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Building an *Assessment Use Argument* for sign language: the BSL Nonsense Sign Repetition Test

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In this article, we adapt a concept designed to structure language testing more effectively, the *Assessment Use Argument (AUA)*, as a framework for the development and/or use of sign language assessments for deaf children who are taught in a sign bilingual education setting. By drawing on data from a recent investigation of deaf children's nonsense sign repetition skills in British Sign Language, we demonstrate the steps of implementing the *AUA* in practical test design, development and use. This approach provides us with a framework which clearly states the competing values and which stakeholders hold these values. As such, it offers a useful foundation for test-designers, as well as for practitioners in sign bilingual education, for the interpretation of test scores and the consequences of their use.

Keywords: assessment; sign bilingualism; phonology; non-word repetition; deaf education

1. Introduction: sign bilingual education in the UK

Over the course of the past decade, sign bilingual education in the UK has become more established, due to changes in the educational context and to an increased understanding of sign language development based on research (Swanwick and Gregory 2007). While the number of deaf[1] children attending sign bilingual education programs[2] which use British Sign Language (BSL) as the (primary) means of instruction and communication is relatively small, this does not necessarily represent the true number of children who are sign bilingual. In fact, many deaf children who attend mainstream programs or oral schools with little or no use of sign language are likely to be exposed to sign language outside the classroom (or may themselves be native signers), through interaction with other deaf peers or at home when communicating with deaf family members. Efforts to gather reliable information are impeded by the lack of available census information on deaf children's type of schooling. Additional challenges lie in the heterogeneous nature of this target group: there is significant variation across individuals with regard to the degree of hearing loss, age of language onset, communication at home, linguistic and cultural background, etc. (Andersen 2006; Humphries and Allen 2008; Marschark, Lang, and Albertini 2002). As a result,

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practitioners' decisions on issues including placement and type of intervention need to be made on a case-by-case basis rather than following a 'one approach fits all' procedure.

In light of these demands, credible evidence is indispensable for supporting decision-making, and this requires appropriate assessments. For instance, in a sign bilingual education environment, special consideration needs to be given to the question of how deaf pupils' sign language can be properly assessed. In addition to designing tests that measure different aspects of an individual's sign language proficiency, more explicit links are needed between test scores, their interpretation, and the consequences of their use (e.g. type of support the child receives, type of educational placement, etc.). These links are essential for maximizing the efficiency (not only with regard to quality but also whether the test will be consistently used long term) of the assessment and for meeting the requirements of the key stakeholders (e.g. practitioners, deaf students, school administrators). The lack of such links creates a gap between test design and test use, leaving each area more susceptible to errors and/or misguided decisions.

Given the relative youth of sign language research and the limited number of studies that have focused on sign language assessment, this area needs to be approached with extra caution, if some of the mistakes from regular education (e.g. treating test validity and test use as unrelated issues) are to be avoided. Because of the great diversity in deaf children's early language experiences, which leaves some of them without access to a meaningful language until they enter school (Moores 2001), they are at a constant disadvantage compared to their hearing peers (Kuntze 1998; Meier and Newport 1990). Consequently, there is a need for appropriate assessment based on which decisions regarding suitable intervention can be made. In order to avoid further delays in students' language development, test-developers and test-users[3] need to collaborate on constructing a framework for the assessment. This includes discussing the primary aims of the assessment, including practicability (i.e. what will the test be used for?), reliability (i.e. is the test consistent?), level of interactivity (i.e. how is the test experienced by the user?), and validity (i.e. does the test really measure what it sets out to measure?). Because test-developers and test-users often approach collaborations with different expectations about the purpose of assessment, agreeing on these aims is an important prerequisite for successful links between inference and consequence of testing. The main idea behind the close collaboration between test-developers and test-users is to set up a framework for quality control during the development phase and to continue examining the overall usefulness throughout the test cycle. Following the *Assessment Use Argument (AUA)* approach, conceptualized by Bachman (2005), helps to further specify links between test validity and test use.

In this paper, we present some of the challenges of sign language assessment related to assessing deaf children. We then introduce the *AUA* and provide some background information on the data from a recent study investigating deaf children's phonology and phonological working memory (PWM) skills, which adapts a non-word repetition methodology for sign language. Finally, we explore the suitability of the *AUA* for sign language assessment by drawing from the aforementioned data on our Nonsense Sign Repetition Task.[4]

2. Some of the challenges of sign language assessment

Language assessments are frequently used by professionals across disciplines, including education, psychology, and linguistics (Bachman and Palmer 1996), for a number of reasons. These reasons include documenting students' developmental progress in school, measuring performance of second language learners, diagnosing error patterns in late language learners, and/or serving as a linguistic research tool. In the field of education, language assessments often play a key role not only in measuring students' academic success but also in ranking schools. Generally, these assessments have been developed for hearing pupils, with hearing children as a norming group, and are not appropriate for the particular needs of most deaf test-takers.

