

The Phonological Skills Test for British Sign Language (PST-BSL)

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1 Introduction

Why assess sign language skills?

Sign languages are increasingly used in bilingual education programmes with deaf children. As a result, it is necessary to monitor and document the success of these programmes, as well as to appropriately measure the progress made by children in acquiring sign language. At the same time, tests of sign language development are important in helping practitioners to identify children with language difficulties.

Currently, there is a lack of standardized assessments for sign language. There are two notable exceptions: the BSL Receptive Skills Test (Herman, Holmes, & Woll, 1999) and the BSL Productive Skills Test (Herman, Holmes, Woll, & Morgan, 2004). The Phonological Skills Test (PST) complements those two tests. It represents the first standardized test of sign language phonology, based on British Sign Language (BSL) development of deaf children with early exposure to BSL. The PST can be used in combination with the BSL Receptive Skills Test and the BSL Productive Skills Test, thereby enabling the tester to compare deaf children's progress across different areas of language.

What is the test for?

The test measures phonological skills in BSL and is suitable for use with children from 3-11 years of age who are learning BSL. It may also be used with older children whose BSL skills are felt to be below average, however standard scores should be interpreted with caution.

Who can use the test?

Any professional who is experienced in working with deaf children can use the test. It is not necessary to be a fluent BSL user to administer the PST, as test instructions in BSL are provided in the test package. However, a minimum level of CACDP Stage II is recommended:

- to use the PST with very young children
- where video presentation of the NSRT has to be abandoned in favor of a live presentation

Who developed the test?

The PST was developed by three individuals:

Wolfgang Mann, a sign linguist at City University London & the Deafness Cognition and Language Research Centre (DCAL), who is also an experienced language test developer.

Chloe Marshall, Lecturer in Developmental Psychology and Language Acquisition at City University.

Gary Morgan, Reader in Developmental Psychology at City University and Co-director of DCAL.

Which children took part in developing and standardizing the test?

Given the small population size of deaf children from deaf families, the PST was developed and piloted using deaf children from deaf and hearing families who were

either native BSL users or who had been exposed to BSL from an early age in established bilingual BSL/Educational programmes and/or Total Communication educational programmes.

2 Contents of the test package

The test-package includes the following items (see Figure1):

- PST Test item videos
- PST Test item time codes
- PST instruction + practice items
- Test software (Video Jukebox)
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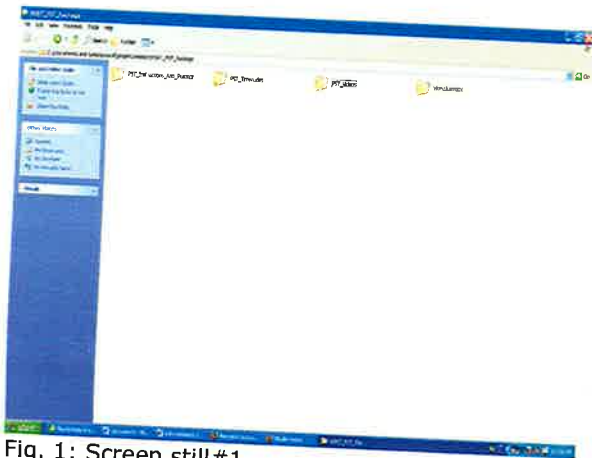


Fig. 1: Screen still#1

There are two versions of the test (A, B) both of which contain similar items to be used alternately with children (see Fig. 2).

