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Early Identification and Prevention of Reading Problems

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Introduction and Subject

If left untreated, difficulty with reading and writing compromises knowledge acquisition, exposes a child to repeated experiences of failure, and thus may reduce motivation for learning in general.[1] Such consequences can have a long-term impact on educational career, the learning of skills, and ultimately, the employment status that could otherwise be achieved.

For a substantial number of children, the acquisition of reading and spelling is a difficult challenge. The consequences and length of delay in this acquisition vary as a function of the nature of the writing system (orthography) being learned. In a highly regular orthography, such as Finnish, roughly 6% of children have difficulties with acquisition, while more than 3% have severe difficulties and may continue to read too slowly to facilitate the adequate comprehension of demanding text. Most, if not all, of these children can be observed to have a familial (genetic) background to their difficulties. By contrast, among children who acquire reading skills in less orthographically regular languages, such as English, the proportion of spontaneous learners is smaller and the number of delayed early learners is relatively larger, with more than 10% of

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young readers of English facing problems in achieving sufficient accuracy and fluency of reading and spelling.[2]

Children in need of preventive training can be identified early by using two sources of information: the history of parents and/or other close relatives, such as siblings, in relation to reading (familial background); and the development of those skills that can predict reading acquisition. The Finnish prospective data, on which the present report is based, reveal that even very early indices may be predictive.

Problems

Two important issues are how to identify those in need as early as possible and the actual nature of prevention.

Research Context

Only a small area of reading-related research has focused on early identification and prevention. Those studies that have provided information about early identification[3,4,5,6,7] have consistently observed a number of significant predictive indices. Information on family background is helpful.[3,8,9,10] Gilger et al.[11] have computed that a child with an affected parent has a risk of being dyslexic of up to 80 times what would be expected to occur in the general population. Another study puts the risk at four to five times higher than in a random sample.[10] In replicating and complementing earlier findings published by Scarborough,[6] the Jyväskylä Longitudinal Study of Dyslexia (JLD),[12,13] which looked at 100 children at familial risk for dyslexia (and matched non-risk controls) from birth to school age, found that 40% of children at familial risk encountered difficulties in acquiring reading skills, with 20% encountering very severe reading problems. The prevalence of difficulty in the control group in comparison to this 20% group with severe difficulties and with familial background was only 2%. Thus, the most persistent reading problems apparently occur among children with a familial background of dyslexia.

Although multiple developmental paths lead to dyslexia,[12-15] ultimately the common factor is compromised reading, expressed from the first steps of reading acquisition, such as learning of letter names. In terms of prevention and irrespective of the etiology of any difficulty associated with reading, this means that time spent in training and strengthening the core reading processes is the most likely guarantor of success in terms of elevating reading skill.

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Key Research Questions

Finnish is one of the most regular writing systems: there are only 21 phonemes/letters, a letter from the Swedish alphabet (as the second official language) and 1 two-letter grapheme. Six additional phonemes occur only in loan words. With little exception therefore, each single sound in the Finnish language is consistently represented by a single letter and vice versa. With such bi-directionally consistent correspondence between the graphemes and phonemes of Finnish, the learning load is therefore minimal. Consequently, Finnish children's reading problems tend to manifest in the storage and fluent automatic retrieval of these few letter-sound connections. This difficulty can even occur in children with average to above-average IQ and surprisingly, sometimes in children with good or precocious general language development. This poses a challenge to the early identification of children with such an explicit specific reading difficulty.

Recent Research Results

Results from the JLD have shown that speech processing and perception measures taken in infancy[16-20] and delayed expressive language and to some extent, delayed receptive language in toddlerhood, can differentiate children who end up with reading problems from those who do not, among children at familial risk for dyslexia.[21] From age three, the predictive measures include phonological skills.[22] However, the single most easy to use and reliable predictor is letter knowledge from three years of age;[23] when combined with rapid naming[24] at age five or later, low scores on both of these indices seem to lead to accurate prediction of reading failure, with only a few false positives if no preventive training is provided.

