# Chapter 1

## Introduction

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## Introduction

> *To completely analyse what we do when we read would almost be the acme of a psychologist's achievements, for it would be to describe very many of the most intricate workings of the human mind, as well as to unravel the tangled story of the most remarkable specific performance that civilisation has learned in all history* (Huey, 1908/1968, p.6).

In this study the writer endeavours to unravel part of the "tangled story" that Huey refers to in his writings on the difficulties of learning to read.

This chapter provides a framework for the questions addressed in the present study. The main question posed in the present study is what skills a prereader needs in order to become a successful reader.

Successful reading can be considered to be the product of decoding and listening comprehension. This is how Gough and Tunmer (1986) describe their Simple View of reading. The ultimate aim of reading is comprehension but without adequate word recognition comprehension is unattainable. There have been no instances of good comprehension skills being equated with poor word recognition skills (Share & Stanovich, 1995). Therefore this study will concentrate on the development of word recognition and will focus on the early stages of reading acquisition. Emphasis is placed on the early stages of word recognition as opposed to the acquisition of fluent reading skills. Several theories of reading contend that fluent readers rely on visual/orthographic information rather than on a phonological recoding

route, but novice readers require a reliable method of word recognition offered by decoding, prior to the development of higher level orthographic codes (Seidenberg, 1992). Reliable word recognition in turn provides for successful orthographic/visual skills to develop. The letter-by-letter processing involved in sequential decoding may be the principle means by which letter order and identity become incorporated into well-specified orthographic representations (Adams, 1990).

## 1.1 Background to the Research Question

Two distinct theories have been proposed to account for the acquisition of reading. In broad terms these are firstly, the 'whole-language' or 'top-down' methods advocated by theorists such as Goodman (1976) and Smith (1971), and secondly, the 'bottom-up' method that requires the inclusion of instruction in phonemic awareness and letter-sound knowledge (Bryant & Bradley, 1985; Stanovich, 1980).

The 'whole-language' approach to reading relies on prediction and anticipation of words rather than decoding (Goodman, 1976; Smith, 1971). By and large, whole-language methods have been judged as failing beginning readers (Algeria, Pignot & Morais, 1982; Byrne, Fielding-Barnsley & Ashley, 1997; Masonheimer, Drum & Ehri, 1984; Seymour & Elder, 1986 ).

'Top-down' methods could also include the method of teaching whole-words either by, the presentation of flash cards in the "look-say" method or in the context of "basal readers". It is questionable whether providing the identity of a printed word at the whole-word level is likely to draw a child's attention to the detailed orthographic structure which ultimately forms the basis for proficient word recognition (Byrne & Fielding-Barnsley, 1989; Ehri, 1992). "If the ability to form rote, holistic,

'logographic-style' associations between spoken and printed words were of value in reading development, one would expect to find positive correlations with reading ability. The evidence on this issue, however, is uniformly negative" (Share, 1995, p.159).

In dramatic contrast to 'whole-language' or 'top-down' methods are those which necessitate an understanding of the alphabetic principle. Methods which promote phonemic awareness and alphabet knowledge fall into this category. There is now strong evidence for a causal link leading from phonological processing to early reading acquisition (Ball, 1993; Bradley & Bryant,1983; Byrne & Fielding-Barnsley, 1991a, 1993, 1996; Cunningham, 1990; Hatcher, Hulme & Ellis, 1994; Lie, 1991; Lundberg, Frost & Peterson, 1988; Torgesen, Morgan & Davis, 1992).

Methods which promote the acquisition of phonemic awareness and alphabet knowledge will now be outlined in the following section.

## 1.2 The Research Question

The research question includes which phonemic awareness and alphabet knowledge skills to teach, how to teach these skills, and when to teach them.

Ample evidence exists for the usefulness of including phonemic awareness as a prereading skill (Bradley & Bryant, 1983; Byrne & Fielding-Barnsley, 1991, 1993, 1995; Olofsson & Lundberg, 1983, 1985; Treiman & Baron, 1983; Williams, 1980). Phonemic awareness is the ability to decentre from the meanings of spoken words, and instead to reflect on and analyse their sound patterns (Stuart, 1995b). Lack of phonemic awareness not merely *can* but *does* cause reading failure (Bradley & Bryant,1983). Knowledge of the sounds of the letters of the alphabet and how these

letters correspond to the sounds of spoken words also needs to be made explicit either before or during reading instruction. The classic study by Bradley and Bryant (1983) demonstrated the need for instruction in both letter-sound correspondences and phonological awareness. A group of children that was taught both phonological awareness and letter-sound correspondences made significant gains in standardised tests of reading and spelling, over and above a group that was taught only sound categorisation.