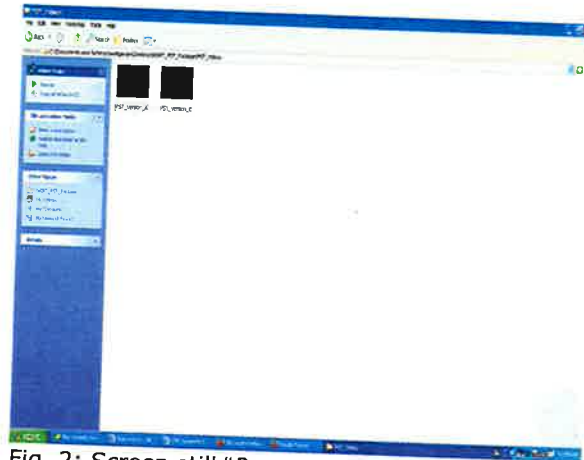


Fig. 2: Screen still#2

An introduction and instructions how the test works are presented in BSL as part of the test package (see Figure 3).

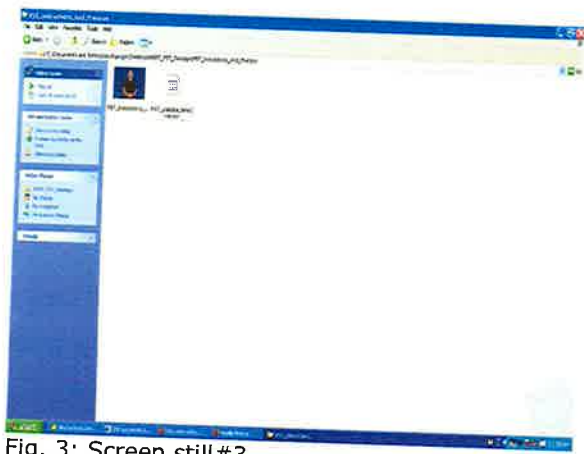


Fig. 3: Screen still#3

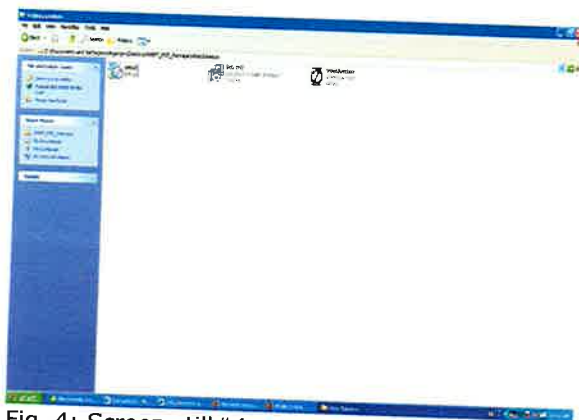


Fig. 4: Screen still#4

As a first step, the test software needs to be installed on the computer where the test will be administered on. (see Fig.4) As part of this process, additional software needs to be downloaded from the internet.

3 The Phonological Skills Task

The PST focuses on phonological development in BSL. Development of the test items was based on available research on the use of Non Word Repetition Tasks with hearing children, which has shown the importance of phonological skills for successful development of wider language skills. In addition, low performance on these tasks by hearing children has been found to be an indicator of possible language difficulties, including SLI and dyslexia. Based on the strong empirical evidence for the use of Non Word Repetition Tasks to measure children's phonological skills, this approach has been adapted for BSL.

The PST has a video presentation format. The child watches a video of a deaf adult who introduces the test and provides the test instructions in BSL. This is followed by 3 practice items. The test consists of 40 test items which assess children's ability to produce selected aspects of phonology in BSL.

The child responds by repeating each target sign as soon as the screen turns dark. For each response, the child either gets a '0' (false) or '1' (correct). The child's score is converted to a standard score using the standardization table shown on page 17. The standard score indicates the child's level of BSL phonology compared with the average score of children from the standardization sample in the same age group.

4 Description of linguistic features of BSL included in the PST

To create different levels of phonological complexity for the PST items, the following two phonological parameters in BSL were manipulated: hand shape and movement (see table 1).

