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Language Sample Practices with Children who are Deaf and Hard-of-Hearing

Megan Shannahan

Department of Communication Sciences and Disorders

Idaho State University

Meridian, Idaho

A thesis

submitted in the partial fulfillment

of the requirements for the degree of

Master of Science in Speech Language Pathology

in the department of Communication Sciences and Disorders

Idaho State University

Spring 2017

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of MEGAN SHANNAHAN find it satisfactory and recommend that it be accepted.

Kristina M. Blaiser, PhD, CCC-SLP
Major Advisor

Diane A. Ogiela, PhD, CCC-SLP
Committee Member

Elizabeth A. Horn, PhD, LCPC
Graduate Faculty Representative

ACKNOWLEDGEMENTS

I would like to express my gratitude to my thesis advisor Dr. Kristina Blaiser for her contributions to this project. Her continuous support and vast knowledge in academia and clinically were invaluable assets during the research and writing of this thesis. Additionally, her enthusiasm for the field of communication sciences and disorders was contagious, and provided me with constant motivation to be a better professional so that I can impact the field positively as she has.

I would also like to thank the members of my thesis committee, Dr. Diane Ogiela and Dr. Elizabeth Horn, for their support and meaningful contributions to this project. I acknowledge the Communication Sciences and Disorders faculty at Idaho State University, as well as my class mates, who have provided me feedback, insight and inspiration that shaped my graduate studies experience.

Finally, I would like to say thank you to my friends and family who have constantly encouraged me during my graduate studies and completion of this project. It could not have been possible without their love and encouragement when I felt like things were particularly difficult to endure. Thank you.

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LIST OF ABBREVIATIONS

ASHA	American Speech Language Hearing Association
CASLLS	Cottage Acquisition Scales for Listening, Language and Speech
CHILDES	Child Language Data Exchange System
CP	Computerized Profiling
DHH	Deaf/Hard-of-Hearing
DSS	Developmental Sentence Scoring
EDHH	Educators of the Deaf/Hard-of-Hearing
IPSYN	Index of Productive Syntax
LSLS	Listening and Spoken Language Specialist
MLU	Mean Length of Utterance
SALT	Systematic Analysis of Language Transcripts
SIG	Special Interest Group
SLP	Speech Language Pathologist
TASL	Teacher Assessment of Spoken Language

LANGUAGE SAMPLE PRACTICES WITH CHILDREN WHO ARE DEAF AND HARD-OF-HEARING

Thesis Abstract – Idaho State University (2017)

Language samples can be an invaluable tool for speech-language pathologists to assess the communicative outcomes of children who are Deaf/Hard-of-Hearing. This is particularly important as, in isolation, norm referenced assessments are not sensitive to identify error patterns in the use or omission of high frequency noun and verb morphology, errors that are common in children with hearing aids and cochlear implants. However, a recent study reports that professionals who work with children with cochlear implants do not frequently use language samples and most often use standardized assessments and checklists to evaluate and monitor progress of children with cochlear implants (Neuss et al., 2013). The purposes of this study are to 1) identify common language sample practices of professionals who work with children who are DHH, 2) identify how professionals are using information gained from language samples and 3) outline common practices and propose a clinical protocol for language sample use.

Background

Language samples are a dynamic and essential component of evaluating a child's language (Blau, Lahey & Oleksiuk-Velez, 1984; Danahy-Ebert & Scott, 2014; Evans & Craig, 1992; Guo & Eisenberg, 2015; Heilmann, Nockerts & Miller, 2010b; Hux, Morris-Friehe & Sanger, 1991; Kroecker et al., 2010). Researchers and clinicians have advocated for the use of language samples by speech-language pathologists (SLPs) for assessment because it allows for analysis of a child's language in a naturalistic setting (Finestack et al., 2014; Heilmann, Miller & Nockerts, 2010a; Heilmann et al., 2010b). 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 lacks 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).

Language samples can be particularly helpful when working with children who are Deaf/Hard-of-Hearing (DHH) because they provide an opportunity to analyze a variety of language abilities (Olszewski & Blaiser, 2011). Due to advancements in hearing technology (i.e. cochlear implants, hearing aids) and newborn hearing screenings, children are identified as being DHH at younger ages and have the potential to develop speech and language skills similar to those of age-matched peers (e.g., Hayes, Geers, Treiman, & Moog, 2009). In addition to evaluation of higher level language skills and use, it is particularly important for SLPs to select an assessment tool that can identify error patterns of use or omission of fricative and affricate and noun and verb morphology, since even mild to moderate hearing loss has been shown to cause difficulties with these

communication abilities (Stelmachowicz, et al., 2008). However, a recent study reports that professionals who work with children who are DHH do not frequently use language samples as part of their assessment protocol (Neuss et al., 2013). Given the discrepancy between the value of language samples and the use of samples in clinical practice, there is need to better understand the protocols and potential barriers of SLPs who serve children who are DHH.

Language Sample Use

When deciding which tools to utilize during an assessment, clinicians must consider which tools will distinguish children with disordered development, characterize a child's strengths and deficits, and assist in choosing treatment goals (Danahy-Ebert & Scott, 2014). Formal assessment procedures, such as norm-referenced testing, can provide information regarding a child's performance in comparison to age-matched peers (Boesch & Da Fonte, 2014). In contrast, informal assessment procedures, such as language samples, provide information about a child's performance in a natural setting and may be used to assess specific skills in a variety of settings (Boesch & Da Fonte, 2014).