In some cases, the difficulty ican be observed solely in letter-sound learning. This finding is not surprising, as it is acknowledged that the effects of including letters in phonology training programs are additive.[25,26,27] Thus, dynamic testing of letter sounds from age four may be the most appropriate single tool for early identification, as letter sound learning difficulty seems to be a bottleneck, irrespective of the developmental path which precedes the reading failure.[28] For learners of transparent writing systems, the initial focus of this dynamic testing should involve vowel sound items (before introduction of consonants). In contrast, and in the absence of such solid consistency between sounds and letters, more complex writing systems such as English should focus on sound items that are most consistent in terms of occurrence in the language. As a consequence, no child in need would be left without preventive support if, during dynamic assessment, those children who demonstrate low scores in storing letter names, are afforded the

opportunity to start learning the sounds of the written items, not later than at the time of school entry (see below).

All this provides cues to the best prevention strategies. Nevertheless, the letter-sound association learning should be organized in such a way that the child enjoys learning and continues to practice until the goal has been reached. In Finnish, this goal is simply the learning of the letter-sound connections. The case with less regular orthographies, such as English, is much more complex, and this poses a major challenge to learning the connections between written and spoken language units. Nonetheless, we believe that a preventive training procedure, using a consistency principle that favours the most dominant and frequent letter-sound connections as the initial step, is the most appropriate for preventive training of reading in alphabetic languages, irrespective of the complexity of the orthography. One such preventive tool that we have developed (GraphoGame)[29] is based on a computer game that ensures that children experience success, thus motivating them to continue for long enough to achieve the goal of learning the letter-sound relationships. This computerized intervention has demonstrated success (acceleration of letter knowledge, especially in those children with poor initial pre-reading skills) when implemented in the beginning phase of reading acquisition in Finnish.[30,31] Preliminary findings concerning English, especially in the context of GraphoGame Rime, are also promising,[32] while extension of GraphoGame to other languages, including learning English as a second language, is having a noticeable impact.[33] The criticisms of many (albeit effective) remediation programs often relate to their cost-effectiveness in terms of implementation costs and manpower requirements.[34] With its simplicity, child-friendly and child-directed interface, the GraphoGame computer game environment ensures better economy on both of these counts.

Conclusion

Children who are at high risk for difficulties in the acquisition of basic reading skill should be helped as early as possible. Those in need of preventive practice can be identified with simple methods of letter-sound acquisition, the core skill of reading. This can be practiced long before the child encounters too many experiences of failure at school: encounters that may have detrimental effects on learning motivation. Such training should, however, be highly enjoyable and, when provided in a game context, appropriate for children at this age – five to six years.

Implications

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Children, especially those whose familial background points to the possibility of risk for reading failure, should be attended to from age two with regard to language development. If no delay is observed, the next stage of identification of potential risk is at age four, when spontaneous acquisition of letter knowledge provides good evidence of the possible need for preventive practice. If no or few (1 to 5) letters are familiar to the child, a short game to learn some new letter-names is instigated. If acquisition proves difficult, the child may require slowly increasing attention to reading-related learning. All activity that aids the development of language skills is to be welcomed but, from age five, more systematic practice (realized in the context of play) of at least 5 to 20 minutes' duration per day should be in place for the years (kindergarten to grade 2-3) during which the child needs help in order to match classmates' rate of learning. It is important that rudimentary skills be acquired sufficiently early to help the child glean enjoyment from reading. Beyond this, the best learning environment is, of course, reading itself, and the most challenging issue is how to sustain the child's interest in reading. The results of the JLD, as well as U.S. data,[35] show that approximately 20% of children who have familial background and serious difficulty at the beginning of their reading acquisition become fully "compensated." The main characteristic of these individuals is a sustained interest in literacy, as documented by their long educational careers.

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