

Influence of pre-school phonological training on early reading and writing abilities

Ulla Bjursäter and Francisco Lacerda

Department of Linguistics, Stockholm University, Sweden

E-mail: ullabj@ling.su.se, frasse@ling.su.se

ABSTRACT

This paper reports a study of the possible impact of pre-school phonological training on first and second graders' reading and writing abilities. Two public schools in the Stockholm metropolitan area were selected. The children were divided in two groups, depending on whether or not they had participated in a phonological training program in their last pre-school year. The children's linguistic and literacy development was followed during their first two school years. Psycholinguistic profiles (ITPA) were obtained for all the first grade children, along with an assessment of their phonological awareness. In the second grade, the children were reassessed to map their reading and writing abilities. Although the results suggested an initial advantage in general linguistic awareness for the children enrolled in the phonological training program, that advantage seems to be quickly overshadowed by social and personal factors such as continuity in the pedagogical leadership and attended school.

1. INTRODUCTION

It has earlier been reported that training in phonological awareness improves the acquisition of reading and writing abilities [1, 2, 3, 4, 5]. In Sweden, where children traditionally start school at the age of seven after attending a pedagogically ambitious pre-school system, there was an opportunity to offer phonological training to various groups of 6-year old pre-school children, as a sort of playful additional preparation for their future school life. Parents from two schools in the Stockholm metropolitan area were offered the choice of enrolling their 6-year old children in additional pedagogical programs focused on either music or language awareness. The language awareness program consisted of regular sessions of meta-linguistic games, like rhymes, finding words that started with a certain sound, deriving words by subtracting syllables, etc., that were carried out during the whole school year. These games were carefully structured in a progression that is adjusted to the level of the participating children [6]. The goal of the program was to enhance the children's level of phonological awareness.

The present study attempts to assess the relevance of the phonological training program by comparing the linguistic profiles of the children who participated in the language program with matched groups of children that did not have

that kind of training. For three consecutive years, the language development, as well as reading and writing ability, of different groups of children participating in this study was assessed during their first and second school year.

2. METHOD

Subjects

The subjects participating throughout this longitudinal study were 133 normally developed first and second grade children at two different schools in the Stockholm metropolitan area. The distribution of the second-grade children per gender and project year is presented in Table 1. However not all children had participated in every test administrated during first grade. This is a consequence of the adaptive nature of the tests used, as described below. Also, because of the parents' choice of additional programs, the number of children in the experiment group could not be held constant across project years and school environment. This was accepted as an undesirable but ethically unavoidable deviation from the original experiment design. All the subjects in this study were highly fluent in the Swedish language.

Table 1: Distribution of subjects, sorted by grade, project year, school and gender

Year	Grade			
	2A		2B	
	Boys	Girls	Boys	Girls
1	15	6	13	11
2	3	11	11	14
3	8	16	12	13

Materials

In the first grade the children were tested in phonological awareness using UMESOL 1 [7], as well as on their relative psycholinguistic age, assessed by the Illinois Test of Psycholinguistic Abilities (ITPA) [8]. In the second grade the children's reading and writing skills were assessed by another UMESOL 2 test [9], designed to map the reading and writing abilities of lower-grade pupils. This procedure was repeated for three groups of children entering school in three consecutive years.

The UMESOL 1 test assessed the subject's ability to divide a word into separate sounds (phoneme analysis), to add up separate sounds to create words (phoneme synthesis), to decide the position of a given sound in a word and to subtract segments from words. The second test, ITPA, consists of 13 subtests that measure different audio-visual capabilities of the subjects. The third test (UMESOL 2) was administered when the children had moved to the second grade. Among the original twelve different sub-tests included in UMESOL 2 battery, six were selected because they were judged to provide the most relevant assessment of the subjects' early reading and writing abilities. The six subtests addressed the children's performance at different difficulty levels of word dictation, sentence dictation, silent reading comprehension, reading out loud, reading reversible words (palindromes) out loud and proofreading with and without the key-text.

Procedure

All tests were administered individually, in a separate room adjacent to the children's ordinary classroom. The test procedure followed, as close as practically possible, the recommendations of the test constructors. In the UMESOL 1 tests, the different tests were terminated once the examiner noticed that the child was no longer able to cope with the increasing difficulty level. The ITPA test consists of 13 different sub-tests that would take about 1,5 hours to administrate, if presented strictly according to the instructions. Therefore, ITPA was administrated during two closely scheduled sessions, as a means to help the subjects to maintain concentration throughout the sessions.

