

# **Phonological awareness in children with Down's syndrome**

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**Ryka Evans**

*Research Assistant,  
Psychology Department,  
University of Dundee,  
Scotland, UK.*

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**Opinions vary as to whether phonological awareness is a necessary prerequisite for beginning reading, or a product of learning to read. This paper describes a study of phonological skills in six children with Down's syndrome who were participating in a larger study of literacy development. The results indicated that some logographic reading ability had developed, while alphabetic and phonological skills were largely absent.**

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Phonological Awareness (PA) is a blanket term for a variety of language manipulation skills. These include repetition of polysyllabic words or non-words, rhyme and alliteration production and detection, synthesising (blending) a word from a series of spoken sounds, analysing (segmenting) a given word into constituent parts and phoneme counting and deletion.

It is generally considered that such skills are facilitating factors in the acquisition of reading, in particular, competence at the phonemic level. Phonemes are the smallest units of sound and are the most difficult for the unskilled reader to identify. Yet the ability to sound out the letters in a word or 'hear' the word in a string of phonemes is an important skill for the beginner.

Research has shown that some PA skills are present in pre-school children (e.g. rhyme and alliteration) and that higher level skills such as those demanded in the phoneme tasks, develop during reading instruction. It is expected, therefore, that those children who have acquired reading, will perform competently in PA tasks. It is not the case, however, that every competent reader is equally proficient in all PA tasks or that every disabled reader is equally poor, but as yet, there is no evidence of poor readers who have exceptional phonological skills.

Bradley and Bryant (1983) have asserted that these skills are a necessary pre-requisite for reading, but conversely, many children with Down's syndrome have acquired reading despite their inability to perform conventional PA tasks.

A recent study (Cossu, Rossini and Marshall, 1993) investigated the phonological skills of a group of 10 Italian children with Down's syndrome. These children (age range 8.0 - 15.8 years) could read at the seven-year level. They were matched for reading ability with a group of 10 younger normal children (age range 6.9 - 7.9 years). Reading performance was matched for words with regular and irregular spelling and for non-words.

When given conventional phonemic awareness tasks however, which the reading-age match controls performed competently, the sample with Down's syndrome failed drastically. Cossu et al. contend that this result shows that PA tasks, while drawing on a range of cognitive skills, do not necessarily embody those skills which are crucial to reading. (For a refutation of Cossu et al.'s claims see Morton and Frith, 1993).

The present research used similar PA tasks to those administered by Cossu et al. The study is part of a thesis examining literacy development in children with chromosome abnormalities. Six of the ten children in the study had Down's syndrome. Many factors were investigated including reading and spelling of words and non-words, matching, naming, and comprehension of both pictures and words, and various psychometric tests of short and long term memory, receptive grammar and vocabulary. Table 1 on page 104 gives background details of the six subjects.

Although child 1 and child 2 did not score on the Schonell word graded reading and spelling tests, they were able to read at sight some words from their school reading scheme, therefore were not complete non-readers.

Child	Sex	CA	RA	SA	BPVS	TROG
1	M	7.9	NS	NS	4.4	NS
2	F	10.9	NS	NS	6.3	4.0
3	F	13.2	6.4	5.5	3.6	4.0
4	F	13.3	6.5	5.5	4.8	4.0
5	M	11.3	6.6	5.7	5.3	4.5
6	M	11.3	6.8	NS	4.0	4.0

Table 1. Details of Down's syndrome sample, including sex, chronological age (CA), reading age (RA), spelling age (SA), British Picture Vocabulary Scale (BPVS), and Test for the Reception of Grammar (TROG). Scores refer to age in years. NS = no score.

The study overall was based on the 'dual foundation theory' of reading acquisition proposed by Seymour (1990) and revised in 1993 (Seymour, 1993). This cognitive developmental theory assumes that skilled reading involves the interactive contribution of two modes of processing print: (a) a LOGOGRAPHIC PROCESS, and (b) an ALPHABETIC PROCESS. Logographic processing refers to the recognition and storage of words as wholes, and Alphabetic, to the application of letter-sound knowledge in the decoding of unfamiliar words.

