ASSESSMENT OF SIGN LANGUAGE DEVELOPMENT: NEW INSIGHTS

ROSALIND HERMAN[1], KATE ROWLEY[2]

[1]Department of Language & Communication Science, City, University of London, Northampton Square, London, Great Britain, contact: r.c.herman@city.ac.uk

[2]Deafness, Cognition and Language Research Centre, University College, London, 49 Gordon Square, London WC1H 0PD

Received: 04.11.2021.
Accepted: 06.09.2022.

REVIEW ARTICLE
UDK: 81'221.24-047.43
doi: https://doi.org/10.31299/hrri.58.si.5

Abstract: *Since the late nineties, several assessments to track and assess sign language acquisition in deaf and hard of hearing (DHH) children have been developed and standardised for some sign languages (Herman, Rowley, Mason, & Morgan, 2014; Rosenburg, Lieberman, Caselli, & Hoffmeister, 2020). These assessments have provided important insights into how DHH children acquire sign language and how acquisition can be impacted by developmental or acquired disorders (Mason et al., 2010; Quinto-Pozos, Forber-Pratt, & Singleton, 2011). Moreover, the development of sign language assessments has enabled research studies to show associations between language, cognitive skills and literacy (Botting et al., 2017). The availability of sign language assessments has confirmed that DHH children from DHH, signing families achieve similar milestones in sign language as their hearing counterparts in spoken language. Yet the measures developed to date are insufficient for tracking bimodal bilingual development in DHH children, particularly as children progress through the later school years. This article reviews hitherto mentioned and new issues in test development and standardization related to the status of sign language research, the size and nature of the population of DHH signers, and tester issues with a specific focus on assessments used by practitioners rather than those designed for research purposes. References are made to the reasons why DHH children are at risk for language delay. A selection of different types of sign language test is presented. In the UK and elsewhere, many of the tests developed to date have focused on the earlier stages of language development. We therefore include a description of a UK project that is adapting an assessment for adolescent signers.*

Keywords: *assessment, deaf, sign language, test*

1. INTRODUCTION

Parents and professionals are often aware when a hearing child's language is developing differently to their same age peers. This is because hearing children are surrounded by other hearing children, which provides opportunities to spot similarities and differences in development. Further, standardised assessments are generally not used in the first few years of life unless specific concerns are raised about a hearing child's language development.

However, for deaf and hard of hearing (DHH) children, standardized assessments of sign language acquisition are crucially needed to evaluate children's communication skills against established developmental milestones for several reasons. In contrast to hearing children, DHH children rarely mix with other DHH peers who sign in the early years; thus, parents and professionals cannot readily compare their sign language development with their peers. Furthermore, DHH children are acknowledged to be at risk for language delay (Hall, 2017; Herman, 1998b, 2015; Humphries et al., 2014; Humphries et al., 2017). This is because only 5% of DHH children (Mitchell & Karchmer, 2004) acquire sign language under typical circumstances, i.e., from birth and from DHH parents who are themselves sign language users. For the remainder of children with hearing parents, families must learn sign language once deafness has been identified, and parents frequently fail to develop sufficiently high levels of fluency to keep pace with children's developmental needs (Woolfe et al., 2010). As a result, exposure to sign language in the home is often reduced in quality and quantity (Lu et al., 2016; Marschark, 2002). Many DHH children therefore rely on contact with signing peers at school to further develop their language skills and, where available, exposure to

signing from DHH adults. The failure to expose DHH children to sufficient early and accessible language, either signed or spoken, has recently been termed language deprivation, with DHH and hearing people calling out for change, supporting better quality and earlier input in sign language (Hall et al., 2019; Humphries et al., 2014).

Misconceptions and negative ideologies surrounding sign languages (Humphries et al., 2017; Snoddon, 2018) are additional factors in children's delayed exposure to sign language. A key misconception is that if families decide to learn sign language to communicate with their DHH babies, this will have a negative impact on the acquisition of spoken language once the appropriate hearing technologies have been fitted. Recent research shows that this is not the case: DHH families who opt for their DHH children to have cochlear implants are acquiring both spoken English and American Sign Language (ASL) age appropriately (Davidson et al., 2014). Moreover, the linguistic skills of DHH children with cochlear implants from DHH families have been shown in some studies to surpass those of DHH children with cochlear implants from hearing families (Davidson et al., 2014; Goodwin et al., 2017).

Despite research that suggests otherwise, misconceptions can result in professionals advising against families learning sign language, leading to language deprivation and impacts on other aspects of development (Hall et al., 2019; W. C. Hall, 2017; Humphries et al., 2017).