3. RESULTS

The first step in this analysis was to assess the impact of the training program on the first grade children's phonological awareness. The results from the different tests in UMESOL 1 indicate a significant difference in phoneme analysis skills ($F(134)=8.136, p<0.005$) between the children who had been offered phonological training and those who simply had participated in the ordinary pedagogical program. The trained children attained higher

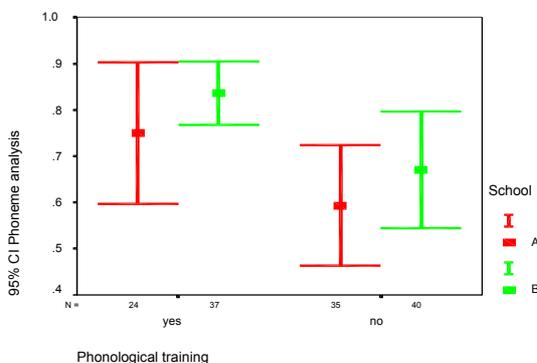


Figure 1: Results from the phoneme analysis test, per school and phonological training.

scores in the phoneme analysis test, presumably as a consequence of the phonological training program (Fig.1) while the other three tests did not generate any significant difference between the children.

The second test, ITPA, was also administrated in the first grade, during each of the project's three years. The children's psycholinguistic age ratios (i.e., the ratio between the psycholinguistic age and the chronological age) are displayed in Figure 2, sorted by phonological training, attended school and project year. A one way ANOVA of the pooled psycholinguistic age ratios by phonological training indicates significant effects of the phonological intervention ($F(1,127)=4.410, p<0.038$).

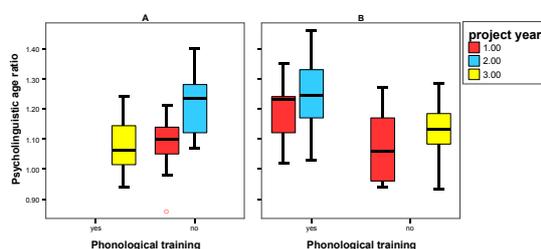


Figure 2: Psycholinguistic age ratio by project year, phonological training and attended school.

During second grade, UMESOL 2, was administrated to evaluate the early reading and writing abilities of the children. The results from this test battery do not reveal any significant difference associated with the phonological training in any of the sub-tests. Instead, the results suggest that the difference lies between the project years and the two schools attended by the children. A one way ANOVA with the word dictation test as variable and Phonological training as factor did not yield any significant differences between the children ($F(1,131)=0.622, p<0.432$). There were, however, significant differences across project year ($F(2,130)=4.656, p<0.011$) and also depending on the school that the children attended ($F(1,131)=5.794, p<0.017$, see Figure 3).

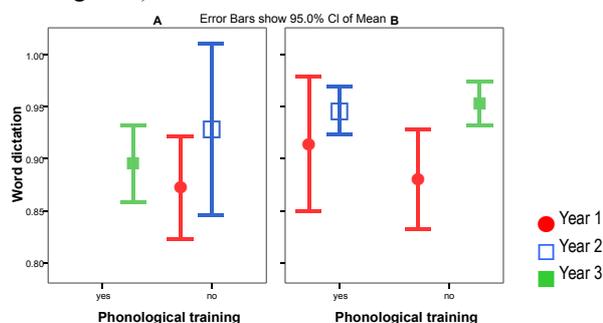


Figure 3 Results from the word dictation test. Means and 95% CI sorted by school (A and B), phonological training and project year.

Figure 4 shows the children's performance on word dictation, sorted by agreement between the word's phonetic and orthographic representation. The performance for words whose orthographic representation directly matches the phonetic structure was significantly better for all the children than for words in which the orthographic representations did not directly match the sound structure ($F(1,131)=329.466, p<0.001$).

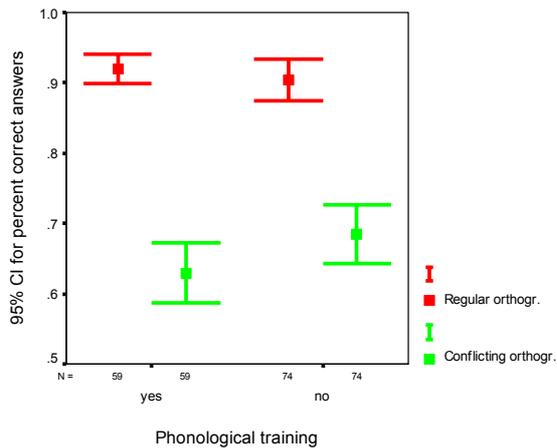


Figure 4: Percentage correct spellings per phonological training, for dictated words with regular or conflicting orthography.