Compared to spoken languages, research on the assessment of sign language can be considered still in its infancy and, while several assessments have been developed, most of these instruments have not been standardized or are used mainly for linguistic research (e.g. *Test Battery for American Sign Language Morphology and Syntax*, Supalla et al. in press; *Test Battery for Australian Sign Language Morphology and Syntax*, Schembri et al. 2002; *Test for Grammatical Judgment of ASL*, Boudreault and Mayberry 2006). Notable exceptions include the *BSL Receptive Skills Test* (Herman, Holmes, and Woll 1999) and the *BSL Productive Skills Test* (Herman et al. 2004). For many practitioners in sign bilingual education, this means they either have to rely on standardized assessments developed for hearing pupils[5] or make up their own informal assessments, if they want to measure deaf pupils' language proficiency. Some of the most relevant challenges of sign language assessment within the context of sign bilingual education are discussed next (for a more general review of sign language assessment, the reader is referred to Haug and Mann 2008).

The first and most apparent challenge is the overall scarcity of available, standardized sign language tests, specifically those that are appropriate for use in an educational setting (e.g. Haug and Mann 2008; Jamieson 2003; Mann 2008; Prezbindowski and Lederberg 2003; Schick and Hoffmeister, forthcoming). In this context, relevant aspects include test length, time for scoring, and the linguistic knowledge required of the scorer (Singleton and Supalla 2003). An example is the *Test Battery for American Sign Language Morphology and Syntax* (Supalla et al. in press), which requires administration and scoring by a deaf native signer[6] and takes two hours to administer and 15 hours to score (Supalla et al. in press).

Another challenge lies in the limited time and resources available for sign language test development, specifically for practical use. Like with spoken languages, these constraints are often tied to the lack of clear mechanisms for integrating existing lists of, 'more or less independent qualities and questions into a set of procedures for test-developers and users to follow' (Bachman 2005, 1).

Finally, one of the key challenges to successful sign language assessment, which applies equally to spoken languages, is the lack of an overall framework to link assessment performance to use (i.e. a framework for decision-making) (Bachman 2005). This requires a transparent connection between test performance and interpretations, and from interpretation to use. One of the possible advantages of such a connectional framework would be to apply data collected mainly for research purposes, where appropriate, to explore possible uses for practitioners in sign bilingual education.

In this paper, we will focus in more detail on the last key challenge. The need for sign language assessment tests, in particular for use with young test-takers, has been well established in the literature (e.g. Haug and Hintermair 2003; Herman 1998; Mann and Prinz 2006). In a series of recent studies, researchers have developed a number of language assessments specifically for use with deaf children. The areas investigated in these studies included deaf children's phonology and PWM skills (Mann et al., 2010), their speech–reading ability (Kyle et al. 2009), and their sentence processing skills (Mason and Rowley, personal communication). Given the emphasis of these studies on assessment, they make ideal examples with which to explore the suitability of the *AUA*. For the purpose of this paper, we will draw on data from one particular study (Mann et al. 2010), which investigated deaf children's phonology and PWM skills in BSL.

3. The *Assessment Use Argument (AUA)*

The structural concept for sign language assessment that we refer to in this paper is the *AUA*[7]. The *AUA* is grounded in research focusing on test validity, which has explored the interaction between different areas of language ability that a test-taker draws on during (spoken) language assessment. It moves away from the traditional approach to language assessment, i.e. providing sets of procedures for investigating and supporting claims about conclusions based solely on performance scores without addressing issues of test use or consequences of test use. Instead, the *AUA* suggests approaching assessment by first setting up a framework in which the different processes associated with assessment are made visible and are connected. These processes represent two major levels of assessment, i.e. validity and utilization; they include measurement of performance, interpretation of performance scores, as well as decisions related to performance and are supported by claims, or interpretations, one wants to make, 'on the basis of the data, about what a test-taker knows or can do' (Bachman 2005, 9). Figure 1 illustrates how the validity level and the utilization level can be connected to form the *AUA*, using Toulmin's (2003) argument structure (in which arguments consist of claims, supported by data and statements).

At each of the two levels, the structure includes data and general statements used to back up the generated claims. Furthermore, each of these statements is supported by other types of evidence, including theories or findings from previous research, as part of the test validation process. During the process of gathering data in support of an argument, it is possible to uncover alternative explanations to the intended conclusions, which may be supported, weakened, or rejected based on the data (Bachman 2005). On the assessment utilization level, the number and/or type of statements to support claims are flexible and may vary from argument to argument, while on the assessment validity level, there is only one such statement.

