Research Article

Language Sample Practices With Children Who Are Deaf and Hard of Hearing

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Purpose: In this study, we aimed to identify common language sample practices of professionals who work with children who are Deaf/hard of hearing (DHH) who use listening and spoken language as a means to better understand why and how language sampling can be utilized by speech-language pathologists serving this population.

Method: An electronic questionnaire was disseminated to professionals who serve children who are DHH and use listening and spoken language in the United States. Participant responses were coded in an Excel file and checked for completeness. Descriptive statistics were used to analyze trends.

Results: A total of 168 participants participated in the survey. A majority of participants reported that they use language sampling as a part of their intervention when working with children who are DHH. However,

approximately half of participants reported using norm-referenced testing most often when evaluating language of children who are DHH, regardless of the fact that they felt that language samples were more sensitive in identifying the errors of children who are DHH. Participants reported using language samples to monitor progress and set goals for clients. Participants rarely used language samples for eligibility and interprofessional collaboration.

Conclusions: Language samples offer a unique way to examine a child's language development that norm-referenced assessments are not sensitive enough to detect, particularly for children who are DHH. This offers insights into current practice and implications for the development of a more clearly defined language sample protocol to guide practices in the use of language samples with children who are DHH and use listening and spoken language.

Language samples are a dynamic and essential component of a comprehensive evaluation of a child's language abilities (Blau, Lahey, & Oleksiuk-Velez, 1984; Danahy-Ebert & Scott, 2014; Evans & Craig, 1992; Guo & Eisenberg, 2015; Heilmann, Nockerts, & Miller, 2010; Hux, Morris-Friehe, & Sanger, 1991; Kroecker et al., 2010). Researchers and clinicians have advocated for the use of language samples for assessment because it allows for flexible analysis of a child's language in a naturalistic setting (Finestack, Payestaeh, Rentmeester, & Julien, 2014; Heilmann, Nockerts, et al., 2010; Heilmann, Miller, & Nockerts, 2010). Despite the widespread acceptance of language sample use as the gold standard for assessment and intervention planning, there is agreement among clinicians that language sample collection and analysis lack uniformity between professionals and can be a time-intensive process

(Evans & Craig, 1992; Finestack et al., 2014; Hux et al., 1991; Kemp & Klee, 1997; Thomas, 1989).

There is often a lack of consensus on how to evaluate children who are deaf and hard of hearing (DHH) who use spoken language, given that most standardized assessments do not include children who are DHH in their norming population. Complicating this issue further, many speech-language pathologists (SLPs) feel less confident serving populations of children who are DHH (Blaiser & Mahshie, 2017). The inclusion of language samples can be particularly helpful when working with children who are DHH because not only do they provide an opportunity to assess a child's communication within an integrated context but they also provide multiple opportunities to analyze spontaneous use of morphological and syntactic structures. These structures (particularly those with fricative or affricate noun and verb morphology) have been found to be vulnerable in young children who are DHH, even those with mild–moderate hearing losses (Moeller, Tomblin, Yoshinaga-Itano, Connor, & Jerger, 2007; Stelmachowicz et al., 2008). Given this information, a better understanding of assessment practices of specialists who work with children who are DHH may shed light on best practice protocols for

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integrating language samples in the evaluation of language development of children who are DHH.

Language Difficulties of Children Who Are DHH

Children who are DHH are at risk for language deficits due to distorted or inconsistent auditory access, such as the effects of distance, noise and reverberation, and periods without amplification in everyday settings (Koehlinger, Van Horne, Oleson, McCreery, & Moeller, 2015). These factors may impact overall language abilities, including the integration of complex language, but may specifically impact the use of fricatives and affricates because of the inaudibility of high-frequency components of speech. Even with well-fitted hearing technology with advanced signal processing and feedback reduction schemes, very little gain is provided for high frequencies, such as 4 kHz and 5 kHz (Stelmachowicz et al., 2008). As a result, children who are DHH may be missing high-frequency acoustic information (such as /s/ and /z/) that are important to the linguistic development of plurals, possession, and verb tense (Stelmachowicz et al., 2008; Stelmachowicz, Pittman, Hoover, & Lewis, 2001).

McGuckian and Henry (2007) completed a comprehensive study of morphological development in 10 children with moderate hearing loss and reported that the morphemes *third singular –s, past tense –ed, and possessive –s* were the most difficult to master. Children with moderate hearing loss in this study did not demonstrate an overall delay in morphological development but omitted specific grammatical morphemes that are not as acoustically salient and not used as frequently. This indicates that decreased access to auditory input may play a role in the omission and misuse of these specific morphemes (McGuckian & Henry, 2007).

Findings that demonstrated a morphological vulnerability have been supported in work comparing children who are DHH to age-matched hearing peers. Koehlinger et al. (2015) found that children who are DHH made different errors than their hearing peers, suggesting that assessment practices used to evaluate the language/ morphosyntactic skills of children who are DHH should account for these differences. Although standardized assessments normed on hearing children are considered best practices for evaluating the language skills of children who are DHH (Joint Committee on Infant Hearing, 2007), the administration, scoring, and interpretation of these assessments may not reveal the specific language profile and/or needs of a child who is DHH (e.g., Anderson & Blaiser, 2014). For example, standardized assessments lack the ability to distinguish when a child is specifically missing high-frequency verb and noun morphology, masking omission of grammatical morphemes as an overall delay (Anderson & Blaiser, 2014), rather than identifying its relationship to acoustic access.

The presence of hearing loss in children can impact the overall language and educational outcomes. When clinicians are aware of the potential areas of weakness that might exist in a specific population, they are better able to utilize assessment tools to determine if phonological or morphological errors are developmental in nature, a symptom of an underlying language impairment, and/or if the patterns of errors are due to limited access to specific frequencies and a referral to an audiologist is warranted. The advantages of obtaining language samples from children who are DHH include the ability to analyze communication breakdowns across domains (i.e., form, content, and use) in different communication contexts (e.g., child could not hear), use of communication strategies with various partners, development of noun and verb morphology, and the integration of complex language and new vocabulary (Olszewski & Blaiser, 2011; Stelmachowicz et al., 2001; Walden & Maryrose, 2013). As clinicians assess and monitor progress of children who are DHH and determine eligibility for services, language samples may offer insight to a child's typical language productions and provide information regarding a child's language skills in relation to access to auditory input.