Sample Length

Generally, it is recommended that SLPs use language samples that are 50 to 100 utterances in length (Guo & Eisenberg, 2014; Heilmann et al., 2010b). Although this sample size takes approximately 10 to 15 minutes to elicit, it can create significant time constraints on SLPs because of the additional time needed for transcription and analysis of utterances (Guo & Eisenberg, 2014). Heilmann et al., (2010b) investigated whether shorter samples (samples 1 to 3 minute in length) were as effective as longer samples (7+

minute samples). When analyzing language samples of 231 children, the authors compared the effects of sample length on aspects such as number of total utterances, number of different words, mean length of utterance in morphemes, and omissions of words and morphemes (Heilmann et al., 2010b). The results were consistent across sample lengths, suggesting that language measures obtained from shorter samples may be as reliable as longer samples. Overall, the results from this study indicate that data obtained from language samples is stable, despite language sample length, and that short sample may be a good alternative for clinicians who do not typically obtain language samples due to time constraints or as one tool in a battery of tools in a comprehensive assessment (Heilmann et al., 2010b).

Although samples shorter than 50 utterances are not recommended in all contexts, completing a short language sample may be better for clinical purposes than not completing one (Paul, 2007). However, further research is needed to determine the validity of short language samples, and clinicians should continue to use traditional guidelines (50 to 100 utterances) when language samples will be the primary source of information for assessment of a child's language abilities (Guo & Eisenberg, 2014; Heilmann et al., 2010b).

Sample Context

Sample context is important to consider because different activities affect a child's language use (Costanza-Smith, 2010). For preschool children it is recommended that language sample contexts represent natural and familiar conversational environments; such as play, narratives and conversation (Costanza-Smith, 2010; Kroecker et al., 2010). Through play observation clinicians may evaluate a child's play

patterns to distinguish developmental problems which may give clues to a child's overall language status and abilities (Vig, 2007). For older children, play and conversation may not give a reliable assessment of the child's higher level language abilities. It is recommended that elicitation techniques such as narrative-retell and expository language samples may be more effective with this population (Costanza-Smith, 2010). Contexts like narrative retell require fewer utterances (100) while providing adequate predictive evidence for language and reading achievement (Heilmann et al., 2010b). Ultimately, the clinician must recognize the needs and abilities of the child and integrate those factors into choosing a context that will elicit a representative sample of the child's typical language production (Costanza-Smith, 2010).

Language Sample Analysis

Since there is little agreement on best language sample procedures, interpreting results can be daunting for clinicians without extensive knowledge of language development or the use of a reference database (Heilmann et al., 2010a). Software, such as the Systematic Analysis of Language Transcripts (SALT) program, provide access to robust databases of language samples from typical speakers, which allow clinicians to access user-friendly language sample analysis (Heilmann et al., 2010a). While SALT uniquely offers clinical training through a variety of modalities (website, workshops, and reading materials), it does require a fee for access to the program unlike two other popularly cited programs (Child Language Data Exchange System (CHILDES) and Computerized Profiling (CP)) for language sample analysis (Heilmann et al., 2010a). Language sample analysis software programs provide clinicians with normative data which assists clinicians in diagnosis of disorder and development of treatment goals.

Clinicians may also choose to analyze language samples by hand or using a word processing program using their own clinician created measures, which may be individualized for each child. Samples may also be individualized to look for specific hallmarks of language difficulties made by a target population. These modified methods allow for clinicians to tailor language sample analysis to look at a child's specific strengths and weaknesses but often have not been tested for reliability or validity because of the lack of standardization from clinician to clinician (Heilmann et al., 2010b).

Benefits of Language Samples Use

It has been long recognized that language sample use is part of best practice when assessing, tracking progress or determining goals for clients with speech and language deficits (Kemp & Klee, 1997; Costanza-Smith, 2010; Finestack et al., 2014; Heilmann et al., 2010b). Language samples have also been empirically shown to provide differential diagnoses of language impairment (Condouris, Meyer & Tager-Flushberg, 2003; Olszewski & Blaiser, 2011). One issue often encountered when using norm-referenced assessments is that the testing environment typically does not resemble everyday communication. In contrast, language samples provide ecological validity by allowing the clinician to see a child's communication in a more natural setting (Costanza-Smith, 2010; Danahy-Ebert & Scott, 2014). The naturalness that language samples provide allows clinicians to determine the child's language abilities, rather than only identifying deficits. This is important when assessing how language deficits are affecting the child's everyday communication and how the child uses his/her strengths to convey messages to various listeners (Costanza-Smith, 2010).

Additionally, language samples provide both microstructural and macrostructural information about a child's language abilities (Costanza-Smith, 2010; Olszewski & Blaiser, 2011). By providing multiple opportunities for a child to use/omit language structures in spontaneous language, clinicians may learn with what rate and in which contexts a child uses a language structure (Costanza-Smith, 2010). Language samples, especially narrative-retell samples, may provide multiple examples of a child's use of macrostructural components (e.g. story grammar use), microstructural components (e.g. noun phrases, adverbs, etc.), language productivity (e.g. number of total words, number of different words) and language complexity/mean length of utterances (Olszewski & Blaiser, 2011). Determining abilities in these various measures allows a clinician to determine whether a child is close to mastery of language structures, or if structures are just emerging.

Variability in Language Sample Practices

While there is agreement among researchers and clinicians that language samples are an effective and reliable tool, there is disagreement on recommended sample lengths and analysis procedures (Finestack et al., 2014; Heilmann et al., 2010b). Generally, it is accepted that clinicians obtain language samples that are 50-100 utterances in length, but agreement on other measures of language samples lack standardization (Guo & Eisenberg, 2015; Heilmann et al., 2010b). This variation makes the use of language samples by clinicians even more daunting, and may discourage clinicians from using this tool in their own practice. Due to limitations of language samples, such as time constraints and lack of standardization, it is a clinical tool not used extensively by SLPs

(Guo & Eisenberg, 2015; Heilmann et al., 2010b; Nuess, et al., 2013; Pavelko, Owen, Ireland & Hahs-Vaughn, 2016).

