

# Language skills and learning to read

**A** CHILD'S first words are a momentous occasion, but for many parents late talking goes unnoticed. If the child is the firstborn of the family, no comparisons can be made, and relatives may reassure 'It's OK, he's a boy' (and boys are more likely to be late starters). Later in the preschool years, a child may be difficult to understand; he or she might have a large repertoire of their 'own words' that others find unintelligible. Often such babble is endearing, the source of family amusement, and no one worries much because an older sibling can translate. But speech or language delay can be the first sign of reading difficulties – difficulties that will only come to the fore when the child starts school. The problem for parents and clinicians is to know when a language delay is an issue for concern, and when it is just part of typical variation.

## From letters to sounds

Language is a complex system that requires the coordinated action of four interacting subsystems. *Phonology* is the system that maps speech sounds onto meanings, and meanings are part of the *semantic* system. *Grammar* is concerned with syntax and morphology (the way words and word parts are combined to convey different meanings) and *pragmatics* is concerned with language use. An assumption of our educational system is that by the time children start school, the majority are competent users of their native language. This is a reasonable assumption. But those



Presidents' Award winner **MARGARET J. SNOWLING** looks at risk and protective factors.

who aren't very good with words start out at a disadvantage, not only in speaking and listening skills, but also in learning to read – written language builds on a foundation in oral language skills.

It is useful to distinguish *speech skills* from *language abilities* when considering literacy development. Learning to read in an alphabetic system, such as English, requires the development of mappings between speech sounds and letters – the so-called alphabetic principle – and this depends on speech skills. Wider language skills are required to understand the meanings of words and sentences, to integrate these in texts and to make inferences that go beyond the printed words.

More formally, the relationship between oral and written language skills has been simulated in computational models of the reading process. In the triangle model of Plaut *et al.* (1996) reading is conceptualised as the interaction of a phonological pathway mapping between letters and sounds and a semantic pathway mapping between letters and sounds via meanings (Figure 1). In the early stages of learning to read, children's attention is devoted to establishing the phonological pathway ('phonics'). Later, children begin to rely increasingly on word meanings to gain fluency in their reading. We can think of this as an increase in the role of the semantic pathway, something which is particularly important for reading 'exception' words in English, such as *yacht* and *pint* – words that cannot be processed efficiently by the phonological pathway. Arguably, however, this model is limited for considering the risk of reading difficulties among children with spoken language impairments; the model is of single-word reading but most reading takes place in context. Language skills beyond phonology, encompassing grammar and pragmatics, are needed for making use of context.

## Reading the signs

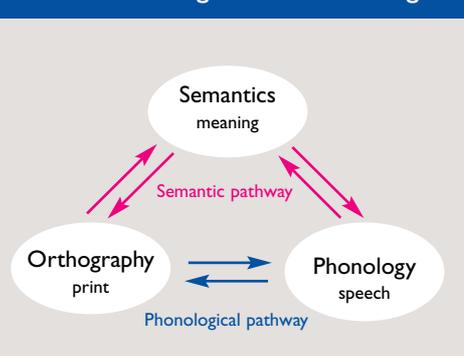
In order to discuss the risk of reading difficulties among children with language difficulties, we need to consider what studies of typical development have told us about the role of language skills in learning to read.

My colleagues and I followed the early reading development of 90 children between the ages of 4 years 9 months and 6 years 9 months (Muter *et al.*, in press), assessing them annually on tests of letter knowledge, word recognition and phonological awareness (rhyme and phoneme). They were also given a test of vocabulary at 4 years 9 months, and two tests of grammar at 5 years 9 months (one requiring the child to order words to make a sentence and one requiring them to inflect words in a morpheme generation task, e.g. *walk* ⇒ *walking*). We also measured their reading comprehension at the end of the study.

Using path analysis, we found that phoneme awareness and letter knowledge at the age of four predicted word recognition at age five. From age five to age six there were three predictors: phoneme awareness, letter knowledge and five-year-old word recognition. In short, when earlier word-recognition skills were controlled in this model, there were just two early predictors of word recognition at age six – phoneme awareness and letter knowledge. Children who come to school knowing letters and being able to segment spoken words into speech sounds fare better in the reading stakes. As Byrne (1998) has argued, these two skills are fundamental to the alphabetic principle; but what then is the role of wider language skills beyond phonology?

