

Language disordered children's reading and spelling: ¹

Preliminary results

Kerstin Nauclicr and Eva Magnusson

A great number of children who have been diagnosed as language disordered during their pre-school years will have reading and spelling difficulties at school (Rabinovitch, 1968, Bergendal, 1969, Bruce et al, 1978). This is so for a majority of the language disordered children, even if some of them seem to acquire written language in much the same way as normal children do. For a few exceptional ones it has been noticed that learning to read and write is followed by a sudden increase in their speech production ability.

All language disordered children do not show the same kind of language disturbances. For some children speech perception problems dominate, while for others different types of speech production problems are the most prevalent. It should thus be possible to identify subgroups within the larger group of language disordered children and to relate these subgroups to children's later reading and spelling success. By doing so, it would be possible to find out if children with one type of language disorders are more likely to become poor readers and/or spellers than children with another type of disorders.

It has been reported in several studies (e.g. Liberman et al, 1977, Lundberg et al, 1980) that the best predictor of pre-school children's future reading and spelling success is their linguistic awareness. In studies of normally developing children it has been shown that linguistic awareness increases with age

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(Bruce, 1964, Calfee et al, 1973, Liberman, 1973).

Results from studies with language disordered children (e.g. Curtiss, 1977, Magnusson, 1983) indicate that linguistic awareness is not necessarily directly related to the linguistic level as manifested in children's speech production. In this perspective, it is of interest to study the relationship between linguistic awareness and language developmental level in pre-school children, (especially in language disordered pre-school children) and their later reading and spelling success.

We hypothesize that different linguistic and metalinguistic factors are differentially relevant for learning to read and spell. We are now going to report on a study where we have tried to identify some such linguistic and metalinguistic factors and to evaluate their importance as predictors for language disordered children's later reading and spelling success.

The subjects in this investigation are taken from an earlier study by Magnusson (1983) where the phonology of 32 language disordered children was described. The children had been diagnosed by speech pathologists but had not yet been enrolled in any language programs. The age of the subjects ranged from 3:9 to 6:6. Twentyfive of these children agreed to take part in this follow-up study. The recordings from the first study were made six years ago. The children's speech production was (at that time) registered by means of a naming test and in spontaneous speech. A rhyming test was used to test their linguistic awareness. From these data subclassifications were made, based on

- phonological patterns
- phonological deviance score based on values for developmental status, range and frequency values for each phonological process
- rhyming scores
- syntactic production evaluated in spontaneous speech
- lexicon calculated from the naming task

From the production data, the subjects were divided into four subgroups with different phonological patterns consisting of

- 1 - children whose speech was nearly normal
- 2 - children in whose speech implicational patterns could be found. The degree to which the subjects deviated from the norm differed, but they were classed together since the same implicational ordering could be observed in the patterns they exhibited, i.e. the subjects had reached different developmental levels though following the same developmental order.
- 3 - children who had one dominating segmental problem. The problematic segment was not among the types that are the latest to be acquired by normally developing children.
- 4 - children whose speech was characterized by word patterns. Restriction of word structure seemed to be a more important determinant of their speech than substitutions or cluster reduction patterns.

The deviance scores ranged from 3 to 158 and were divided into three degrees where

1	covers	the	range	0 - 49
2	"	"	"	50 - 99
3	"	"	"	100 -

The rhyming test consisted of nine tasks. Based on statistical criteria the subjects were regarded as

- good rhymers (5) (six correct choices or more)
- poor rhymers (5) (five correct choices) and
- non-rhymers (14) (four correct choices or less)

(One subject was not tested.)

The syntactic production was assigned values from 1 to 4, where

- 1 indicated normal performance for the age,
- 2 nearly normal,
- 3 below the norm and
- 4 far below the norm for the age.

Lexical scores were calculated from the naming task. The results were arranged into three groups where

1	corresponds	to	99% - 90%	correct	naming
2	"		89% - 81%	"	"
3	"		80% and less		

When first tested, the age of the subjects ranged from 3:9 to 6:6 as mentioned before. At the time of the present investigation, the children have attended school for 3 to 5 years. The subjects' parents and teachers were interviewed about the children's reading and spelling, their general academic success and their adjustment at school, as well as about the children's enrolment in special teaching programs and/or language programs.

According to the parents, 46% of the children had had or still had reading problems and 75% had spelling difficulties. According to the teachers, 55% of the children were poor readers and only a few of them performed above the average. 40% were poor spellers and about the same number were judged as average spellers. Thus, in the parents opinion, spelling was more problematic than reading, while the teachers considered reading a bigger problem than spelling. Although the judgements of the parents and the teachers are not in complete agreement, the number of poor readers and spellers is much higher than in a group of students of the same age with no history of language disorder.

Two third of the children had been or still were enroled in special teaching programs or language programs. Earlier reports on the high frequency of reading and spelling problems among language disordered children are thus supported.

Our aim was to evaluated not only the reading and spelling performance but the children's present linguistic and metalinguistic ability as well. Both spoken and written performance in perception as well as production was to be considered.