Another reason that DHH children are at risk for language delay is because of the significant proportion of children with additional needs. Between 20-40% of DHH children are reported to have additional disabilities, ranging from visual impairments to learning disabilities and autistic spectrum disorders (Cupples et al., 2016). Others exhibit difficulties with language learning over and above those related to deafness (Mason et al., 2010; Quinto-Pozos et al., 2011). Compared to hearing children, additional needs in DHH children may go undetected for longer periods of time, as parents and professionals attribute language difficulties to children's deafness (Morgan, Herman & Woll, 2007). Research from hearing populations shows that early detection and intervention are vital if children are to overcome any difficulties they may have. This is another reason that standardised assessments are important for DHH children, to ensure that additional needs are detected early so that interventions can be put in place to support children and their families.

For all these reasons, professionals who work with DHH children (e.g., teachers, speech and language therapists, Deaf practitioners, psychologists) need effective assessment tools to monitor children's language development and identify those in need of additional support.

We move on now to discuss challenges in test design and development, before reviewing a selection of available sign language assessments.

2. CHALLENGES IN TEST DEVELOPMENT

The challenges facing test developers when designing assessments of sign language have been discussed extensively elsewhere (e.g., Woolfe et al., 2010; Herman, 2015; Enns et al., 2016), therefore we provide only a brief overview here. There are challenges in relation to the small size of the DHH community, and correspondingly to the size of samples included in test development. Some researchers have defended their sample size, arguing that it represents a much larger proportion of the potential population than is found in any spoken language test standardizations. For example, Woolfe et al. (2010) point out their sample size of 29 native signers represented approximately 30% of the estimated number of DHH children born to DHH parents in the UK within the designated age range (8-36 months). Others have addressed the issue of sample size by developing and piloting a measure on native signers, but extending data collection to a wider sample including non-native signers for the development of test norms (Herman et al., 1999; Rosenburg et al., 2020). An alternative solution is to include repeated assessments on the same participants at different ages within the standardization sample (Anderson & Reilly, 2002; Hermans et al., 2010; Woolfe et al., 2010). However, even then, the number of children at

each age interval frequently remains small, which can be problematic given the heterogeneity in language development seen in the DHH population.

A separate concern with many assessments developed so far is that included DHH children are grouped by communication mode or educational programme, with very little information provided about the individual language experience of each child (Hall & De Anda, 2021). DHH people are exposed to various ways of communicating and develop their own individual semiotic repertoires based on these experiences in order to interact with others around them; in essence, they adopt translanguaging practices on a daily basis (De Meulder et al., 2017; Kusters et al., 2017). This means that in order to successfully communicate with others, they will use any language and/or communication tools, whether gestural or linguistic, that they have in their semiotic repertoire. Furthermore, age of first language acquisition, whether it is signed or spoken, is often overlooked, as well as the quality of children's communication experience in the first few years of life (Hall & De Anda, 2021). For example, if three DHH children aged 5 years start at a school with a bilingual educational programme, one having exposure to sign language from their DHH parents from birth, another having limited and delayed exposure from hearing parents, and the other having had no exposure to a natural sign language, quite different language and communication profiles would be expected. An alternative approach raised by Hall & De Anda (2021) is to explore language profiles in greater detail in order to provide a more accurate picture of a child's language ability, such as including information about age of language acquisition, whether spoken or sign, and details of language access. If test developers were to provide such detailed information about their sample, this would enable testers to consider how the quality and quantity of language input of the children they are testing compare to that of the standardization sample. This is even more of an issue for DHH children from diverse linguistic and cultural backgrounds and those with additional needs. To date, inclusion of such children in test development is rare and there is very little research investigating whether existing tests are effective, despite evidence that they are used with such groups (Herman & Curtin, 2017). Moreover, both of these groups are underrepresented in the research literature, despite their numbers within the Deaf community.

For tests of spoken language, knowledge of language areas that are vulnerable to language delays or disorders in hearing children is useful to the design of language measures. For sign language test developers, such knowledge is sparse. As a result, test design has in part followed the design of assessments of spoken language, informed by research on sign languages where available. However, the direct translation of a test developed for one language into another is not appropriate and considerable adaptations are generally required, particularly when adapting spoken language tests to sign languages (Enns et al., 2021). This is due to the fundamental differences between languages that operate in different modalities, such as the use of space and the visual motivation behind signs (Rowley, 2020; Rowley, 2022); for example, the BSL sign for TREE looks like a real tree; the BSL sign for PUSH demonstrates the real-life action. Although there is little evidence to date that such motivations have an impact on language acquisition (Sumer et al., 2017), they do influence the content of assessments because test items that are easy to guess by those with no prior knowledge of sign language should be eliminated (Herman, 2002). Nonetheless, in certain situations, adaptation of a spoken language test to a sign language may be achieved, where care has been taken to ensure that it is appropriate for the visual-gestural modality (Enns et al., 2021). In contrast, there is evidence that sign language assessments may be successfully adapted for other sign languages (Enns & Herman, 2011; Haug, 2011; Kotowicz et al., 2020).