However, many SLPs do not have a working knowledge of best practices in terms of evaluating young children who are DHH. Although the population of children has changed significantly in the last 10 years with newborn hearing screening, advanced hearing technology, and early intervention, practices have lagged behind the research. There is a discrepancy in the knowledge and confidence of providers who specialize in working with children who are DHH and those who serve the population as part of a broader caseload. For example, in a recent survey of 459 American Speech-Language-Hearing Association (ASHA)-certified providers, only 51% of providers (*n* = 79) who were not in the ASHA's Special Interest Group (SIG) 9: Hearing and Hearing Disorders in Childhood said that they felt comfortable serving preschool children who are DHH (Blaiser & Mahshie, 2017). In comparison, 76% of providers (*n* = 143) who were in SIG 9 and had received more extensive training said that they felt comfortable serving preschool children who are DHH (Blaiser & Mahshie, 2017). This lack of comfort serving children who are DHH has also been seen with providers who serve birth-to-3 populations in early intervention (Harrison et al., 2016). Because of this, it is particularly important to understand and share the practices of providers who see children who are DHH with specialization and/or advanced training to serve children who are DHH in terms of setting guidelines and best practice protocols for assessment and intervention for those providers who see children who are DHH as part of a broader caseload.

Although it is important to understand professional practices related to serving children who are DHH, limited data are available regarding language sample use by clinicians who specialize in working with this population. Nuess et al. (2013) examined assessment practices of 116 listening and spoken language specialists (LSLSs) from eight countries. A majority of LSLS-certified professionals (*n* = 81; 69.5%) used checklists and standardized testing as the primary way to assess communication skills of children with cochlear implants. Of the respondents, only 5% used language

samples, and of the seven tools identified as being used to evaluate children who are DHH (e.g., norm-referenced testing, parent report, checklists), language samples were used least often (Nuess et al., 2013).

The current study extends the Nuess et al. (2013) work by focusing specifically on the language sample practices of professionals who specialize in working with children who are DHH. Evaluating the practices of professionals who self-select as specialists with children who are DHH offers a unique insight to comprehensive assessment practices in terms of measuring progress of children who are DHH. Surveying practices of this population of professionals will shed light on how specialists assess the language development of children who are DHH and, more specifically, how they are analyzed and used for intervention. If specific patterns emerge in the assessment, use, and analysis with this population of professionals, there is reason to believe that this knowledge can be extended to other professionals who serve this population as part of a broader caseload.

The purposes of this study are to (a) identify common language sample practices of professionals who specialize in (e.g., SLPs, audiologists, and educators of the Deaf/hard of hearing [EDHHs]) working with children who are DHH, (b) identify how these professionals are using information gained from language samples, (c) outline common practices and propose a clinical protocol for language sample use, and (d) obtain information regarding other assessment protocols used by professionals who specialize in working with children who are DHH.

Method

Instrumentation

The electronic questionnaire included approximately 31 questions investigating three aspects of language sample use: (a) practice demographics, (b) language sample practices, and (c) attitudes toward language samples. The questionnaire and study received approval from the Idaho State University Internal Review Board before dissemination. The survey was developed by a graduate student and faculty member at Idaho State University following outlined steps for survey research proposed by Meline (2009) and Dillman (2000). A pilot electronic questionnaire was disseminated on June 4, 2016. The questionnaire was e-mailed to graduate students and faculty in the Communication Sciences and Disorders Department at Idaho State University to determine the feasibility of the developed questionnaire and to identify any logistical problems with outlined survey methods. Respondents who elected to participate in the pilot study were excluded from the main survey as to prevent contamination to survey results. Modifications were made to question order and language used on the questionnaire after receiving anonymous qualitative responses from pilot respondents. The full questionnaire can be found in the Appendix.

Participant Recruitment

Electronic questionnaires were disseminated to professionals who work with children who are DHH and use listening and spoken language in the United States through e-mail and anonymous links using Qualtrics, a web-based survey management system. Respondents were recruited through the ASHA SIG 9: Hearing and Hearing Disorders in Childhood and the Alexander Graham Bell Association for the Deaf and Hard of Hearing Listening and Spoken Language Knowledge Center directory and through OPTION Schools, a nonprofit organization of listening and spoken language programs and schools for children who are DHH. The initial e-mail was distributed in June 2016. A follow-up e-mail was sent to respondents 2 weeks after the initial e-mail in order to increase response rates as recommended by Dillman (2000). In addition, an anonymous link was posted on ASHA SIG 9: Hearing and Hearing Disorders in Childhood Community Board to recruit respondents. Respondents were given access to the electronic questionnaire from June 24, 2016, to July 28, 2016. Because of multiple recruiting methods, the sample is limited by the possibility of a self-selection bias of respondents who chose to participate in the survey.

Of the 443 surveys disseminated via e-mail, a total of 119 were completed (26.8% response rate via e-mail distribution). In addition, a total of 49 responses were collected via an anonymous link that was distributed to the SIG 9: Hearing and Hearing Disorders in Childhood Community Board and to faculty of OPTION Schools. A total of 168 respondents from 34 different states participated in the survey. Seven of the respondents were audiologists and were removed from the analysis. An exact response rate from all survey-recruiting methods was unable to be calculated due to the lack of a defined sample group.

As shown in Table 1, of 168 respondents, the majority of respondents were SLPs followed by EDHHs. Eighteen respondents (10%) reported listening and spoken language certification (but indicated other professions than SLP, EDHH, and audiology). Approximately 12% ($n = 21$) of the respondents had two or more degrees, and 70% ($n = 118$) had listening and spoken language certification. Approximately 77.3% ($n = 129$) of respondents reported that over 75% of their caseload was children who are DHH, and 75% ($n = 123$) of the respondents reported that they had worked with children who are DHH for over 10 years. Respondents listed public school (either for children who are DHH or mainstreaming) most frequently ($n = 66$) as place of work. The remainder of the respondents worked in private therapy clinics ($n = 31$), private schools for children who are DHH ($n = 29$), college/universities ($n = 15$), home-based intervention ($n = 30$), or other ($n = 15$). Approximately 19.6% of respondents were from the western region of the United States ($n = 33$), 19.0% were from the midwestern region ($n = 32$), 16.0% were from the northeastern region ($n = 27$), 14.8% were from the southeastern region ($n = 25$%), and 10.7% were from the southwest region ($n = 18$).

Table 1. Practice demographics of survey respondents.

Licensing and certification		
SLP	77	45.8%
Audiologist	7	4.2%
EDHH	46	27.3%
Audiologist and SLP	3	1.8%
Audiologist and EDHH	4	2.4%
EDHH and SLP	13	7.7%
LSLS certification (other degree)	18	10.7%
Current work setting		
Hospital	18	
Private therapy clinic	31	
Private school for children who are DHH	29	
Public school for children who are DHH	35	
Public school: mainstream	31	
College/university	15	
Home-based intervention	30	
Other	15	
Years working with children who are DHH		
0–2 years	1	0.6%
2–5 years	15	9.1%
6–10 years	26	15.8%
10+ years	123	74.5%
Percentage of caseload of children who are DHH		
0%–25%	14	8.4%
26%–50%	11	6.6%
51%–75%	13	7.8%
76%–100%	129	77.3%

Note. SLP = speech-language pathologist; EDHH = educator of Deaf/hard of hearing; LSLS = listening and spoken language specialist; DHH = Deaf/hard of hearing.