The aim behind Bachman's *AUA* is to provide a framework to guide and facilitate the development, use, and evaluation of assessment. This is done by combining the two levels, utilization and validity, into one argument, and connecting the different functions and uses of assessment (e.g. data interpretation, consequences of assessment, assessment use) to maximize the effectiveness of the assessment instrument. The result is a model which functions as an assessment protocol to guide both test-developers and test-users.

Our aim in this paper is to explore the suitability of the *AUA* for sign bilingual education. We do so by using data from a recent study in which we investigated deaf children's performance on a Nonsense Sign Repetition Test. A brief description of the background and methodology of this test follows next.

3.1. Background

In our study (Mann et al. 2010), we used nonsense sign repetition methodology to examine in a systematic way how phonetic complexity in two phonological

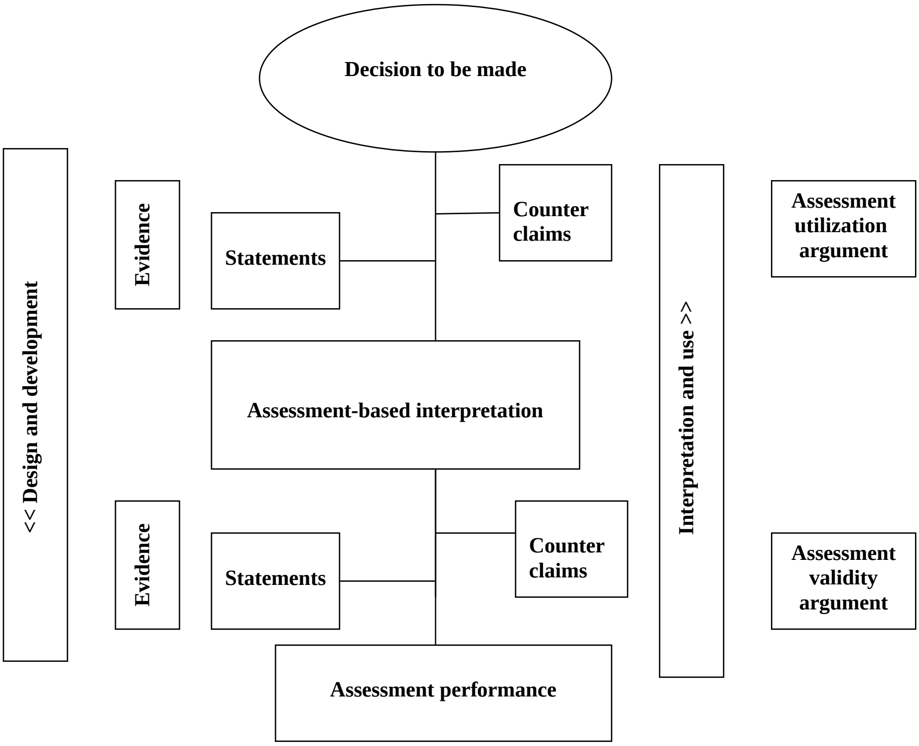

Figure 1. Structure of the *Assessment Use Argument (AUA)*.

parameters of signed languages – handshape and movement – affects the perception, short-term memory, and articulation of signs. 'Phonology' is a sublexical level of structure consisting of patterns of meaningless units (sounds in spoken languages and gestural units in signed languages). Phonology is in part constrained by the physiology of the systems involved in production and perception (the oral–auditory channel in spoken languages and the visual–gestural channel in signed languages). To this point, there has been little research on signers' acquisition of phonological skills, and the majority of existing studies are single or small-scale case studies (e.g. Meier et al. 2008; Morgan 2006). There have been few descriptions of sign phonology development in older deaf children, and none of the existing research has compared deaf children's general sign language skills with their developing phonological abilities. Despite this, several studies have shown similarities in the development of sign phonology to previously documented cases in the speech literature (Boyes Braem 1990; Clibbens and Harris 1993; Meier 2005; Morgan 2006). In particular, structural complexity affects phonological acquisition in signed languages as in spoken languages, with young children simplifying phonological forms and mastering complex target forms only gradually.

In our study (Mann et al. 2010), we investigated deaf children's phonological skills in BSL, specifically their ability to repeat nonsense signs. This research was motivated by a non-word repetition methodology which has been widely used in spoken language research (for reviews, please see Coady and Evans 2008; Gathercole 2006). In these tasks, the participant listens to a set of nonsense words (i.e. words that are phonologically possible but do not have any meaning) and repeats each one immediately after hearing it. Skills that are measured include both perception and production. In addition, the task assesses the ability to encode a phonological representation for storage in PWM and to retrieve it from there (Gathercole 2006). Because the child has never heard the items before, the task taps into the child's productive phonology, unconfounded by stored lexical knowledge. Non-word repetition abilities have been linked to word-learning abilities (Gathercole 2006) and to language development more generally. For instance, children with specific language impairment (SLI) and dyslexia have difficulty repeating non-words (Dollaghan and Campbell 1998; Gathercole and Baddeley 1990), and non-word repetition ability is an excellent predictor of language learning ability in children learning English as a second language (Service 1992). Several commercially available non-word repetition tests are widely used in the assessment of school-aged hearing children with language and literacy difficulties. Furthermore, non-word repetition tasks are included as part of screening tests to identify pre-school children who are at risk of developing reading and writing difficulties in the early school years.