Tests of spoken language development are available that cover a large variety of linguistic domains and extend across the age range. There are also many assessments testing the same domain, which is helpful for practitioners and children alike, in that test performance can be validated on different measures and children are not

faced with repeated exposure to the same assessment tools. In comparison, tests of sign language acquisition have a more recent history. The first standardized tests of sign language only emerged in the late 1990s (Herman et al., 2020). Although sign language measures were used prior to this in research studies, they were not designed for, nor were they necessarily relevant to, professionals working with DHH children in pre-school and school settings. Research measures typically investigate specific areas of language in detail, focus on a narrow age range and are not designed to provide information on language proficiency or norms, whereas practitioners require both of these and in addition require measures that are sensitive and time efficient. Although a variety of linguistic domains is included when looking globally at tests of sign language developed to date (see http://www.signlang-assessment.info/tests-of-l1-development.html), for individual sign languages, the range of tests is more limited, and in some countries there continue to be no measures available to assess sign language development (e.g. Língua Gestual Portuguesa, A. Mineiro, personal communication).

Of central importance is the involvement of DHH people who are fluent sign language users in the development of sign language assessment tools. Other researchers (Ladd, 2003; Jones & Pullen, 1992) have pointed out the vital role of native signers in sign language research more broadly. This is particularly relevant when developing language measures, since non-native non-fluent signers lack the language skills, insights and cultural knowledge to determine whether tests items are suitable, whether they are testing the target appropriately and whether distractor items are likely to be effective. Designing sign language assessments to investigate specific aspects of language and creating appropriate and reliable scoring systems requires a team of experts with different backgrounds and skills and should primarily include DHH individuals. Reporting on a recently completed study (DOTDeaf: Developing Online Training for Deaf Language Specialists, https://city.ac.uk/dotdeaf), Hoskin, Herman & Woll (in press) advocate for the role of Deaf Language Specialist, a role that currently carries many different titles for deaf professionals working in educational and health contexts, for whom there is very little training. Deaf Language Specialists are ideally suited to conducting sign language assessments and also possess important skills for the stage following assessment, the delivery of interventions for children with language impairments.

3. SIGN LANGUAGE ASSESSMENT INSTRUMENTS

Henner et al. (2018) overview the purposes of sign language assessment and note that assessments typically measure the development of receptive or expressive language skills. Below we present examples of tests from a range of these areas.

The first two standardized tests of any sign language, the British Sign Language Receptive Skills Test (BSL RST, Herman et al., 1999) and the BSL Production Test (BSL PT, Herman et al., 2004) were both initially developed on native signers and subsequently used with a broader sample including DHH children from hearing families to develop norms (Herman & Woll, 1998). Designed to evaluate the success of bilingual English/BSL educational programmes, these tests continue to be used in UK schools today, and have also been used in studies of language impairments in sign language (Herman et al., 2014). The BSL RST is a test of receptive morphosyntax. Children watch signed sentences and choose the picture that best matches the test sentence from a selection. At an early stage in development of the BSL RST, the question arose as to how to deliver the test in a uniform way. Spoken language measures maintain a standardized approach to test administration by testers reading written instructions to children. Sign languages have no written form, and preliminary pilot work with the BSL RST identified inconsistencies in test administration as a result (Herman, 1998b). By filming test items and presenting them to children on video, this first challenge was overcome. The most recent version of the test is automated and accessed online (Herman et al., 2015), with possibilities for group assessment similar to the ASL Assessment Instrument

(Hoffmeister et al., 2014) and the option to collect data online for the purpose of updating standard scores. Herman & Curtin (2017) reviewed data collected using the online BSL RST. Unexpectedly, in the light of changes affecting DHH children in the intervening years, no differences were found in children's BSL test scores between the original dataset - data collected shortly after publication of the test (Herman & Roy, 2006), and data collected through the online test. Native signers were still found to achieve the highest scores, while signers in hearing families lagged behind. Despite the opportunities available for earlier exposure to sign language, the authors note that in the UK at least, deaf children were still not being exposed to sign language from the time that deafness was first identified.

In contrast to the BSL RST, the BSL PT looks at children's expressive signing in the form of a narrative recall task. For this, scoring is much more complex and testers are required to undergo training in order to code children's stories and check for scorer reliability. Stories are coded for key features of the narrative content, i.e. the informational content of the story, and the child's ability to structure the story using a high point analysis (Labov & Waletzky, 1967). Features of BSL grammar assessed in the test include spatial and agreement verbs, classifiers (e.g. handling vs whole entity classifiers), aspectual and manner modifications, and role shift. An adaptation of the test to ASL has added the option for testers to use alternative story stimuli so that children do not view the same story when reassessed (Enns et al., 2021).