Data Analysis

Participant responses were coded in an Excel file and checked for completeness. Results were imported into JMP (Version 13; SAS Institute Inc., 2016). Descriptive statistics were used to identify trends.

Results

Current Attitudes Toward Language Sample Analysis

Respondents were asked to report their attitudes toward various aspects of language samples by rating to what extent they agreed or disagreed with statements regarding language sample use and analysis. Overall, respondents viewed the utilization of language samples favorably. A total of 98 respondents either rated that they agreed (n = 53) or strongly agreed (n = 45) that they had adequate training on language samples. Respondents overwhelmingly agreed or strongly agreed that they found language samples useful with the populations they serve (n = 108; 87.1%) and that they could offer information that norm-referenced assessments could not provide (n = 103; 83.1%), despite norm-referenced assessments being most popularly used for evaluation of children who are DHH. One professional commented that language samples were more beneficial in evaluating children who were DHH because "norm-referenced tests are so formal so that a child may or may not use the

structures used in spontaneous conversation. For example, an implanted child may be able to produce all of the sounds in the English language but not use them in informal settings."

Current Practices of Obtaining Language Samples

Respondents were also asked to report on language sample practices. Of 160 respondents, the majority (n = 149; 93.1%) reported that they use language samples as a part of their assessment and intervention practices when working with children who are DHH. As shown in Figure 1, the largest percentage of respondents reported that they take language samples of children who are DHH on a monthly basis (n = 62; 38.7%). Other respondents reported taking language samples during assessment/reassessment (n = 38; 23.7%), quarterly (n = 33; 20.6%), and annually (n = 16; 10%). Eleven respondents (6.9%) reported that they did not use language sampling in their professional practice (seven SLPs, three EDHHs, and one SLP-EDHH). In contrast, several respondents commented that they take informal and ongoing language samples in each session to document and monitor progress of children who are DHH. With regard to frequency of language sampling, most SLPs (n = 29, 31.5%) and EDHH (n = 28, 45.2%) obtained language samples on a monthly basis.

Of respondents who reported use of language samples in their clinical practices, approximately 77.5% (n = 114) determined the length of their samples by the number of utterances versus amount of time (n = 33, 22.4%). When determining the language sample length by the number of utterances, most commonly, respondents attempted to obtain 50 utterances (n = 48; 45.3%), following best practice recommendations made by Guo and Eisenberg (2015) and Heilmann, Nockerts, et al. (2010). Of the remaining

Figure 1. Frequency of obtaining language samples.

Monthly ■ Assessment/Reassessment ■ Quarterly ■ Annually
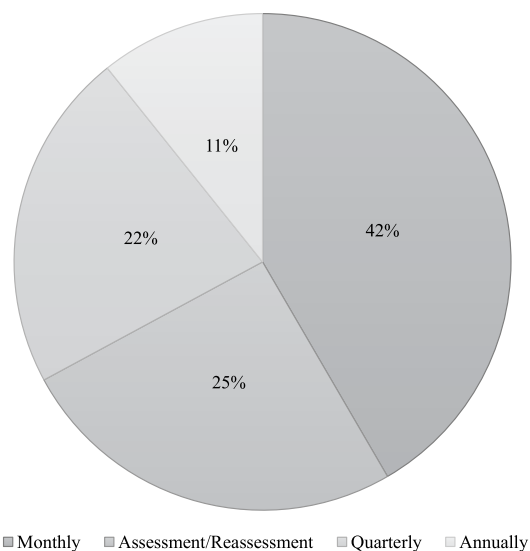
respondents who determined the length of their samples by the number of utterances, it was reported that they used 25 utterances ($n = 20$; 18.9%), 100 utterances ($n = 17$; 16%), more than 100 utterances ($n = 9$; 8.5%), under 25 utterances ($n = 7$; 6.6%), and 75 utterances ($n = 5$; 4.7%). There was more variability among respondents who used "amount of time" to determine the length of their language samples ($n = 30$). Of these respondents, the time ranged from 1 to 15+ min with respondents most often collecting language samples 15+ min long ($n = 8$; 26.7%).

For children from birth to 3 years old, respondents reported obtaining language samples most commonly in the treatment room ($n = 58$; 52.7%) or in the child's home ($n = 42$; 38.2%) utilizing free-play ($n = 107$; 52.3%). They also reported that a child's parent/caregiver was the most common conversational partner ($n = 76$; 69.7%) during language samples for this age group. When broken down by profession, there were some differences where SLPs were more likely to collect samples in a therapy room ($n = 39$; 60.9%) and EDHHs were more likely to sample language in the child's home ($n = 24$; 57.1%). Both groups of professionals (SLPs and EDHHs) used parents as the primary communication partner in language samples of children between birth and 3 years of age.

For children 3 to 6 years of age, it was reported that language samples are most commonly obtained in a treatment room ($n = 80$; 66.1%) utilizing free-play ($n = 99$; 26.8%) or conversation to elicit a dialogue ($n = 91$; 24.6%). When examined by profession, the majority of SLPs took samples in the treatment room ($n = 56$; 82.4%) with the clinician ($n = 38$; 55.9%) as a communication partner. The majority of EDHHs took samples in the classroom ($n = 24$; 50%) but varied in communication partners for the sample with peer/sibling ($n = 11$; 23.9%) or a teacher ($n = 11$; 23.9%).

Respondents reported obtaining language samples most often in a treatment room with children ages 6 to 12 years ($n = 76$; 78.3%) and children older than 12 years of age ($n = 60$; 74.1%). Conversation was reported to be the most common context used for language samples with children ages 6 to 12 years ($n = 76$; 80%) and older than 12 years of age ($n = 57$; 76%), although narrative retell was also commonly used with children ages 6 to 12 years ($n = 70$; 73.7%) and older than 12 years of age ($n = 55$; 73.3%). A clinician was also the most common conversational partner with children ages 6 to 12 years ($n = 65$; 69.9%) and older than 12 years of age ($n = 58$; 75.3%). There were no differences between professions (SLP and EDHH) for these older age ranges.