It has been established that phonemic awareness and alphabet knowledge need to be taught at some stage, but how are these skills taught? Phonemic awareness does not develop spontaneously in the normal course of cognitive and linguistic development but only in the specific context of learning to read an alphabetic script or if directly taught, outside the reading context (Morais, Cary, Algeria, & Bertelson, 1979; Share, 1995). Several strategies have been successfully implemented which do bring the abstract phoneme to the child's attention. These strategies include segmentation (Stuart & Coltheart, 1988), alliteration (Byrne & Fielding-Barnsley, 1991) and alliteration and rhyme (Bradley & Bryant,1983).

The question of how to teach phonemic awareness, either by "synthesis" or "analysis," is another area of controversy. Synthesis involves some kind of blending of phonemes as well as an analysis of phonemes within words. When phonemic awareness includes a synthesis/blending component in addition to analysis, superior results are usually reported (Beck & Juel, 1995; Cunningham, 1990; Fox & Routh, 1984; Lundberg, Frost & Peterson, 1988; Treiman & Baron, 1983). Several of these studies incorporated an analysis-of-phonemes-only group, in which the findings were consistently negative. However, other studies which did not include a blending

component found that analysis and letter-sound knowledge provided adequate skills for the development of reading (Ball & Blachman, 1991; Bradley & Bryant,1983; Byrne & Fielding-Barnsley, 1991). The present study aims to clarify previous inconsistencies in the literature by incorporating relevant variables and procedures into the design of the study. (See Chapter 4).

The question of when to teach phonemic awareness is answered in part by several researchers who have found that the largest gains in phonemic awareness are made during the first year of reading instruction, largely irrespective of when reading instruction begins (Bowey & Francis, 1991; Liberman, Shankweiler, Fischer & Carter, 1974). It would seem important then, from these findings, to include explicit instruction in phonemic awareness during the early stages of learning to read.

## 1.3 Summary

In this chapter the significance of phonemic awareness and letter-sound correspondences for the acquisition of reading has been proposed. The main points covered were that: reading is composed of accurate decoding and comprehension; accurate decoding requires knowledge of the phonemic structure of speech; whole-word methods do not provide adequate information for an understanding of the alphabetic principle; explicit instruction is needed in phonemic awareness and letter-sound knowledge and these skills need to be included in early reading instruction.

# Chapter 2

## Theoretical Framework

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## 2.1 Introduction

In this chapter a theoretical framework for the acquisition of reading will be discussed with reference to the relevant literature. The crux of the following discussion will be based on the claim that "there is a clear demonstration of a palpable connection between children's sensitivity to the component sounds in words and their progress in reading" (Bradley & Bryant, 1991, p.37).

The smallest component sound in words is the phoneme. Besides gaining an awareness of the phoneme, a child must know how these phonemes map onto the letters of the alphabet. To appreciate the complexity of this process, this chapter will cover, firstly, the development of the English alphabet in which the sounds rather than the concepts of language are represented, secondly, how speech maps onto the letters of the alphabet, thirdly, how children develop phonemic awareness and fourthly how children combine all these prerequisites into models of reading.

## 2.2 The English Alphabet

"Children learn to read successfully by learning how their writing system works" (Perfetti, 1995, p.106).

To learn to read in an alphabetic orthography requires learning the alphabetic principle. However the alphabetic principle is a complex one. To appreciate the

complexity of the English alphabet some explanation will be given as to its development.

Our English alphabet has evolved through several different stages. Basically, this development has moved through pictographies, logographies, syllabaries and finally the alphabet. These four categories are further partitioned in the following Figure 2.1 which shows the development of writing as explained by Gelb (1952).