This methodology was used for the present study for two reasons: firstly, to allow us to systematically investigate the development of phonological skills in a large group of deaf children and secondly, to create a test of PWM that is suited to sign language. We discuss each of these points in turn.

3.2. Sign language phonology

Comparable to spoken languages, signed languages systematically organize meaningless phonological units into meaningful ones (Brentari 1998; Stokoe 1960). Signs are made up of three basic phonological categories or 'parameters': handshape, movement, and location. These terms are fairly self-explanatory. 'Handshape' denotes the particular configuration of the hand, and shape that a hand makes in a sign, and handshapes vary in the number of fingers that are selected and how these fingers are flexed or extended. Approximately 50 different handshapes are attested in BSL (Brien 1992). There are two classes of movement – 'path movements,' which involve movement of the hand and arm, and 'hand-internal movements' that involve just the fingers or wrist. Signs contain either one or both of these types of movement. An example of a BSL sign containing two movements is FIRE (noun), which consists of an up-and-down movement of both hands while, at the same time, the fingers move back and forth (wiggle). Most signs are produced in a neutral location in front of the signer, but they can be produced elsewhere, such as at various locations on the face and torso.

Handshapes and movements differ in their complexity, and therefore in how easily they are acquired. Simple handshapes that are easy to articulate, such as a fist 'A,'[8] a fist with the index finger extended 'G,' or an open hand '5,' are amongst the first to be acquired. More complex handshapes, such as 'Y,' with the thumb and little finger extended, and 'W,' where the thumb and little finger are bent and the other three fingers extended, are acquired later, and young children will often use simpler handshapes in their place (Morgan 2006; Morgan, Barrett-Jones, and Stoneham 2007). With respect to movement, signs with both a path and internal movement, termed a 'movement cluster,' cause difficulties in acquisition, with children sometimes deleting one of the movements, or producing the two sequentially rather than simultaneously (Morgan 2006; Morgan, Barrett-Jones, and Stoneham 2007). By contrast, location represents by far the simplest part of the sign for deaf children to acquire, with very few errors reported after three years of age (Cheek et al. 2001; Meier 2005).

3.3. Phonological working memory (PWM)

PWM is the type of short-term memory we use whilst producing and understanding language, be that language spoken or signed. A central feature of PWM is that it is limited, allowing for only a small number of linguistic items to be temporarily maintained and manipulated, and it therefore creates a bottleneck for language processing (Lewis, Vasisth, and van Dyke 2006). Children's PWM capacity increases with age and is most often measured using either serial recall tasks, whereby the participant has to repeat random sequences of words or digits forwards or backwards, or non-word repetition tasks.

Serial recall tasks have become the focus of considerable debate in the recent sign language research literature. One such task is the digit span task. While hearing adults can remember an average of seven digits (± 2) when having to recall them in the same order that they were presented, the digit span of deaf and hearing adults using a signed language is significantly lower, at around five (± 1) (Bavelier et al. 2006; Boutla et al. 2004). However, although signers are unable to remember as many items in sequence as speakers are, they *are* able to recall the same number of items when their exact sequence is not required (Bavelier et al. 2008). Hence, it appears that sequence is important for PWM in spoken languages, but that sequentiality does not play as great a role in signers' PWM (Bavelier et al. 2008; Geraci et al. 2008). This conclusion, therefore, raises the possibility that digit span is not a fair measure of PWM in signers, and that a Nonsense Sign Repetition Test, because it takes into account the greater degree of simultaneity in sign language structure, would have more validity. Furthermore, in spoken languages the relationship between non-word repetition and language is stronger than that between digit span and language (Gathercole et al. 1994), thereby reinforcing the validity of non-word repetition as a measure of PWM.

3.4. Design

Our Nonsense Sign Repetition Task consisted of 40 nonsense signs, all of which were phonotactically possible but meaningless in BSL. Because signs generally contain only one syllable, stimuli could not be created by manipulating the number of syllables, as is most often the case for non-word repetition tests (e.g. the *Children's Test of Non-word Repetition*, Gathercole et al. 1994; and the *Non-word Repetition Test*, Dollaghan and Campbell 1998). Instead, we manipulated the complexity of the handshape and movement in a 2×2 design, as shown in Table 1.

