



University of Groningen

## At risk for dyslexia. The role of phonological abilities, letter knowledge, and speed of serial naming in early intervention and diagnosis

Eleveld, Martha Annechien

**IMPORTANT NOTE:** You are advised to consult the publisher's version (publisher's PDF) if you wish to cite from it. Please check the document version below.

*Document Version*

Publisher's PDF, also known as Version of record

*Publication date:*

2005

[Link to publication in University of Groningen/UMCG research database](#)

*Citation for published version (APA):*

Eleveld, M. A. (2005). *At risk for dyslexia. The role of phonological abilities, letter knowledge, and speed of serial naming in early intervention and diagnosis: the role of phonological abilities, letter knowledge.*. s.n.

### Copyright

Other than for strictly personal use, it is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license (like Creative Commons).

### Take-down policy

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Downloaded from the University of Groningen/UMCG research database (Pure): <http://www.rug.nl/research/portal>. For technical reasons the number of authors shown on this cover page is limited to 10 maximum.

## Summary

The study described in this thesis is part of a national Dutch longitudinal intervention study, in which it was attempted, first, to reduce reading and spelling disabilities of children at familial risk for dyslexia (as well as accompanying cognitive, behavioral, social and educational problems) via early intervention, and, second, to explore the role of some basic reading-related abilities in the prediction of dyslexia. The specific contribution of the study described in this thesis is an exploration of the role of phonological abilities, letter knowledge, and speed of serial naming in early intervention and diagnosis of children at familial risk for dyslexia.

Many prospective studies over the last decade have demonstrated the importance of phonological awareness (phonological awareness in the broad sense and phoneme awareness) in predicting dyslexia, and recently, more insight in the independent role of speed of serial naming in predicting dyslexia has been established. Previous intervention studies have shown that phonological awareness can be trained successfully in kindergarten pupils. Training phonological awareness seems most effective if instruction in letter-sound correspondences is included. Direct effects on the trained abilities have been reported, as well as transfer effects on reading and spelling abilities. Empirical evidence of the effectiveness of kindergarten training in speed of serial naming is not available.

In the present study seven hypotheses about the role of phonological abilities, letter knowledge, and speed of serial naming were tested. To test these hypotheses, children at familial risk for dyslexia (that is, children with at least one dyslexic parent) were followed from their entrance into kindergarten (4-year-olds) till the end of grade 1. Three different at-risk groups were composed. Experimental group 1 consisted of at-risk children who were trained in kindergarten years 1 and 2. Experimental group 2 comprised at-risk children who were only trained in the second kindergarten year. Children in control group 1 were not trained at-risk children. A second control group (control group 2) was drawn from the general kindergarten population.

The intervention given to children in the first kindergarten year was focused on improving phonological skills and nonalphanumeric serial naming speed skills. Children were not yet trained in letter-sound associations. The intervention given to children in the second year of kindergarten was focused on improving phoneme awareness skills and serial naming speed skills (alphanumeric and nonalphanumeric), in combination with letter-sound instruction. Thirty 20-to 30-minute training sessions were provided (two sessions per week over a period of 15 weeks) in both the first and second kindergarten year's intervention.

Five of the seven hypotheses in this study concern early intervention. First, it was hypothesized that training phonological awareness and nonalphanumeric serial naming speed in the first kindergarten year would have direct effects on the trained abilities of phonological awareness and serial naming speed of children at-risk for dyslexia. This hypothesis was not confirmed. Results showed that the training remained ineffective in improving reading-related abilities in the first kindergarten year of Dutch 4-year-olds at-risk for dyslexia.

Second, it was expected that training phoneme awareness (in combination with letter-sound instruction) and serial naming speed (alphanumeric and nonalphanumeric) in the second kindergarten year would have direct effects on the trained abilities of phoneme awareness, letter knowledge, and serial naming speed of children at-risk for dyslexia. This hypothesis was only partly confirmed. Results showed that phoneme awareness (in combination with letter-sound instruction) can be successfully trained in the second kindergarten year. The training improved children's phoneme awareness and letter knowledge. The intervention was not effective in improving serial naming speed. It seems that serial naming speed is a cognitive ability that is hard to improve by training.

Third, it was hypothesized that starting training in the first kindergarten year (and continuing training in the second kindergarten year) would be more effective in improving reading-related abilities than a training that starts in kindergarten year 2. This hypothesis was not confirmed. No significant differences between experimental group 1 (trained in the first and second kindergarten year) and experimental group 2 (trained in the second kindergarten year) were found on reading-related measures in the second kindergarten year, indicating that the first kindergarten year's intervention program did not facilitate the second kindergarten year's intervention.

