CHAPTER 2

LEARNING TO READ THE WORDS ON THE PAGE: THE CRUCIAL ROLE OF EARLY PHONICS TEACHING.

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Introduction

Reading is one of the most miraculous of human achievements. Learning to read is one of the most important acts of learning required of children. Small wonder, then, that how children can best be taught to read has been fiercely debated down through the ages.

Reading is also complex, and the word itself is subject to many different definitions and interpretations. We read in order to understand written language - language we see; just as we listen in order to understand spoken language - language we hear. For understanding to happen in reading, we need to process visually presented information (written words). For understanding to happen in listening, we need to process aurally presented information (spoken words). One of the major differences between reading and listening is thus the nature of the information to be processed: the written versus the spoken word. Human beings are biologically endowed to process the spoken word; processing the written word, however, is a culturally determined skill that has to be taught and learned.

This chapter is intended as an introduction to research into the ways in which human beings learn to process the written word: research that seeks to understand how children
come to be able to look at any visually presented word, whether it is presented in a context or by itself, and read it aloud and understand what it means. Unless children do develop efficient processes for recognizing written words, they will not be able to understand written texts; but development of efficient word recognition and comprehension processes does not guarantee understanding at the textual level. Reading the words is a necessary but not a sufficient condition for understanding of written texts to take place. This chapter, then, investigates only the necessary condition – ability to read the words on the page.

A child’s route to reading

Let’s take an imaginary child – always easier to deal with than a real one! Chelsea is five, and she’s just starting school. We are going to follow Chelsea’s journey from not being able to read the words on the page, to doing this with a certain degree of ease: from pre-reader to word reader. Chelsea is going to be a child who takes to reading as naturally as a duck takes to water, and we are going to learn what it is that enables her to be so rapidly successful.

At five, Chelsea’s oral vocabulary is well within the average range for her age: she is a typically developing five-year-old in terms of her ability to understand and produce spoken words. Her grammatical system is also well within the average range for her age: she is also a typically developing five-year-old in terms of her ability to understand and produce a range of different sentence structures. Chelsea is as well able to understand spoken messages and stories as any other typically developing five-year-old. In her short
life, she has experienced the full range of experiences that one might expect an inner-city five-year-old like Chelsea to have experienced. She has attended morning sessions at nursery since she was three and a half. She goes to the shops with her mum, and spends time on the swings in the local playground. She is invited to birthday parties. She travels on buses and in cars, and sometimes on trains. She goes to the doctor. She also frequently visits her nan who lives nearby, and sometimes her granny who now lives by the sea. Her parents, grandparents and nursery teachers/carers have read her lots of stories. We might therefore expect, given her age appropriate language system, and her range of childhood experiences, that once Chelsea learns to read the words on the page, she will be as well able as any typically developing five-year-old to understand the stories she reads. What essential attributes does Chelsea bring to the task of learning to read the words on the page?

Chelsea learned quite a lot about letters before she started school. She’d had an alphabet frieze in her bedroom, and her Nan had a favourite alphabet book that they used to enjoy together. At nursery, she learned the alphabet song, and began to write her name. There was an alphabet frieze at nursery too, and Chelsea and her friends sometimes played at copying the letters from that. By the time she was five, Chelsea could name many of the letters on the alphabet frieze. Knowledge of letter names has frequently been identified in the research literature as a reliable predictor of success in learning to read words: this might be one of the factors that contributed to Chelsea’s capacity to take to reading like a duck to water.
Alphabet books and friezes tend to illustrate each letter with an object whose name starts with the sound of that letter (a picture of a bear to go with B; a picture of an egg to go with E, etc.). So, at five, Chelsea had also begun to realise that letters had sounds as well as names, and she’d begun to associate some of the letters with the sounds they represented. She knew that M was /m/ for mummy, D was /d/ for daddy, N was /n/ for nan, B was /b/ for bear.