Items contained handshapes that were either simple or complex. Simple handshapes were 'B,' '5,' 'G,' and 'A' (Sutton-Spence and Woll 1999). All other handshapes, which were selected from the BSL inventory, were classed as 'complex.' One movement – either internal movement or path movement – was classed as 'simple' and two movements (internal movement plus path movement) as 'complex' while balancing across conditions for different types of path movement (e.g. straight, arc) and different types of internal movement (e.g. opening, closing, wiggling). We also controlled for phonological properties that were not experimentally manipulated, such as one-handedness versus two-handedness.

Table 1. Levels of complexity for the Nonsense Sign Repetition Task.

		Handshape	
		Simple	Complex
Movement	Single movement	Level 0 (10 items): Path movement *or* hand-internal movement	Level 1b (10 items): Path movement *or* hand-internal movement
	Movement cluster	Level 1a (10 items): Path movement + hand-internal movement	Level 2 (10 items): Path movement + hand-internal movement

The design for the Nonsense Sign Repetition Test is based on the theoretical concept that the greater the degree of phonological complexity within a nonsense sign, the greater the load on PWM, and therefore the more difficult the sign will be for the test-taker to repeat (see Figure 2).

The stimuli were produced by a deaf fluent signer, sitting against a blue screen facing a digital camera. All items were presented to participants as 10×14 inch images on a laptop computer with a 15-inch screen.

3.5. Participants

Ninety-one congenitally deaf children (60 boys/31 girls) participated in the experiment. They were divided into three age groups: 3–5 years old ($N = 26$, mean $= 4.11$, range $=$

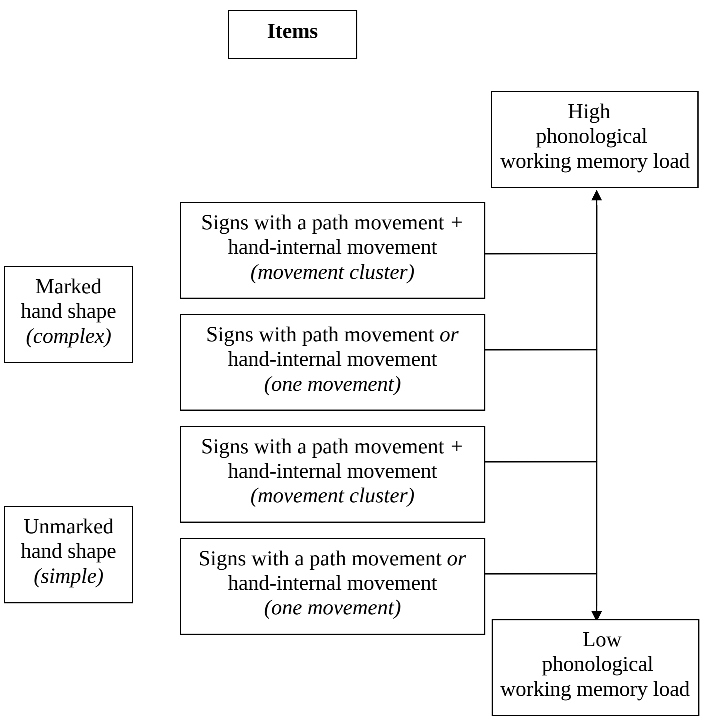

Figure 2. Test construct for measuring BSL phonology and phonological working memory skills based on the ability to repeat nonsense signs.

3.4–5.11), 6–8 years old ($N = 26$, mean = 7.4, range = 6.0–8.10), and 9–11 years old ($N = 38$, mean = 10.3, range = 9.0–11.9). Participants were recruited through schools for the deaf in the UK. They were either born into BSL-using deaf families ($N = 14$) or had very early exposure to BSL at nursery school, and showed subsequent typical language development as measured using the *BSL Receptive Skills Test* (Herman, Holmes, and Woll 1999).[9] Furthermore, we selected children with no diagnosed special educational need additional to deafness and normal non-verbal cognitive development, as reported by the school educational psychologist and/or speech and language therapist.

3.6. Procedure

Each participant was tested individually by a fluent BSL signer in a quiet room at the school in a single session which took between 15 and 20 minutes. We used prerecorded instructions by a deaf native-signing adult, who explained to participants that they were to be presented with a number of novel signs and had to copy each sign as accurately as possible. These instructions were followed by three practice items during which participants could ask questions, if necessary. Once the test began, no more questions were answered. Each stimulus item was presented just once, and the order in which the items appeared was randomized across participants.

3.7. Scoring

Responses were scored as either correct or incorrect. Errors were classified according to whether they appeared in the parameters that we had experimentally manipulated (i.e. handshape, path movement, and internal movement), based on a coding scheme developed during the piloting of this test (Marshall, Denmark, and Morgan 2006).