Fourth, it was anticipated that training phonological awareness, letter knowledge, and serial naming speed in kindergarten would have transfer effects on reading and spelling abilities in grade 1. In other words, the training would result in a lower incidence of primary symptoms of dyslexia (i.e., poor reading and spelling performance). This hypothesis was not confirmed. Transfer effects of the intervention on reading and spelling ability in grade 1 were not found. When percentages of possibly dyslexic and normal reading children at the end of grade 1 were calculated, no differences occurred.

Fifth, it was expected that starting training in the first kindergarten year (and continuing training in the second kindergarten year) would be more effective in improving reading and spelling abilities than a training that starts in kindergarten year 2. This hypothesis was not confirmed. There appeared to be no significant differences between experimental group 1 and experimental group 2 on reading and spelling measures in grade 1. This indicates that the intervention in the first kindergarten year did not facilitate the second kindergarten year's intervention. Training children in the second kindergarten year is equally effective (or equally ineffective) as training children in the first and second year of kindergarten.

Two of the hypotheses were not confirmed. It was hypothesized that training phonological awareness and serial naming speed in the first kindergarten year would have direct effects on the trained abilities of phonological awareness and serial naming speed of children at-risk for dyslexia. This hypothesis was not confirmed. Results showed that the training remained ineffective in improving reading-related abilities in the first kindergarten year of Dutch 4-year-olds at-risk for dyslexia.

This hypothesis was only partly confirmed. Results showed that phoneme awareness (in combination with letter-sound instruction) can be successfully trained in the second kindergarten year. The training improved children's phoneme awareness and letter knowledge. The intervention was not effective in improving serial naming speed. It seems that serial naming speed is a cognitive ability that is hard to improve by training.

Second, it was expected that training phoneme awareness (in combination with letter-sound instruction) and serial naming speed (alphanumeric and nonalphanumeric) in the second kindergarten year would have direct effects on the trained abilities of phoneme awareness, letter knowledge, and serial naming speed of children at-risk for dyslexia. This hypothesis was only partly confirmed. Results showed that phoneme awareness (in combination with letter-sound instruction) can be successfully trained in the second kindergarten year. The training improved children's phoneme awareness and letter knowledge. The intervention was not effective in improving serial naming speed. It seems that serial naming speed is a cognitive ability that is hard to improve by training.

Parts of the hypotheses were not confirmed. It was hypothesized that training phonological awareness and serial naming speed in the first kindergarten year would have direct effects on the trained abilities of phonological awareness and serial naming speed of children at-risk for dyslexia. This hypothesis was not confirmed. Results showed that the training remained ineffective in improving reading-related abilities in the first kindergarten year of Dutch 4-year-olds at-risk for dyslexia. This hypothesis was not confirmed. Results showed that the training remained ineffective in improving reading-related abilities in the first kindergarten year of Dutch 4-year-olds at-risk for dyslexia.

It seems plausible that the lack of direct effects is due to a number of factors, such as the less important role of phonological awareness and serial naming speed in the prediction of reading and spelling ability in grade 1. It seems plausible that the lack of direct effects is due to a number of factors, such as the less important role of phonological awareness and serial naming speed in the prediction of reading and spelling ability in grade 1.

by intervention. First, it nonalphanumeric serial effects on the trained of children at-risk for showed that the training in the first kindergarten

ss (in combination with (alphanumeric and ave direct effects on the and serial naming speed arly confirmed. Results r-sound instruction) can The training improved e intervention was not erial naming speed is a

first kindergarten year ould be more effective orts in kindergarten year t differences between indergarten year) and 1 year) were found on ndicating that the first he second kindergarten

cal awareness, letter ave transfer effects on e training would result i.e., poor reading and Transfer effects of the ere not found. When 1 at the end of grade 1

indergarten year (and be more effective in starts in kindergarten 1 to be no significant 1 group 2 on reading ervention in the first 1 year's intervention. e effective (or equally kindergarten.

Two of the seven hypotheses in this study concern early diagnosis. First, it was hypothesized that children at familial risk for dyslexia would show deficits in reading-related variables (phonological awareness, speed of serial naming, and letter knowledge) in kindergarten and in reading-related variables (phonological awareness, speed of serial naming, and letter knowledge) and reading and spelling abilities in grade 1 compared to the general population.

This hypothesis was, for the most part, confirmed. The at-risk sample showed deficiencies in speed of serial naming, letter knowledge, and phoneme awareness in comparison with children from the general population in the second kindergarten year. Grade 1 comparisons revealed a significant difference between at-risk children and children from the general population on letter knowledge in January, as well as significant differences on speed of serial naming, reading ability, and spelling ability at the end of first grade.