In a recent national survey conducted by Pavelko et al., (2016) one-third of SLPs who responded (n=435) reported not obtaining language samples during the 2012-2013 school year. Of the respondents who did obtain and use language samples, 87% reported using samples for initial evaluation, 73% for reevaluation and 68% for progress monitoring in therapy (Pavelko et al., 2016). Using multilevel logistic regression, the survey's authors looked at factors that predict language sample analysis use by clinicians. Clinicians who serve infants, toddlers and early school-aged children have significantly increased odds of using language samples than clinicians who serve middle and/or high school students (Pavelko et al., 2016). Additionally, clinicians with larger caseloads (41-61+ students) had significantly decreased odds of using language samples than clinicians who served caseloads smaller than 40 students (Pavelko et al., 2016).

Other limitations to language sample use include difficulty choosing appropriate stimulus materials and the subjective nature of analyzing and transcribing samples (Heilmann et al., 2010b; Hux et al., 1991). Clinician often use modified methods when using language samples that have not been tested for reliability or validity because of the lack of standardization (Heilmann et al., 2010b). Both researchers and clinicians advocate for the use of language samples in conjunction with standardized assessments to account for this variability in use (Danahy-Ebert & Scott, 2014; Hux et al., 1991; Heilmann et al., 2010b).

However, variability in language sample practices may also be an advantage for clinicians who wish to determine what aspects of language are most critical to evaluate or

monitor (Danahy-Ebert & Scott, 2014; Finestack et al., 2014). This variability allows clinicians to choose which context and length of sample that will best demonstrate the child's typical language production (Danahy-Ebert & Scott 2014; Finestack et al., 2014).

Clinicians may also conduct language samples in settings that are familiar to the child, which may enable a more representative sample of the child's typical language productions (Kroecker et al., 2010). Additionally, for children who are difficult to test, language samples may even be taken in the home or collected during a parent-child or peer-child interaction, allowing to collect data about a child's typical language use. Children may have variable language use in different communication settings (play, story-retell, conversation) and clinicians may collect samples in more than one setting to gather a complete picture of the child's typical language use (Costanza-Smith, 2010).

To account for the balance between clinical productivity and reliability of language sample measures there is a need to determine standardization procedures for specified populations, so that clinicians have adequate information about clinical implications of language sample use. To implement standardization, information regarding current language sample practices must be obtained.

Language samples: Use by clinicians working with deaf/hard-of-hearing children

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, Owen Van Horne & Moeller, 2013). These factors may impact overall language abilities including the integration of complex language and production of fricatives and affricates because of 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, meaning that children who are DHH may be missing high frequency acoustic information (such as /s/ and /z/) which are important to the linguistic development of plurals, possession, and verb tense (Stelmachowicz, et al., 2001; Stelmachowicz, et al., 2008).

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).

It has been suggested that standardized assessments may not be sensitive enough to identify these specific language deficits in children who are DHH despite the widely accepted use (Anderson & Blaiser, 2014; Olszewski & Blaiser, 2011). Limitations of standardized assessments include a lack of universal criteria that determines what scores indicate a language disorder and assessments vary greatly in their sensitivity of diagnosis (Costanza-Smith, 2010). While standardized assessments normed on hearing children are considered best practice 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 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, rather than identifying its auditory relationship.

The presence of hearing loss in children can impact overall language and educational outcomes. Just as with the other populations who present with language disorders, language samples can provide unmatched data about a child who is DHH's language abilities. The advantages of obtaining language samples from children who are DHH include the ability to analyze communication breakdowns (e.g. child could not hear), use of communication strategies, development of noun and verb morphology, and the integration of complex language (Olszewski & Blaiser, 2011; Stelmachowicz, et al., 2001; Walden & Maryrose, 2013). Language samples may also help clinicians monitor hearing technology, validate its effectiveness in different communicative environments (e.g., the classroom vs. therapy room), and provide a foundation for interprofessional communication (Blaiser & Nevins, in review). Consistent access to the auditory environment has positive effects on language outcomes and hearing technology failure may impact language development. Full-time, consistent auditory access, even for children with mild hearing loss, has positive impacts on vocabulary and grammar measures when compared to children not using amplification (Walker et al., 2015). Information obtained from language samples provide clinicians with the 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. As we 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.

While studies have examined attitudes towards language samples and practices (Hux et al., 1991), there is limited data is available regarding language sample use by clinicians who specialize in working with children who are DHH. Nuess et al. (2013) examined assessment practices of 116 Listening and Spoken Language Specialists (LSLS) from 15 countries. This study found a majority of LSLS certified professionals (69.5%) used checklists and standardized testing to assess communication skills of children with cochlear implants. Of the respondents, only five percent used language samples, and of the seven tools identified as being used to assess children who are DHH (e.g. norm-referenced testing, parent report, checklists, etc.) language samples were used least often (Nuess et al., 2013). On average, respondents had a mean of 15 years of experiences practicing, and 95.7% of respondents practiced in the United State, Canada, Australia or New Zealand (Nuess et al., 2013). Over half of respondents reported that over 25% of their caseload was children with hearing loss from ages birth to three (Nuess et al., 2013). Nearly one-third of respondents in this study identified that they utilized various checklists because of their ease of use; however, a majority of respondents expressed concern about lack of standardization and comprehensiveness (Nuess et al., 2013). In addition to checklist use, respondents identified using standardized testing to complete comprehensive analysis of children with cochlear implants (Nuess et al., 2013).

