

On the Training of Phonological Awareness in Language-disordered Preschool Children. Does it Facilitate Learning to Read and Write?

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Introduction

Earlier studies of children with normal language development (e.g. Bradley & Bryant 1985, Lundberg et al. 1988, Olofsson 1985) have shown phonological awareness to be crucial for learning to read and write. This is the case also for language-disordered children as we have reported in several papers (Magnusson & Naclér 1987, 1990a, 1990b). Another finding in our studies is that language-disordered children as a group show a lower level of phonological awareness than a matched group of children with normal language development. This has led us to consider whether language disorders prevent the development of phonological awareness, and if awareness can be trained in language-disordered children in the same way as has been shown by for example Bradley & Bryant 1985 and Lundberg et al. 1988 for linguistically normal preschool children. Furthermore, if it is the case that phonological awareness can be trained in language-disordered children, does it facilitate reading and writing to the same extent as in linguistically normal children who have had such training?

In order to investigate these questions we carried out a training study with language-disordered preschool children. The post-test, which assessed the subjects' ability to identify phonemes in words and to recognize rhymes after a training period, showed that it is possible to train the phonological awareness of these children (Magnusson & Naclér 1991a and 1992b). Of the 25 children who have so far completed the training, 23 have started school. They began first grade with a higher level of phonological awareness (measured by a phoneme identification task) than a group of non-

trained language-disordered preschool children and even with the same level of awareness as a group of linguistically normal children.

In this paper we will report on the children's reading and writing and discuss to what extent their learning to read and spell is facilitated by the training of phonological awareness.

Procedure

The subjects in the part of the study which we are going to report on here are 23 language-disordered children. They have been selected for the training program by the speech pathologists who worked with them when the children were preschoolers. Before they were included in the training study, their phonological awareness was assessed by testing both their ability to identify phonemes in words and to recognize rhymes.

The training, which was mainly individual, was carried out by each subject's respective speech pathologist. The training program was developed in collaboration between all the participating speech pathologists and us. For more information about the subjects and the training program see Magnusson & Nauc ler 1991a, 1992b.

Out of the 25 children who were enrolled in the phonological awareness training as six-year-olds (i.e. one year before they started school), 23 were followed during their first school year. All the children were visited at school in the middle of Grade 1. The school visits included classroom observations during a day or half-day and interviews with the teachers. The purpose was to gain information about the children's school adjustments, academic achievements, and their need for special teaching and special attention. Particular interest was taken in reading and writing/spelling instruction. The teachers were also asked to fill in a questionnaire about their attitudes to reading and to reading instruction.

At the end of Grade 1 the children's reading and spelling were tested with a number of different tasks:

- reading aloud of single words
- reading aloud of three short texts
- reading comprehension for words (OS 64) (S eg rd et al. 1982)
- reading comprehension for sentences (SL 60) (S eg rd et al. 1986)
- spelling of single words (DLS) (Dahlqvist & J rpsten 1975)

The reading aloud will not be discussed in this paper, which will be concerned with reading comprehension and spelling only. These tests are described below.

Reading of single words (OS 64). The task is to match a written word with one of four pictures. There are 64 items to be read within 10 minutes. The score is the number of correct choices.

Reading of sentences (SL 60). The task is to match a written sentence with one of five pictures. There are 60 items to be performed within 15 minutes. The score is the number of correct choices.

Spelling of single words (DLS). A sentence is read aloud to the child who is then told to write down one of the words in the sentence. There are 28 words to be spelled and there is no time limit. The score is the number of correctly spelled words.

Results

The results on the reading of words (OS 64) and the reading of sentences (SL 60) are shown in Table 1.

Table 1. Results on word reading (OS 64) (N=23), sentence reading (SL 60) (N=16) and spelling (DLS) (N=22) for the training group. Numbers in parentheses indicate the number of test items.

	<i>word reading (64)</i>	<i>sentence reading (60)</i>	<i>spelling (28)</i>
mean	41.3	22.0	9.9
S.D.	20.0	18.0	9.3
maximum	64	59	27
minimum	7	0	0

It is apparent that OS 64 is much easier than SL 60 with a mean of 41.3 (64 items) as compared to a mean of 22 (60 items). This is to be expected and has been shown in our earlier studies (e.g. Magnusson & Nauc ler 1987, 1990a). There was one subject who scored zero on the sentence reading task, and there were no less than seven subjects for whom it was too much or too difficult to even try to read the sentences. The results on the spelling task (DLS) are also shown in Table 1. The mean for the number of correctly spelled words is 9.9 (28 items). There were subjects who scored zero on the spelling task, but there also were subjects who nearly hit the ceiling, just as on the sentence reading task. Thus, the variation among the subjects is considerable.