All scores were coded separately by two hearing experimenters, both of whom are fluent signers. These scores were compared and any discrepancies resolved. As an additional measure for inter-rater agreement, 15 participants were randomly selected and coded by a third coder, who was a deaf native signer. Inter-rater agreement was high (85% for overall score, 88% for handshape, 87% for path movement, and 83% for internal movement).

3.8. Summary of results

Results are reported in full in Mann et al. (2010); we present a summary of the most important findings here. Children's accuracy at repeating nonsense signs improved with age, showing that the task captures developmental increases in PWM capacity. Although the number of errors decreased with age, children of all ages made more errors on handshape and internal movement than on path movement, and this replicates previous results from case studies (Meier 2005; Morgan 2006). Children were least accurate at repeating the phonologically most complex nonsense signs, although there was no significant difference between their accuracy on the most simple signs and signs with just one level of complexity.

As well as testing children on the Nonsense Sign Repetition Task, we also asked them to complete a bead threading task. This requires children to thread 15 large beads onto a string as quickly as they can, and provides a measure of fine motor control and eye–hand coordination. We found a link between nonsense sign repetition accuracy and speed of bead threading for deaf children under the age of six, even when age was partialed out of the correlation, indicating that for young children fine motor skills are related to sign language production. In addition, we had *BSL Receptive Skills Test* scores available for 65 of the 91 children. Scores on this test correlated significantly with nonsense sign repetition accuracy even when age was partialed out, indicating that the Nonsense Sign Repetition Task taps into general BSL language skills.

In order for teachers to make use of the assessment, we established norms for each age group. This was done by subdividing the wide age range (3–11 years) into six groups. Despite the fairly small numbers in each group, it was considered important to maintain yearly age intervals for the younger children (3–5.11 years) as progress in language development in this period is particularly marked. For the older children (6–11.11 years), two-year age groups were selected. This allowed for larger subject numbers in each group, producing a more reliable basis for the standardization. Participants' raw scores were converted to standard scores and a language quotient was selected as being an easily accessible method of displaying standard scores, using a mean of 100 and standard deviation of 15. These norms have subsequently been made available to the participating schools as part of the Nonsense Sign Repetition Test package.

4. Linking assessment performance to use

At this point, we want to explore the suitability of the *AUA* for sign language assessment, by drawing from the data on the Nonsense Sign Repetition Task (see Figure 3).

One of the main advantages of the *AUA* is that it can be approached in more than one way, depending on whether the user looks from the perspective of a test-developer (bottom to top) or from the perspective of the test-user (top to bottom). Because the Nonsense Sign Repetition Task was originally developed as a research tool, we are taking a 'bottom to top' approach in the following discussion.

Starting at the bottom of the figure, we can see the first part of the *AUA*, which is concerned with gathering evidence for the validity of the assessment by linking assessment performance to an interpretation. Within the context of our data, this means that the interpretation of a deaf test-taker's performance on the Nonsense Sign Repetition Task is a valid measure of his or her PWM. This interpretation is backed up by the data from a large number of research studies of non-word repetition in spoken languages (see Coady and Evans 2008).

A potential counter argument to this statement is that the test does not actually tap PWM. BSL is a visuo-spatial language: perhaps, deaf children use visuo-spatial working memory rather than PWM in this task. In order to test this counter argument, we recruited 46 hearing children aged between 6 and 11 years of age, who had no previous exposure to any sign language, to perform the Nonsense Sign Repetition Task (see Mann et al. 2010, for further details). The only way that hearing children could tackle the task was by using visuo-spatial working memory to process what, to them, were non-linguistic gestures. Upon comparison, our results showed that, overall, hearing children performed significantly worse than deaf children, suggesting that deaf children were approaching the task differently, and processing the stimuli linguistically using PWM. Based on this evidence, we conclude that the test does indeed tap PWM.