		Handshape	
		simple (unmarked)	complex (marked)
Movement	simple (1 movt)	5 hand- internal 5 path movement	5 hand- internal 5 path movement
	complex (2 movts)	10 hand- internal + path movement	10 hand- internal + path movement

Table 1: Levels of complexity for phonological parameters

Complexity of hand shape:

Simple = marked

Complex = unmarked

Complexity of movement:

Simple = one movement (internal movement or path movement)

Complex = two movements (internal movement plus path movement)

5 Test development

5.1 The pilot study

The pilot version of the PST contained 48 items and was piloted on 15 deaf children aged 4 to 10 years old from deaf and hearing families (Marshall, Denmark & Morgan, 2006). There were 5 girls and 10 boys. Children previously diagnosed as having additional disabilities were excluded from the pilot sample.

Testing took place at a local bilingual school. A hearing researcher, who is a fluent BSL user, administered the test.

The aims of the pilot study were:

- to assess the suitability of the test items
- to make the test accessible to young children
- to conduct a preliminary analysis looking for broad age effects
- to establish the scoring criteria and devise a coding scheme
- to investigate test reliability based on inter-rater reliability

Levels of accuracy on the test ranged from 47% to 93%. There was a strong correlation with age: as children got older they repeated items more accurately. There was also an effect of phonological complexity: the most complex items were repeated least accurately. Path movement was repeated more accurately than hand

shape and internal movement. Inter-coder reliability was high, at 93% for hand shape, 97.5% for path movement and 93.75% for hand-internal movement.

5.2 The standardization study

Following the pilot study, a revised version of the PST containing 3 practice items and 40 test items was produced and administered to 99 children throughout England and Scotland for standardization. None of the children, who participated in the pilot, took part in the standardization study. Children previously diagnosed as having additional disabilities were excluded from the sample.

In addition to the PST, all children completed a timed bead threading task. The purpose of this task was to measure children's fine motor skills and to compare these scores with their performance on the PST. In addition, children's PST scores were also compared to their most recent scores on the BSL Receptive Skills Test as a measure of validity of the PST.

The results of 91 children (60 boys/31 girls) were included in any further analysis. For 6 participants, the test was aborted after the child missed more than 5 consecutive items. The two remaining children refused to take the test. All of these participants were in the youngest age group.

All testing took place either at the children's school or, in one case, at their home. Tests were administered by a hearing researcher with good BSL skills.

The aims of the standardization study were:

- to carry out the tests on large numbers of children in order to derive age norms (standardized scores) for the PST
- to compare test scores of children according to their exposure to BSL or lack thereof (via hearing control group)
- to further investigate the reliability of the test through use of alternate test forms
- to examine the relationship between deaf children's phonological skills and their wider language skills
- to examine the relationship between deaf children's phonological skills and their motor skills

5.3 Results: Standardisation of the PST

The age range was subdivided into six age groups for the standardization of the PST.

Group	Age range	Number of children	Mean test scores
1	3;00-3;11	3	11
2	4;00-4;11	10	34
3	5;00-5;11	13	34
4	6;00-7;11	20	41
5	8;00-9;11	17	58
6	10;00+	28	59

Table 2: Mean scores of children on PST

Despite the fairly small numbers, it was considered important to maintain yearly age intervals for the younger children (3 years to 5;11) as progress in language development in this period is particularly marked. For the older children (6 years to 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. In addition, as language development as measured by the test was starting to plateau among the older children, two-yearly groupings were more effective at discriminating scores between the older age groups. 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 (see standardized scores).

Results showed, as in the pilot test, that children made most errors on the most phonologically complex non-signs. There were more errors for hand shape and internal movement than there were for path movement.

5.3.1 Test reliability

In order to investigate test reliability, to alternate test version (A,B) were developed which contained similar items. Children were randomly assigned one version and their scores were compared. A high alternate forms coefficient (.635) was observed between the two test forms, indicating that the test reliability was satisfactory. In addition, Inter-rater agreement was high (85% for overall score, 88% for Hand shape, 87% for Path Movement, and 83% for Internal Movement).