Current Practices of Language Sample Analysis

When analyzing language samples, respondents reported most commonly comparing samples obtained to a checklist ($n = 64$; 48.5%) or informally by hand ($n = 52$; 39.4%). Respondents described that they compared language samples to the Cottage Acquisition Scales for Listening, Language, and Speech (Wilkes & Sunshine Cottage School for Deaf Children, 2001) and the Teacher Assessment of Spoken Language (Moog & Biedenstein, 2006). Few respondents reported using a computer analysis system ($n = 9$; 6.8%) or by using a language sample analysis methodology, such as the developmental sentence scoring or index of productive syntax ($n = 7$; 5.3%). As shown in Figure 2, respondents most often analyzed language samples for mean length of utterance ($n = 112$; 84.8%), use and omission of grammatical morphemes ($n = 105$; 79.5%), and evidence of Brown's stages of grammatical morphemes ($n = 85$; 64.4%). In addition, respondents reported analyzing language samples for intelligibility ($n = 82$; 62.1%), communicative intentions ($n = 77$; 58.3%), and turn-taking ($n = 61$; 50.8%).
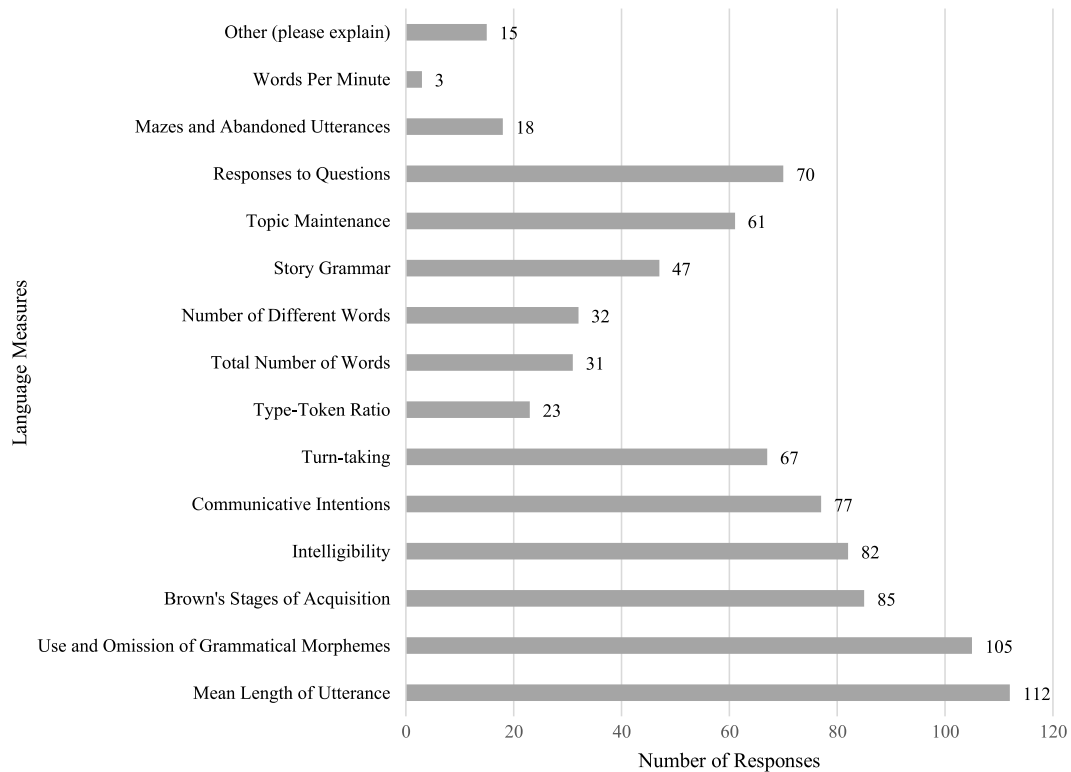
Use of Language Samples

Despite a majority of respondents reporting that they used language samples in some capacity in their practices, Figure 3 demonstrates that approximately half ($n = 62$; 51.2%) of the respondents reported using norm-referenced testing most often when evaluating the language of children who are DHH. Only 21.5% ($n = 26$) of respondents reported using language samples most often when evaluating children who are DHH. The remaining respondents reported using scales of typical development ($n = 14$; 11.6%) and other criterion-referenced tools ($n = 7$; 5.8%), such as dynamic assessment, observation ($n = 6$; 5%), and checklists ($n = 5$; 4.1%), and one participant reported using parent report ($n = 1$; 0.8%). Similar to assessing language, respondents also reported using norm-referenced testing when assessing speech of children who are DHH ($n = 62$; 50.4%). Approximately 12.6% ($n = 15$) of respondents reported using language samples to evaluate speech of children who are DHH.

When asked how they always use information obtained from language samples, respondents reported most often to monitor progress of clients ($n = 78$; 63.9%), to set goals for clients ($n = 75$; 62%), and to share results with parents and caregivers ($n = 69$; 57.5%). Approximately one third of the respondents reported sharing information obtained from language samples with other professionals ($n = 41$; 35.0%). Respondents reported that they "never" used language samples to determine diagnosis ($n = 30$; 26.8%) or to determine eligibility of services ($n = 21$; 18.6%).

Discussion

This study aimed to better understand the language sample practices of professionals who designate themselves as having a focus and/or interest in serving children who are DHH and use listening and spoken language. Information from this group of professionals was sought specifically with the intent of analyzing procedures and trends of these providers to determine if there were patterns of practice that could be shared with a broader group of professionals also serving this low-incidence population. Overall,

Figure 2. Measures used in analysis of language samples.

Horizontal bar chart. Y-axis labeled "Language Measures"; X-axis labeled "Number of Responses" (0 to 120).

- Other (please explain): 15
- Words Per Minute: 3
- Mazes and Abandoned Utterances: 18
- Responses to Questions: 70
- Topic Maintenance: 61
- Story Grammar: 47
- Number of Different Words: 32
- Total Number of Words: 31
- Type-Token Ratio: 23
- Turn-taking: 67
- Communicative Intentions: 77
- Intelligibility: 82
- Brown's Stages of Acquisition: 85
- Use and Omission of Grammatical Morphemes: 105
- Mean Length of Utterance: 112

this recruiting technique was successful as we obtained responses from professionals who were highly degreed and/or certified to work with children who are DHH. In fact, 12% of the professionals who responded had more than one degree, and 70% had successfully completed certification as LSLSs. With that in mind, this sample of professionals may not be representative of the typical SLP, EDHH, or general educator, but given the experience and the caseloads of these professionals, it does offer a preliminary look at the practices of those who specialize in working with this population.

The majority of the professionals who responded to this survey used language samples on a regular basis and felt that language samples were an important part of assessing communication development and progress of children who are DHH. Communication setting and partner varied between this sample of SLPs and EDHHs, where, for younger children, SLPs were more likely to collect samples in treatment rooms with clinicians as communication partners and EDHH were more likely to collect language samples at home and with a variety of partners. One advantage of using language samples, instead of something more prescribed such as norm-referenced testing, is that language samples are flexible in nature and can be collected in a variety of settings with various communication partners. Therefore, given what is known about social delays in children who are DHH (e.g., Goberis et al., 2012) and how noise can impact a child's ability to learn new words

and academic content (Blaiser, Nelson, & Kohnert, 2014; Nelson & Soli, 2000), it is not only possible, but particularly important, to include language samples that are collected in different (i.e., less pristine/structured) settings with different partners to monitor progress and assess communication. Educational teams should consider collecting and using language samples more frequently to understand how a child's social communication and/or ability to communicate with peers in addition to samples collected solely with a clinician or another adult communication partner.

