Evidence from the Wider Use of the BSL Receptive Skills Test

Authors: **Ros Herman & Penny Roy**

Affiliation: **City University**

Address: **Department of Language & Communication Science**

City University

Northampton Square

London EC1V OHB

Email: **r.c.herman@city.ac.uk**

Evidence from the Wider Use of the BSL Receptive Skills Test

Abstract

Following the development and standardisation of the British Sign Language Receptive Skills Test (Herman, Holmes & Woll, 1999), the test was made widely available to professionals working with deaf children. Test users were asked to return completed score-sheets on individual children they had tested in order to compare a selection of children from the wider population of deaf children with those from the sample upon whom the test was standardised. The analysis of almost 200 score sheets is presented.

Overall, children from the wider population achieved lower standard scores than those from the standardisation sample, with the exception of native signers, whose scores were equivalent to the native signers' scores in the original sample. The findings raise important questions about the adequacy of BSL provision for deaf children in hearing families.

Data on tester ratings and children's reading scores provide an opportunity for a preliminary investigation of the psychometric properties of the test. Finally, tester feedback on the test itself, the training offered and the overall contribution of the test to assessing deaf children's BSL development are reviewed.

Key words: deaf, sign language, assessment, standardisation

Introduction

The need to assess British Sign Language (BSL) development is increasingly recognised in schools and services, but until recently, approaches to BSL assessment in the UK have been individual to specific schools and services and have generally failed to refer to norms of development (Herman, 1998a). The publication of the BSL Receptive Skills Test , a norm referenced/ standardised test (Herman, Holmes and Woll, 1999) has enabled a more consistent approach to be adopted and stimulated much discussion in the UK and other countries in the area of sign language assessment (Haug and Hintermair, 2003; Johnston 2004; Schembri, Wigglesworth, Johnston, Leigh, Adam and Barker, 2002; Schönström, Simper-Allen and Svartholm, 2003; Surian and Tedoldi, 2005). Indeed Johnston (2004), in a study using an adaptation of the BSL Receptive Skills Test to Australian Sign Language (Auslan), raises many questions about the development and use of the UK test that this paper seeks to address, e.g. the proficiency levels of native signers; the achievements of deaf children on bilingual educational programmes; the relationship between test scores and teachers' ratings of pupils sign language levels, etc.

The BSL Receptive Skills Test assesses comprehension of morphosyntax in BSL in children aged 3-11 years. Administration of the test is preceded by a vocabulary pre-check to ensure familiarity with the test vocabulary. Forty test sentences are presented on video and a picture pointing response is required. Sentences are ordered in terms of difficulty and raw scores may be converted to standard scores with a mean of 100 and standard deviation of 15 for each age group, based on the results obtained by the standardisation sample.

The test was initially developed on deaf and hearing children in deaf families who were acquiring BSL from birth (native signers). The test was standardised on a small sample of 135 children that included a majority of native signers and in addition, deaf children in hearing families who were carefully selected in terms of their exposure to BSL. All of the latter had been exposed to BSL before the age of 5 years, after which age mastery of a sign language is unlikely to be achieved (Mayberry 1994). Some of this group had attended well established bilingual (BSL/English) educational programmes, where the overriding aim is achievement of a mother tongue in BSL, upon which basis the acquisition of English may then proceed. As such, children had received extensive input in BSL from the point of diagnosis and through their schooling from large numbers of fluent signers. The remainder of the children were from Total Communication (TC) educational programmes. TC is a philosophy that invokes the use of all available channels of communication such as gesture, signing, lipreading and the written word to achieve spoken language. Children from these programmes had been selected by their teachers as being good signers who, despite the schools' TC philosophy, used BSL as their preferred means of communication. Many of this group had deaf siblings or extended family members who were deaf, meaning that BSL input was available to them from outside the school programme (see Herman et al. 1999 for a fuller description of the sample details).