5.3.2 Correlation of PST scores with BSL Receptive/Bead Threading Test scores

We investigated whether there was a relationship between children's scores on the PST and their scores obtained on the BSL Receptive Skills Test and the Bead Threading Task. Even when age was factored out of the analysis (because as children get older they are expected to get better at all tasks), there was a significant correlation between PST scores and BSL Receptive Skills Test scores, and between PST scores and Bead-Threading Task scores. This shows that phonological abilities are related to more general sign language abilities. The influence of motor skills on children's performance on the PST was particularly strong amongst younger children. For older children, the motor demands of the PST are less likely to be an issue.

6. Instructions for Test Administration

6.1 The Phonological Skills Test

6.1.1 Materials

Computer, test DVD, Non Sign Repetition Test score sheet

6.1.2 Aim

To see if the child understands phonological structure in BSL presented in the test.

6.1.3 Procedure

The PST takes between 15-20 minutes to administer, depending on age and ability of the individual child. The child watches the deaf adult signing on the computer

screen responds by repeating each sign as soon as the screen turns black. (Some children need to be reminded to wait for the screen to turn black before repeating a sign). After each set of 10 items, there is a short cartoon for the child to watch and relax.

6.1.4 Starting the test

It is important to carry out the test in an area where there are no distractions. Check that the child is comfortably seated and can easily see the screen. A seating position at table placed opposite the computer is ideal, with the screen at the child's eye level.

The tester should sit next to the child and observe the child carefully to ensure s/he is watching the test items and waits until the screen turns black before repeating each sign. It may be helpful for the tester to point to the computer screen in order to direct the child's attention to it and keep the child's attention on the screen until the test item has been completed.

6.1.5 Introduction to the test

An introduction to the PST along with instructions and 3 practice items are provided in a separate video. For some children, e.g., under the age of 5 years, testers with good BSL skills may find it easier to introduce and sign the instructions themselves. In these cases, it is important to stay as close to the pre-recorded instructions on the video and check the child has understood what is required. The main points to emphasise are:

- watch the person signing on the video carefully
- wait until the person finishes signing

- wait until the screen has gone black
- repeat the sign exactly the same way as done on the video
- not to worry if sometimes s/he can not remember the sign

6.1.6 Practice signs

Three practice signs are provided following the introduction and instructions. If the child fails any of these, the tester may provide feedback by saying 'no' and repeating the practice sign (either on the video or live). This is NOT allowed once you start the PST. During the practice signs it is also good to remind the child not to look away from the screen too soon, i.e., before the person has stopped signing, as this may lead to mistakes. If the child cannot cooperate or gets all the practice signs wrong (even with some help), do not continue with the test.

6.1.7 The main test

Check that the child is looking at the computer screen for each test item. If the child watches but seems unsure about what s/he has seen, do not repeat the test item. Tell the child to try repeating the sign as good as s/he remembers, it does not matter if s/he is wrong. Test items can be shown once only to keep the testing conditions constant for all participants.

6.1.8 Recording responses

To record the child's responses, the tester needs to complete the Phonological Skills Test score sheet (example!). After each test item there are three differently colored columns. Each color represents a

different phonological parameter: red represents 'hand shape', green represents 'path movement', and yellow represents 'hand internal movement'. Check off the item if the sign is repeated accurately. If the child makes an error, mark the column for the phonological parameter where the error occurs.

6.1.9 Providing feedback to the child

Do not write on the score sheet during the test whether test items are passes or fails. Many children get upset if they realize they are failing and may refuse to continue with the test. If the child wants to know what the tester is doing. Showing them what the tester is checking/marking certain columns should satisfy their curiosity without providing any feedback on how well they are doing.

If the child makes a mistake or asks if s/he is right or wrong, the tester should be careful not to let him/her know how well s/he is doing from facial expression. If the child seems anxious, the tester should offer reassurance that s/he is doing well and explain some parts of the test are more difficult than others.