To answer this question we ran two further analyses. In the first, we showed that neither vocabulary measured at four years nor grammar measured at five years

**FIGURE 1** Triangle model of reading



Adapted from Seidenberg & McClelland (1989).

predicted word recognition at age six. However, when the outcome was reading comprehension rather than word recognition, both vocabulary and grammatical awareness were important predictors, together with earlier word recognition. It seems that vocabulary and grammatical awareness, together with basic word recognition measured at age five, are the foundations of reading comprehension at age six.

### Evidence from atypical populations

With these findings as a backdrop, we can make some predictions about the risk of reading impairments in children; since phonological difficulties will affect the development of phoneme awareness and also affect the child's ability to learn letter sounds (a phonological learning task), children with poor phonology will be at risk of poor word recognition. On the other hand, we can predict that wider language difficulties will place children at risk of reading comprehension difficulties. However, identifying the predictors of reading among typically developing children is not the same enterprise as identifying who will become a poor reader. A range of factors both intrinsic to the child and environmental in origin can modify the outcome of a child who might be considered 'at risk'. So what is the evidence from atypical populations of the

association between different language deficits and different patterns of reading impairment?

It is now well established that children with dyslexia (who typically have word-recognition deficits in the absence of poor comprehension) have phonological deficits. Marshall *et al.* (2001) got children to remove a phoneme from a spoken non-word (phoneme deletion, e.g. *bice*, take away *b* is *ice*), and to repeat non-words. Children with dyslexia were worse than children of the same age and younger children reading at the same level. Perhaps less well recognised are the phonological learning difficulties of these children. Kristina Goetz in our lab taught children with dyslexia a set of Greek letter-names. Each letter was shown twice paired with its name, followed by six learning trials with feedback. They learned fewer letters than children of the same age, performing only as well as younger reading age controls. Thus, given the problems children with dyslexia have in the two basic components of alphabetic skill (letters and phonemes), it is not surprising that they have difficulties developing decoding skills (the phonological pathway within the triangle model).

On the other side of the coin is a reading impairment affecting 'poor comprehenders': children with normal decoding skills but impaired reading comprehension. Studies conducted by

Kate Nation and me (Nation & Snowling, 1998) suggest that these children's difficulties are semantic in nature. Thus, although poor comprehenders perform at the normal level on phonological tasks (e.g. generating rhyming words), they have problems of oral fluency in a task in which they are given a target word (e.g. *plate*) and have to generate semantically related words in a 30-second interval (e.g. *knife, fork*). They are also impaired when judging whether pairs of spoken words are similar in meaning, both in terms of accuracy and in the time it takes to make the judgements. Thus, poor comprehenders have an impairment of semantics that, within the triangle model compromises the use of the semantic pathway. As a consequence they have subtle impairments of exception word reading but their use of the phonological pathway is unimpaired.

Findings from children with dyslexia and children with selective deficits of reading comprehension suggest that there is a degree of modularity in the developing reading system. Furthermore, they confirm that poor phonology should be considered a risk factor for problems of word recognition, whereas semantic impairments (principally poor vocabulary) carry the risk of poor reading comprehension. But pure disorders are rare in development; more commonly, children's reading difficulties reflect the balance of their language strengths and weaknesses, modified by any interventions they have received.

### Studying 'at-risk' children

The interaction of different language skills in determining the literacy outcomes of children at risk of reading failure can be seen clearly in a family study of dyslexia recently reported by Snowling *et al.* (2003). This study followed the progress of preschool children, recruited just before their fourth birthday, who were considered 'at risk' of dyslexia. The risk in this case was carried by virtue of the fact that they had a parent with a history of reading difficulties, although it is interesting to note that some 38 per cent of these children were late talkers. As we will see later, the children in this sample did not show the typical modular deficit in phonological skills that characterises research samples of children with dyslexia who are recruited at school age.