Although 135 is a small number of children to use for test standardisation, it was felt that this figure represented a sizeable proportion of the available population of deaf children in optimal sign language learning environments. The inclusion of children from hearing families was necessary in order to augment the sample to a reasonable size. In addition, it was felt important to include some children who were non-natives, since the test would in future be used predominately with such groups.

However, the wider population of deaf children includes many who are in less ideal situations for acquiring BSL, and this may be for a number of reasons. For example, until the recent introduction of newborn hearing screening in the UK, identification of hearing loss typically occurred at around the age of 2 years. As a result of this, the implementation of intervention (including exposure to BSL, where offered) was delayed, with implications for language development in BSL. Additionally, differences in educational philosophy have consequences for the quantity and quality of BSL provided in different areas of the UK. Bilingual educational programmes are likely to have larger numbers of deaf staff who are fluent BSL users, compared with Total Communication programmes where English, albeit presented in different modalities, remains the goal. Children who use BSL and are mainstreamed may have contact with a communication support worker who signs, but will have far less access to a signing peer group and therefore opportunities to communicate in BSL are restricted. Despite differences in educational philosophy, children from each type of school programme emerge as BSL users, many with BSL as their preferred means of communication.

It was of interest to know how results obtained from the children included in the original standardisation sample would compare with those taken from the wider population of deaf children with whom the test is being used. For this reason, following publication of the test, test users were invited to return completed score-sheets on children they had tested, along with background information on each case. Comparisons of the new data set (sample 2) with the original standardisation sample (sample 1) are reported below and provide an indication of the adequacy of educational provision in the UK in terms of developing BSL skills.

At the time of test development, measures were taken of test reliability (inter-scorer, intra-scorer and test-retest reliability). However, in the absence of other tests of BSL

development, it was not possible to find out about test validity. In the first year following publication of the BSL Receptive Skills Test, test purchasers were offered free training courses in its use. During these courses, feedback was sought on the format of the test, the adequacy of the training provided and the overall contribution of the test to assessing deaf children's BSL development. A selection of participants was invited to contribute their views on how test results compared with independent views on children's BSL development. One participant offered to provide reading test scores for comparison with children's BSL Receptive Skills Test scores. This data allowed us a preliminary investigation of the validity of the BSL Receptive Skills Test.

Methodology

This paper presents the analysis of new data (Sample 2) collected from a range of professionals using the BSL Receptive Skills Test and makes comparisons with subjects included in the standardisation phase (Sample 1). The new data also provides an opportunity to investigate the validity of the BSL Receptive Skills Test, through comparisons of independent tester ratings and BSL test scores and reading test and BSL test scores.

Subjects in Sample 2

A total of 196 score-sheets (representing 187 subjects) were returned. These were all children who were BSL users who were being supported in mainstream schools, units or special schools It emerged that three children had previously been tested in the standardisation phase of test development, therefore their data were considered to be re-test data based on the original sample rather than new data and were consequently taken out.

Data from nine new subjects included a set of re-test data; the latter were not included to avoid introducing a bias in the sample.

There was only one hearing child in the sample. He was from a hearing family and had been placed in a school for the deaf because of an auditory processing disorder affecting spoken language development. Because this child did not fit into any of the previously established groups for analysis, his data were also taken out. Two further subjects could not co-operate with the video presentation of the test and so test sentences were presented live. As this violates the recommended standardised mode of presentation, data from these subjects were excluded from further analysis.

Following the exclusions described above, the present study considers new data submitted on 181 deaf children by 18 different testers based in England and Wales. Testers were deaf and hearing professionals: deaf instructors, speech and language therapists, teachers of the deaf, psychologists and researchers. Tester skill and knowledge of BSL are unknown. Children were tested individually in schools, nurseries or at home. All children completed the video-based BSL Receptive Skills Test, including the vocabulary check and testers followed the procedure described in the test manual.