6.2 Finishing testing before the end

If the child appears to be losing concentration, pause the test (shift+p) and the camera and allow a break before continuing (shift+p). Some children may not want to continue in which case the test should be completed within a week of starting. (Indicate cases where this happened clearly on the score sheet to be able to pick up from where the child left off.)

7. Scoring the test

7.1 Converting raw scores to standard scores

After finishing the test, go through the score sheet and count the number of fails for hand shape, path movement, and hand-internal movement. Next, count the number of fails for the total score (a fail is given for an item if the child made an error in any one, or more than one) category. Total the number of passes to obtain the child's raw score. This can be converted to a standard score using Table 3. To do this, identify the child's raw score in the left hand column. Locate the child's age group at the top of the table. The point of intersection reveals the child's standard score. On this test, the child's performance is his or her level of phonological skills in BSL. The norms were derived from children included in the standardization study. The average standard score in each age group is 100. However, scores between 70 and 130 are still within the normal range. Scores below 70 (-2 standard deviations) are indications of extremely poor performance, achieved by only the bottom few percent of the normal population.

PST RAW SCORE	3;00- 3;11	4;00- 4;11	5;00- 5;11	6;00- 7;11	8;00- 9;11	10;00- 11;11
40						
39						
38						131
37						129
36						127
35					133	125
34					130	122
33					128	120
32					125	118
31					122	116
30					119	114
29					116	112
28		135	139	126	113	109
27		133	136	124	110	107
26		130	133	122	107	105
25		128	131	120	105	103
24		125	128	117	102	101
23		123	125	115	99	98
22		120	123	113	96	96
21		118	120	110	93	94
20		115	117	108	90	92
19		113	114	106	87	90
18		111	112	103	84	87
17		108	109	101	82	85
16		106	106	99	79	83
15		103	104	97	76	81
14		101	101	94	73	79
13		98	98	92	70	77
12		96	96	90	67	74
11		93	93	87	64	72
10	118	91	90	85		70
9	115	88	88	83		68
8	111	86	85	80		66
7	108	83	82	78		63
6	105	81	79	76		61
5	102	78		73		59
4	99			71		57
3	95			69		
2	92					

Table 3: Standard scores

8. Interpreting the test scores

Standard scores indicate the child's performance in comparison to the norm for his or her age. Standard scores on different tests can be easily compared, e.g., the Phonological Skills Test and BSL Receptive Skills Test.

There are a number of reasons why a child may achieve a low standard score which must be considered when interpreting test scores:

8.1 Test environment

If the test environment contains distractions, e.g., other people walking in and out of the child's field of vision, the child is unlikely to produce his or her best performance.

8.2 Time of testing

If the child is tired or unwell or unwilling to carry out the test, this is likely to result in lower test scores.

8.3 Tester

An inexperienced tester may give clues (e.g., repeating (part of) the item for the child) which affect the child's performance on the test. Presenting test items live may affect the reliability of the test if the test format of test items is changed from that seen on the video. As a result, the child may achieve artificially higher scores because of these factors.

8.4 Age of first exposure to BSL

Many deaf children continue to be identified late and intervention cannot occur until after identification. Even

then, deaf children may not receive input in BSL until attempts at spoken language have failed, or until they meet other deaf children or adults. Complete mastery of BSL grammar is unlikely if a child is only exposed to BSL for the first time after the age of five.

8.5 Number of years of BSL input

The total number of years over which a child has been exposed to BSL will influence progress made in BSL development. For example, a 5-year-old child who has been only learning BSL for one or two years is unlikely to have age appropriate BSL skills.

8.6 Quality of exposure to BSL

Even when exposure to BSL occurs, the quality of BSL input may be poor. This is because most deaf children have parents and teachers who are not fluent in BSL. Deaf children often learn BSL from other deaf children who themselves have variable BSL skills.