Training group - control group

In order to examine the impact of the training on reading and spelling scores we need a control group. As we have reported previously

(Magnusson & Nauclér 1991a), it is a tricky task to find matching controls for the subjects in this study. Therefore we have used 19 language-disordered preschool children from our earlier studies as controls. They were matched with the subjects in the training group on phoneme identification scores before starting school, but no matching was done on linguistic variables. Since the reading and writing abilities of the controls had been assessed with the same reading and spelling tests at the end of the first grade, their results are comparable to those of the subjects in the training group.

As can be seen in Table 2, the results in the control group are better than in the training group on word reading (OS 64) – with mean of 52.3 versus 41.3, on sentence reading (SL 60) – with a mean of 26.2 versus 22, and on spelling (DLS) – with a mean of 10.4 versus 9.9. However, none of these differences are significant.

Table 2. Results on word reading (OS 64) (N=19), sentence reading (SL 60) (N=18) and spelling (DLS) (N=19) for the control group. Numbers in parentheses indicate the number of test items.

	<i>word reading (64)</i>	<i>sentence reading (60)</i>	<i>spelling (28)</i>
mean	52.3	26.2	10.4
S.D.	14.8	15.2	6.1
maximum	64	51	22
minimum	18	4	0

Does the fact that there are no significant differences between the training group and the control group imply that the training of phonological awareness is of no use for promoting language-disordered children's learning to read and write? To draw such a conclusion about a group as heterogeneous as the language-disordered one on the basis of group values only is too rash and unwarranted. Therefore, we will now turn away from group results and examine the data on an individual level.

As mentioned earlier, the group results on the post-test of phonological awareness as well as on the reading and writing assessments are very heterogeneous. Even if phonological awareness increased for all children during the training period, there were some subjects who only improved a few points, and not enough to reach what we have found in earlier studies to be the lowest possible level for developing into a good reader and speller (Magnusson & Nauclér 1990b). Fifteen of the subjects reached this critical level, whereas the remaining eight did not.

For the discussion of results the test scores on the reading and spelling tests (OS 64, SL 60 and DLS) and on the post-test of phonological awareness (phoneme identification) have been divided into four levels as shown below:

	<i>OS 64</i>	<i>SL 60</i>	<i>DLS</i>	<i>phoneme identification</i>
4 very high/good	49 – 64	45 – 60	21 – 27	19 – 24
3 high/good	33 – 48	30 – 44	14 – 20	13 – 18
2 low/poor	17 – 32	15 – 29	7 – 13	7 – 12
1 very low/poor	0 – 16	0 – 14	0 – 6	0 – 6

Training effects on reading

When examining the data more closely we find that in order to score *very high* on OS 64 (reading of words) the subjects must score ≥ 19 on the phoneme identification task at the post-test. The eight subjects who scored below 19 with one exception performed *low* (two subjects) or *very low* (five subjects) on OS 64. However, it is not enough to perform *very high* on the identification task. One third of the fifteen subjects with top scores on the identification task did not perform well on the word reading task. This is shown in Table 3. Being very good at identifying phonemes is obviously an important prerequisite for learning to read words, but it is not the only one.

The impact of phoneme identification proficiency on SL 60 (reading of sentences) is much weaker than on OS 64 (reading of words). As can be seen in Table 3, only three of the 15 very good phoneme-identifiers scored very high on SL 60. The rest did not even reach above the low level. The three very good sentence readers were also very good words readers. Since there are nine very good word-readers but only three very good sentence readers, the opposite is not true.

Table 3. Results on word reading (OS 64), sentence reading (SL 60), and spelling (DLS) for 15 subjects who performed *very high* on phoneme identification at the post-test.

	<i>OS 64</i>	<i>SL 60</i>	<i>DLS</i>
4 very high/good	9	3	3
3 high/good	2		5
2 low/poor	2	4	2
1 very low/poor	2	8	5

Training effects on spelling

There were only three subjects who performed *very good* on the spelling task, all of them scoring *very high* on the identification task. They were all very good word-readers and two of them were very good sentence-readers too. None of the subjects performing below the critical level on the identification task (<19) is a very good speller. Thus, also when it comes to top results on spelling, it is necessary but not sufficient to be very good at identifying phonemes.

Factors contributing to training effects on phonological awareness

As mentioned above, 15 of the 23 subjects performed *very high* on the phoneme identification task after the training period. Although most of the subjects improved between the pre-test and the post-test, eight of them did not reach the critical level. Two of them even scored *low*. What could be the reason for their not benefiting from the training? Does it have anything to do with their linguistic abilities and disabilities? In order to answer these questions we have analysed the children's phonological problems as well as their ability to use syntactically acceptable and syntactically complex sentences before the phonological awareness training started. The outcome of the syntactic analyses was classified into one of four groups identical to the categorization of the test scores on the reading and spelling tasks, i.e. very good, good, poor, very poor. The analysis of phonological problems resulted in the following categories:

- 4 *very mild problems* substitution of a single phoneme in a single position, simplification of late clusters
- 3 *mild problems* substitutions of one or two phonemes in one or two positions, simplification of late clusters
- 2 *severe problems* substitutions of three phonemes in all positions, sometimes assimilations and metathesis, producing only a few early clusters
- 1 *very severe problems* substitutions of more than three phonemes in all positions, assimilations and metathesis, producing no clusters.

