

## Introduction: The Early Prediction of Reading and Spelling

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Longitudinal research on cognitive prerequisites of reading and spelling has accumulated over the last two decades. Much of this research has been fuelled by the concern about high rates of children with learning problems. The idea that the early identification of learning problems in preschool or kindergarten could lead to appropriate early interventions and thus minimize reading and spelling problems in school has certainly stimulated research on this issue (cf. Bradley & Bryant, 1985).

A first generation of studies summarised in meta-analyses by Horn and Packard (1985) and Tramontana, Hooper, and Selzer (1988) suffered from the problem that the selection of predictor measures was not guided by theoretical considerations: most of the measures assessed in these studies (e.g., motor skills, behavioural-emotional functioning, general cognitive ability) were not proximal to reading processes. Interestingly enough, many of these measures predicted later reading performance surprisingly well, even when only one single predictor variable was used. However, one general problem with these predictor measures was that their differential validity was low: That is, they not only predicted reading performance but were equally suited to predict math achievement and performance on other subject matters in elementary school.

A second generation of longitudinal studies has taken care of this problem in that the selection of predictor measures was primarily guided by theoretical assumptions concerning necessary and sufficient prerequisites of reading and spelling. Compared with the first generation of studies, these more recent investigations have been more conclusive, as far as the question of important predictor variables is concerned.

Overall, three relevant predictor domains have been repeatedly identified in the literature. These domains will be shortly summarized below.

The majority of longitudinal studies focused on meta-linguistic or *phonological awareness* and its role in predicting subsequent reading. Phonological awareness can be defined as the ability to reflect on and manipulate the phonemic segments of speech (cf. Tunmer & Rohl, 1991; Wagner & Torgesen, 1987). This ability includes aspects of analysis (i.e., segmenting a word into units) as well as aspects of synthesis (i.e., combining the constituent segments of a word into a whole word, as realized in the common sound-blending task).

Most researchers agreed that phonological awareness assessed during preschool and kindergarten years influence subsequent reading skills: There is plenty of evidence that

children's sensitivity to the component sounds in words is related to their progress in reading. One of the controversial issues, however, concerned the question of whether phonological awareness can be acquired without knowledge about the alphabetic code. Whereas Morais and his coworkers (e.g., Morais, 1991; Morais, Cary, Alegria, & Bertelson, 1979) assumed that phonological awareness cannot be developed outside the context of explicit reading instruction, other researchers (e.g., Bradley & Bryant, 1985, 1991; Lundberg, 1991) presented evidence showing that some aspects of phonological awareness like rhyming and word segmentation skills assessed in preschoolers without knowledge of the alphabet are significantly related to reading performance in school. Although the question whether or not knowledge of an alphabet is the cause or consequence of phonological awareness is still a controversial issue, a majority of researchers seem to accept a view that emphasises the reciprocal nature of the process: phonological awareness helps the beginning reader to take advantage of the alphabetic system at the same time that being taught to read may help to develop phonological awareness (cf. Mann, 1991; Liberman, Liberman, Mattingly, & Shankweiler, 1980).

There is also broad agreement in the literature that *early literacy*, that is, insight into the alphabetic system (e.g., letter knowledge) acquired before entering school, is another important predictor of reading and spelling performance (e.g., Lundberg, 1991; Schneider & Näslund, 1992; Skowronek & Marx, 1989). Letters can serve as an effective system representing the phonemic structure of words. Furthermore, print awareness may play an important role as a precursor of reading, although probably not directly linked to the development of reading skills (cf. Lundberg & Høien, 1991).

Third, the importance of memory capacity or *working memory* has been emphasised in numerous studies (see Baddeley, 1986; Brady, 1991; Wagner, 1988; Wagner & Torgesen, 1987). Efficient recoding in working memory seems important for early reading because beginning readers have to accomplish several tasks when confronted with a new word. First, they have to retrieve the sounds of the letters. Next, the initial sounds must be stored while subsequent sounds are being retrieved, and all of the sounds must be kept in working memory for subsequent processing. Third, the entire set of sounds in working memory has to be blended together to form a word.

Given that the importance of phonological awareness, early literacy, and working memory as precursors of reading skills has been demonstrated in a variety of studies, the question arises why another publication should be devoted to this topic. In my view, there are several reasons for dealing with the issue in the *European Journal of Psychology of Education*.

First, the majority of research on early prediction of reading and spelling has been carried out in English-speaking countries (most of it in the United States). Although several research groups in Scandinavia (Lundberg and colleagues) and Belgium (Morais and coworkers) basically confirmed the findings of the Anglo-American studies, more information about possible interactions between aspects of a specific language (e.g., its regularity or difficulty) and predictors of reading and spelling seems necessary.

A search through the Inventory of European Longitudinal in the Behavioural and Medical Sciences (Schneider & Edelman, 1990) identified several longitudinal studies on reading and spelling that may be well-known in their respective countries but in most cases have not yet been presented to an international audience. When asked to contribute to this special issue of EJPE, most researchers involved in these European longitudinal studies agreed to do so. In my view, including studies conducted in Austria, France, Germany, Great Britain, Ireland, Italy, Norway and the Netherlands into this issue should enrich our knowledge about important precursors of reading and writing. In particular, such a collection of European studies may be suited to answer the question whether the same variables predict reading and spelling across different languages.

A second reason to come up with this issue was that some of these European longitudinal studies deal with research questions that have not been frequently addressed in previous Anglo-American studies. In addition to more traditional topics like the impact of phonological processing skills on the acquisition of literacy, some of the European studies also deal with

the influence of semantic and syntactic aspects of language processing on subsequent reading performance, and further include spelling as a criterion variable. In some European countries (e.g., the German speaking countries), spelling is an even more important predictor of school success than reading and general intelligence. As reading and spelling processes differ in several aspects, it seems important to test whether similar theoretical models can be used to predict reading and spelling in school.