There were 89 girls and 92 boys ranging in age from 40 to 177 months (mean age 102.97 months). Children at the younger end of the age range were under-represented, only 9 (5%) being under 5 years of age. Data were also sent in on 5 children (3%) over the age of 12 years, which is beyond the recommended age range of the test.

Of the total, 35 children came from deaf families, 113 came from hearing families and information was unavailable about family hearing status on the remaining 33 children. The children attended a range of bilingual and total communication educational programmes throughout the UK. This information was not used for further analyses because at the time that this data was being collected, many educational programmes were moving from total communication to bilingual. In practice, this meant that children being assessed in what was described as a bilingual programme had in fact received most of their education until relatively recently in a total communication programme. As a result, any analysis would not be meaningful in terms of making comparisons between educational programmes.

Testers had been asked to provide information on children's overall levels of development (excluding language), in the form of psychological assessment results or subjective opinions. Such information was returned on 119 (66%) of the sample. Of this number, 63 (53%) were rated as having non-verbal abilities within the normal range, 31 (26%) were rated as below average and 25 (21%) were reported to be performing at an above average level.

Many of the children rated as 'below average' were had accompanying objective psychological test results that supported the ratings, suggesting the latter to be reasonably accurate in separating low achievers from the remainder of the sample. The numbers of children rated as performing above average non-verbally seemed to be unusually high, and neither data from these children, nor from those rated as average, included objective test data to support the rating. It was therefore felt that some of these ratings may not be particularly reliable in discriminating between average and above average subjects.

Additional information was provided on some of the children. Data on age when BSL signs were first used were available for 34 subjects (19%), 5 from deaf and 29 from hearing families. Eight children had received cochlear implants. Eighteen (10%) were identified as having special needs in addition to deafness (see Table 1).

Insert Table 1 here

One tester provided information on 11 of the children's reading ages using the Edinburgh Reading Test (2002). Three testers sent in their own subjective ratings on 19 children's BSL comprehension based on their experience and knowledge of the child before administering the BSL Receptive Skills Test. These data were used to investigate test validity.

Table 2 provides a summary of subject details for both samples to facilitate comparisons between groups. The observed similarities and differences are explored further in the Discussion section below.

Insert Table 2 here

Results

Investigation of Systematic Bias between Samples

Before making statistical comparisons across the two sets of test scores, the samples were compared for child gender, parental hearing status, ratings of non-verbal abilities and age group to investigate systematic bias. A series of chi-square analyses were performed using Fischer's Exact Test to investigate sample differences (see Table 3). Analysis revealed

highly significant differences for all variables except for child gender, highlighting important differences between the samples.

Insert Table 3 here

The analyses reported below used standard scores to compare samples as these control for age differences. This effectively excluded children in the new sample whose raw scores could not be converted to standard scores, either because scores were too low and off the standardisation table, or because the children were too old to be able to convert scores using the standardisation table. Children with low non-verbal ratings were also excluded from these analyses, as to have included their scores would have lowered scores in the new data set, unfairly biasing the sample. As a result of these exclusions, the final sample size of sample 2 was 162.

Age when BSL Signs First Produced

Mean age when BSL signs were first produced was compared between samples using a one-way Anova. Children from Sample 1 showed a highly significant advantage ($p<0.001$), with a mean age for production of first BSL signs of 19.53 months, compared with 37.95 months for children in Sample 2. In addition, in a trend approaching significance, younger children in Sample 2 were reported to use their first BSL signs earlier than older children.

BSL Receptive Skills Test Scores of Children according to Age

Mean test raw scores for each sample according to age group and are presented in Table 4. These figures show that for both groups, there is a progressive increase in scores with age. Raw scores for Sample 2 are notably lower than those for Sample 1, especially among the

younger age groups. There was also far more variability within all age groups for Sample 2 than was found in the original sample.