As could be expected from our earlier findings (e.g. Magnusson & Nauclér 1992a and in press), phonology as it is manifested in production did not have much influence on the development of phonological awareness, and phonological problems did not seem to prevent a successful outcome of the metaphonological training. Actually, three of the five subjects with the most severe phonological problems performed *very high* on the identification

task. In spite of this their performance both on OS 64, SL 60 (reading of words and sentences) and on DLS (spelling) was extremely poor – poorer than that of any other subjects. Thus, it also seems possible to develop phonological awareness by training in subjects with severe phonological problems, at least enough to make them understand very simple tasks like phoneme identification and rhyme recognition (Magnusson & Nauclér 1987), but in these cases the training does not have the same impact on learning to read and spell as it has for other subjects.

What about the influence of the children's syntactic ability? Syntax was not explicitly trained in the project, but we know from our earlier studies that preschool children's level of syntactic complexity is crucial for their reading development, at least up to Grade 4 (Magnusson & Nauclér 1991b). Out of the five very poor readers and spellers with severe phonological problems mentioned above, two scored *very high* on syntactic complexity, one scored *high*, and two of them scored *low*. Obviously, being good at tasks assessing syntactic complexity does not compensate for whatever ability is missing.

If we look at the results from the point of view of syntactic complexity, we find that out of the five subjects with very high scores, four scored *very high* on OS 64 (word reading) but only two on SL 60 (sentence reading) and on DLS (spelling). Syntactic complexity does not seem to have much to do with decoding words, as children may score *very high* on OS 64 but *low* or *very low* on syntactic complexity. However, it seems to be necessary to perform very well on syntactic complexity in order to score *very high* on sentence reading.

Cases

In an attempt to disentangle the complex relations between linguistic abilities, phonological awareness, and reading and spelling, we will now look more closely at some cases. First we will consider some cases differing in reading and spelling. Then we will discuss some other cases taking their linguistic abilities and phonological awareness as our starting point.

Subjects differing in reading and spelling. In order to compare subjects differing in reading and spelling we selected three very proficient readers and spellers, i.e. the only three subjects who performed *very high* on both OS 64, SL 60 and DLS. They were compared to the three subjects who were the only ones who performed *very low* on the same tasks. Two of

these could not cope with the sentence reading task at all. Thus, at the end of the first grade the subjects differed considerably in written language proficiency. What could be the explanation for these results? In what other respects, known to us, did these subjects differ before they started to learn to read and write?

When *phonological awareness* was assessed after the training period, the three subjects who were very good readers and spellers at the end of Grade 1 scored *very high* on the identification task (see Table 4). Thus, they started school with a very high level of phonological awareness. However, this was also so for the three subjects who turned out to be very poor readers and spellers at the end of Grade 1. Two of them scored very high on the identification task, the third performed low on identification but compensated for this by scoring very high on a rhyming task. Thus, their level of phonological awareness did not separate the three very poor readers and spellers from the three very good readers and spellers before they started school.

At the assessment of *syntactic ability and syntactic complexity* in preschool, one of the three very good readers and spellers scored *very high* on both, one scored *high* on syntactic ability but *very high* on syntactic complexity, and the last one scored *low* on syntactic complexity but *very high* on syntactic ability. As shown in Table 4, the pattern for the three poor readers and spellers is slightly different. Two of them scored *high* and one of them *very high* on syntactic ability, whereas the first two scored *low* and the third one *high* on syntactic complexity.

Table 4. Level of phonological awareness, syntactic ability, syntactic complexity and phonology for three very good readers and spellers (x) and three very poor readers and spellers (o).

	<i>Phonol. awareness</i>	<i>Syntactic ability</i>	<i>Syntactic complexity</i>	<i>Phonology</i>
4	xxx ooo	xx o	xx	xx
3		x oo	o	x
2			x oo	o
1				oo

The most striking difference concerns the severity of the subjects' *phonological problems*. As can be seen in Table 4, two of the three very good readers and spellers had very mild problems and one had mild problems, i.e. their phonological problems as preschoolers were rather

small. The three very poor readers and spellers, on the other hand, had severe and in two cases very severe phonological problems.

The *cognitive level* of all the subjects was assessed with a non-verbal test (Raven's coloured matrices). There was no significant difference between the very good and the very poor readers and spellers in this respect.