The children in the 'at risk' study were assessed at four, six and eight years of age on a large battery of tests of language and

reading-related tasks (we also looked at their motor skills, behaviour and psychosocial development, but those findings will not be discussed here). At each point in time they were compared with children in a control group who came from families who had no history of reading impairment but were similar in socio-economic circumstances. As predicted, at eight years of age, we found an increased risk of poor reading and spelling among the children at family risk of dyslexia. Our definition of poor literacy was having literacy skills one standard deviation below the average of the control group. In relation to this norm, 66 per cent of the family sample was affected.

We then proceeded to compare the

developmental profiles of the at-risk affected children (to whom we will refer as dyslexic), those at-risk children who became normal readers and the control group (removing four cases of dyslexia).

---

**'At six, the dyslexic group were already showing difficulty with phonological awareness tasks'**

---

At four years, the oral language development of the dyslexic children was slow compared with that of the two normal reader groups. At six, the dyslexic group were already showing difficulty with phonological awareness tasks, particularly phoneme awareness, after only a short time of reading instruction. On phonological awareness tasks, there was a non-significant trend for the at-risk normal readers to be slightly worse than the control group that was not seen for oral language development.

The performance of the groups on tests of early literacy skill showed a somewhat different picture. As expected, the children with dyslexia were impaired in letter knowledge and on a test of phonic skill (the number of words they were able to write correctly in a spelling test). However, the performance of the at-risk children who went on to be normal readers was also less good than that of controls; it was midway between that of the controls and the children with dyslexia on the test of letter knowledge and as poor as the affected group on the phonetic spelling test.

In summary, the at-risk children who went on to be classified as dyslexic had impairments on a wide range of measures. These included phonological awareness and letter knowledge but extended to other measures of oral language, such as vocabulary and expressive grammar. The at-risk children who went on to be normal readers were as poor as the children with dyslexia in tasks tapping the use of the phonological pathway, and they were moderately impaired in letter knowledge, but their (non-phonological) oral language

## WEBLINKS

Centre for Reading and Language:

[www.york.ac.uk/res/crl](http://www.york.ac.uk/res/crl)

Afasic: [www.afasic.org.uk](http://www.afasic.org.uk)

Dyslexia Institute: [www.dyslexia-inst.org.uk](http://www.dyslexia-inst.org.uk)

British Dyslexia Association: [www.bda-dyslexia.org.uk](http://www.bda-dyslexia.org.uk)

development was normal. Since these children did not succumb to reading deficits at eight years, we must assume that they were able to compensate for the phonic decoding deficit they experienced, possibly by relying on their good language skills. In terms of the triangle model then, the at-risk normal readers showed a selective impairment of the phonological pathway at six, which was compensated by age eight.

It follows that the risk of reading impairment is not all or none. Among the children whose parents are dyslexic, there are a number of different outcomes. These include a pervasive reading impairment affecting both word recognition and reading comprehension associated with poor language; classic dyslexia; a 'hidden' (compensated) reading impairment; and a pattern of normal reading. It seems that the developmental outcome for a child at risk of poor reading depends not only on how severe their phonological difficulties are, but also on the other language skills they bring to the task of learning. Those who have good vocabulary and wider language skills are likely to be able to compensate better, modifying the genetic risk they carry of becoming dyslexic.

### Making a difference

Another potentially protective factor for children at risk of reading failure is early intervention. In a recent study Hatcher *et al.* (2004) attempted to circumvent the development of reading problems in children who entered school with poor vocabulary and poor phonological awareness. This study involved 20 schools in which we trained the reception and Year 1 teachers to teach reading using a highly structured phonic approach in which children are taught to link letters and sounds in the context of their reading. In addition, some children in the study had the reading programme supplemented with oral phonological awareness training.

There were four matched groups in the study; one received reading intervention comprising phonic reading (PR) alone, one received PR together with training about the rhyming relationships between words, one received PR and training in phoneme skills, and a final group received PR and training about phonemes and rhymes.

Two points need to be made about our results. First, for children who were not at risk of poor reading, supplementing the phonic reading programme with training in oral phonological awareness made no

difference; it was not needed. The typically developing children appeared to benefit from a phonic teaching programme that encouraged them to sound out words and to use context without oral training. However, for the at-risk group, supplementing the programme with phonological awareness training was helpful.