Finally, several of the European longitudinal studies have focused on long-term prediction of reading and spelling skills, thus following up a line of research that — mainly due to the cost factor — has been rarely considered in American studies (see Juel, 1988, for an exception to this rule). These studies give valuable information on the consistency of reading and spelling performance over time. They not only inform about general developmental patterns in reading and spelling processes but also focus on the stability of individual differences over the course of elementary school and beyond.

This Special Issue thus presents a selection of papers representing both traditional and new trends in this active research area. Bente Hagtvet provides an overview of studies that deal with the transition from oral to written language, focusing on the relations between early language mastery and subsequent reading and spelling performance. The overview of literature is enriched by findings from two recent longitudinal studies carried out by the author at the Institute for Special Education at the University of Oslo, Norway.

Eva Louvet-Schmauss and Yves Prêteur report on a longitudinal study that examined the importance of kindergarten children's print awareness for reading and writing in first grade. This longitudinal study seems particularly remarkable because it compared the performance of French and German children, thereby focusing on differences in educational contexts in which children develop their competencies.

Lúcia Rego and Peter Bryant present longitudinal evidence about a group of children in their first year at school (in England this means that the children are still younger than 6 years). The hypothesis they test in their study is that children's phonological skills affect their success in word decoding, whereas their semantic and syntactic skills determine their success in using context to work out the meaning of difficult words. The results indicate that different components of oral language skills are important for different aspects of the acquisition of literacy.

Francesca Pazzaglia, Cesare Cornoldi, and Patrizio Emanuele Tressoldi summarize the major results of a long-term research program that they have conducted at the University of Padova, Italy. Some of the studies are related to Rego and Bryant's work in that they assessed the impact of early phonological, syntactic, and semantic processes on decoding and comprehension skills in first and second grade. Other research concerned the respective roles of memory, perceptual, and linguistic variables in predicting reading accuracy, speed, and comprehension.

Susan Gathercole and Alan Baddeley report on data of a longitudinal study that assessed the contribution of working memory to vocabulary acquisition and reading in British children who were first tested at the age of four years, and then followed up in three further waves at ages five, six, and eight years. The results of the study imply that phonological memory skills are directly related to reading development.

Wolfgang Schneider and Jan Carol Näslund summarize findings from the Munich Longitudinal Study of the Genesis of Individual Competencies (LOGIC). In this study, a variety of predictor measures including phonological processing, memory capacity, early literacy, and general cognitive ability were assessed during the last year of kindergarten, and related to children's word decoding, reading comprehension, and spelling skills in elementary school. Furthermore, children-at-risk as defined via kindergarten screening tests were followed up in school. It was shown that whereas group predictions of reading and spelling were quite accurate, the individual prognosis of school problems was less satisfying.

Theo Boland reports on a large longitudinal research project on reading and spelling that was carried out at the Department of Education of the University of Nijmegen, The Netherlands.

In this project, the acquisition of literacy of several hundred Dutch children was observed between Grade 1 and Grade 8, using a total of 17 measurement points. Results of structural equation modeling procedures showed changing relationships among word decoding, reading comprehension and spelling variables over time. The findings also indicated the importance of reading and spelling skills for success in secondary school.

The contribution by Christian Klicpera and Alfred Schabmann continues this theme, again looking at the development of reading and spelling skills in a large sample of school children. Several hundred children from Vienna, Austria, were tested five times between the second and eighth grade. Klicpera and Schabmann found that not only children's cognitive prerequisites but also aspects of their classroom behaviour and social support turned out to be relevant for the long-term prognosis of reading and spelling skills.

Finally, Jean Whyte summarizes the findings from her study of 100 Belfast boys, from age 4 to age 21, carried out from 1975 to 1991. One aspect of her contribution concerns the short- and long-term effects of an early language intervention on reading development up to age 16. Another set of research questions addressed in Whyte's paper focused on the development of good and poor readers. For example, a question rarely followed up in previous research concerned the educational and social outcomes at the age of 21 for those who had been good and poor readers at the age of six years.

Taken together, this Special Issue presents findings from a variety of European longitudinal studies on reading and spelling, most of which have not been accessible to an international readership so far. I do hope that the publication of this work in the EJPE will not only stimulate further research on early predictors of reading and spelling but also facilitate international cooperation in studying this fascinating issue.

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*The article discusses relations between early oral language abilities and reading and writing development as reflected in longitudinal research. The observation that poor reading is less accurately predicted than superior reading is documented, and developmental characteristics of poor readers and superior readers, respectively, are described. The importance of early intervention is emphasized both by reference to experimental research and by a documented high consistency between reading at ages 2-3 and reading in adolescence.*

## Introduction

One of the most striking issues in literacy research regards the relationships between preschool mastery of skills and knowledge and the following reading and writing development. The issue has been especially addressed in early as well as in more recent longitudinal research, but our understanding of the long-range relationships are still rather rudimentary. The last 10 years of research have, however, identified some variables of presumed critical relevance to literacy development. Developmental patterns from early childhood to adolescence have been described, and experimental research has shed light on the potentialities of preventive intervention.

In the following I shall discuss some of the contributions of studies that have explicitly focused on the relations between early language mastery and the following reading and writing development. In particular I shall focus on findings obtained in two longitudinal studies that were carried out at the Institute for Special Education, University of Oslo, Norway (Ingvald, 1987, 1988, 1989, 1990; Hagrin & Philander, 1990). Characteristics of the early reader as well as the preschool child at risk of developing a reading problem will be described, and variables influencing their literacy development will be discussed. The importance of early intervention is finally emphasized by reference to experimental research.