From the nursery rhymes her nan taught her, and the rhyming songs and games she played at nursery, Chelsea had got the idea of rhyme. If you asked her what rhymed with ‘cat’, she could tell you that ‘bat’ did, and so did ‘lat’ and ‘dat’. She was beginning to be able to categorise words by the sound patterns they had in common – beginning to be ‘phonologically aware’. At its broadest, phonological awareness involves being able to turn away from the meanings of words and pay attention to their form. Chelsea, like many other young children, became aware first of rhymes. But by the time she started school, Chelsea could also tell you what sound a word started with: that ‘cat’ began with /k/ and ‘dog’ with /d/. She probably was helped towards this by her experience with the alphabet books and friezes, where letters were illustrated by objects whose names began with the sound of the letter; and by the day to day exchanges at home where /m/ was for mummy and /d/ for daddy.

**Understanding the alphabetic principle**

And here we come to the most crucial influence on Chelsea’s flying start in learning how to read words: by the time she started school, she had already begun to understand the
alphabetic principle. She knew that there were letters. She knew that letters could be named and written. She knew that spoken words were composed of sounds. She knew that those sounds could be represented by letters. There is ample research evidence that children who understand these aspects of the alphabetic principle are likely to learn to read words quickly and easily (see, for example, Bus & van Ijzendoorn, 1999; Foorman, Breier & Fletcher, 2003; Mann & Foy, 2003; Treiman, 2000). Moreover, as Brian Byrne has shown in his important longitudinal studies, providing children with teaching that enables them to understand the alphabetic principle before they start school has long lasting beneficial effects on their ability to read the words on the page (Byrne, 1998: pps 75-106).

According to David Share (1995) these long-lasting beneficial effects occur because young children who understand the alphabetic principle and who are taught letter-sound rules (elementary phonics) as their first introduction to reading have a powerful self-teaching device available. They can ‘sound out’ and hence pronounce unfamiliar words that they come across in their reading. If the word is one that is already in their spoken vocabulary, sounding out and pronouncing it will allow them to understand it. If it is a word that is not in their spoken vocabulary, the context in which it appears will give them some idea of what it might mean, thus contributing to oral vocabulary development. Using phonic rules to sound out unfamiliar words thus has the power to develop both written and spoken vocabulary. Furthermore, Share argues that paying close attention to the letter-by-letter sequence of the unfamiliar word as it is sounded out facilitates its
storage in sight vocabulary (by sight vocabulary, we mean a store of words that are instantly recognized on sight, and linked to their meanings and pronunciations).

Chelsea was lucky, in that her first teacher understood the place and value of early phonics teaching, and provided the children in her class with systematic and structured teaching of letter-sound correspondences. This wise and wonderful teacher also made sure that it was fun for the children, and that they immediately had opportunities to practice their new knowledge in reading and writing words using the letter sound rules they’d learned, and the segmenting and blending skills they’d been taught. Chelsea was soon well placed to start trying to sound out unfamiliar words, as she had been taught letter sounds and how to blend these to make words. She had a powerful toolkit to help her decode transparent two, three and four letter words like ‘up’, ‘hat’, ‘went’, etc. Her self-teaching device was kicking in from the beginning. Her phoneme segmentation skills and knowledge of letter sounds also enabled her to start to write without needing continual adult input to this – her spelling was not conventional, but she was able to represent the sound pattern of most words she wanted to write (e.g. “plez wil u cum to mi prte”).

**Acquiring sight vocabulary**

Chelsea also took part in shared reading sessions with Big Books. She often looked at the big book herself once the session had ended, and played school with her friend, when they took turns in being the teacher and reading the big book. Because the same big books were shared frequently in reading sessions, Chelsea very quickly learned several of
the texts off by heart. Then, her ‘playing school’ sessions with her friend became real learning sessions: Chelsea was careful to follow each word in the text with her finger, as the teacher did, and to recite the text she had learned by heart as she did so. Most often, the word she recited was the word she was pointing to and looking at, although there were occasional mismatches – five-year-olds are not necessarily perfect at identifying word boundaries in connected speech, so her recitation occasionally ran ahead of her pointing. When the word attended to on the page matched the word she was speaking, Chelsea had the opportunity to learn that that particular arrangement of printed letters represented that particular spoken word. She was able also to start storing some sight vocabulary.