Currently, there are no standardized language sample procedures particularly for children who are DHH. Establishing a corpus of information regarding current attitudes

and use of language samples by professionals specializing in children with hearing loss would help establish standardization procedures for this population, which may encourage clinicians to utilize the tool more frequently. Additionally, establishing a language sample protocol will assist clinicians with less experience working with children who are DHH to determine eligibility, monitor progress, plan intervention and collaborate with other professionals. Given the discrepancy between the value of language samples and the use of samples in clinical practice, there is need to better understand the current practices and attitude towards language samples of professionals who serve children who are DHH.

The purposes of this present study are to 1) identify common language sample practices of professionals who specialize in (e.g., SLPS, Audiologist and Educators of the Deaf/Hard-of-Hearing (EDHH)) working with children who are DHH, 2) identify how these professionals are using information gained from language samples 3) outline common practices and propose a clinical protocol for language sample use, and 4) 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: (1) practice demographics, (2) language sample practices, and (3) attitudes towards 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 emailed 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.

Participant recruitment

Electronic questionnaires were disseminated to audiologists, SLPs and EDHHs in the United States through email and anonymous links using Qualtrics, a web-based survey management system. Respondents were recruited through the American Speech-Language-Hearing-Association (ASHA) special interest group (SIG) SIG 9: Hearing and Hearing Disorders in Childhood and the Alexander Graham Bell (AG Bell) Association for the Deaf and Hard of Hearing Listening and Spoken Language Knowledge Center directory and through OPTION schools, a non-profit organization of listening and spoken language programs and schools for children who are DHH. The initial email was distributed in June 2016. A follow-up email was sent to respondents two weeks after the initial email in order to increase response rates as recommended by Dillman (2000) approach. Additionally, an anonymous link was posted on the 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.

Due to multiple recruiting methods the sample is limited by the possibility of a self-selection bias of respondents who chose to participate in the survey.

Data analysis

Participant responses were coded in an Excel file and checked for completeness. Results were imported into JMP (v12). Descriptive statistics were used to identify trends.

Results

Of the 443 surveys disseminated via email, a total of 119 were completed. Additionally, a total of 49 responses were collected via an anonymous link that was distributed using the SIG 9: Hearing and Hearing Disorders in Childhood discussion board and to faculty of OPTION schools. A total of 168 respondents from 34 different states participated in the survey (16.8% response rate). As shown in Table 1, 77.3% (n=129) of respondents reported that over 75% of their caseload was children who are DHH. Approximately 75% (n=123) of the respondents reported that they had worked

Table 1. Practice Demographics of Professionals who work with Children who are DHH

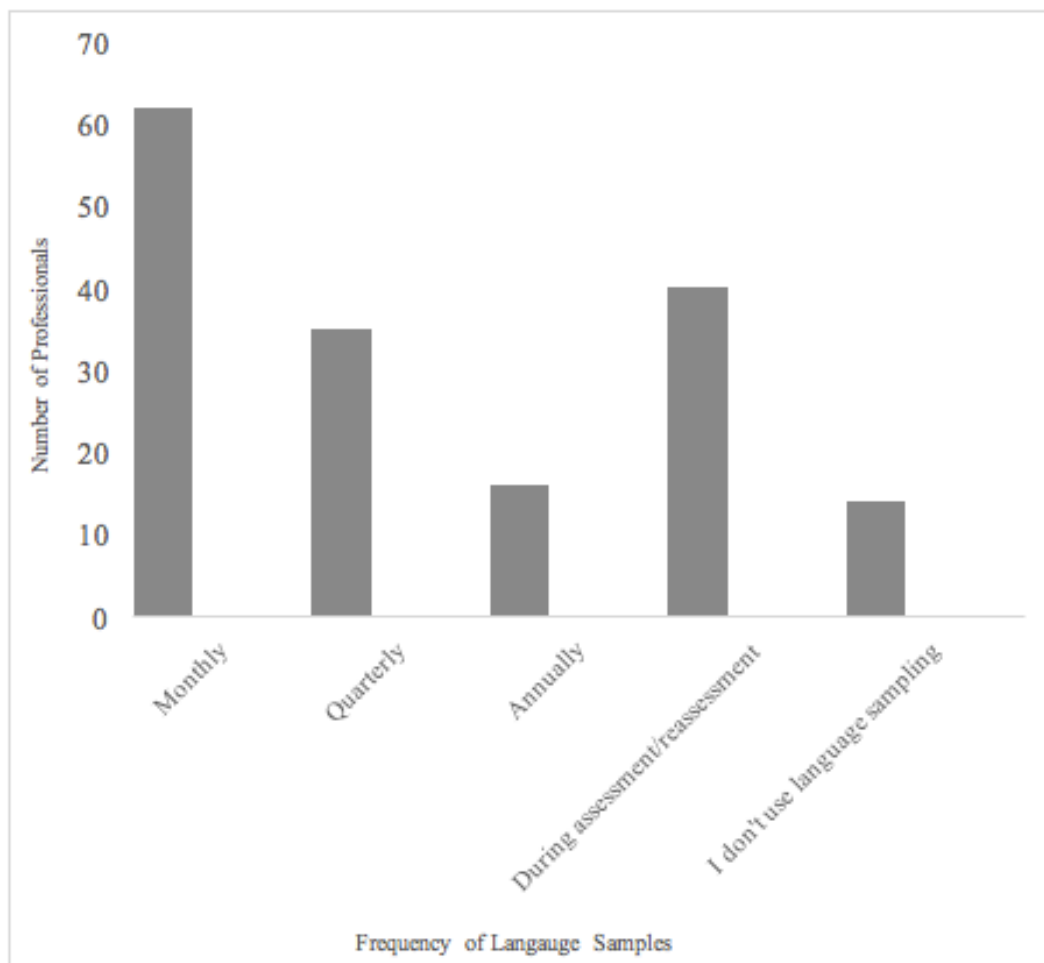
Licensing and Certification	
CCC-SLP	55.36% (93)
CCC-A	8.33% (14)
Deaf Education	37.50% (63)
LSLS – AVE d	29.76% (50)
LSLS – AVT	41.07% (69)
Other	6.55% (11)
Current Work Setting	
Hospital	(18)
Private therapy clinic	(31)
Private school for children who are DHH	(29)
Public school for children who are DHH	(35)
Public school – mainstreaming	(31)
College/University	(15)
Home-based intervention	(30)
Other	(15)
Years Working with Children who are DHH	
Less than 2 years	0.61% (1)
2 – 5 years	9.09% (15)
6 – 10 years	15.76% (26)
10+ years	74.55% (123)
Percentage of Caseload of DHH	
0 – 25%	8.38% (14)
26 – 50%	6.59% (11)
51 -75%	7.78% (13)
75% and above	77.25% (129)

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).