Insert Table 4 here

Mean test standard scores were compared between the two samples. The difference was statistically highly significant (p=0.04), with children from Sample 1 (mean score = 100.17) outperforming children in Sample 2 (mean scores = 90.46) – see Figure 1.

Insert Figure 1 here

Mean standard scores for Sample 2 are presented in Table 5. This indicates the distribution of standard scores by age group and show that some age groups, particularly 6-7 year olds, achieved lower standard scores than other age groups.

Insert Table 5 here

BSL Receptive Skills Test Scores according to Parental Hearing Status

A one-way Anova was used to investigate differences in BSL Receptive Skills Test standard scores of children from deaf and hearing families in Sample 2. The overall effect was highly significant ($p<0.001$), with children from deaf families achieving higher standard scores overall than children from hearing families – see Figure 2. This finding replicates that of the original standardisation sample.

Insert Figure 2 here

The same analysis was carried out across the two samples. Again, a significant overall effect was observed (p=0.01), with children from deaf families achieving the higher scores in both samples. However, it should be noted that the scores of deaf children from hearing families were significantly lower in Sample 2 than in Sample 1.

BSL Receptive Skills Test Scores according to Gender

BSL Receptive Skills Test standard scores of boys and girls were compared in Sample 2. The results are statistically significant (p=0.01), with girls (mean = 103) outperforming boys (mean = 92). In the standardisation sample, the observed trend failed to achieve statistical significance.

When this analysis was performed across the two samples, a highly significant overall effect was observed (p<0.001) girls achieving significantly higher test scores than boys overall.

Test validity

Correlation of BSL Receptive Skills Test Scores with Reading Scores in Sample 2

Edinburgh Reading Test scores (reading age in months) for 11 children from one school were correlated with their BSL Receptive Skills Test standard scores as a measure of the concurrent validity of the BSL test. A significant positive correlation was observed to exist between the two scores (r=0.70, p=0.02).

Comparison of BSL Receptive Skills Test Scores with Tester Ratings of Children's BSL

BSL Receptive Skills Test standard scores were correlated with tester ratings of 19 children's BSL comprehension based on their experience and knowledge of the child before

administering the BSL test. The result was highly significant ($p<0.001$), with test standard scores corresponding to higher BSL ratings. These correlations are indications of the construct validity of the BSL Receptive Skills Test.

Discussion

Native vs non-native signers

In reviewing the similarities and differences between the two data sets, a major significant observation is in the numbers of children coming from deaf and hearing families. In Sample 1, children from deaf families accounted for over half of the data set and included some hearing children. Analyses revealed no differences between deaf and hearing native signers. In Sample 2, less than a quarter of the sample came from deaf families and no hearing children were included. As mentioned previously, deaf and hearing children in deaf families were specifically selected during the development and standardisation phases of test development because of their earlier and more consistent experiences of BSL. However, their rarity in the wider deaf population (especially deaf children in deaf families) is reflected in their low numbers in Sample 2.

Johnston (2004), using the PARST (an adaptation of the BSL test to Auslan), finds similar results, i.e. natives outperforming non-natives. However, his native subjects achieved higher scores than did the UK sample. This raises concerns about the use of an adapted test relying on standardised scores derived from a different (albeit related) sign language.

Johnston (ibid) also reports on the test performance of a small number of hearing non-native signers. In his study, hearing signers who had been exposed to Auslan as part of a bilingual programme achieved PARST test scores that were equivalent to those of native signers and

better than those of deaf non-natives on the bilingual programme. In the present study, we have no equivalent group for comparison, however one explanation for the higher performance of Johnston's hearing non-natives may be that they have the advantage of an established first language (English) prior to their acquisition of Auslan as a second language, whereas for the deaf non-native subjects, Auslan was most likely to be their first language.

The BSL Receptive Skills Test scores of children in deaf families in both samples show an advantage over children from hearing families. Deaf children in deaf families have repeatedly been shown in the literature to demonstrate advantages over deaf children from hearing families (Paul & Quigley 2000). The fact that the BSL test replicates such a robust effect provides support for its construct validity.