Jackie Masterson, Maureen Dixon and I carried out a training experiment (Stuart, Masterson & Dixon, 2000) to see how easy it was for five-year-old beginning readers to store new words in sight vocabulary from repeated shared reading of the same texts. It turned out to be much harder than we expected! We tried to teach the children 16 new words, which were printed in red to make them identifiable as the words to be learned. There was one of the red words on each page. After the children had seen and read each red word 36 times, no child was able to read all 16 of them, and the average number of words read correctly was five. We were quite shocked by this, because we had made a database of all the words from all the books the children were reading in school, and so we knew how many different words each child had been exposed to in their first term reading at school. This ranged from 39 to 277 different words, with a mean of 126. Hardly any of these words occurred frequently in any individual child’s pool of
vocabulary: on average fewer than four words occurred more than 20 times – yet 36 repetitions had not been enough to guarantee that children would remember a word. When we tested children’s ability to read words they’d experienced more than 20 times in their school reading, on average they could read only one word correctly.

**The alphabetic principle and learning sight vocabulary**

Chelsea would have been one of the stars if she had taken part in our experiment. We had actually split the children into two groups, based on their knowledge of letters and their ability to give the first sound in a spoken word. One group had, like Chelsea, good understanding of the alphabetic principle. They were near perfect at telling us that ‘sandwich’ began with /s/, and at choosing the written letter S as the one you’d need if you were going to start writing ‘sandwich’. We’ll call this group, the ‘graphophonic group’. The other group had no idea what ‘sandwich’ or any other spoken word we presented started with, and made random choices when asked which letter you’d need if you were going to start writing ‘sandwich’ or any other word we’d presented. We’ll call this group the ‘non-graphophonic group’. The graphophonic group learned significantly more of the new words than the non-graphophonic group: after 36 encounters with each word, the graphophonic group could on average read seven words and the non-graphophonic group only three.

We suggested that two things - awareness of phonemes in spoken words, and letter-sound knowledge - are crucial to this swifter acquisition of sight vocabulary. Sight vocabulary involves forming links between the visual form of the word and its meaning and
pronunciation. The link from the visual form of a word to its meaning is essentially arbitrary. If, like Chelsea, and like the children in the graphophonic group, you can also make some logical links between some of the letters in the visual form of the word and some of the sounds you can hear in the spoken word, this should underpin and reinforce the arbitrary link from visual form to meaning. This, we suggest, is why the graphophonic group who could identify initial sounds in words and map from a sound to a letter learned more words than the non-graphophonic group. Similar suggestions have been made by Linnea Ehri (1995) and Usha Goswami (1993).

Interestingly, we had also measured the children’s visual memory abilities, because making links between visual forms of words and their meanings could be seen as involving visual memory – memory for things you have seen. Our two groups of children were matched for visual memory ability. For children in the graphophonic group, there was no correlation between visual memory scores and number of words learned. But for children in the non-graphophonic group, this correlation was highly significant: although children in this group learned fewer words, the children with better visual memory scores were more likely to learn some words. It seems that if a child has no understanding or knowledge of the alphabetic principle, then they’d better have a good visual memory.

The fact that we’d found evidence not only of differential rates of learning but also that the two groups were perhaps trying to set up representations of words based in entirely different kinds of information led us to a further question, namely, what aspects of printed words do children store in their earliest representations of sight vocabulary? Some
children seem to be able to use logical links between print and sound to remember sight vocabulary, whilst others seem to have to rely on the arbitrary links between print and meaning that their visual memory allows. We (Dixon, Stuart & Masterson, 2002) set out to investigate whether these different ways of remembering words led to the formation of qualitatively different representations in sight vocabulary.