Apart from the conventional reading and spelling tests, verbal comprehension was evaluated by means of the Token test (de Renzi et al, 1962). The test consists of tokens of various geometrical forms, sizes and colours to be manipulated according to verbal instructions.

The comprehension of logic-grammatical relations was measured by means of a test based on Luria's theories and developed for linguistically normal children by Askman et al (1982). It contains among other things inverted constructions, double negations and double comparisons.

Comprehension and production of syntactic structures were investigated by encouraging the children to model syntactic structures of various kinds.

Oral production was investigated by asking the children to tell a story about a picture and written production by asking them to write a composition about the same picture.

Finally, the children's phonological awareness was evaluated by means of a rhyming test, the same one as was used when the subjects were tested as pre-school children. The children were asked to choose rhyming word pairs out of sets of rhyming and non-rhyming words.

Here are the preliminary results from the tests:

Reading and spelling performance

Nine of the 25 subjects made a lot of reading errors and two of them did not manage to read more than half of the text. This equals roughly the number of children judged by parents and teachers as having reading problems. Only four of the subjects read the text with less than five errors. Spelling performance was somewhat better as six subjects made none or only one error but ten made a high amount of misspellings.

As can be seen in table 1, all subjects with few reading errors made few spelling errors, but not all subjects with few spelling errors made few reading errors. Seven of the 11 subjects who made lots of reading errors also made lots of spelling errors, while the other four made less spelling errors. Three subjects were better readers than spellers but six subjects were better spellers than readers.

Language comprehension

The Token test was managed fairly well by the majority of the subjects. Six of them scored 100% correct. A certain relation to reading performance was found, as the two subjects who did not manage to read the whole text both scored far below the others (13/22) and five of the six subjects making more than 4 errors were among the worst readers.

Tabel 1. Number of good (I), average (II), and poor (III) readers and spellers.

		R E A D I N G		
		I	II	III
S P E L L I N G	I	4	2	
	II		5	4
	III		3	7

Grammatical comprehension

The logic-grammatical test turned out to be more difficult than the Token test, and only one subject scored 100% correct. This is what could be expected from the testing of linguistically normal children (cf Askman et al, 1982) who also found some of the tasks difficult to master. However, there seemed to exist a certain connection between poor performance on the test and poor reading, since all nine subjects with low scores (< 18/22) also scored low on the reading test.

Comprehension and production of syntactic structures

This was also a difficult task for most subjects. None of them scored higher than 9 out of 11. No obvious relation to reading performance could be found by using only the raw data. The qualitative analysis still remains to be done.

Spoken and written production

The linguistic analysis of the children's spoken and written production when they were telling a story about a picture has not yet been completed. It was obvious, however, that there was no phonological deviance in the children's production anymore.

Metalinguistic ability

The metalinguistic ability or more precisely the phonological awareness of the subjects as measured by the rhyming test was compared with the children's spelling scores since it has been argued that phonological awareness predicts spelling performance better than reading performance. We found that all good spellers obtained top scores on the rhyming test. So did some of the average and poor spellers as well, but the poor rhymers were all poor spellers (and readers). This indicates that phonological awareness (rhyming ability) is a necessary but not sufficient prerequisite for spelling.

Reading strategies

By means of a detailed linguistic analysis of the reading errors, taking into account not only error types such as deletion or addition but also what kind of linguistic unit and what linguistic level that was affected by the error, it could be shown that all readers did not use the same reading strategy. The errors made by the best readers were almost exclusively made on meaningful units, i.e. morphemes or words, the errors made by the worst readers on meaningless units as phonemes and syllables. Four poor readers, however, showed the same reading strategy as the good readers in that the majority of their errors included and affected meaningful units. Those four were all better spellers than readers. This strongly suggests that when investigating reading and spelling proficiency it is insufficient to account for the quantitative aspects only.

We started this investigation with the hypothesis that various linguistic and metalinguistic factors are differentially relevant for learning to read and spell. The aim was to identify such factors and evaluate their importance as predictors for language disordered children's reading and spelling success. The subjects' reading and spelling was therefore examined in relation to pre-school data of the following types:

- 1 - phonological patterns
- 2 - phonological deviance scores
- 3 - rhyming scores
- 4 - syntactic production
- 5 - lexicon

This was done in order to evaluate to what extent the following predictions based on the pre-school data are valid:

Value 1 on a certain factor was taken to predict good performance, value 2 average performance and value 3 poor performance. Predictions based on phonological patterns imply good performance for subgroups 1 and 3, and poor performance for subgroup 4. No prediction is made for subgroup 2 besides what can be predicted from the deviance scores.

All factors are regarded as equally potent predictors for reading and spelling at this point. Each value is considered in relation to reading and spelling performance with regard to whether the prediction is met or not. By this procedure the following ranking lists for factors predicting reading and spelling correctly were set up:

READING		SPELLING	
syntax	.68	syntax	.60
group	.50	rhyming	.44
deviance score	.48	group	.42
rhyming	.44	deviance score	.36
lexicon	.40	lexicon	.36

The factors predicted reading correctly to a somewhat greater extent than spelling. The best predictor for both reading and spelling was syntax. (As mentioned before, this is the same correlation as we found when comparing reading and spelling with the results from the syntactic testing in the follow-up study.) The least predictive factor was lexicon.