The sample of professionals in this study primarily utilized language samples to monitor progress, set goals, and provide education to families of children who are DHH; however, similar to the Neuss et al. (2013) findings, a majority of professionals focus primarily on norm-referenced testing, not language samples, for determining eligibility. This was true for SLPs, EDHHs, and those with additional certification and training. This is particularly interesting as the majority of respondents believe that language samples offer a unique way to examine a child's language development that norm-referenced assessments are not sensitive enough to detect. This belief is supported by research (e.g., Werfel & Douglas, 2017) showing that, in fact, norm-referenced assessments in isolation may miss morphological deficits of children who are DHH.

The three most common aspects of analysis (across professions) were mean length of utterance, grammatical

Figure 3. Assessment tools utilized most often by survey respondents.
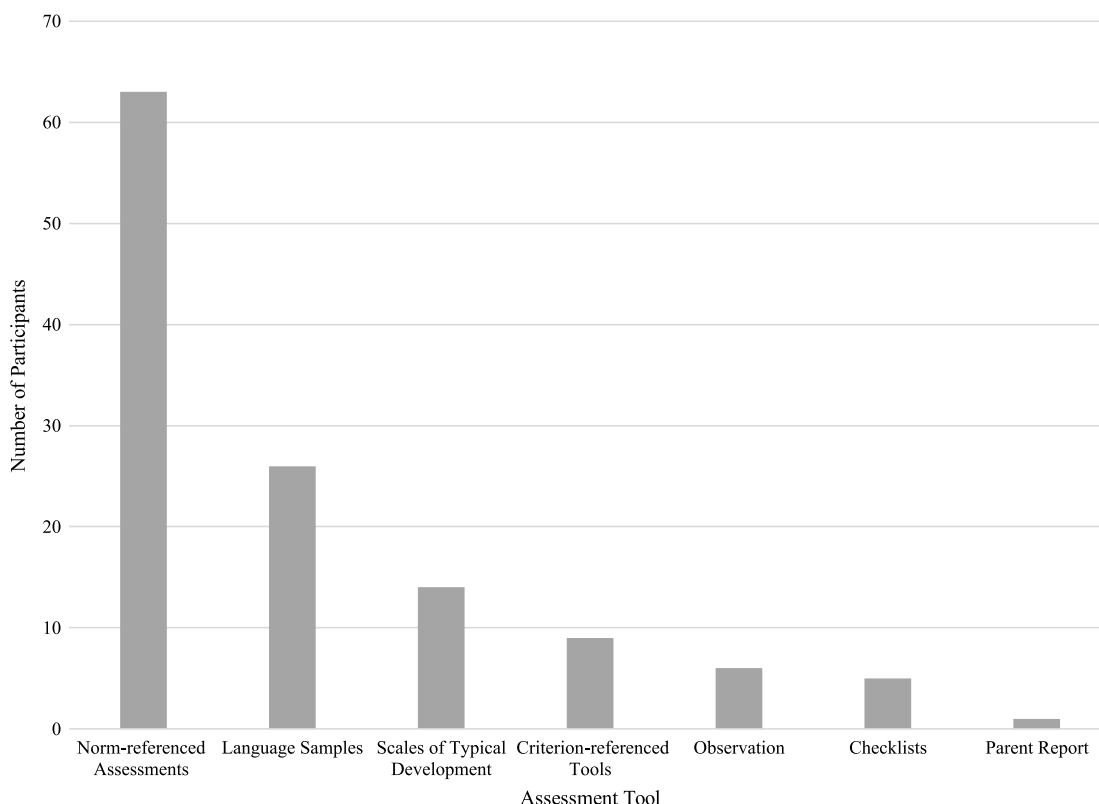
structure analysis, and omission of grammatical morphemes. This common thread supports the findings, that regardless of hearing technology use, children who are DHH continue to be vulnerable to perception and production of these high-frequency grammatical morphemes. These results also suggest that professionals with experience serving this population utilize language samples as a complement to standardized testing to monitor and address issues that are unique to children who are DHH. Language samples are able to identify items missing morphemes in obligatory contexts, demonstrate weaknesses in vocabulary, and highlight challenges in communicative intents. Given this specific information, language samples can be of use not only for developing but also for validating hearing technology and its effectiveness in different communicative environments (e.g., the classroom vs. therapy room) and as a foundation for communication between SLPs, EDHHs, audiologists, and general educators (Blaiser & Nevins, 2017).

Despite the overall agreement in how language samples were analyzed, there were very few "shared protocols" for analyzing language samples. For example, although there were common aspects as listed above, no two professionals in the sample used the same protocol for analyzing language samples. Samples varied in how many utterances were collected, who the communication partner was, what the samples were analyzed for, and how they were used.

While one of the advantages of using language samples is this flexibility of use to assess the specific needs of any child, there may be a benefit in developing a specific minimal protocol reflecting the specific language profile of children who are DHH.

Given the lack of existing protocols to assess the language of this population, information obtained from this sample of professionals (i.e., those who specialize in working with this population) can be used as a preliminary first step in developing recommendations for language sample analysis. For example, a proposed protocol would include two 50-utterance language samples obtained in two settings with two communication partners: one in a therapy setting with the clinician in a conversational context and one in a (noisy and/or less structured) classroom setting with a peer in a play-based context. The protocol would include a checklist that examines the *form* of language, including intelligibility, the production of high-frequency grammatical morphemes, such as *third person singular*, *plural –s*, and *possessive –s* (McGuckian & Henry, 2007; Stelmachowicz et al., 2001; Stelmachowicz et al., 2008) in obligatory contexts, and the ability to produce complex sentences; the *content* of language through the analysis of number of total words and number of different words; and the *use* of language by analyzing the number and type of communication intents and repairs with peers. A protocol such as this would complement standardized assessments by providing

information across communication domains and across communication contexts providing a clear understanding of if and how hearing loss has an educational impact on the child's ability to access the general curriculum. A standardized protocol for collection and analysis of language samples may make language samples more readily acceptable in eligibility conversations and comparisons between professionals.