Educational programme

In the present study, no attempt was made to compare children's levels of BSL according to educational programme. This was because, in a period of change in the UK when many schools were adopting a bilingual philosophy, it was difficult to establish which type of programme children had been exposed to for the majority of their schooling. In our original sample, deaf children on bilingual programmes were drawn from only two different services in the UK: a residential school for the deaf and a service where all deaf children were mainstreamed. Children from these selected programmes were found to compare favourably with native signers. This is in contrast to Johnston's (2004) finding that deaf non-natives on bilingual programmes achieved lower PARST scores than native signers. This result may be due to factors specific to the bilingual programme selected – no information is provided about programme delivery - or to characteristics of the deaf children, on whom again only limited

background information is provided. Factors such as how long the programme had run for, numbers of native signing adults, etc. may help us to better understand Johnston's findings.

Overall, the children in Sample 2 were older than those in Sample 1 sample. This is most likely related to fact that a minority of children in Sample 2 were from deaf families. Among deaf families, identification of deafness and choice of communication approach are likely to be determined at an earlier age. As a result of this, children in deaf families may be expected to be more advanced in their language acquisition than children in hearing families and therefore more readily testable on a formal language measure at a younger age. To control for this factor, comparisons between the data sets used standard scores only.

Considering the data on age when BSL signs were first produced, and with the caveat that this data is incomplete, the findings are as would be predicted: children from Sample 1 produced their first BSL signs earlier than children in Sample 2. This can also be accounted for by the differing distributions of children in deaf families between the samples. More of the data in Sample 1 came from children from deaf families who would have been exposed to BSL from birth, with BSL playing a large part in home life. Children from hearing families would only have received input in BSL after identification of deafness, and quantity and quality of BSL input would be less consistent.

A further interesting finding in the data from Sample 2 on BSL acquisition was the encouraging trend for younger children to use their first BSL signs at an earlier age than older children. This may be related to the fact that many schools in the UK have moved towards bilingual programmes, with the accompanying emphasis of introducing BSL to children at an

earlier age. This change would be expected to show greater benefits among the younger age groups in future in terms of their BSL development.

A quarter of the children in Sample 2 were described as having lower than average non-verbal abilities and a number were reported to have additional difficulties which may have affected their learning. Such children were not represented at all in Sample 1 because of the selection process. These figures are a reminder of the sizeable proportion of deaf children in the deaf population at large who have additional needs (up to 40%, according to Holden-Pitt and Diaz, 1998). Only scores obtained from children with low non-verbal abilities were excluded from the conducted statistical analyses in order to facilitate comparisons between the two samples.

Children in Sample 2 achieved BSL Receptive Skills Test raw scores which, although lower than those of children in Sample 1, still increased with age. However, there was also far more variability within age groups in Sample 2 than was found in Sample 1 (see Table 3). This was as expected in view of the careful selection criteria adopted for the standardisation phase, whereby children were expected to be following a more predictable pattern of language development approximating the norm for native signers of average ability. The wider degree of variability in the new sample would suggest that some children may not be following the same pattern. This could be caused by differing quantity, quality and age of exposure to BSL at home and at school. Furthermore, some of the additional difficulties presented in Table 1, especially attention and behavioural problems, will have contributed to the observed variability in Sample 2 scores.

Girls in Sample 2 achieved significantly higher scores overall than boys. A similar trend had been noted in Sample 1, however this difference failed to achieve statistical significance. When the data sets were combined, the overall effect of gender was found to be significant. This finding is in line with previous research which has repeatedly shown girls to outperform boys on verbal measures (Bornstein, Haynes, Painter and Genevro, 2000).