Rhyming is the second best predictor for spelling, while for reading rhyming is placed lower in the ranking list although the prediction value is the same. This is as could be expected from many observations made by both educators and researchers that phonological awareness (here measured by a rhyming task) predicts spelling performance better than reading performance.

The next step was to check how well reading and spelling respectively were predicted by the five factors for each subject. When all factors indicated the same outcome the prediction was considered reliable. When one factor at the most contradicted the others the prediction was considered less reliable, but still a prediction. Using these principles, the reading performance for nine subjects is reliably predicted, and for another seven subjects less reliable predictions are made. Thus, reading performance of 16 of the 25 subjects can be predicted with fairly good reliability. Spelling performance is also reliably predicted for nine subjects and less reliably for another six, thus accounting for 15 of the 25 subjects.

When both reading and spelling are considered in the same individual, reliable predictions are made for six subjects and less reliable ones for seven subjects. Thus, it is possible to make correct predictions for 13 subjects. When both reading and spelling are taken into account, seven subjects showed reading and spelling scores that were contradictory to what was predicted from the factors. Four subjects had developed better reading and spelling than predicted, and three less good than predicted. If syntax were considered a more powerful predictor than the other factors, the three subjects that developed less well than predicted and one of the subjects that developed better than predicted could be accounted for.

When reading and spelling proficiency both have the same value (good, poor or average), the predictions are more reliable than when reading and spelling performance have different values, e.g. poor spelling and average reading, or good reading and poor spelling. This is so because the same factors have been used for predicting both reading and spelling and, furthermore, have been assigned equal power for predicting both reading and spelling. Some of the results suggest that some factors have differentially predictive values for reading and spelling, as e.g. rhyming, which is a better predictor for spelling than for reading. A further analysis of differentially predictive values seems to be promising in the quest for more reliable predictions when reading and spelling are performed at different levels.

On the whole, poor reading and spelling is more often reliably predicted than good reading and spelling. Five out of eight subjects with poor reading and spelling are correctly predicted while only one subject out of five with good reading and spelling is correctly predicted. For clinical purposes the more frequent predictions of poor readers and spellers, i.e. the identification of the at-risk children, is more important than the correct identification of the other group.

TO SUM UP

Pre-school children with language disorders will have more problems with reading and spelling in school than linguistically normal children. This investigation has shown that

1. Reading and spelling performance in language disordered children can be predicted from pre-school data.
2. The most important factor for predicting both reading and spelling is syntactic ability, the least important for both is lexicon.
3. One factor seems to predict spelling better than reading, i.e. phonological awareness as measured by rhyming ability.
4. Poor reading and spelling is more correctly predicted than good reading and spelling.

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REFERENCES

- Askman, C., Hansson, K., Johansson, N. & Åström, B. 1982. Är en myra större än en elefant? Testning av normala barns förståelse av logisk-grammatiska konstruktioner. Examensarbete i logopedi. Institutionen för logopedi och foniatri, Lunds universitet
- Bergendal, B-I. 1969. Språklig oförmåga manifesterad i tal och skrift. Lic.avhandling i fonetik, Lunds universitet
- Bruce, D.J. 1964. Analysis of word sounds by young children. *British Journal of Educational Psychology* 34, 158 - 169
- Bruce, B., Persson, I. & Santesson, R. 1978. Läs- och skrivförmågan hos språkförsenade barn. 60-poängsarbete i fonetik, Lunds universitet
- Calfee, R.C., Lindamood, P. & Lindamood, C. 1973. Acoustic-phonetic skills and reading - Kindergarten through twelfth grade. *Journal of Educational Psychology* 64, 293 - 298
- Curtiss, S. 1977. Genie. A psycholinguistic study of a modern-day "wild child". Academic Press, New York
- Lieberman, I.Y. 1973. Segmentation of the spoken word and reading acquisition. *Bulletin of the Orton Society* 23, 65 - 77
- Lieberman, I.Y., Shankweiler, D., Liberman, A.M., Fowler, C. & Fischer, F.W. 1977. Phonetic segmentation and recoding in the beginning reader. In Reber & Scarborough (eds.), *Towards a psychology of reading: Proceedings of the CUNY conference*, Hillsdale, New Jersey
- Lundberg, I., Olofsson, Å. & Wall, S. 1980. Reading and spelling skills in the first school years predicted from phonemic awareness in the kindergarten. *Scandinavian Journal of Psychology* 21, 159 - 173
- Magnusson, E. 1983. The phonology of language disordered children. Production, perception, and awareness. *Travaux de l'institut de linguistique de Lund XVII*, Gleerups, Lund
- Rabinovitch, R.D. 1968. Reading problems in children: definitions and classifications. In Keeny & Keeny (eds.), *Dyslexia. Diagnosis and treatment of reading disorders*. The C.V.Mosby Company, Saint Louis
- deRenzi, E. & Vignolo, L.A. 1962. The Token test: a sensitive test to detect receptive disturbances in aphasics. *Brain* 85, 665 - 678