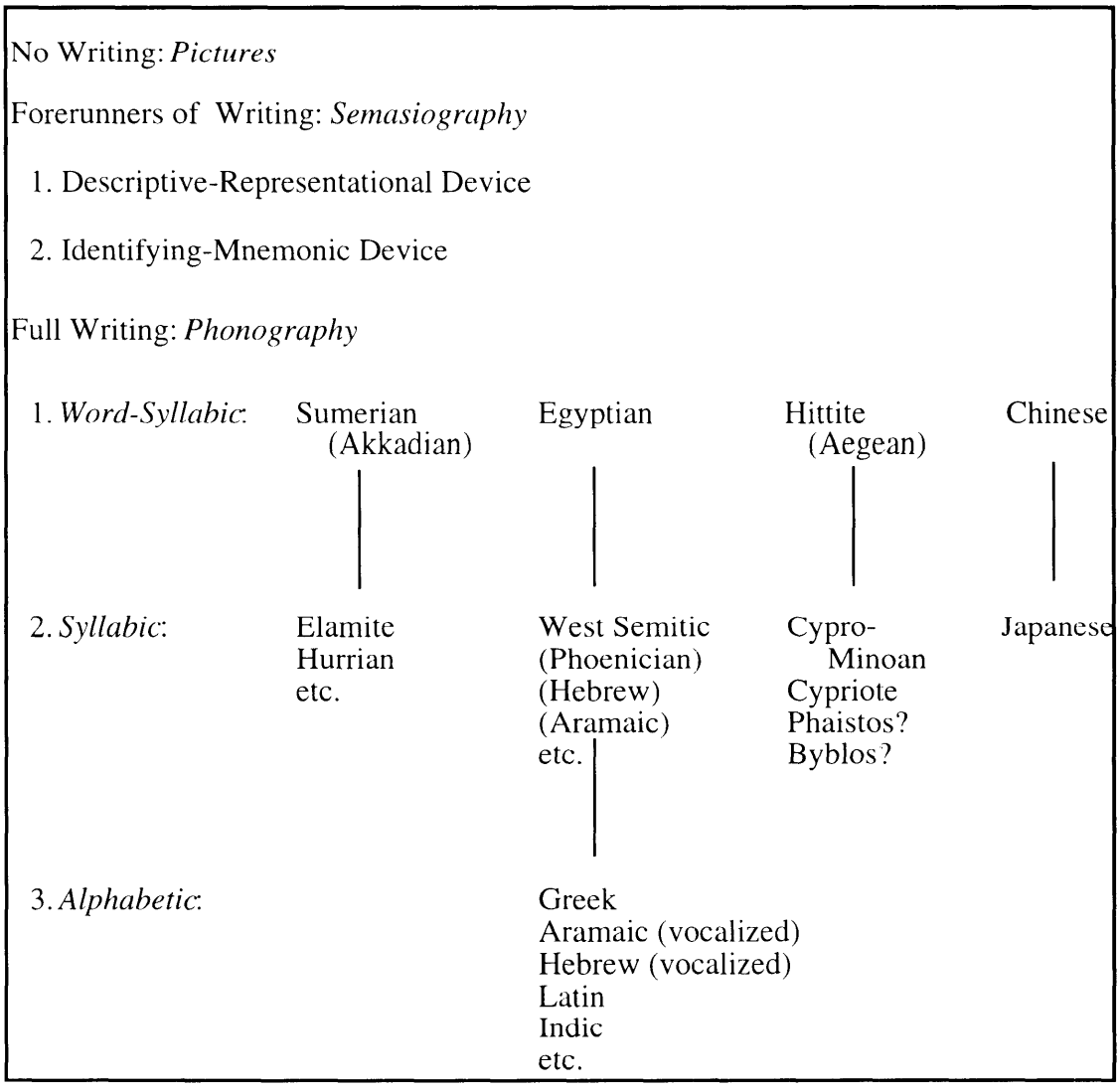


**Figure 2.1** Stages of the development of writing. (Gelb, 1952, p.191).

This evolution has occurred over thousands of years. Prehistoric pictographic records have been found throughout the world. Logographies, established by the Sumerians, are still used for a number of writing systems including Chinese, (although Chinese is not considered to be a true logography but a "word-syllabic" form; Gelb, 1952.) Syllabaries were used to write an early form of the Greek language during the 2nd millennium BC, but the only major language using a syllabary today is Japanese. The breakthrough to alphabetic writing took place on the Eastern shores of the Mediterranean around 2000 B.C. (Coulmas, 1989; Gelb, 1952; Gleitman & Rozin, 1977; Sampson, 1985).

Pictography, put simply, is a writing system in which each symbol represents a concept or a word in the form of a sketch or a diagram of the object it represents. One disadvantage of a pictography is that a picture can convey more than one meaning: a picture of a dog could mean 'Beware of the dog' or 'Dogs are welcome'. To overcome this problem, the logographic system in most instances uses one symbol to represent one word. The difficulty for pictographies of representing any word apart from nouns with concrete referents was overcome in the syllabic system by using a symbol to represent each syllable in the language. This development provided a major breakthrough in that sounds of language, rather than concepts, were now represented. Syllabaries were the precursors of our modern alphabet. The development of the alphabet relied upon the fact that words have an internal structure. Once this discovery was made, it was possible to represent the units of that structure with letters (Liberman, Shankweiler, & Liberman, 1989). The move from representing the syllable to representing individual speech sounds, or phonemes, in the alphabetic system reduced the number of symbols required from many thousands to between 20

and 40 (Rozin & Gleitman, 1977). It was now feasible to memorise all the alphabetic symbols and thereby read and write any word required. However, the alphabet is not a perfect system. As the need for a more efficient system arose, the symbols became more abstract. No longer was it possible for anyone to *recognise* a written message as it required *deciphering* of the alphabetic code, and herein lies the problem. These abstract symbols need to be learned before it is possible to decipher the alphabetic code. The present study will include explicit instruction in the acquisition of the alphabetic code.