The theory was formulated after years of practical observations within the classroom and those observations were a major consideration as procedures for assessing reading acquisition were developed. The theory recognises the importance of phonological skills, these being particularly relevant to the Alphabetic process.

The results of the main study indicated an almost complete lack of alphabetic processing indexed by an inability to read or spell non-words, although all children had some knowledge of the sounds of individual letters of the alphabet. In this, the present sample differed from the Italian sample (Cossu et al., 1993) who read non-words as competently as their reading-age match controls. This could reflect a different approach in teaching methods or merely the more regular nature of the Italian language, where letter-sound correspondences are more consistent.

Reading was mediated in all the present cases through logographic (whole word) processing, as has been found in past research (Buckley and Wood, 1983).

Details of the phonological tasks used with the subjects are given below. Practice items were always given before the assessment proper.

- (1) **Repetition.** This task uses 15 polysyllabic items, 5 words and 10 non words. Children with phonological, sequential, or short-term memory problems can find these quite taxing.
- (2) **Production of Rhyme and Alliteration.** These tasks require the child to respond to a word delivered verbally, e.g. 'What sounds like 'cut'? 'What begins the same way as 'toast'?

(3) **Capacity to blend and segment.** This assessment is based on a theoretical notion that the syllable has a hierarchical structure, i.e. it can be divided up in various ways. At the highest level the division is into two specific parts known as onset and rime, the onset being the consonant(s) which precede the vowel, and the rime, the vowel plus whatever follows.

At the intermediate level the distinction is between initial consonant(s) + vowel + terminal consonants, i.e. a three-part division. The lowest level involves distinguishing by phonemes - the smallest units of sound. This is referred to as 'many-part' division. An example of segmentation using the word 'ground' is given below.

- 2-parts      onset+rime              gr+ound
- 3-parts      cons+vowel+cons      gr+ou+nd
- many-parts      phonemes      g+r+ou+n+d

In addition to these tasks the subjects were given a syllable counting task, where they had to tap with a pencil for each syllable in a spoken word (e.g. el-e-phant = 3 taps). Items ranged from 1 to 4 syllables in length. The final task was phoneme deletion (e.g. What's left if you take away the 's' from 'sand'?

Table 2 on page 105 gives the results of the phonological assessment.

No child gave a correct response in the rhyme production or phoneme deletion tasks and only one (Child 3) scored on the alliteration task (3/10). These results have not been entered in the table.

The tasks proved for the most-part to be beyond the children. Refusals at the outset were common and several children gave up before completing a task.

The repetition task was difficult to judge because of general articulatory problems, but despite this, most of the children did reasonably well. The results for the syllable tapping task however, were much poorer, the top scorer, child 4, performing just above chance level. No real understanding of the task was demonstrated.

Two children (3 and 4) had some success in synthesising, but no theoretically correct responses were produced in the analyses tasks.

None of the children showed any strong evidence of phonological awareness and error rate was outside the range of typical children in their second year of schooling, apart from child 3's and child 4's scores on the synthesis tasks.

A closer look at individual children illustrates various error responses.

CHILD 1. All phonological tasks were refused apart from two. In the repetition task he correctly repeated six items from the first 10 dictated. Errors were reasonable attempts at reproducing the item (hospital - "oskil," strimp - "limp," fitilestor - "mister," ambigance - "ins").

Child	W and NW Repetition	Syllable Tapping	Synthesis			Analysis		
			2	3	Many	2	3	Many
1	6	0*	*	*	*	*	*	*
2	7*	0	0	*	*	0	*	*
3	3	4	7	8	1	0	0	0
4	12	5	6	6	3	0	0	0
5	6	2	3	*	*	0	*	*
6	*	*	*	*	*	*	*	*

Table 2. Number correct on phonological tasks.

\*Refusal. (Repetition N=15, Tapping N=12, Synthesis and Analysis N=10)

This broke down on the five final responses when he produced items from the reading set (videthate - "in," sedoridge - "at," probor - "does," keleretic - "can," throce - "look").