There was limited use of language samples as a communication tool between professionals. This is surprising given the expertise of the professionals who sampled and the essential nature of interprofessional collaboration for children who are DHH. In addition, the limited communication between professionals regarding language sample results was surprising as there was agreement between professionals who took language samples that high-frequency grammatical morphemes were often examined as a particularly vulnerable aspect of language development. This supports the notion that, although communication and collaboration between professionals are often discussed as essential roles of providers who serve children who are DHH, in actuality, true interprofessional collaboration can be limited in practice, even within a sample of highly trained professionals. There is reason to believe that collaborative practices regarding the communication development of children who are DHH may happen even less frequently with providers who are less specialized in serving this population. The sharing of language samples, particularly as frequently as they are taken from the professionals in this sample, could be an excellent tool to communicate and validate the hearing technology in functional settings, particularly if samples are collected in two communicative environments (e.g., in the classroom and in a treatment room).

The small sample size of this study may limit the ability to infer a broader practice pattern as specialists who do not use language samples or feel that they are important may have opted out of the survey. Although the sample size is small, the results from this sample of professionals still may provide insights to the current language sample practices of specialists working with children who are DHH. It should also be noted that, intentionally, this study focused on recruiting a small population of professionals who are highly trained to serve children who are DHH. Because respondents were recruited from ASHA SIG 9: Hearing and Hearing Disorders in Childhood, the Alexander Graham Bell Association for the Deaf and Hard of Hearing Listening and Spoken Language Knowledge Center directory, and OPTION-based schools, there is a chance that these professionals are representative only of professionals who go above and beyond in terms of clinical education and experiences, providing some challenges in generalizing the results to all professionals. It is also possible that only the specialists who use language samples responded to this survey, again, making the results less generalizable.

Future research should examine the clinical effectiveness of a proposed language sample protocol to determine if it is, in fact, helpful to educational teams in supplementing norm-referenced assessments to determine educational services. In addition, future studies should examine how productions are altered depending on the context. For example, how does grammatical complexity and/or morpheme use differ from a play-based context to a narrative retell or describing a process context? Understanding how context influences outcomes can be important for ensuring that the language sample replicates the cognitive load that might be present in a classroom setting. In addition, although this survey examined practices of professionals who specialized in seeing children who are DHH as a whole, a larger, more representative sample of all professionals who work with children who are DHH should be recruited to participate in a similar survey to determine and compare differences in clinical practices regarding language sample use and attitudes of effectiveness.

Conclusions

There are an increasing number of children who are DHH entering into mainstream settings, and many professionals see them as a part of a broader caseload. Specialists with high numbers of children who are DHH, with many years of experience serving this population, and/or with advanced training (e.g., multiple degrees and/or certification) offer experiences and practices that can benefit the general profession. It is important for professionals who serve this population to have the tools to monitor progress and assess communication outcomes across settings. This study provides a perspective on the language sample practices of professionals who specialize in working with children who are DHH suggesting that language samples provide unique insight into a child's language abilities and capture information about a child's language use that norm-referenced assessments cannot provide. To better serve children who are DHH, information obtained from language samples should be used to specifically focus on communication development across communication domains, to write treatment goals, and to monitor progress and as a basis for validating hearing technology between professionals.

Acknowledgments

References

Anderson, A., & Blaiser, K. (2014, April). *Morphosyntactic development in preschool children with hearing loss.* Paper presented at the 13th Annual Early Hearing Detection and Intervention Meeting, Jacksonville, FL.

Blaiser, K., & Mahshie, J. (2017, February). *Supporting professionals serving children who are DHH.* Paper presented at the

16th Annual Early Hearing Detection and Intervention Meeting, Atlanta, GA.

Blaiser, K., Nelson, P., & Kohnert, K. (2014). Effect of repeated exposures on word learning in quiet and noise. *Communication Disorders Quarterly, 37,* 25–35.

Blaiser, K., & Nevins, M. E. (2017). Practitioner reflection that enhances interprofessional collaborative practices for serving children who are deaf/hard-of-hearing. *Perspectives of the ASHA Special Interest Groups, 2*(SIG 9), 3–9. https://doi.org/10.1044/persp2.SIG9.3

Blau, A. F., Lahey, M., & Oleksiuk-Velez, A. (1984). Planning goals for intervention: Language testing or language sampling? *Exceptional Children, 51*(1), 78–79.

Danahy-Ebert, K., & Scott, C. M. (2014). Relationships between narrative language samples and norm-referenced test scores in language assessments of school-age children. *Language, Speech, and Hearing Services in Schools, 45,* 337–350. https://doi.org/10.1044/2014_LSHSS-14-0034

Dillman, D. (2000). *Mail and internet surveys: The tailored design method.* New York, NY: Wiley.

Evans, J. L., & Craig, H. K. (1992). Language sample collection and analysis: Interview compared to free play assessment contexts. *Journal of Speech and Hearing Research, 35*(2), 343–353. https://doi.org/10.1044/jshr.3502.343

Finestack, L. H., Payestaeh, B., Rentmeester, D., & Julien, H. M. (2014). Reporting child language sampling procedures. *Journal of Speech, Language, and Hearing Research, 57,* 2274–2279. https://doi.org/10.1044/2014_JSLHR-L-14-0093

Goberis, D., Beams, D., Dalpes, M., Abrisch, A., Baca, R., & Yoshinaga-Itano, C. (2012). The missing link of language development of deaf and hard-of-hearing children: Pragmatic language development. *Seminars in Speech and Language, 33*(4), 297–309.

Guo, L. Y., & Eisenberg, S. (2015). Sample length affects the reliability of language sample measures in 3-yr olds: Evidence from parent-elicited conversational samples. *Language, Speech, and Hearing Services in Schools, 46*(2), 141–153. https://doi.org/10.1044/2015_LSHSS-14-0052

Harrison, M., Page, T. A., Oleson, J., Spratford, M., Berry, L. U., Peterson, B., ... Moeller, M. P. (2016). Factors affecting early services for children who are hard of hearing. *Language, Speech, and Hearing Services in Schools, 47*(1), 16–30.

Heilmann, J., Miller, J. F., & Nockerts, A. (2010). Using language sample databases. *Language, Speech, and Hearing Services in Schools, 41*(1), 84–95. https://doi.org/10.1044/0161-1461(2009/08-0075)

Heilmann, J., Nockerts, A., & Miller, J. F. (2010). Language sampling: Does the length of the transcript matter? *Language, Speech, and Hearing Services in Schools, 41,* 393–404. https://doi.org/10.1044/0161-1461(2009/09-0023)

Hux, K., Morris-Friehe, M., & Sanger, D. (1991). Language sampling practices: A survey of nine states. *Language, Speech, and Hearing Services in Schools, 22,* 236–241. https://doi.org/10.1044/0161-1461.2402.84

Joint Committee on Infant Hearing. (2007). Year 2007 position statement: Principles and guidelines for early hearing detection and intervention programs. *Pediatrics, 120*(4), 898–921.

Kemp, K., & Klee, T. (1997). Clinical language sampling practices: Results of a survey of speech-language pathologists in the United States. *Child Language Teaching and Therapy, 13,* 161–176.