Another type of test used to measure sign language development involves repetition of linguistic material such as sentence repetition (Haug et al., 2020; Hauser et al., 2008; Schönström & Hauser, 2021). Repetition tests have the advantage of being applicable to a range of ages, and have been used effectively in spoken languages to identify developmental language disorder (DLD) (e.g., Maillart & Parisse, 2008; Snow & Hoefnagel-Höhle, 1978; Stokes & Fletcher, 2003; Volterra et al., 2003). Research has shown sentence repetition tasks (SRTs) to be highly sensitive to short-term memory impairments, information processing abilities and grammatical knowledge, all of which may be affected in DLD in spoken languages (Poll et al., 2010).

The BSL SRT was created to see if this type of measure could also be effective in identifying language impairments in BSL (Marshall et al., 2014). The BSL SRT was developed as a video-based task consisting of 20 BSL sentences of varying complexity and 3 practice sentences, presented by a Deaf, native BSL user. The sentences were constructed to cover a range of complexity determined by the number of clauses in a sign sentence: the more clauses in a sentence, the more difficult it was considered to reproduce. An example of a simple sentence is 'GIRL WRITE' and an example of a complex sentence is 'MUM SIT-ON-A-CHAIR READING BOY SAME SIT-ON-A-CHAIR READING'. The scoring criteria for sentences included: correct lexical item, placement, sign order, facial expression and meaning. The BSL SRT has not yet been standardized but research using this test with DHH children has reported differences in the performance of children with and without language impairments, with those with suspected DLD achieving lower scores, suggesting the BSL SRT may be a useful tool for identifying DLD in signing DHH children (Marshall et al., 2015).

It is interesting to note that few, typically developing or language impaired DHH children included facial expression when reproducing test sentences, despite some of them using normal facial expression outside the test situation. It is possible that they were focusing on the sentence structure and vocabulary and therefore did not attend sufficiently to these non-manual features (Marshall et al., 2014). Pilot work using this test with DHH adults showed that even native signers found it challenging to recall all aspects of the sentences, with almost none achieving full marks. The same pattern has also been found in SRTs in other sign languages (Hauser et al., 2008; Schönström & Hauser, 2021). As a result, SRTs developed for DHH adults in ASL (Hauser et al., 2008), BSL (Cormier et al., 2012), German Sign Language (DGS; Kubus & Rathmann, 2012) and Swedish Sign Language (SSL; Schönström &

Hauser, 2021) minimize facial expressions when presenting sentences and ignore errors in facial expression when scoring.

Apart from these measures, there are very few assessments available for older DHH children and none that assess text comprehension in BSL (note: here we use the term 'text' to refer to a range of linguistic compositions, including sign language texts (Rosenburg et al., 2020). Language comprehension continues to develop into the later school years, and it is widely known that children with good spoken language skills such as vocabulary knowledge, sentence comprehension, etc., go on to be better readers in comparison to those with less developed spoken language skills (Duke & Cartwright, 2021). Sign language assessments have been used in several studies to show that DHH individuals with good sign language skills are also better readers compared to those with little or no sign language skills, particularly signers who do not have adequate spoken language skills (Bélanger & Rayner, 2015; Chamberlain & Mayberry, 2008; Ormel et al., 2012). As many DHH children struggle to develop good literacy skills due to a lack of access to language and poor access to education (Caselli et al., 2020), it is important to understand more about the relationship between sign language and reading. To this end, a project currently underway by the second author (Katherine Rowley) is exploring language comprehension in BSL, and how low-level skills such as vocabulary and syntactic knowledge relate to higher level skills such as text comprehension, literal and inferential skills. Part of this study will involve adapting the ASL comprehension test developed by Rosenburg and colleagues (2020) into BSL. For the ASL test, three signed texts were developed, two non-fiction and one fiction, and a series of questions about the texts. The questions were a combination of literal and inferential questions, all produced in ASL. A total of 251 DHH children between the ages of 8-18 completed the test online and results followed expected patterns: older DHH children performed better, literal questions were easier than inferential questions and native signers were more accurate overall than non-native signers (Rosenburg et al., 2020). The adaptation of this test to BSL will seek to replicate these findings in another sign language.

The availability of sign language assessments has made it possible for researchers to explore the relationship between sign language and other skills such as cognition and literacy, leading to a better understanding of DHH children's development of these skills (Botting et al., 2017; Marshall et al., 2015). We now know that strong sign language skills provided through early language exposure are associated with the development of cognitive and literacy skills on a similar timetable to hearing peers (Woolfe et al., 2002; Chamberlain & Mayberry, 2008). To date, most studies have focused on correlation rather than causation. To determine causation, longitudinal studies are needed, for example, to explore the ways in which sign language skills support print literacy skills. Although longitudinal studies have been carried out with DHH children, to date these have mostly focused on how spoken language skills support print literacy skills (e.g., Harris et al., 2017). This is beginning to change with a recent study indicating that sign language skills such as fingerspelling and sign based phonological awareness are predictors of word reading latency and word/text reading fluency (Ormel et al., 2022).