Current practices of obtaining language samples

Respondents were asked to report on various aspects of language sample use and attitudes toward language sample analysis. As shown in Figure 1, a majority of the respondents (n=153; 91.6%) reported that they use language samples as a part of their intervention when working with children who are DHH. Respondents reported that they

Figure 1. Professional Frequency of Taking Language Samples



take language samples of children who are DHH most often monthly (n=62; 37.1%).

Other respondents reported taking language samples during assessment/reassessment (n=40; 24.0%), quarterly (n=35; 21.0%), annually (n=16; 9.6%) or reported that they did not use language samples in their clinical practice (n=14; 8.4%). In addition to reporting how often they took language samples, several respondents commented that they take informal and ongoing language samples in each session to document and monitor progress of children who are DHH.

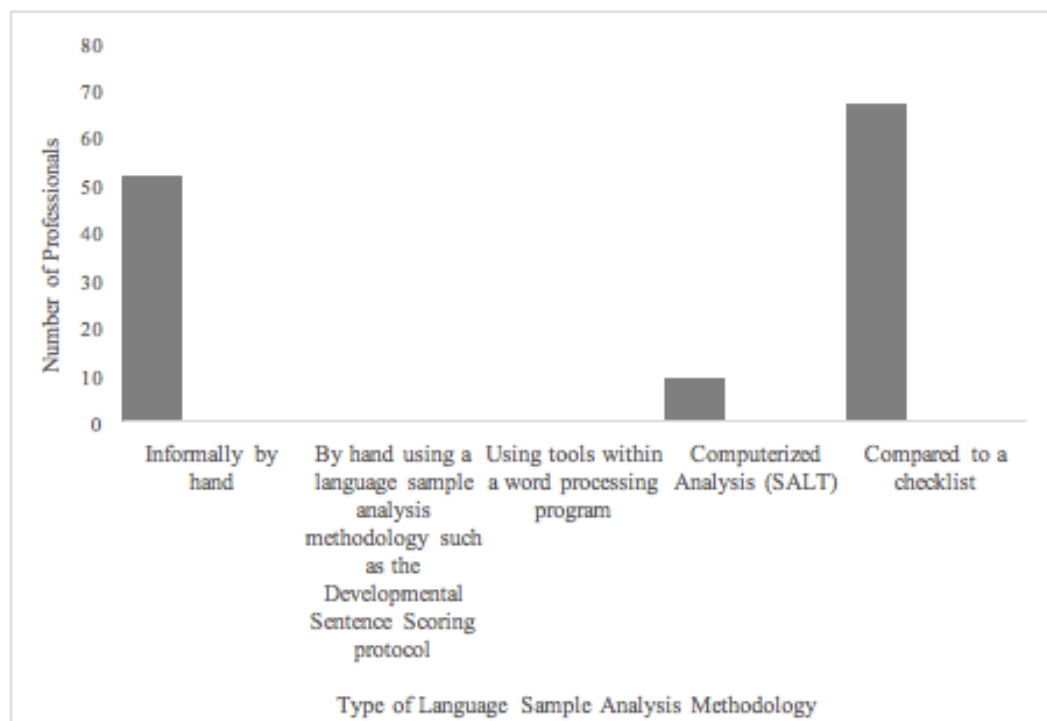
Of respondents who reported use of language samples in their clinical practices, approximately 77% (n=116) determined the length of their samples by number of utterances versus amount of time (n=35). When determining language sample length by number of utterances, most commonly respondents attempted to obtain 50 utterances (n=48; 44.4%), following best practice recommendations made by Guo and Eisenberg (2014) and Heilmann et al., (2010b). Of the remaining respondents who determined the length of their samples by number of utterances it was reported they used 25 utterances (n=22; 20.4%), 100 utterances (n=17; 15.7%), more than 100 utterances (n=9; 8.3%), under 25 utterances (n=7; 6.5%) and 75 utterances (n=5; 4.6%). There was more variability among respondents who used “amount of time” to determine the length of their language samples (n=32). Of these respondents the time ranged from 1 to 15+ minutes (n=32).

For children birth to 3 years old, respondents reported obtaining language samples most commonly in the treatment room (n=59; 51.6%) or in the child’s home (n=44; 38.6%) utilizing free play (n=110; 96.5%). They also reported that a child’s parent/caregiver was the most common conversational partner (n=78; 69.0%) during

language samples for this age group. For ages 3 to 6 years old it was reported that language samples are most commonly obtained in a treatment room (n=82; 65.6%) utilizing free play (n=102; 82.3%), or conversation to elicit a dialogue (n=92; 74.2%). The clinician was the most common conversational partner during language samples in this population (n=57; 46.3%). Respondents reported obtaining language samples most often in a treatment room with children ages 6 to 12 (n=78; 77.2%) and children older than 12 years of age (n=62; 73.8%), Conversation was reported to be the most common context used for language samples with children ages 6 to 12 (n=79; 80%), and older than 12 years of age (n=57; 73.1%) although narrative retell was also commonly used with children ages 6 to 12 (; n=72; 72.7%) and older than 12 years of age (n=55; 70.5%). A clinician was also the most common conversational partner with children ages 6 to 12 (n=69; 71.1%) and older than 12 years of age (n=61; 76.3%).