**Phonemic identification and sight vocabulary**

We worked again with five-year-olds, and tested their ability to tell us what sounds spoken words began and ended with. We also again tested their knowledge of letter sounds. From these screening tests, we assigned the children to three groups. Children who could identify both initial and final phonemes and could select the letters to represent given phonemes at levels significantly above chance were assigned to group 1; children who could identify initial but not final phonemes, and could also select letters to represent given phonemes at levels significantly above chance were assigned to group 2; and children who could do neither phoneme identification task, and were at chance on the sound-letter matching task were assigned to group 3. Chelsea, who could identify initial phonemes but not final phonemes (i.e. could tell you that CAT begins with /k/, but not that CAT ends with /t/) and who by now had been taught lots of letter sounds, would have been assigned in this experiment to group 2.

We then set out again to teach some new words to all the children. But this time, we didn’t just expect that group 1 would learn more quickly than group 2, who in turn would learn more quickly than group 3. This time, we also predicted that children in the three
different groups would store different representations of the words they learned. As children in group 1 were aware of sounds at both the beginning and end of words, we predicted that they would include the beginning and end letters of the word in their representation. Children in group 2 we thought would selectively store the beginning letter – and we didn’t know what children in group 3, relying on visual memory rather than on forming links between some letters and some sounds, would store.

We made the learning task fearsomely difficult by making all ten words the same length, by printing them in capital letters so there were no overall distinguishing patterns of ascenders and descenders, and by having five pairs of words starting with the same letter. That is, we tried to teach SANDAL, SIGNAL, RASCAL, ROCKET, TICKET, TURNIP, CARTON, COBWEB, PICNIC, PENCIL. We showed the children the words on flashcards and we got them to match the words to pictures and we planned to continue this training until each child had read all ten words correctly in two consecutive sessions. But nine children, mostly from group 3, never met this criterion, and for such children training was stopped after 56 presentations of each word (14 training sessions).

Then we tested the children with the real words and a variety of misspelled versions of each, to discover which aspects of each word were represented in the child’s memory for that word. We laid out a word and its seven variants on the table (e.g. SANDAL PANDAL SANDAN SARDAL SANCAL NASDAL SANLAD SADNAL) and asked the child e.g. “Which of these says ‘SANDAL’?” We noted which word the child chose and then asked, “Do any of the others say SANDAL?” And we kept on noting the child’s
response and asking this question until the child said, no, none of the others was ‘SANDAL’.

We expected children in group 1 to choose fewer variants of each word, because we expected them to have stored the first and last letter in their sight vocabulary representation. If this were so, then they would likely accept SANDAL, SARDAL, SANCAL and SADNAL, i.e. the real word and the three variants that retained the first and last letter. We were quite close here: on average, children in this group accepted 3.4 items, and were more likely to be misled by variants where the change was in the middle of the word.

We expected children in group 2 to choose more variants of each word than children in group 1, because we expected them to have stored only the first letter in their sight vocabulary representation. If this were so, then they would likely accept SANDAL SANDAN SARDAL SANCAL SANLAD SADNAL, i.e. the real word and the five variants that retained the first letter. We were quite close here too: on average children in this group accepted 5.9 items, and only very seldom accepted variants where the first letter was wrong. And we expected children in group 3 to choose at random and possibly accept the real word and all its variants: they accepted on average 6.5 items, and were more likely than children in group 2 to accept variants where the first letter was wrong, although they were still less likely to accept variants where the first letter was wrong than variants with changes in other positions within the word. It clearly was a very hard task, and Chelsea might have commented, as did some of the children in groups 2 and 3: “I
know which ones say rocket, nearly all of them!” and “But all of them look like turnip to me!”

Let’s just pause here for a recap and think-forward. Chelsea got off to a good start in reading, because she knew about letters, she knew that spoken words were patterns of sounds, she could identify the initial sound in spoken words, she knew that sounds in words could be written with letters, and she knew the letters that stood for a few sounds. These attributes allowed her quickly to learn remaining letter-sound rules, and to use these to work out the pronunciations of some of the unfamiliar words she came across in reading texts. As we’ve seen, according to David Share the ability to sound out unfamiliar words acts as a self-teaching device: children who can use phonics to sound out unfamiliar words can then store these words in sight vocabulary for subsequent rapid recognition. Our experiments suggest that these attributes are what allowed Chelsea also to use her experiences in shared reading and in playing at reading to start to develop a sight vocabulary. Moreover, the representations she stored in sight vocabulary were likely to contain the first letter of each word, because as she could identify the first sound of the word, she could link the first letter to that sound, reducing the arbitrariness of the relationship between written word and meaning.