These areas of research have led to insights into human development, contributing to theories of language, cognition and literacy development in all children, not only those that use spoken languages. Studies show that it does not matter what type of language a child uses; what is vital is that language is acquired early (Marshall et., 2015; Botting et al., 2017, Hall et al., 2019). Research using sign language assessments has shown that DLDs can occur in children learning sign languages (Mason et al., 2010), challenging theories of DLD that attribute children's difficulties to the inability to process speech (ibid). To summarise, we cannot garner a full understanding of how children develop and process language without also considering those whose first language is a sign language. The development of sign language assessments has put sign languages on a more equal footing with spoken languages.

4. CONCLUSION

In this review, we have discussed issues in the development of sign language assessments and given examples of different types of measures. In spite of increased interest in the measurement of sign language development and the development of a wider range of tools, there is still more work needed in this area, in particular for sign languages that currently have no such tests available. More tests appropriate for older DHH children are also needed to contribute to our understanding of language development at different ages.

Future research should also investigate how effective existing tests are with sub-groups of DHH sign language users, including children from diverse linguistic and cultural backgrounds as well as children with additional needs. To date, our knowledge about these groups remains limited as both are underrepresented in the research literature, despite their significant presence within the Deaf community. In addition, it is important for future test developers to collect and present more detailed information on the communication profiles of children involved in test development, and to consider ways of capturing translanguaging behaviours.

Finally, there is also a need to look beyond the use of standardised assessments that generate a 'snapshot' of a test taker's performance at one point in time and focus on the nature of the learning process. Other approaches to assessment may lend themselves more readily to achieving this goal. For example, dynamic assessment employs a test-teach-retest paradigm to focus on the emerging skills a learner shows when facing a new task and the amount of support required by the tester for optimal learning. The use of dynamic assessment to detect differences in DHH children's language learning profiles within a vocabulary context is a relatively recent development in this area (Mann et al., 2014). A combination of both standardized and informal assessments can provide clinicians and other professionals working with DHH children with more detailed insights about areas of strengths and development needs.

Throughout any discussion of sign language assessment, the involvement of DHH people is key, for designing, developing, administering and evaluating tests, and also for delivering interventions in sign language. For the future, more work is needed to ensure there are links between assessment findings and the design and delivery of interventions to improve children's sign language skills.

Finally, we have reported on the use of sign language assessments to explore the links between sign language and cognitive skills including reading. Research conducted using sign language assessments continues to highlight an urgent need for children's sign language skills to be established as early as possible to avoid the negative consequences of language deprivation.

REFERENCES

Anderson, D., & Reilly, J. (2002). The MacArthur Communicative Development Inventory: Normative Data for American Sign Language. *Journal of Deaf Studies and Deaf Education, 7*(2)*,* 83-119.

Bélanger, N. N., & Rayner, K. (2015). What eye movements reveal about deaf readers. *Current Directions in Psychological Science, 24*(3), 220–226. https://doi.org/10.1177/0963721414567527

Botting, N., Jones, A., Marshall, C., Denmark, T., Atkinson, J., & Morgan, G. (2017). Nonverbal Executive Function is Mediated by Language: A Study of Deaf and Hearing Children. *Child development*, *88*(5), 1689–1700. https://doi.org/10.1111/cdev.12659

Caselli, N. K., Hall, W. C., & Henner, J. (2020). American Sign Language Interpreters in Public Schools: An Illusion of Inclusion that Perpetuates Language Deprivation. *Maternal and Child Health Journal*, *24*(11), 1323–1329. https://doi.org/10.1007/s10995-020-02975-7

Chamberlain, C., & Mayberry, R. I. (2008). American Sign Language syntactic and narrative comprehension in skilled and less skilled readers: Bilingual and bimodal evidence for the linguistic basis of reading. *Applied Psycholinguistics*, *29*(3), 367-388.

Cormier, K., Adam, R., Rowley, K., Woll, B., & Atkinson, J. (2012, March 7-9). The BSL Sentence Reproduction Test: Exploring age-of-acquisition effects in British deaf adults [Conference presentation]. DGfS 34th annual meeting, Frankfurt, Germany.

Cupples, L., Ching, T.Y.C., Button, L., Leigh, G., Marnane, V., Whitfield, J., Gunnourie, M., & Martin, L. (2016). Language and speech outcomes of children with hearing loss and additional disabilities: Identifying the variables that influence performance at 5 years of age. *International Journal of Audiology*, *57*(2), S93-S104. https://doi:10.1080/14992027.2016.1228127

Davidson, K., Lillo-Martin, D., & Chen Pichler, D. (2014). Spoken English language development among native signing children with cochlear implants. *Journal of Deaf Studies and Deaf Education*, *19*(2), 238–250. https://doi.org/10.1093/deafed/ent045

De Meulder, M., Kusters, A., Moriarty, E., & Murray, J. (2017). Describe, don't prescribe. The practice and politics of translanguaging in the context of deaf signers. *Journal of Multilingual and Multicultural Development*, *40*(10), 892-906. https://doi.org/10.1080/01434632.2019.1592181