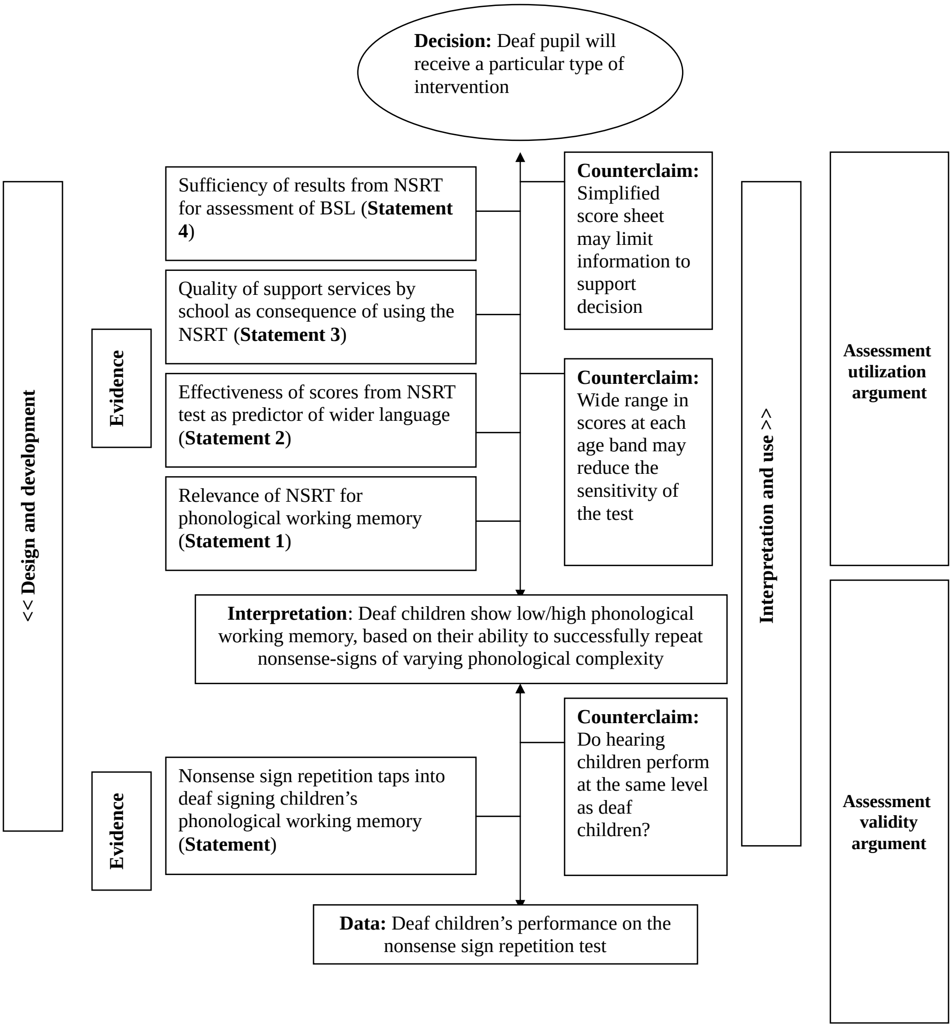

Figure 3. Structure of *Assessment Use Argument (AUA)* for sign language.

Moving up the figure, we see that four statements form the part of the *AUA* which is concerned with utilization, i.e. the link between score-based interpretations and the decisions based on these interpretations. In the case of the Nonsense Sign Repetition Test, the claim is: practitioners' decision as to whether it is necessary to provide special intervention to promote development of phonological skills in students with low PWM.

The first statement is concerned with the relevance of the assessment, i.e. the extent to which the test-taker's ability assessed is a requisite part of the competence. With regard to the Nonsense Sign Repetition Test, our findings comparing deaf and hearing children show that the ability to successfully repeat nonsense signs does rely on PWM. Furthermore, as discussed in the introductory section on PWM, digit span tasks, which are also used to measure PWM in spoken languages, are not well suited to assessing PWM in sign languages because of their reliance on temporal order. Nonsense sign repetition is more relevant to measuring PWM in a modality whereby language is processed with a greater degree of simultaneity than is the case for spoken languages. Note that this first statement and its backing also provide support for the validity argument, thus reinforcing the link between use and validity (Bachman 2005).

The second statement addresses the effectiveness of the assessment, or, the extent to which the score-based interpretation can provide information to be used by practitioners and administrators to make appropriate decisions. In the case of the Nonsense Sign Repetition Test, our statement is that repetition accuracy is correlated with wider BSL abilities. This is backed up by the finding of a significant correlation between deaf participants' repetition accuracy and their score on the *BSL Receptive Skills Test*. This relationship is statistically significant even when age is accounted for in the analysis, meaning that it is not the case that the relationship is driven by older children being better at both tests. Additional support comes from research with hearing individuals which shows that test-takers with high scores on the non-word repetition task have better overall language skills than those who achieve lower scores.

The third statement is related to quality, describing the beneficial outcomes that the test-user expects to achieve by using the assessment[10]. With regard to sign language assessment, the Nonsense Sign Repetition Test enables practitioners to use the results to inform/guide their decisions about deaf children's language proficiency (in accordance/agreement with other assessments) and determine appropriate intervention measures where necessary. In addition, deaf children, who take the test, potentially benefit from receiving better support services at school, in particular when scores are low and there is a suspicion of delayed or impaired language, for example SLI. The statement is supported by previous research with hearing individuals showing that low non-word repetition scores are a reliable indicator of SLI, which, in response, enables practitioners to initiate special intervention services (see review in Coady and Evans 2008). The first study to investigate whether the Nonsense Sign Repetition Test can be used to identify deaf children with SLI reports that four out of 13 deaf children with SLI scored at or below one standard deviation below the mean (Mason et al. forthcoming).