**From initial and final phonemes to vowel digraphs: inferential self teaching**

How much better would Chelsea have done if she had also been able to identify the final sounds in spoken words? In that case, her sight vocabulary representations of words would include the first and last letters. That is, the word ‘BOAT’ would be represented as
B-T, and the word ‘NIGHT’ as N-T. From another of our experiments (Stuart, Masterson, Dixon & Quinlan, 1999), we argue that these skeletal representations provide the child with a particularly powerful device for learning.

So let’s assume that by the time she was six (the age of the children in Stuart et al 1999), Chelsea had got to grips with final sounds in words, and was now storing both beginning and end letters in her sight vocabulary representations. If so, then as she reads and re-reads these words in the books she is now reading every day, in guided as well as shared reading sessions, and at home with her parents, every repeat encounter with a word provides an opportunity to complete its representation in sight vocabulary. As she reads ‘BOAT’, the B is already linked to /b/ and the T to /t/: the OA must therefore link to the remaining portion of the sound pattern, to the /9/ in the middle of /b9t/. As she reads ‘NIGHT’, the N is already linked to /n/ and the T to /t/: the IGH must therefore link to the remaining portion of the sound pattern, to the /α/ in the middle of /nαt/. Chelsea aged six is able to learn further phonic rules from her experience of reading! Stuart et al (1999) demonstrated this ability in six- to seven-year-old readers who learned to read before the NLS was implemented. These children were taught only the sounds of single letters at school: no vowel digraphs were taught. We reasoned that if the children were nonetheless able to read made-up ‘words’ containing vowel digraphs correctly, they must have learned about the vowel digraphs from their reading experience, because nobody was directly teaching them these.
We used our database of the children’s reading vocabulary to identify vowel digraphs that the children had come across very frequently (EE, EA) or very infrequently (OY, EI) in words they read in their school reading books. And as a check on our hypothesis that correct reading of vowel digraphs indicated self-teaching through reading, we further reasoned that children should in that case be more likely to read correctly the vowel digraphs they’d experienced frequently than those they’d not come across very often. So, in our experiment, EE and EA should be read correctly more often than OY and EI. But vowel digraphs differ in more than just frequency of occurrence: for example, they also differ in the consistency of their pronunciation. So we manipulated this too: EE is always pronounced /i/ and OY is always pronounced /oɪ/ in all the English words in which they occur; EA and EI are pronounced in a variety of ways in different words in English (bead, great, head; vein, heir, weird). So we also reasoned that consistency should affect vowel digraph reading accuracy: the consistent should be easier to learn than the inconsistent.

In this experiment, we split children into two groups, according to whether they were reading above or below the level expected for their age on a standardized word reading test. There was an effect of reader group: children reading at or above the expected level for their age were better at reading the vowel digraphs correctly. We also found the expected effect of vowel digraph frequency: EE and EA were read correctly much more often than OY and EI. Our scoring system militated against finding any effects of consistency, as we counted any of the several alternative pronunciations of each inconsistent digraph as correct.
The explanation I’ve given of how some children – six- to seven-year-old children who are reading words well - might be able to learn further phonic rules from their experience of reading depends crucially on the notion that sight vocabulary representations that incorporate beginning and end letters of words provide opportunities for the child to infer that the remaining letters must represent the middle sound of the word. We found some support for this notion also, in that children who could identify the middle sound in a spoken word (i.e. who could tell us that the middle sound in /b9τ/ was /9/) were the best at reading vowel digraphs. The children with all the necessary prerequisites in place for such inferential learning to occur were indeed the best learners.