Duke, N. K., & Cartwright, K. B. (2021). The science of reading progresses: Communicating advances beyond the simple view of reading. *Reading Research Quarterly*, *56*(S1), S25-S44. https://doi.org/10.1002/rrq.411

Enns, C., & Herman, R. (2011). Adapting the Assessing British Sign Language Development: Receptive Skills Test into American Sign Language. *Journal of Deaf Studies & Deaf Education*. *16*(3), 362-374. https://doi.org/10.1093/deafed/enr004

Enns, C., Haug, T., Herman, R., Hoffmeister, R., Mann, W., & McQuarrie, L. (2016). Exploring signed language assessment tools in Europe and North America. In M. Marschark, V. Lampropoulou & E.K. Skordilis (Eds.), *Diversity in Deaf Education*. New York: Oxford University Press.

Enns, C., Kolbe, V. & Becker, C. (2021). Challenges and solutions in test adaption: Comparing international experiences with the British Sign Language Production Test (Narrative Skills). *Sign Language & Linguistics*, *24*(2), 226-258.

Goodwin, C., Davidson, K., & Lillo-Martin, D. (2017). English article use in bimodal bilingual children with cochlear implants: Effects of language transfer and early language exposure. *Proceedings of the Boston University Conference on Language Development, 41*. 283-295.

Hall, M.L., Hall, W.C., & Caselli, N.K. (2019). Deaf children need language, not (just) speech. *First Language, 39*(4), 367–395. https://doi.org/10.1177/0142723719834102

Hall, W. C. (2017). What You Don't Know Can Hurt You: The Risk of Language Deprivation by Impairing Sign Language Development in Deaf Children. *Maternal and Child Health Journal, 21*(5), 961–965. https://doi.org/10.1007/s10995-017-2287-y

Hall, M.L., & De Anda, S. (2021). Measuring "Language Access Profiles" in Deaf and Hard-of-Hearing Children with the DHH Language Exposure Assessment Tool. *Journal of Speech, Language, and Hearing Research, 64*(1), 134-158. https://doi.org/10.1044/2020_JSLHR-20-00439

Harris, M., Terlektsi, E., & Kyle, F.E. (2017). Literacy Outcomes for Primary School Children Who Are Deaf and Hard of Hearing: A Cohort Comparison Study. *Journal of Speech, Language and Hearing Research, 60*(3), 701-711. https://doi.org/10.1044/2016_JSLHR-H-15-0403

Haug, T. (2011). *Adaptation and Evaluation of a German Sign Language Test – A Computer-Based Receptive Skills Test for Deaf Children ages 4-8 years old.* Hamburg: Hamburg University Press.

Haug, T., Batty, A. O., Venetz, M., Notter, C., Girard-Groeber, S., Knoch, U., & Audeoud, M. (2020). Validity evidence for a sentence repetition test of Swiss German Sign Language. *Language Testing*, *37*(3), 412–434.

https://doi.org/10.1177/0265532219898382

Hauser, P., Paludneviciene, R., Supalla, T., & Bavalier, D. (2008). American Sign Language Sentence Reproduction Test: Development and Implications. In R.M. de Quadros (Ed.), *Sign Language: Spinning and Unravelling the Past, Present and Future* (pp.160-172). Petropolis: Arara Azul.

Henner, J., Novogrodsky, R., Reis, J., & Hoffmeister, R. (2018). Recent Issues in the Use of Signed Language Assessments for Diagnosis of Language Disorders in Signing Deaf and Hard of Hearing Children. *Journal of Deaf Studies and Deaf Education, 24*(3), 307–316. https://doi.org/10.1093/deafed/eny014

Herman, R. (1998a). The need for an assessment of deaf children's signing skills. *Deafness & Education*, *22*(3), 3-7.

Herman, R. (1998b). Issues in Designing an Assessment of British Sign Language Development. *International Journal of Language & Communication Disorders,* 33(S1), 332-337.

Herman, R. (2002) *Assessing British Sign Language Development.* [Unpublished doctoral thesis]. City, University of London.

Herman, R. (2015). Language assessment in deaf learners. In H. Knoors & M. Marschark (Eds.), *Educating Deaf Learners: Creating a Global Evidence Base.* Oxford: Oxford University Press.

Herman, R., & Curtin, M. (2017, September 27-28). *The BSL Receptive Skills Test: How much has changed in 18 years?* [Conference presentation]. *RCSLT Conference 2017,* Glasgow, Scotland.

Herman, R., Grove, N., Haug, T., Mann, W., & Prinz, P. (2020). The assessment of signed languages. In G. Morgan (Ed.), *Understanding Deafness, Language and Cognitive Development. Essays in honour of Bencie Woll* (pp. 53–72). Amsterdam: John Benjamins.

Herman, R., Grove, N., Holmes, S., Morgan, G., Sutherland, H., & Woll, B. (2004). *Assessing BSL Development: Production Test (Narrative Skills)*. London: City University Publication.