8.7 Quantity of exposure to BSL

Hearing adults who sign rarely use BSL among themselves, so deaf children miss out on the opportunity to 'overhear' adult BSL, which is an important additional source of language input.

8.8 Additional difficulties

Some deaf children may have additional learning difficulties which will affect their language development. These may relate to generally slow development in all areas (including language), or to a more specific difficulty with learning language. A low PST score in the absence of other evidence does not mean that a child

has a learning difficulty. However, limited progress in BSL when good BSL input is provided may be an indication of additional learning difficulties. In such cases, further assessment by relevant professionals is recommended.



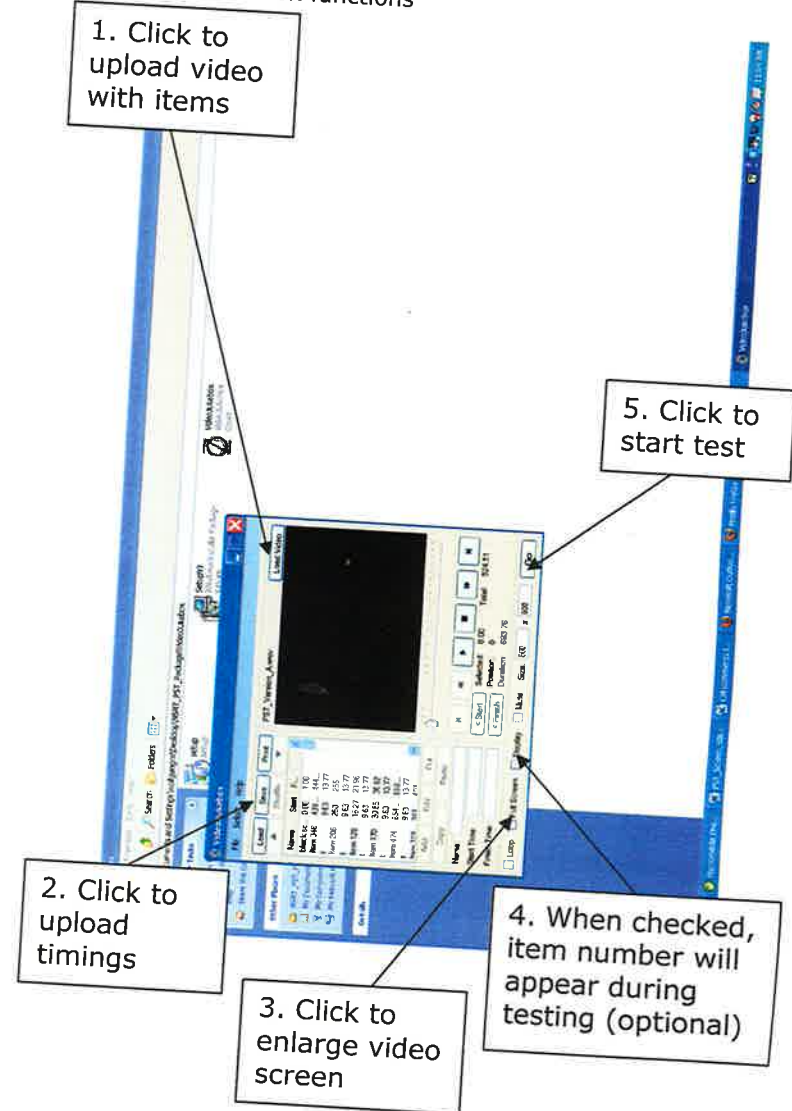
Appendix

A - How to load the videos/timings:

See Figure 5 how to operate Video Jukebox. To pause the test, press the 'Shift' key and 'P' and press these keys again when you want to continue. To stop the test, press the 'Shift' key and 'S'.

Make sure that both the time code and the video refer to the same test version ('A' or 'B')! Use the same approach for loading the 'Introduction and Practice' video and time code.

Fig. 5: Video Jukebox functions



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