages 6–10) deaf dual language learners. Changes on the ASL-PAT (24 test items) administered at the beginning and end of the intervention confirmed these results. More recently, Keck & Wolgemuth (2020) report positive correlations between ASL phonological awareness skills (as measured by the ASL-PAT and English reading skills in deaf children (ages 4.7–13.7) who had early ASL exposure (i.e., deaf children with deaf parents, n = 27). Taken together, the evidence that knowledge transfer of signed language phonological awareness correlates with English reading skills suggests that assessing signed language phonological awareness can provide insights into young bilingual deaf children's readiness for learning to read. In addition, it will allow educators to establish targeted phonological learning objectives and plan effective sign phonological instructional interventions for bilingual deaf students.

Conclusion

Language assessment for the purpose of guiding instruction with deaf dual language learners needs to provide diagnostic information about the specific components of both spoken and signed language that contribute to learning. In the past, deaf children's dual language resources were often not acknowledged, and therefore, could not be leveraged for language and literacy instruction. As more research becomes available regarding bilingual and multilingual learners, there is also more evidence for the ways that a robust signed language foundation can facilitate spoken and written language abilities. In particular, signed language

skills (as L1) contribute to establishing background knowledge, concepts, and content and facilitate the development of strategies, like problem-solving and abstract thinking. These are the potential language resources that Hoffmeister (2000) recognized decades ago when he emphasized the importance of deaf children learning ASL for its own merit – not simply as a stepping stone or bridge to learning English – but for the explicit value of establishing fundamental cognitive structures and learning mechanisms that are needed for all higher-level thinking and academic development. Assessing the degree to which deaf children have acquired these concepts and strategies, sheds light on how best to scaffold their ongoing language and literacy learning processes.

Although there is an ongoing need for additional valid and reliable assessments of signed language abilities, there are currently a few tools available, as described in this chapter, that can assist educators and researchers in determining the strengths and gaps in children's ASL abilities that contribute to language and literacy development. For information on additional signed language assessment please refer to Enns *et al.* (2016).

The development of signed language assessments has led to an increased understanding of the influence of signed language skills on learning (Hoffmeister & Caldwell-Harris, 2014; Mayberry & Kluender, 2018). It has also led to more widespread recognition of the consequences on learning that result from variability and diversity in children's language repertoires (e.g., Lederberg *et al.* 2019; Quinto-Pozos *et al.* 2017). As noted by Swanwick (2016) "this new knowledge also highlights the need for more integrated approaches to assessment which recognize the fluctuating dominance of different languages in children's lives and different language proficiencies across different domains" (p. 15). Understanding and applying the knowledge gained from assessing all language abilities, including and in particular signed language skills, will help educators and researchers to see the learning potential of deaf children through new eyes.

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