Comparing BSL Receptive Skills Test scores across the two samples, Sample 1 significantly outperformed Sample 2. This was as expected because the latter group drew from the wider population of deaf children, whereas the former was a carefully selected sample of children acquiring BSL under optimal circumstances. However, the differences were particularly marked when comparing children from hearing families across the samples. In Sample 1 (Herman et al. 1999), a number of the children from hearing families achieved scores comparable to those of children in deaf families. This was explained by the fact that one subgroup were attending bilingual programmes that had been running for many years with large numbers of deaf staff providing high quality input in BSL and good role models for the children. This group included children with spoken languages other than English at home (Herman, 2002). The high scorers on Total Communication programmes benefited from contact with other deaf family members (either siblings or members of the extended family who were deaf), creating a community of BSL users outside school to supplement the children's more limited exposure to BSL in school.

The markedly lower scores of children in hearing families in Sample 2 has implications for the educational services involved in the current study. Where schools are aiming for age-appropriate levels of BSL development among deaf children, this appears not to be achieved unless children come from deaf families where BSL is used at home. Future studies should

repeat these analyses, to investigate whether the gap between children in deaf and hearing families narrows with time as new bilingual programmes become better established and diagnosis of deafness occurs at birth.

The new data provided opportunities to begin to investigate the concurrent and construct validity of the BSL Receptive Skills Test which, at the time of publication, was not possible. The first of these was a correlation between BSL test scores with reading test scores from a small number of children from one school. A highly significant positive correlation emerged, providing encouraging evidence of the validity of the BSL test. The relationship between measures of sign language and reading in particular supports research findings on ASL (Chamberlain, Morford and Mayberry, 2000). However, this result requires replication on larger numbers of children before firm conclusions can be drawn.

As a further measure of the validity of the BSL Receptive Skills Test, and in the absence of any other objective measures of BSL, three testers experienced in working with deaf children were asked to provide their own independent ratings of children's BSL comprehension prior to administering the test. Ratings of below average, average and above average were found to reliably distinguish BSL test scores, providing support for the construct validity of the BSL test. This finding is in direct contradiction to that of Johnston (2004) who used an adaptation of the BSL Receptive Skills Test to Auslan. Johnston found that children's test scores did not match teachers' impressions of their everyday communication. Such a difference in findings is cause for concern, raising questions about the validity of the adapted test.

Finally, we report the feedback from testers. Overall, very favourable comments were made concerning the value of the BSL Receptive Skills Test. These included the feeling that it

represented an important step forward to have a national assessment of BSL; that it raised the status of BSL among parties who were sceptical of using BSL in schools; that parents in particular found their children's BSL test results encouraging, especially as the majority had only ever previously experienced disappointment at achievements on English language tests; and finally that many children with depressed cognitive abilities were still able to comply with test requirements. Negative feedback referred principally to the limited representation of ethnic minorities in the test illustrations.

From the training days on use of the test, a number of issues arose. Firstly, it was apparent that very few deaf staff whose job it was to assess BSL development had been provided with adequate training in language assessment. This was noted in the survey carried out at the start of the project to develop assessment materials for BSL (Herman 1998a); several years later, it appears that little has changed. Secondly, even when written documentation and training in use of the test were provided, it was apparent from the returned score-sheets that mistakes still occur, e.g. including results of practice items in the raw score; inaccurate scoring of items with multiple repetitions during testing; continuing testing beyond the discontinue rules. Such inconsistencies clearly affect the scores awarded to children and upon which decisions are made. They also highlight the need for training in test use and the value of a careful follow-up on the test once it has been released.

Feedback from participants has also indicated that training days provide unique opportunities for professionals to share experiences related to BSL assessment and to set up support networks.

Conclusions

Analyses of new data collected on the BSL Receptive Skills test provide an additional perspective on this particular assessment tool and also on the wider population of deaf children who are BSL users. Deaf children upon whom the test is being used include numbers with additional disabilities and children who are older than the intended age range. The latter is no doubt due to the lack of tests designed specifically for older children, and may also be because of the significant language delays experienced by many older deaf children.