The fourth and final statement concerns sufficiency of the information provided by the assessment to make a decision. This can be related to what gets included in the definition of the test construct, or, the test-taker's ability to be assessed. In the case of the Nonsense Sign Repetition Test, the underlying construct taps into the child's productive phonology, unconfounded by stored lexical knowledge, by measuring perceptual and production skills, as well as the ability to encode a phonological representation for storage in PWM and to retrieve it from there. However, the construct by definition does not include lexical knowledge because the signs are not real lexical items, nor does the construct measure morphological or syntactic skills (although it is significantly correlated with them).

Together, the four statements provide support to the decision to be made by practitioners. Still, there are a number of possible counterclaims to these statements. One potential counterclaim concerns the wide range of scores in any particular age band. This means that a child has to achieve a very low score in order to fall outside the normal range and this may therefore reduce the sensitivity of the assessment in identifying children with real impairments in phonology and PWM. Part of this variability in scores may be linked to higher performance in deaf children with deaf parents compared to deaf children of hearing parents. The former population is much smaller: in our study, we had only 14 participants with deaf parents and therefore not enough to analyze across the wide range of ages that we tested.

Another potential counterclaim concerns the scoring of the test. In its current form, the test is scored in two ways: each repetition is scored as being correct (awarded 1 point) or incorrect (0 points). The scorer can then fill in a more detailed score sheet indicating exactly where any error or errors have occurred – for example, whether a movement has been deleted, or a handshape substituted. This in-depth error-scoring is time-consuming (between 1 and 2 hours) and requires good phonological knowledge of BSL on the part of the scorer, but it has the advantage of providing extra detail as to the child's phonological abilities. The simplified version of the scoring sheet, while quicker (less than 1 hour) and easier to fill out, may not provide sufficient information to inform practitioners' decisions. To further investigate this, a number of selected schools will be provided with a trial version of the Nonsense Sign Repetition Test which contains a simplified version of the score sheet and asked to provide feedback on ease of use as well as sufficiency of results for decision-making. On the positive side, the test itself is quick to administer, and even with detailed scoring the total administration plus scoring time takes no longer than two hours, considerably less than the time required for administration and scoring of many other sign language assessments.

5. Conclusion

In this paper, we adapted a concept to structure language testing more effectively as a framework for the development and/or use of a test to assess deaf children's nonsense sign repetition skills in BSL. The *AUA* shows potential for use in a sign bilingual (education) context in that it can inform practitioners on decisions regarding the type of intervention most suitable for deaf students with limited phonology and PWM skills in BSL while, at the same time, offering a transparent framework for researchers developing sign language assessments. By fostering a close collaboration between test-developers and test-users, the *AUA* offers an approach to sign language assessment which may help to more efficiently detect and address some of the challenges that deaf children experience as a result of delayed access to language.

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Notes

1. Our use of deaf with a lowercase (d) includes children with a hearing loss as well as members of the community that use BSL.
2. Throughout this paper, we are referring to Swanwick and Gregory (2007) who define sign bilingualism as an: 'approach to the education of deaf children which includes sign language as means of instruction and communication' (9).
3. In the context of this paper, we make a distinction between test-users and test-takers. The first group includes test administrators and practitioners, the second group includes test participants.

4. Our purpose of using nonsense signs is that the child has never encountered these forms before. As a result, the task taps into the child's productive phonology and PWM, unconfounded by stored lexical knowledge.
5. For example, to generate lists for assessment of vocabulary in BSL, practitioners may adapt selected items from well-established tests, including the *Peabody Picture Vocabulary Test (PPVT4FA;* Dunn and Dunn 2007) or the *Expressive One Word Picture Vocabulary Test (EOWPVT-2000;* Brownell 2000).
6. We use the term deaf native signer to refer to a deaf individual with deaf parents, who has acquired sign language from birth.
7. We present the *AUA* in a slightly more lay and less technical form to make it more suitable for a wider practitioner audience. Those readers interested in more specific details are referred to Bachman (2005).
8. We follow the convention of naming handshapes after the letters they represent in the American Sign Language manual alphabet or the numbers they represent in the counting system.
9. This test assesses the comprehension of selected aspects of BSL morphology and syntax (e.g. negation, number and distribution, verb morphology, and the distinction between nouns and verbs) in a picture-pointing paradigm.
10. Bachman points out that there may always be the possibility, at least in theory, that adding one more assessment will provide more complete information about the ability of interest (Bachman 2005, 19). This is even more so the case with regard to the assessment of sign language skills in deaf children about which we still have a fairly limited understanding.

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