So, by the age of seven, Chelsea’s ability to teach herself phonic rules from reading continues to increase the power of her phonic decoding abilities, so that she can sound out more and more complex words, which she can then store in sight vocabulary for future swift recognition. These two different kinds of word recognition processes, (sight vocabulary; phonics), work together to reinforce and strengthen each other. Phonic knowledge allows rudimentary decoding of unfamiliar words and underpins early sight vocabulary; early sight vocabulary allows further phonic rules to be inferred; expansion of the phonic rule system allows more complex unfamiliar words to be decoded and stored as sight vocabulary; as sight vocabulary expands, so does the possibility for further inferences to be made; this further expands the phonic rule system, and so on. This is why some children, like Chelsea, take to reading like ducks to water.
Systematic teaching of phonics

But what of the children who do not: how can they best be taught? First, we need to be able to identify such children early on. When we start teaching children to read, we need to know whether they are phonologically aware: whether they can identify rhymes and initial and final phonemes in spoken words. We need to know how many and which letter sounds they know. This information is quick and easy to obtain. It is probably counter-productive to start teaching children to read before they are capable of understanding and using the alphabetic principle. As Stuart et al. (2000) showed, children who are required to learn to read words before these capacities are developed rely on visual memory and are unable to do more than learn to associate arbitrary features of print with word meanings: this learning is unproductive and cannot generalize to novel items. Therefore, the first priority with five-year-olds who are not phonologically aware and who do not know letter-sound correspondences is to teach them these things.

The research evidence clearly indicates that teaching phoneme awareness and phonics facilitates the development of word reading and spelling skills (for a review of the effects of phoneme awareness training, see Ehri, Nunes, Willows et al, 2001; for a review of the effects of phonics teaching, see Ehri, Nunes, Stahl & Willows, 2001). In intervention studies with inner city children most of whom were learning English as an additional language (Stuart, 1999, 2004), children who were given one term of systematic phonics and phoneme awareness teaching in their second term in Reception were significantly better readers and spellers of words at the end of Year 1 than children not taught in this way. They retained their word reading and spelling advantage at the end of Year 2 over
children in the sample who were not given any systematic phonics teaching throughout KS1. One class not taught systematic phonics in Reception had received one year of systematic phonics teaching during Year 2. This class were equally as good word readers as the Reception-taught group by the end of Year 2, although their ability to read ‘made up’ words (an analogue for ‘unfamiliar words’) was still less well developed than that of the children taught phonics for one term in Reception.

We also know that early systematic phonics teaching does not abolish individual differences: some children learn what is taught faster and with less need for practice than others. But it is clear that systematic phonics teaching which includes the two components of phoneme awareness and linking phonemes with letters is beneficial to the progress of children who learn with more difficulty and who need more practice (Hatcher, Hulme & Snowling, 2004).

If we adopt phoneme awareness and phonics teaching as the entry point for teaching reading, then many of the children we teach will, like Chelsea, get off to a flying start in reading and will progress, as Chelsea did, to develop a self-teaching system for reading words. This will be true even of some of those who enter school without the attributes that enabled Chelsea to get off to such a flying start, but who are quick to pick up on these things when they are given the opportunity to do so through structured, systematic and intensive teaching. The children who are slow to pick up on these things need more time and practice. For example, in the school where the Jolly Phonics programme was developed, the whole Reception class would go through the 10-week programme in the
first term. Those who had not got it at the end of the first term were given additional small group teaching in the second term. Those who still had not got it then were given additional individual teaching in the third term. By the start of Year 1, the alphabetic principle was understood and used to some extent by all children. This, I suggest, is what we should be aiming to achieve for all the children we teach.

**Something to think about**

How do the arguments and evidence presented in this chapter relate to those in Chapter 6, *Developmental issues* and in Chapter 1, *How children learn to read*.  

**Something to read**

The author of this chapter was a member of the Rose Committee which looked at the role of phonics in early reading. Read the Rose Review’s report published in March 2006. Available on [http://www.standards.dfes.gov.uk/rosereview/](http://www.standards.dfes.gov.uk/rosereview/)

**Something to do**

Identify children in your class who bring some of the different kinds of understanding about sounds in words that are described in this chapter. Reflect on how well your current phonics curriculum is meeting their needs.
References