Koehlinger, K., Van Horne, A. O., Oleson, J., McCreery, R., & Moeller, M. P. (2015). The role of sentence position, allomorph, and morpheme type on accurate use of s-related morphemes by children who are hard of hearing. *Journal of Speech, Language, and Hearing Research, 58*(2), 396–409.

Kroecker, J., Lyle, K., Allen, K., Filippini, E., Galvin, M., Johnson, M., ... Owens, R. (2010). Effect of student training on the quality of children's language samples. *Contemporary Issues in Communication Sciences and Disorders, 37,* 4–13.

McGuckian, M., & Henry, A. (2007). The grammatical morpheme deficit in moderate hearing impairment. *International Journal of Language & Communication Disorders, 42*(1), 17–36. https://doi.org/10.1080/13682820601171555

Meline, T. (2009, November). *How to do survey research step-by-step.* Presentation at the meeting of the American Speech-Language-Hearing Association, Atlanta, GA.

Moeller, M., Tomblin, B., Yoshinaga-Itano, C., Connor, C. M., & Jerger, S. (2007). Current state of knowledge: Language and literacy of children with hearing impairment. *Ear and Hearing, 28*(6), 740–753. https://doi.org/10.1097/AUD.0b013e318157f07f

Moog, J. S., & Biedenstein, J. J. (2006). *Teacher Assessment of Spoken Language* (2nd ed.). St. Louis, MO: The Moog Center for Deaf Education.

Nelson, P. B., & Soli, S. (2000). Acoustical barriers to learning: Children at risk in every classroom. *Language, Speech, and Hearing Services in Schools, 31,* 356–361.

Nuess, D., Fitzpatrick, E., Durieux-Smith, A., Olds, J., Moreau, K., Ufholz, L., ... Scharmm, D. (2013). A survey of assessment tools used by LSLS certified auditory–verbal therapists for children ages birth to 3 years old. *The Volta Review, 113*(1), 43–56.

Olszewski, A., & Blaiser, K. (2011). *Clinical applications of oral narrative analysis of preschool children with hearing loss.* Manuscript submitted for publication.

SAS Institute Inc. (2016). JMP (Version 13). Cary, NC: Author.

Stelmachowicz, P., Nishi, K., Choi, S., Lewis, D., Hoover, B., Dierking, D., & Lotto, A. (2008). Effects of stimulus bandwidth on the imitation of English fricatives by normal hearing children. *Journal of Speech, Language and Hearing Research, 51,* 1369–1380. https://doi.org/10.1044/1092-4388(2008/07-0115)

Stelmachowicz, P., Pittman, A., Hoover, B., & Lewis, D. (2001). Effect of stimulus bandwidth on the perception of /s/ in normal- and hearing-impaired children and adults. *The Journal of the Acoustical Society of America, 110*(4), 2183–2190. https://doi.org/10.1121/1.1400757

Thomas, J. A. (1989). A standardized method for collecting and analyzing language samples of preschool and primary children in the public schools. *Language, Speech, and Hearing Services in Schools, 20,* 85–92. https://doi.org/10.1044/0161-1461.2001.85

Walden, P. R., & Maryrose, H. N. (2013, November). *Determining functional outcome of hearing amplification: A case for language sample analysis.* Paper presented at the annual convention of the American Speech-Language-Hearing Association, Chicago, IL.

Werfel, K. L., & Douglas, M. (2017). Are we slipping them through the cracks? The insufficiency of norm-referenced assessments for identifying language weaknesses in children with hearing loss. *Perspectives of the ASHA Special Interest Groups, 2*(SIG 9), 43–53.

Wilkes, E. & Sunshine Cottage School for Deaf Children. (2001). *Cottage Acquisition Scales for Listening, Language & Speech* (2nd ed.). San Antonio, TX: Sunshine Cottage School for Deaf Children.

Language Sampling Questionnaire

What is your licensing and certification? (Check all that apply.)
- ❏ CCC-SLP
- ❏ CCC-A
- ❏ Deaf Education
- ❏ LSLS-AVEd
- ❏ LSLS-AVT
- ❏ Other (please explain) _____

How many years have you practiced?
- ○ 0–2 years
- ○ 2–5 years
- ○ 6–10 years
- ○ 10+ years

What percentage of your caseload is children who are Deaf/hard of hearing?
- ○ 0–25%
- ○ 26–50%
- ○ 51–75%
- ○ 75%–100%

How many years have you worked with children who are Deaf/hard of hearing?
- ○ 0–2 years
- ○ 2–5 years
- ○ 6–10 years
- ○ 10+ years

How often do you typically collect language samples per client?
- ○ Monthly
- ○ Quarterly
- ○ Annually
- ○ During assessment and/or reassessment
- ○ I don't use language sampling

How do you determine the length of your language sample?
- ○ Number of utterances
- ○ Amount of time

How many utterances do you try to obtain in a language sample?
- ○ Under 25 utterances
- ○ 25 utterances
- ○ 50 utterances
- ○ 75 utterances
- ○ 100 utterances
- ○ More than 100 utterances

How long are your language samples typically?
- ○ 1–3 minutes
- ○ 3–7 minutes
- ○ 7–10 minutes
- ○ 10–15 minutes
- ○ 15+ minutes

Where do you most commonly obtain language samples?

	Classroom (1)	Treatment room (2)	At the child's home (3)	Other (4)
Ages 0–3 years (1)	○	○	○	○
Ages 3–6 years (2)	○	○	○	○
Ages 6–12 years (3)	○	○	○	○
Ages 12+ years (4)	○	○	○	○

Language Sampling Questionnaire

What contexts of language sampling do you utilize? (Check all that apply.)

	Free play	Conversation (asking a child questions to elicit a dialogue)	Interview (asking a child about a specific event to elicit dialogue)	Narrative retell	Expository (having a child explain a process/task)
Ages 0–3 years	○	○	○	○	○
Ages 3–6 years	○	○	○	○	○
Ages 6–12 years	○	○	○	○	○
Ages 12+ years	○	○	○	○	○

Who is the most common communication partner during your language samples?

	Parent	Peer/sibling	Clinician	Teacher
Ages 0–3 years	○	○	○	○
Ages 3–6 years	○	○	○	○
Ages 6–12 years	○	○	○	○
Ages 12+ years	○	○	○	○

How much time does just transcription of language samples take you (not including the time for analysis)?
- ○ Less than 15 minutes
- ○ 15 to 30 minutes
- ○ 31 minutes to 1 hour
- ○ More than 1 hour

Please rate to what extent you agree or disagree with the following statements regarding collection of language samples.