By plotting the performance of the at-risk children in standard scores at each time point relative to the non-at-risk mean, we found that children who receive only reading tuition show a widening gap

### 'speech skills are the foundation of word-recognition processes in reading'

between their performance and that of their peers. However, supplementing the programme leads to a stemming of this decline; this upturn occurs earliest for the programme that involves training phonemes.

The programme used in this study was delivered in the first two years of school, but on a whole-class basis. The findings are positive, but they suggest that whole-class instruction will not be sufficient to prevent the development of reading difficulties in children who are at risk of reading problems. These children may need more intensive intervention through individual or small group teaching to prevent them going on to develop reading difficulties.

I began by distinguishing the roles of speech and language skills in the

development of reading. I argued that speech skills (phonology) are the foundation of word-recognition processes in reading, while language skills are critical to language comprehension (our focus was on semantics, but grammar and pragmatics are likely to be important too, particularly in explaining how children use context during their reading). The findings from atypical development suggest that speech and language skills work together to determine literacy outcomes. At the core of reading difficulties are phonological problems, but children with good language skills beyond phonology can use these to bootstrap their ineffective phonic skills, probably by using context in reading. This is why interventions that train phoneme awareness and at the same time encourage children to make full use of phonological, semantic and syntactic cues in text are effective for children with reading difficulties.

Finally, to return to our initial question, when does slow speech development become a cause for concern? Findings from recent research on children who have speech difficulties suggest that, for them too, having good language mitigates the risk of reading failure (Stothard *et al.*, 1998). However, if the speech difficulty is severe and persists into the school years, then poor reading is a likely concomitant, regardless of whether wider language skills are also impaired (Carroll & Snowling, 2004; Nathan *et al.*, in press).

■ Professor Margaret Snowling is at the University of York. E-mail: [m.snowling@psych.york.ac.uk](mailto:m.snowling@psych.york.ac.uk)

### References

- Carroll, J.M. & Snowling, M.J. (2004). Language and phonological skills in children at high-risk of reading difficulties. *Journal of Child Psychology and Psychiatry*, *45*, 631–640.
- Hatcher, P.J., Hulme, C. & Snowling, M.J. (2004). Explicit phonological training combined with reading instruction helps young children at risk of reading failure. *Journal of Child Psychology and Psychiatry*, *45*, 338–358.
- Marshall, C.M., Snowling, M.J. & Bailey, P.J. (2001). Rapid auditory processing and phonological processing in normal readers and readers with dyslexia. *Journal of Speech, Hearing and Language Research*, *44*, 925–940.
- Muter, V., Hulme, C. & Snowling, M.J. & Stevenson, J. (in press). Phonemes, rimes and language skills as foundations of early reading development: Evidence from a longitudinal latent variable study. *Developmental Psychology*.
- Nathan, L., Stackhouse, J., Goulandris, N. & Snowling, M.J. (in press). Literacy skills and children with speech difficulties. *Journal of Speech, Hearing and Language Research*.
- Nation, K. & Snowling, M.J. (1998). Semantic processing and the development of word recognition skills: Evidence from children with reading comprehension difficulties. *Journal of Memory and Language*, *39*, 85–101.
- Plaut, D.C., McClelland, J.L., Seidenberg, M.S. & Patterson, K. (1996). Understanding normal and impaired word reading: Computational principles in quasi-regular domains. *Psychological Review*, *103*, 56–115.
- Seidenberg, M.S. & McClelland, J. (1989). A distributed, developmental model of word recognition. *Psychological Review*, *96*, 523–568.
- Snowling, M.J., Gallagher, A. & Frith, U. (2003). Family risk of dyslexia is continuous: Individual differences in the precursors of reading skill. *Child Development*, *74*, 358–373.
- Stothard, S.E., Snowling, M.J., Bishop, D.V.M., Chipchase, B. & Kaplan, C. (1998). Language impaired pre-schoolers: A follow-up in adolescence. *Journal of Speech, Language and Hearing Research*, *41*, 407–418.