The children in the new data set achieved generally lower scores than children in the original standardisation sample, with the exception of children in deaf families. Our results suggest that deaf children in hearing families are less likely to achieve age-appropriate language skills in BSL than children in deaf families at the present time. The suggested reasons for this include late diagnosis of deafness, late exposure to BSL and restricted access to good language models at home and at school.

The new data has provided an opportunity to begin an investigation of the validity of the BSL test. The fact that children in deaf families from both samples achieved the highest test scores provides evidence for the construct validity of the test. Preliminary investigations of the relationships between test results and tester ratings and test results and reading test scores are promising, but need to be replicated on larger samples.

References

Bornstein MH, Haynes M, Painter KM and Genevro JL. Child Language with Mother and with Stranger at Home and in the Laboratory: A Methodological Study. Journal of Child Language 2000: 27, 407-420.

Chamberlain C, Morford JP and Mayberry RI (eds) Language Acquisition by Eye. Mahwah, NJ: Lawrence Erlbaum, 2000.

Edinburgh Reading Test. Godfrey Thompson Unit, Edinburgh University.Hodder and Stoughton, 2002.

Haug T and Hintermair M. Surveying the Need for Sign Language Tests for Hearing-impaired Children. Das Zeichen, 2003: 64, 220-229.

Herman R. The Need for an Assessment of Deaf Children's Signing Skills. Deafness & Education 1998a: 22 (4), 3-8.

Herman R, Holmes S and Woll B. Assessing British Sign Language Development: Receptive Skills Test. England: Forest Books, 1999.

Herman R. The Assessment of British Sign Language Development. Doctoral Dissertation, City University, London, 2002.

Holden-Pitt, L and Diaz, JA. Thirty years of the annual survey of deaf and hard of hearing children and youth: a glance over the decades. American Annals of the Deaf, 1998: 143(2), 72-76.

Johnston T (2004) The Assessment and Achievement of Proficiency in a native Sign Language within a Sign Bilingual Program: The Pilot Auslan Receptive Skills Test. Deafness & Education International, 6(2), 57-80.

Mayberry, RL. First-language acquisition after childhood differs from second-language acquisition: the case of American Sign Language. Journal of Speech and Hearing Research, 1993, 36(6), 1258-70.

Paul PV and Quigley SP. 3nd Edition. Language & Deafness. San Diego, California: Singular Publishing Group Inc., 2000.

Schembri A, Wigglesworth G, Johnston T, Leigh G, Adam R, and Roz Barker. Issues in Development of the Test Battery for Australian Sign Language Morphology and Syntax Journal of Deaf Studies and Deaf Education, 2002: 7: 18 - 40.

Schönström K, Simper-Allen P and Svartholm K. Assessment of Signing Skills in School-aged Deaf Students in Sweden. European Days of Deaf Education, 2003: 88-95.

Surian L and Tedoldi M. Adaptation of BSL Receptive Skills Test to Italian Sign Language (LIS). Unpublished manuscript, University of Trieste, Department of Psychology, 2005.

Table 1: Numbers of Children with Additional Special Needs in Sample 2

Type of special need	Number of children
Behavioural and/or attention problems	8
Cerebral palsy	5
Ushers	2
Charge syndrome	1
Dyslexia	1
Microcephaly with physical difficulties	1
Total	18 (10%)

Table 2: Comparison of Standardisation and New Data Sets

Variable	**Standardisation Data Set (n=135)**	**New Data Set (n=181)**
Child age (months)	90.22 (SD 28.34)	102.97 SD (28.66)
Child gender	74 girls (55%) 61 boys (45%)	89 girls (49%) 92 boys (51%)
Parental hearing status:		
Deaf	78 (58%)	35 (19%)
Hearing	57 (42%)	113 (63%)
Missing data	0	33 (18%)
Non-verbal ratings:		
1 Low	0	31 (17%)
2 Average	135 (100%)	63 (35%)
3 High	0	25 (14%)
Missing data	0	62 (34%)
Additional special needs	0	18 (10%)
Age (months) when first BSL signs produced*	19.53 (SD 13.28)	37.59 (SD 15.50)
Mean BSL Receptive Skills Test standard scores	100.17 (SD 15.21)	90.46 (SD 18.54)