Also a significant interaction between the phonological training and the performance on word dictation was found ($F(1,131)=6.162, p<0.014$). Interestingly, the performance of the phonologically trained group in words with conflicting orthography is worse than for the untrained children.

4. DISCUSSION

The results from the UMESOL 1 tests indicate that the phonological training program has an effect on phoneme analysis, demonstrated by the children's superior ability to divide a word into sounds ("sound segmentation"). This seems to be an important capacity in the early stages of learning how to read and write, along with the ability to combine phonemes to form a word (phoneme synthesis). Studies indicate [4] that it is easier to teach phoneme synthesis skills than phoneme analysis skills to children. This is corroborated by the present results indicating that the phoneme synthesis level does not separate the children's results in any significant way. Accordingly, the effect of the phonological intervention was more noticeable at the phoneme analysis level, where indeed there was a very significant difference in favour of the the children who recieved the additional pedagogical program of language awareness training. The following two tests in the UMESOL 1 battery did not indicate any significant difference between the children's performances.

The results from ITPA indicate a significant enhancement

of the psycholinguistic age ratio for the children who participated in the phonological training program. This does not seem to indicate advantage for the trained group regarding specific aspects of language development. Instead there seems to be a sort of general awareness of language and linguistic processes along with a better capacity of verbalization.

The results from UMESOL 2 do not provide any indication of the phonological awareness training being responsible for any kind of enhancement of the children's reading and writing abilities. The differences that occurred seem to be better accounted for by factors like the school the children attended and/or the pedagogical leadership they were exposed to.

An analysis of the results from the dictation tests with the regularly spelled words and the orthographically deviants suggests however that phonological training might have led the children in the experiment group to listen more to the sounds of the words. Indeed, it was the group of trained children who more often misspelled words with conflicting orthography, probably because they rely more on the phonetics of the words to derive their orthographic representations.

5. CONCLUSIONS

The results from these tests do not provide a clear-cut answer to whether there might be far-reaching effects of phonological training. Initial advantage in general linguistic awareness could be detected as a consequence of the phonological intervention but this effect vanished with time and was eventually overshadowed by the impact of the teacher's pedagogical methods along with other personal and social factors.

However, given previous research results and the fact that the group of children enrolled in the training program that we followed up in this study, there is no reason not to continue betting on language awareness programs for pre-school children. After all, the initial boost on language awareness may have more far reaching beneficial consequences than what possibly can be assessed by the simple reading and writing measures that were used in our study.

ACKNOWLEDGEMENTS

This project was supported by The Swedish Research Council (Grant F0885/1999) and by the municipality of Vallentuna.

REFERENCES

- [1] L. Bradley and P.E. Bryant, "Categorizing sounds and learning to read – a causal connection," *Nature* 301, pp. 419–421, 1983.

- [2] F. Brennan and J. Ireson, "Training phonological awareness: A study to evaluate the effects of a program of metalinguistic games in kindergarten." *Reading and Writing: An interdisciplinary Journal*, vol. 9, pp. 241-263, 1997.
- [3] L. Engen and T. Høien, "Phonological skills and reading comprehension." *Reading and Writing: An interdisciplinary Journal*, vol. 15, pp. 613-631, 2002.
- [4] J. K. Torgesen, S. T. Morgan and C. Davis, "Effects of two types of phonological awareness training in kindergarten children" *Journal of Educational Psychology*, 84, vol. 3, pp 364-370, 1992.
- [5] J. K. Torgesen and C. Davis, "Individual difference variables that predict response to training in phonological awareness." *Journal of Experimental Child Psychology*, vol. 63, pp. 1-21, 1996.
- [6] I. Lundberg, J. Frost and O. Petersen, "Effects of an extensive program for stimulating phonological awareness in preschool children" *Reading research Quarterly*, vol. 23, pp. 263 – 284, 1990.
- [7] M. Tornéus, K. Taube and I. Lundberg, *UMESOL. Fonologisk medvetenhet,Handledning för kartläggning och utveckling*. Psykologiförlaget AB, Stockholm, 1984.
- [8] S. Kirk, J. McCarthy and W. Kirk, *ITPA. The Illinois Test of Psycholinguistic Ability*. 2nd edition. Psykologiförlaget AB, Stockholm.
- [9] K. Taube, M. Tornéus and I. Lundberg, *UMESOL. Läsning och skrivning.Handledning för kartläggning och utveckling*. Psykologiförlaget AB, Stockholm, 1984.