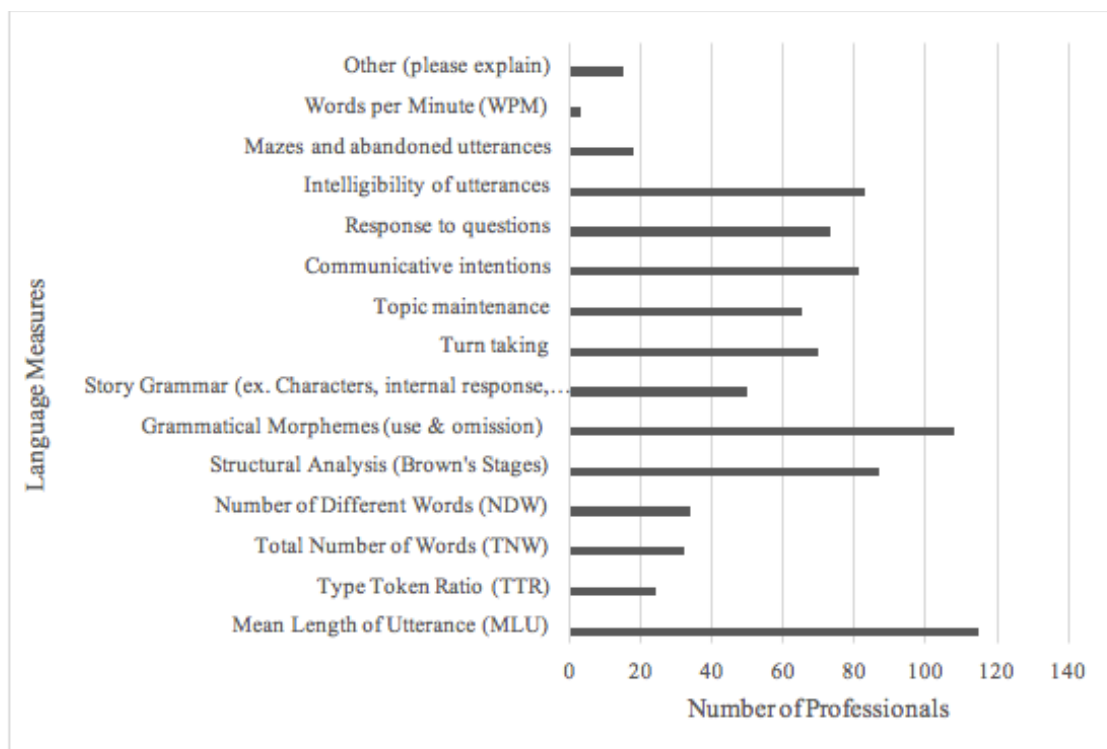
Current practices of language sample analysis

Figure 2. Language Sample Analysis Practices of Professionals who work with Children who are DHH



As shown by Figure 2, when analyzing language samples respondents reported most commonly comparing samples obtained to a checklist (n=67; 49.3%), or informally by hand (n=52; 38.2%). Respondents described that they compared language samples to the Cottage Acquisition Scales for Listening, Language and Speech (CASLLS; Wilkes, E. & Sunshine Cottage Scales for Listening, Language & Speech, 2001) and the Teacher Assessment of Spoken Language (TASL; Moog, J.S. & Biedstein, J., 2006). Few respondents reported using a computer analysis system (n=9) or by using a language sample analysis methodology such as the Developmental Sentence Scoring (DSS) or Index of Productive Syntax (IPSYN, n=8). As shown in Figure 3, respondents most often analyzed language samples for Mean Length of Utterance (MLU, n=115; 84.6%), use and omission of grammatical morphemes (n=108; 79.4%), and for evidence of Brown's Stages of grammatical morphemes (n=87; 64.0%). Additionally, respondents reported analyzing language samples for intelligibility (n=83), communicative intentions (n=81)