Only one item of the syllable tapping task was attempted (caterpillar - 8 taps).

CHILD 2 attempted only three phonological tasks - rhyme production, two part synthesis and two-part analysis. None of these tasks produced a correct response. The stimulus was either repeated or refused.

As child 2 had attempted fewer tasks than the other Down's subjects, a rhyme detection task was devised using two puppets "Jo" and "Flo" who liked words which rhymed. Ten pairs of words were dictated (e.g. big-pig, rice-blue) and she decided whether the puppets would like the words or not. The "puppets" pointed to a drawing of a happy face to indicate rhymes and a sad face for non-rhymes. She performed at chance level (5 correct) indicating no true understanding of what is meant by rhyme.

CHILD 3. Performance on phonological tasks revealed inability to produce either rhyme or alliteration. Responses included repetition of the target, semantic associations (green - "grass," plant - "trees") and unrelated items (town - "hop," kind - "apple"). The response "fish" was given six times. She was generally successful in synthesis tasks, errors perhaps reflecting articulation difficulties (splash - "spash," wound - "wood," blazed - "bazed"). Analysis was a total failure, most responses being repetition of the target. Two were semantic (mud - "squashy," rest - "sleep") and the remainder were refusals.

Child 3 produced 4/12 correct responses in syllable tapping. These co-incided with targets of either three or four syllables and were most probably achieved by chance as three or four taps were the standard response on nine out of twelve trials.

Poor articulation made the repetition task almost impossible to score.

CHILD 4. Answers in the phonological tasks were almost always refusals. She responded twice in the rhyme task (dent - "dentist," waste - "racket") and once in alliteration (red

- blue). Synthesis was fairly good for higher order structures (two-part and three-part both 6/10), but blending from phonemes proved more difficult (trap - "tree," scratch - "rat," grind - "night," rest - "spat"). Child 4 was totally unable to perform the analysis tasks. The two-part task produced seven refusals and three repetitions. In three-part and phoneme tasks, she gave letter names, usually unrelated. One item "beg" was spelled aloud correctly in the three-part task, all other responses were attempts at spelling (e.g. than - "eff-ee-dee").

She was the most successful at repetition, making only three errors. She was also the most accurate in tapping syllables, but even so performance was just above chance level.

CHILD 5. The phonological tasks were generally unsuccessful. He was unable to rhyme and achieved only one correct response in alliteration. Responses were mainly refusals and repetitions with some semantically generated items (red - "blue," help - "tidy up," toast - "pop") and a few seemingly unrelated (kind - "pea," prove - "uncle," drink - "shrink pocket"). He managed to form three correct responses in the two-part synthesis task, all other responses being repetitions. No correct responses were made in analysing words into two parts although six responses were of two syllables (hat - "ha-at," keep - "pee-peep," milk - "mil-milk" etc). Other phonological tasks were refused. He correctly repeated six polysyllabic items, refusing five and failing on four (telescope - "telepobs," caterpillar - "cadpilader," strimp - "shrimp," ambigance - "bigance"). Syllable tapping produced two out of twelve correct responses.

CHILD 6. This child proved the most difficult subject to test, perhaps due to the fact that he was assessed at home, which meant interrupting television or video watching. Subsequent temper tantrums took ten or more minutes to subside. There was a further period of cajoling to persuade him to attempt a task. This had to be reading or matching. At no time would he perform a task involving repetition or writing. All phonological tasks were refused.

### Summary

The results of the study support the findings of Cossu et al (1993). The subjects were unable to perform competently in tasks which required phonological skills. This was true of both the 'lower level' rhyme and alliteration production

tasks, which can be performed by pre-readers, as well as the 'higher level' phoneme tasks which usually develop as a result of specific reading instruction.

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Address for correspondence:  
Ryka Evans,  
Research Assistant,  
Psychology Department,  
The University,  
Dundee, DD1 4HN,  
Scotland, U.K.

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