Herman, R., Holmes, S., & Woll, B. (1999). *Assessing British Sign Language Development: Receptive Skills Test.* Coleford: Forest Bookshop.

Herman, R., Holmes, S., Rowley, K., & Woll, B. (2015). *BSL Receptive Skills Test.* Retrieved May 17, 2022, from https://dcalportal.org

Herman, R., & Roy, P. (2006). Evidence from the Extended Use of the BSL Receptive Skills Test. *Deafness & Education International, 8*(1), 33-47.

Herman, R., Rowley K., Marshall, C., Mason, K., Atkinson, J., Woll, B., & Morgan, G. (2014). Profiling SLI in Deaf children who are sign language users. In D. Quinto-Pozos (Ed.), *Multilingual Aspects of Sign Language.* (pp. 45-69). Multilingual Matters.

Herman, R., & Woll, B. (1998). *Design and Standardization of an Assessment of British Sign Language Development for use with Young Deaf Children* [Final Report, unpublished]. North Thames Regional Health Authority.

Hermans, D., Knoors, H., & Verhoeven, L. (2010). Assessment of Sign Language Development: The case of deaf children in the Netherlands. *Journal of Deaf Studies and Deaf Education*, *15*(2), 107-119. https://doi.org/10.1093/deafed/enp030

Hoffmeister, R.J., Caldwell-Harris, C.L., Henner, J., Benedict, R., Fish, S., Rosenburg, P., Conlin-Luippold, F., & Novogrodsky, R. (2014). *The American Sign Language Assessment Instrument (ASLAI): Progress report and preliminary findings*. (Working paper). Center for the Study of Communication and the Deaf.

Hoskin, J., Herman, R., & Woll, B. (in press) Deaf Language Specialists: Delivering Language Therapy in Signed Languages.

Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D. J., Padden, C., Pollard, R., & Smith, S.R. (2014). What medical education can do to ensure robust language development in deaf children. *Medical Science Educator*. *24*(4), 409–419.

Humphries, T., Kushalnagar, P., Mathur, G., Napoli, D. J., Padden, C., Rathmann, C., & Smith, S. (2017). Discourses of prejudice in the professions: The case of sign languages. *Journal of Medical Ethics. 43,* 648-652. https://doi.org/10.1136/medethics-2015-103242

Jones, L., & Pullen, G. (1992). Cultural Differences: Deaf and Hearing Researchers Working Together. *Disability, Handicap and Society, 7*(2), 189-196.

Kotowicz, J., Woll, B., & Herman, R. (2020). Adaptation of the British Sign Language Receptive Skills Test into Polish Sign Language. *Language Testing, 38*(1), 132-153. https://doi.org/10.1177/0265532220924598

Kubus, O., & Rathmann, C. (2012). Degrees of difficulty in the L2 acquisition of morphology in German Sign Language [Conference presentation]. DGfS 34th annual meeting, Frankfurt, Germany.

Kusters, A., Spotti, M., Swanwick, R., & Tapio, E. (2017). Beyond languages, beyond modalities: transforming the study of semiotic repertoires. *International Journal of Multilingualism*, *14*(3), 219-232. https://doi.org/10.1080/14790718.2017.1321651

Labov, W., & Waletzky, J. (1967). Narrative analysis: oral versions of personal experience. In J. Helm (Ed.) *Essays on the verbal and visual arts*. Seattle: University of Washington Press (pp. 12-44).

Ladd, P. (2003). *Understanding Deaf Culture: In Search of Deafhood*. Multilingual Matters.

Lu, J., Jones, A., & Morgan, G. (2016). The impact of input quality on early sign development in native and non-native language learners. *Journal of Child Language, 43*(3), 537-552. https:/doi.org/10.1017/S0305000915000835

Maillart, C., & Parisse, C. (2008). The interplay between phonology and syntax in French-speaking children with specific language impairment. *International Journal of Language & Communication Disorders*, *43*(4), 448-472. https://doi.org/10.1080/13682820701608209

Mann, W., Peña, E. D., & Morgan, G. (2014). Exploring the use of dynamic language assessment with deaf children, who use American Sign Language: Two case studies. *Journal of Communication Disorders*, *52*, 16–30.

Marschark, M. (2002). Foundations of Communication and the Emergence of Language in Deaf Children. In G. Morgan & B. Woll (Eds.), *Directions in Sign Language Acquisition – Trends in Language Acquisition research* (pp. 1-28). Amsterdam: John Benjamins.

Marshall, C., Mason, K., Rowley, K., Herman, R., Atkinson, J., Woll, B., & Morgan, G. (2015). Sentence repetition in deaf children with specific language impairment in British Sign Language. *Language Learning and Development*, 11(3), 237-251.