Thus, the only thing that really differentiates between the three very poor readers and spellers and the three very good ones – apart from reading and spelling – is the severity of their phonological problems. However, their poor phonology does not make it impossible to develop their phonological awareness through training, but becoming phonologically aware is obviously not enough to promote their reading and spelling, at least not as long as their syntax is not at a sufficiently high level to compensate for the other deficiencies.

Subjects with similar linguistic abilities but differing in phonological awareness. Let us now change perspective and start out from the linguistic abilities and disabilities of twelve subjects. Their linguistic capability were similar when the study started, but they differed in phonological awareness after the training period. In order to make comparisons the subjects are divided into four groups on the basis of their linguistic capability, i.e. their syntactic and phonological abilities:

	<i>Syntactic complexity</i>	<i>Phonology</i>
group 1 (N=4)	very high	mild problems
group 2 (N=3)	high	mild problems
group 3 (N=3)	low	very mild problems
group 4 (N=2)	very low	very severe problems

One of the subjects in each group differed from the rest of their group by being less phonologically aware.

The effect of the level of phonological awareness on reading and spelling seems to vary depending on the subjects' linguistic capability. In the two groups with the mildest linguistic disabilities (the first and the second group), the subjects with the higher level of phonological awareness read and spell better than subjects with the same linguistic capability but a lower level of phonological awareness. For subjects with *severe* or *very severe* problems with either syntactic complexity or phonology (the third and the fourth group) differences in phonological awareness do not seem to affect reading and spelling scores.

Summing up

This study has shown that both linguistic and metalinguistic factors are prerequisites for learning to read and write, and that these factors are intertwined in an intricate pattern. The conclusion we draw about the possibility of facilitating language-disordered children's learning to read and write by training their phonological awareness is that it is not always enough to become phonologically aware in order to develop into a good reader and speller. Phonological awareness seems to play a more important role for those subjects who have less severe linguistic problems. They read and spell better than linguistically similar subjects with a lower level of phonological awareness. For subjects with severe or very severe linguistic problems a high level of phonological awareness alone does not make up for the language impairment. However, at this stage in our investigation we are not prepared to say that children with severe linguistic problems can never profit from phonological awareness training. Maybe they need longer training periods and/or an earlier start of the training than in this study in order for them to be able to make use of the metalinguistic insights they have developed by training to facilitate their learning to read and write.

It is obvious from the six cases differing in reading and spelling as well as from the whole study that there are certain prerequisites for learning to read and write. However, even if children have these prerequisites, there is no guarantee that they will develop into good readers and writers. This is in accordance with what we and other researchers have found in earlier studies. So far we have only dealt with a few linguistic and metalinguistic factors in a rather broad analysis. In addition to these factors there are many other aspects not yet taken into consideration which are important for learning to read and write, such as for instance the role of teachers, the influence of different teaching methods, types of school and classroom. By including this type of information in our more detailed future analyses we hope to be able to explain why there are many subjects in this study who are *unexpectedly poor* readers and spellers on the basis of the data we have analysed so far, but only two whom we could regard as *unexpectedly good* readers and spellers. Thus, even if children have all the necessary linguistic and metalinguistic prerequisites for learning to read and write, there might be other circumstances that make their development into good readers and spellers problematic.

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Phrase-final Intonation in West Greenlandic Eskimo

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A previous description of Eskimo intonation was examined by studying text-reading material. Auditory and acoustic analyses have led to an alternative analysis of phrase-final intonation, where the proposed HLH contour is decomposed to HL plus H. HL is regarded as a word property whereas H is a phrasal component.

Introduction

Works on intonation in West Greenlandic Eskimo are not numerous. It has been described by Thalbitzer 1904, Petersen 1970, Collis 1970 and Rischel (in Mase 1973), among others. Thus far, Rischel presents the most comprehensive description of intonation by identifying five terminal contours. Their occurrence is supposed to be determined by both prosodic and grammatical categories. Of these five types, only the phrase-final high-low-high pattern has been subjected to acoustic analysis (Mase 1973, Nagano-Madsen 1988). Furthermore, the acoustic analyses presented in Mase and in Nagano-Madsen have both used words in isolation forms. Thus, we are still very far from obtaining a more thorough picture of intonation in West Greenlandic Eskimo. This work serves as a pilot study in examining the adequacy of Rischel's description of phrase-internal and phrase-final contours in text reading material, a considerably larger domain of intonation than those used in previous studies.

The present work is part of the project work called *Multilingual Prosodic Rules*, which seeks to ascertain the basic rules and parameters that are necessary in order to describe the typological differences between the three languages chosen for the project (Japanese, West Greenlandic Eskimo, and Yoruba). Earlier, it was hypothesized that in a quantity language like Eskimo, where duration is the primary acoustic cue for signalling single/geminate segments, duration contributes little to other functions such as grouping (Nagano-Madsen 1992). Instead, it is expected that F0 plays the major role for the purpose.