**Note: information available for 57% of the standardisation sample and 19% of the new data set*

Table 3: Chi Square Analyses to investigate Systematic Bias between Samples

	Child gender	**Parental hearing status**	**Ratings of non-verbal abilities**	**Age group**
Differences between standardisation and new sample	no p=0.36	yes p<0.001**	yes p<0.001**	yes p=0.001**

Table 4: Comparison of Mean BSL Receptive Skills Test Raw Scores between Samples according to Age Group

		Standardisation Sample			New Data Set		
Group	**Age range**	**Nos. subjects**	**Mean raw scores**	**Standard deviation**	**Nos. subjects**	**Mean raw scores**	**Standard deviation**
1	3;00-3;11	10	10.88	5.96	1	5	*
2	4;00-4;11	15	16.20	5.48	8	9.89	7.95
3	5;00-5;11	17	23.00	5.51	19	15.37	9.32
4	6;00-7;11	32	25.06	4.88	49	19.47	6.46
5	8;00-9;11	32	29.47	4.29	44	26.43	5.86
6	10;00-11;11	29	32.00	2.65	60	29.02	6.16

Table 5: Mean BSL Receptive Skills Test Standard Scores according to Age Group in Sample 2

Group	Age range	Number of subjects	Mean standard scores	Standard deviation
1	3;00-3;11	1	84.00	*
2	4;00-4;11	6	91.83	17.68
3	5;00-5;11	15	89.13	18.53
4	6;00-7;11	44	86.52	15.64
5	8;00-9;11	43	92.49	17.51
6	10+	53	92.43	21.67
		Total = 162	**Sample mean = 90.46**	**Mean SD =18.54**

** could not be calculated - only one child in age group*

Figure 1: Comparison of Mean BSL Receptive Skills Test Standard Scores in Standardisation and New Sample

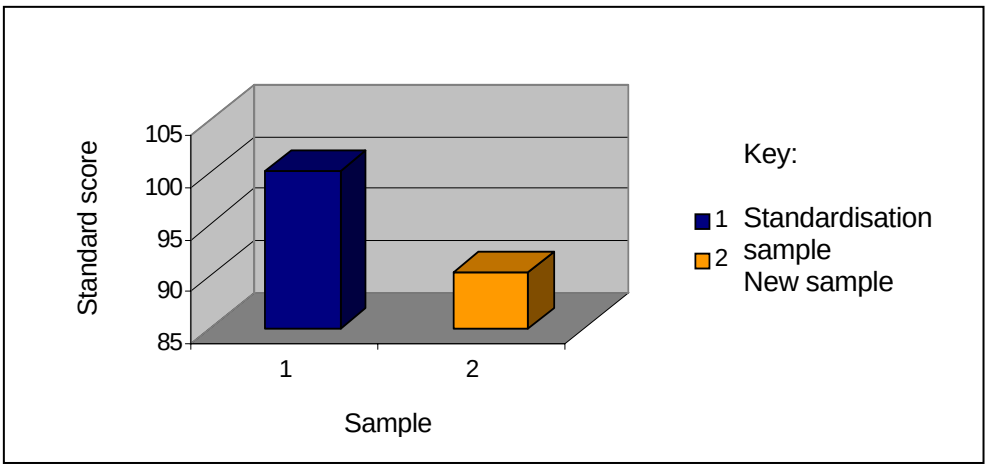

Figure 2: Mean BSL Receptive Skills Test Standard Scores of Children from Deaf and Hearing Families in Sample 2