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
I have adequate time to take language samples.	○	○	○	○	○	○
I have adequate training on language sample use.	○	○	○	○	○	○
I have clear protocols/procedures for taking language samples.	○	○	○	○	○	○
I tailor language samples to fit a child's individual needs (e.g., using books that interest a specific child).	○	○	○	○	○	○
I use language samples in a variety of settings.	○	○	○	○	○	○

How much time does just analysis of language samples take you (not including time for transcription)?
- ○ Less than 15 minutes
- ○ 15–30 minutes
- ○ 31 minutes to 1 hour
- ○ More than 1 hour

How do you most often analyze language samples? (Please choose one.)
- ○ Informally by hand
- ○ By hand using a language sample analysis methodology such as the developmental sentence scoring (DSS), index of productive syntax (IPSYN), etc.
- ○ Using tools within a word processing program
- ○ Utilizing a computerized analysis program such as the Systematic Analysis of Language Transcripts (SALT) or Computerized Profiling software
- ○ Compared to a checklist such as the Teacher Assessment of Spoken Language (TASL) or the Cottage Acquisition Scales for Listening, Language and Speech (CASLLS)

What do you analyze language samples for?
1.   Mean length of utterance (MLU)

2.   Type-token ratio (TTR)

3.   Total number of words (TNW)

4.   Number of different words (NDW)

5.   Structural analysis (e.g., Brown's Stages)

6.   Grammatical morphemes (use and omission of morphemes)

7.   Story grammar (e.g., characters, internal response)

8.   Turn-taking

9.   Topic maintenance

10.   Communicative intentions

11.   Response to questions

12.   Intelligibility of utterances

13.   Mazes and abandoned utterances

14.   Words per minute (WPM)

15.   Other (please explain) _____

Please rate to what extent you agree or disagree with the following statements regarding language sample analysis programs.

	Strongly disagree	Disagree	Somewhat disagree	Somewhat agree	Agree	Strongly agree
Language sample analysis programs are affordable.	○	○	○	○	○	○
Language sample analysis programs provide adequate training information.	○	○	○	○	○	○
Language sample analysis programs are easy to use.	○	○	○	○	○	○

What information do you analyze language samples for?

	Never	Sometimes	About half the time	Most of the time	Always
I use language samples to analyze a child's vocabulary and semantic skills.	○	○	○	○	○
I use language samples to analyze a child's pragmatic skills.	○	○	○	○	○
I use language samples to analyze a child's morphology and grammar.	○	○	○	○	○
I use language samples to analyze a child's speech/ articulation productions.	○	○	○	○	○

Language Sampling Questionnaire

Which assessment tools do you use when evaluating children who are Deaf/hard of hearing? (Check all that apply.)

	Ages 0–3 years	Ages 3–6 years	Ages 6–12 years	Ages 12+ years
Norm-referenced tests	❏	❏	❏	❏
Scales of typical development	❏	❏	❏	❏
Checklists	❏	❏	❏	❏
Language samples	❏	❏	❏	❏
Other criterion-referenced tools (e.g., dynamic assessment)	❏	❏	❏	❏
Observation	❏	❏	❏	❏
Parent report	❏	❏	❏	❏

Which assessment tool do you use most often to evaluate language? (Please choose one.)
- ○ Norm-referenced tests
- ○ Scales of typical development
- ○ Checklists
- ○ Language samples
- ○ Other criterion-referenced tools (e.g., dynamic assessment, clinician created probes)
- ○ Observation
- ○ Parent report

Which assessment tool do you use most often to evaluate speech? (Please choose one.)
- ○ Norm-referenced tests
- ○ Scales of typical development
- ○ Checklists
- ○ Language samples
- ○ Other criterion-referenced tools (e.g., dynamic assessment, clinician created probes)
- ○ Observation
- ○ Parent report

How do you use information obtained from language samples?

	Never	Sometimes	About half the time	Most of the time	Always
To share results with parents/caregivers	○	○	○	○	○
To share results with other professionals	○	○	○	○	○
To report on an Individualized Education Plan (IEP) or Individual Family Service Plan (IFSP)	○	○	○	○	○
To determine eligibility of services	○	○	○	○	○
To monitor progress	○	○	○	○	○
To set goals for clients	○	○	○	○	○
To determine diagnosis	○	○	○	○	○
To supplement standardized assessments	○	○	○	○	○

Language Sampling Questionnaire

Where have you received training on taking and using language samples?

	None	**Limited training (1–4 hours)**	**Moderate training (5–10 hours)**	**Significant training (10 + hours)**
University program	○	○	○	○
Continuing education courses	○	○	○	○
Mentoring from other professionals	○	○	○	○
Reading journal articles and tutorials independently	○	○	○	○
Other	○	○	○	○

Please rate to what extent you agree or disagree with the following statements regarding use of language samples.

	Strongly disagree	**Disagree**	**Somewhat disagree**	**Somewhat agree**	**Agree**	**Strongly agree**
Language samples are useful with the populations I serve.	○	○	○	○	○	○
Language samples are a good representation of a child's typical language skills.	○	○	○	○	○	○
Language samples offer information that norm-referenced tests cannot provide.	○	○	○	○	○	○
Language samples provide opportunities to assess various aspects of language simultaneously in functional contexts.	○	○	○	○	○	○

If agree–strongly agree on Statement 3: What information does language sampling provide that norm-referenced tests cannot?
_____

What is your highest level of education?
- ○ Bachelor's degree
- ○ Master's degree
- ○ Doctorate

What ages do you serve? (Check all that apply.)
- ❑ 0–3 years of age
- ❑ 4–5 years of age
- ❑ 6–12 years of age
- ❑ 12+ years of age

In which state is your primary employment facility located?

In which setting do you practice? (Check all that apply.)
- ❑ Hospital
- ❑ Private therapy clinic
- ❑ Private school for children who are Deaf/hard of hearing
- ❑ Public school program for children who are Deaf/hard of hearing
- ❑ Public school—mainstreaming
- ❑ College/university
- ❑ Home-based intervention
- ❑ Other (please explain) _____

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Language Sampling Questionnaire

Are you a member of the following professional organization specific to providing services to children with hearing loss? (Check all that apply.)

- ❑ AG Bell
- ❑ ASHA SIG 9
- ❑ OPTION Schools
- ❑ Other (please explain)_____

Do you have anything else you would like to share with us?

Note. CCC-SLP = Certificate of Clinical Competence for Speech-Language Pathologists; CCC-A = Certificate of Clinical Competence in Audiology; LSLS-AVEd = Listening and Spoken Language Specialist Certified Auditory–Verbal Educator; LSLS-AVT = Listening and Spoken Language Specialist Certified Auditory–Verbal Therapist; AG Bell = Alexander Graham Bell Association for the Deaf and Hard of Hearing; ASHA SIG 9 = American Speech-Language-Hearing-Association Special Interest Group 9: Hearing and Hearing Disorders in Childhood.