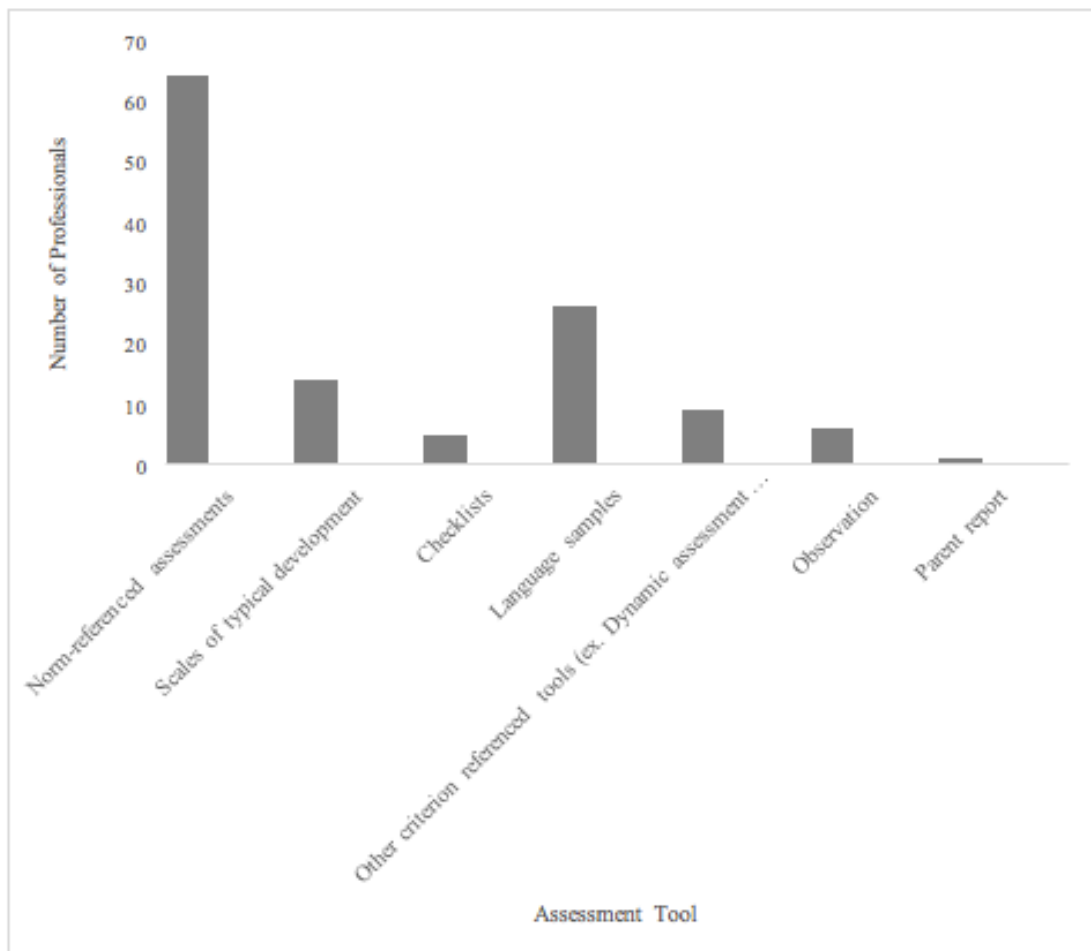
Figure 3. Language Measures Analyzed for in Language Samples



and turn taking (n=70).

Despite a majority of respondents reporting that they used language samples in some capacity in their practices, Figure 4 demonstrates that approximately half (n=63; 51.2%) of respondents reported using norm-referenced testing most often when evaluating language of children who are DHH. Only 20.8% (n=26) of respondents reported using language samples most often when evaluating children who are DHH. Remaining respondents reported using scales of typical development (n=14; 11.2%), other criterion referenced tools (n=9; 7.2%), such as dynamic assessment, observation (n=6; 4.8%), checklists (n=5; 4.0%), and one participant reported using parent report

Figure 4. Language Assessment Tools Used Most Often by Professionals who work with Children who are DHH



(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 12.2% (n=15) of respondents reported using language samples to evaluate speech of children who are DHH.

Use of language samples

When asked how they always use information obtained from language samples, respondents reported most often to monitor progress of clients (n=79; 62.7%), to set goals for clients (n=75; 60.0%) and for sharing results with parents and caregivers (n=70; 56.5%). Approximately one-third of respondents reported sharing information obtained from language samples with other professionals (n=42; 34.7%). Respondents were least likely to use information obtain from language samples to determine diagnosis (n=22; 19%) or to determine eligibility of services (n=27; 23.0%).

Current attitudes towards language sample analysis

Respondents were asked to report their attitudes towards 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 100 respondents either rated that they agreed (n=55) or strongly agreed (n=45) that they had adequate training on language samples. Respondents overwhelmingly agreed that they found language samples useful with the populations they serve (n=130; 94.9%) and that they could offer information that norm-referenced assessments could not provide (n=133; 97.1%), despite them being most popularly used for evaluation of children who are DHH. One professional commented that language samples were more beneficial for 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.”

Discussion

This study aimed to identify the current language sample practices of professionals who specialize in working with children who are DHH, as well as their attitudes towards the use and effectiveness of language samples. The results of the study demonstrate that specialists working with children who are DHH frequently utilize language sample analysis to monitor progress, set goals, and provide education to families of children who are DHH. As Nuess, et al., (2013) found a majority of professionals report using norm-referenced testing for determining eligibility most frequently; however, the current study reflects that the majority of respondents believe that language samples offer a unique look into a child’s language development that norm-referenced assessments are not sensitive enough to detect. Professionals who specialize in working with children who are DHH recognize that language samples provide specific information that norm-referenced assessments cannot provide.

Due to the sensitivity of language samples there is a tendency for specialists working with children who are DHH to use language samples often, especially when in conjunction with other assessment tools such as checklists developed for this specific population. Professionals from this sample most frequently analyzed language samples by hand, using self-designed procedures or comparing information obtained from the language sample in comparison to a checklist.

Despite professionals' frequent use of language samples to evaluate language abilities and monitor progress, a lack of standardization across professionals may affect how the information obtained from language samples is utilized clinically. This variability may contribute to the increased reliance on norm-referenced assessments in determining eligibility, or educational impact, for children who are DHH. Despite their lack of sensitivity to identify language deficits in children who are DHH, standardized assessments are used regularly because of evaluation and eligibility guidelines set by state and federal laws. Per the Individuals with Disabilities Act of 2004 (IDEA) Part B §300.8 (Child with a disability), Deafness is defined as having a hearing impairment that is so severe that, with or without amplification, the child's ability to process linguistic information is impaired and adversely impacts educational performance. Although IDEA (2004) Part B §300.304 provides professionals with a general overview of requirements of evaluation procedures, the primary mode of determining eligibility is left to individual states. Many states require that no single measure is used as the sole criteria to determine eligibility and encourage the use of a variety of assessment tools; however, many require use of at least one norm-referenced assessment score in a battery of evaluation measures to determine if there is adverse educational impact. If norm-referenced assessments are not normed on children with hearing loss, they may not be sensitive enough to determine language deficits, and therefore may not be able to identify overall educational impact.