Second, it was hypothesized that speed of serial naming would show stronger predictive and concurrent relations with reading ability in grade 1 than phonological awareness (in the broad sense) or phoneme awareness. It was expected that, at kindergarten level, nonalphanumeric naming measures would show strong relations with reading ability. When children grow older, the relation between word-reading speed and alphanumeric naming speed would be stronger than the relation between word-reading speed and nonalphanumeric naming speed. For spelling ability in grade 1, it was expected that phonological awareness would show stronger predictive and concurrent relations than speed of serial naming.

Parts of this hypothesis were confirmed. Results indicated that speed of serial naming is a reading-related factor that contributes to the prediction of reading ability independent of phonological awareness. In the first kindergarten year, speed of serial naming dominated the prediction of reading *and* spelling ability. After the first kindergarten year, speed of serial naming no longer played a significant role in the prediction of spelling. Results of this study showed that both phonological awareness in the broad sense (measured in the first kindergarten year) and phoneme awareness (measured in the second kindergarten year) did not contribute substantially to reading and spelling ability in grade 1, with the role of phoneme awareness being even less important than the role of phonological awareness. The best predictor for spelling from measures in the first kindergarten year, was speed of serial naming, and from measures in the second kindergarten year, visual matching. Phoneme awareness only accounted for some variance in the concurrent prediction of spelling ability at the end of grade 1. Grade 1 results showed an increased importance for phoneme awareness in the prediction of reading and a shift from nonalphanumeric to alphanumeric naming speed as important predictor of reading ability.

It seems plausible to argue that the ineffectiveness of this study's intervention is due to a number of factors, viz., the transparency of Dutch (and therefore, the less important role of phonological awareness as predictor of reading ability), the difficulty to train (the more important early predictor) speed of serial naming, and

the fact that the intervention was given prior to explicit instruction in reading and spelling. Because the most likely threats for the quasi-experimental research design were controlled for, the validity of these inferences seems plausible.

Results of this study have some important implications for educational policy and practice. It is recommended to check, at children's start in kindergarten, if dyslexia runs in the family. If dyslexia runs in the family, children have an increased chance of getting severe reading and spelling problems in grade 1. In the first kindergarten year, at least children at familial risk for dyslexia (but preferably all kindergarten pupils) should be screened on speed of serial naming. Besides the robust character of speed of serial naming in the prediction of dyslexia, the serial naming speed measures have also proven to be adequate testing instruments, which are quick and easy to administer at various age levels.

This study showed that the reading-related abilities important for early diagnosis are probably less suited for early intervention. To prevent reading and spelling difficulties, as well as accompanying problems (in social, emotional, behavioral, and educational domains), an intervention program should probably be explicitly linked to reading and spelling instruction. Because reading is a domain-specific process, training the reading ability itself instead of training reading-related abilities seems most appropriate. The best intervention seems a revised reading curriculum for children at risk for dyslexia, which can be offered right from the start of formal reading instruction.

- Adams, M. J., *Focus on awareness in reading*.  
Brookes Publishing Co., Baltimore, MD.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed., text revision). Washington, DC: Author.
- Ball, E. W., & Blachman, B. A. (1991). *Assessing the impact of kindergarten reading instruction on young children's reading development*. *Journal of Educational Psychology*, 83, 283-291.
- Blachman, B. A. (1997). *Phonological awareness in reading: A cross-linguistic analysis*. *Journal of Educational Psychology*, 89, 188-203.
- Borström, I., & Elbro, C. (1998). *Phoneme awareness and reading development: A longitudinal study of children at risk for dyslexia*. *Journal of Educational Psychology*, 90, 1-11.
- Borström, I., & Petersen, J. (1998). *Phonological awareness and reading development: A longitudinal study of children at risk for dyslexia*. *Journal of Educational Psychology*, 90, 1-11.
- Copenhagen, Denmark: University of Copenhagen.
- Bowers, P. G. (1999). *Reading disability: A developmental perspective*. *Journal of Educational Psychology*, 91, 1-11.
- Bowers, P. G., & Snowling, S. (2000). *Reading disability: A developmental perspective*. *Journal of Educational Psychology*, 92, 1-11.
- Bowers, P. G., & Wolf, J. L. (1993). *Reading disability: A developmental perspective*. *Journal of Educational Psychology*, 85, 1-11.
- Writing*, 5, 69-80.
- Bradley, L., & Bryant, P. (1983). *Phonological awareness in reading: A developmental perspective*. *Journal of Educational Psychology*, 75, 1-11.
- Brennan, F., & Ireson, R. (1998). *Reading and writing: A developmental perspective*. *Journal of Educational Psychology*, 90, 1-11.
- Brus, B. T., & Voet, J. (1998). *Reading and writing: A developmental perspective*. *Journal of Educational Psychology*, 90, 1-11.
- Bus, A. G., & van IJzendoorn, L. H. (1998). *Reading and writing: A developmental perspective*. *Journal of Educational Psychology*, 90, 1-11.