Marshall, C., Rowley, K., & Atkinson, J. (2014). Modality-Dependent and -Independent Factors in the Organisation of the Signed Language Lexicon: Insights from semantic and phonological fluency tasks in BSL. *Journal of Psycholinguist Research, 43,* 587–610. https://doi.org/10.1007/s10936-013-9271-5

Mason, K., Rowley, K., Marshall, C.R., Atkinson, J., Herman, R., Woll, B., & Morgan, G. (2010). Identifying Specific Language Impairment in British Sign language: Implications for Theory and Practice. *British Journal of Developmental Psychology*, *28,*(1), 33-49. https://doi.org/10.1348/026151009x484190

Mitchell, R.E., & Karchmer, M.A. (2004). When Parents Are Deaf versus Hard of Hearing: Patterns of sign use and school placement of deaf and hard-of-hearing children. *Journal of Deaf Studies and Deaf Education, 9*(2), 133-152. https://doi.org/10.1093/deafed/enh017

Morgan, G., Herman, R., & Woll, B. (2007). Language Impairments in Sign Language: Breakthroughs and Puzzles. *International Journal of Language and Communication Disorders, 42*(1), 97-105. https://doi.org/10.1080/13682820600783178

Ormel, E., Giezen, M.R., Knoors, H., Verhoeven, L., & Gutierrez-Sigut, E. (2022). Predictors of Word and Text Reading Fluency of Deaf Children in Bilingual Deaf Education Programmes. *Languages*, *7*(1):51. https://doi.org/10.3390/

Ormel, E., Hermans, D., Knoors, H., & Verhoeven, L. (2012). Cross-language effects in written word recognition: The case of bilingual deaf children. *Bilingualism: Language and Cognition, 15*(2), 288-303.

Poll, G. H., Betz, S. K., & Miller, C. A. (2010). Identification of Clinical Markers of Specific Language Impairment in Adults. *Journal of Speech, Language and Hearing Research, 53*(2), 414-429. https://doi.org/10.1044/1092-4388(2009/08-0016)

Quinto-Pozos, D., Forber-Pratt, A., & Singleton, J.L. (2011). Do developmental communication disorders exist in the sign modality? Perspectives from professionals. Language, Speech and Hearing Services in Schools, *42*(4), 423-443.

Rosenburg, P., Lieberman, A.M., Caselli, N., & Hoffmeister, R. (2020). The Development and Evaluation of a New ASL Text Comprehension Task. *Frontiers in Communication. 5*(25). https://doi.org/10.3389/fcomm.2020.00025

Rowley, K. (2020). Sign Language Acquisition. In S. Hupp & J. Jewell (Eds.), *The Encyclopedia of Child and Adolescent Development.* (pp. 1-13). Wiley Blackwell.

Rowley, K. (2022). Sign Language Acquisition. In S. Hupp & J. Jewell (Eds.) *The Encyclopaedia of Child and Adolescent Development).* https://doi.org/10.1002/9781119171492.wecad130

Schönström, K., & Hauser, P. (2021). The sentence repetition task as a measure of sign language proficiency. *Applied Psycholinguistics*, *43*(1), 1-19. https://doi.org/10.1017/S0142716421000436

Snoddon, K. (2018). Whose ASL counts? Linguistic prescriptivism and challenges in the context of parent sign language curriculum development. *International Journal of Bilingual Education and Bilingualism, 21*(8), 1004-1015, https://doi.org/10.1080/13670050.2016.1228599

Snow, C. E., & Hoefnagel-Höhle, M. (1978). The critical period for language acquisition: Evidence from second language learning. *Child Development, 49*(4), 1114–1128. https://doi.org/10.2307/1128751

Stokes, S. F., & Fletcher, P. (2003). Aspectual forms in Cantonese-speaking children with specific language impairment. *Linguistics, 41*(2), 381-406.

Sumer, B., Perniss, P. M., & Ozyurek, A. (2017). A first study on the development of spatial viewpoint in sign language acquisition: The case of Turkish Sign Language. In F. N. Ketrez, A. C. Kuntay, S. Ozcalıskan & A. Ozyurek (Eds.), *Social Environment and Cognition in Language Development: Studies in Honor of Ayhan Aksu-Koc* (pp. 223-240). Amsterdam: John Benjamins. https://doi.org/10.1075/tilar.21.14sum

Volterra, V., Caselli, M.C., Capirci, O., Tonucci, F., & Vicari, S. (2003). Early linguistic abilities of Italian children with Williams syndrome. *Developmental Neuropsychology, 23*(1-2), 33-58.

Woolfe, T., Herman, R., Roy, P., & Woll, B. (2010). Early vocabulary development in deaf native signers: a British Sign Language adaptation of the communicative development inventories. *Journal of Child Psychology and Psychiatry*, *51*(3), 322-331. https://doi.org/10.1111/j.1469-7610.2009.02151.x

Woolfe, T., Want, S., & Siegal, M. (2002). Signposts to development: Theory of mind in deaf children. *Child Development*, 73, 768-778.