Language samples provide an excellent supplement to standardized assessments and are a useful tool for intervention planning, progress monitoring, and validation of hearing technology. The development of a language sample protocol that reflects the specific language profile of children who are DHH may help to standardize collection

and analysis protocols, thus making language samples more readily acceptable in eligibility conversations and comparisons between professionals. This may be particularly useful for professionals, who serve a broader population base than just children who are DHH, as a guide to help determine eligibility and goal development in terms of identifying specific language deficits related to acoustic access. In addition, information obtained from language samples could be used to promote collaboration among professionals. Particularly as language samples may show inclusion or omission of grammatical morphemes as part of the validation of hearing technology.

Based on this study, a language sample protocol would include 50 consecutive utterances given on a monthly basis by SLPs or EDHHs who work with children who are DHH. Samples would be analyzed for MLU, patterns of use and omission of high frequency grammatical morphemes and analysis of the sample in comparison to Brown's Stages of grammatical morphemes. Specifically, samples would be analyzed for the mastery or emergence of grammatical morphemes *plural –s, possessives, auxiliaries, third person –s, and past tense –ed* because these morphemes are carried on high frequencies and are most difficult for children with hearing loss to master (McGuckian & Henry, 2007; Stelmachowicz, et al., 2001; Stelmachowicz, et al., 2008). Samples would also be analyzed for use of syntactic development, in comparison to age-matched peers since comprehension and production of advance syntax is important for social communication and academic achievement (Moeller, Tomblin, Yoshinaga-Itano, McDonald Connor, & Jerger, 2007). In addition to analysis, results from language samples would be shared monthly with other professionals, such as audiologists, EDHHs,

classroom educators, or SLPs in order to monitor progress and validate hearing technology.

One potential limitation to the current study is that the small sample size of clinicians who specialized with children who are DHH limits the ability to infer broader practice patterns. The current study's authors utilized Dillman's (2000) proposed protocol for online survey dissemination, as well as attempted to contact respondents twice to solicit responses, however the survey had a low response rate (16.8%). Although the sample size is small, the results still may provide insights to the current language sample practices of specialists working with children who are DHH. Additionally, this response rate is similar to other surveys of providers who work with children who are DHH (Munoz, Blaiser & Schofield, 2012; Nuess, et al., 2013). Due to multiple recruiting methods of email and posting an anonymous link the sample is limited by the possibility of a self-selection bias of professionals who use language samples or see the benefit of language samples in clinical practice. Respondents were also recruited utilizing the ASHA SIG 9: Hearing and Hearing Disorders in Childhood and the AG Bell Association for the Deaf and Hard of Hearing Listening and Spoken Language Knowledge Center directory and through OPTION-based schools, which may have limited the study by creating a sampling bias of clinicians whose client caseload was mostly children who are DHH. Despite the study's efforts to recruit from multiple organizations, recruiting methods used in the study may not have obtained a representative of the entire population of professionals who work with children who are DHH, and it is unclear if the results are generalizable to all professionals.

To address the many research questions regarding language sample use with children who are DHH, future research should include piloting the use of a tailored language sample protocol along with the use of commonly used norm-referenced assessment with children who are DHH to compare performance of children and eligibility for services. In addition, larger, more representative samples of all professionals who work with children who are DHH should be recruited to participate in a similar survey to determine differences in clinical practices regarding language sample use and attitudes of effectiveness.

Conclusion

Our study provides a national perspective on the language sample methods of professionals who work with children who are DHH. Results from the study provide evidence that professionals who specialize in working with children who are DHH believe 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 help determine eligibility, write treatment goals, monitor progress, and validate hearing technology.

Based on the information obtained from respondents, monthly 50-utterance language samples analyzed utilizing the proposed language sample protocol may serve as a guide for professionals. Providing a framework for professionals of how to collect and analyze information obtained from language samples may allow clinicians to more efficiently and accurately assess language abilities related to acoustic access as well as collaborate with other team members.

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APPENDIX A: 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 specify) _____

How many years have you practiced?

- ☐ Less than 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% and above

How many years have you worked with children who are Deaf/Hard-of-hearing?

- ☐ Less than 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 (1)	☐	☐	☐	☐
Ages 3-6 (2)	☐	☐	☐	☐
Ages 6-12 (3)	☐	☐	☐	☐
Ages 12+ (4)	☐	☐	☐	☐

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	☐	☐	☐	☐	☐
Ages 3-6	☐	☐	☐	☐	☐
Ages 6-12	☐	☐	☐	☐	☐
Ages 12+	☐	☐	☐	☐	☐

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) software or Computerized Profiling
- Compared to a checklist such as the Teacher Assessment of Spoken Language (TASL), or The Cottage Acquisition Scales for Listening, Language & Speech (CASLLS)

What do you analyze language samples for?

1. Mean Length of Utterance (MLU)
2. Type Token Ratio (TTR)
3. Total of Number Words (TNW)
4. Number of Different Words (NDW)
5. Structural analysis (ex. Brown's Stages)
6. Grammatical Morphemes (use & omission of morphemes)
7. Story Grammar (ex. characters, internal response, etc.)
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) _____

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.	☐	☐	☐	☐	☐

Which assessment tools do you use when evaluating children who are Deaf/Hard-of-hearing? (check all that apply)

	Ages 0-3	Ages 3-6	Ages 6-12	Ages 12+
Norm-referenced tests	☐	☐	☐	☐
Scales of typical development	☐	☐	☐	☐
Checklists	☐	☐	☐	☐
Language Samples	☐	☐	☐	☐
Other criterion referenced tools (ex. 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 (ex. 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 (ex. 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	☐	☐	☐	☐	☐

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 & 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.	☐	☐	☐	☐	☐	☐
The 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 test 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) _____

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

- ☐ AG Bell Association
- ☐ ASHA SIG 9: Hearing and Hearing Disorders in Children
- ☐ OPTIONschools
- ☐ Other _____

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