## 2.3 The Alphabetic Principle: Speech to Print

Gleitman and Rozin (1977) suggest that unless children understand how the alphabetic symbols relate to the spoken language they will not learn to read (p.22).

A challenge for the child, in the initial stages of reading, is that of understanding that speech and writing are related. Young children who have not received any formal instruction in reading may assume that adults are actually reading the pictures in their story books (Ferreiro, 1986). Clay (1979) included a question in her Concepts About Print Test which supports this hypothesis. The child is shown a page with print and a page with a picture and then asked "Show me where to start reading?" The results of this test (as evidenced by the norms), show that five-to-seven-year old children often select the picture as telling the story. Ferreiro supports this view, adding that at a later age children tend to believe that writing corresponds to semantic properties of words. Ferreiro gives an example of a prereader who had categorised beginning sounds as representing members of his family, for example "P" says papa and "M" says mommy. When two names were introduced both beginning

with "L" the little boy was quite disturbed as persons must have only their own letter. Prereaders also tend to think that quantity is marked by numbers of graphic symbols and when they are writing they use more symbols to represent several objects (Ferreiro, 1985). When children develop an understanding of the relationship between the spoken and written lengths of words they are identified as being reading- ready as opposed to reading-unready. Rozin, Bressman, and Taft (1974) showed kindergarten children pairs of very long and very short words such as 'mow' and 'motorcycle'. The child was told that one word said 'mow' and one said 'motorcycle', and was then asked to select the one that said 'mow'. Forty three percent of the group termed 'reading-ready' suburban kindergarteners chose correctly whereas only ten percent of the 'reading-unready' inner city children chose correctly.

The results of recent research by Byrne (1996) has further illustrated the difficulty encountered by children in hypothesising how print represents spoken language. Byrne shows that preliterate children fail to select phonologically based hypotheses even when they are available in the input. The focus is on the morphophonology and/ or semantic aspects of words' referents. As an example, preliterate children were taught to recognise two pairs of words, *hat / hats* and *book / books* where the letter *s* represents both a morpheme and a phoneme. The children could detect either the phonological function of /s/ or its morphological or semantic function. To find out which hypothesis the child selected, a series of transfer tests was conducted. The child was shown a new pair of words such as *bike* and *bikes* and after being told what they said, was then asked which random one said *bike* and which one said *bikes*. The children performed well on this task, confirming that transfer was possible. The next test was introduced to test whether the children had deduced the

phonemic value of the letter *s* . They were shown a new word pair *bus/bug* and asked to distinguish between the pair. On this task the majority of children failed. It seems, as a result of these transfer tasks, that the children had acquired the morphemic value of *s* and not its phonemic value. Children who knew the sound of the letter *s* before the experiment were able to utilise their phonemic awareness and pass the *bus/bug* task. In another series of experiments, children who were able to distinguish between the words '*small/smaller'* were also able to generalise to other pairs of words distinguished by the comparative affix, eg., '*mean/meaner'* but they could not generalise to '*corn/corner'* where the '*er*' had no morphemic value.

What the child needs to understand ultimately is that letters map onto phonemes and that these phonemes map onto articulatory targets. Why is this so difficult? If most children can master the spoken language in the first few years of life then why should this not be true also for the act of reading? Part of the answer lies in the fact that speech is a natural act whereas reading is not. Writing and written language are not universal phenomena, whereas speech is a universal phenomenon, being crucial to the human condition (Goody, 1977). Support for this claim comes from evidence that the acquisition of language is innately controlled by a dedicated language acquisition device (Crain, 1991), but there are contrary theories claiming that learning a written language is as natural as learning spoken language (Goodman & Goodman, 1979). Goodman (1967) claims that learning to read is a 'psycholinguistic guessing game.' His 'whole-language' approach to teaching reading draws parallels between the development of spoken and written language. The whole-language approach to reading involves anticipation and prediction rather than accurate decoding of text. Yet if reading is as natural as learning to speak, why is it possible

that so many children fail to learn to read but virtually none fail to talk? "The problem of reading has to do with the *cognitive prerequisites* to understanding alphabetic systems: properties of these orthographies require their users to become aware and to focus attention on the phonological substratum of speech" (Rozin & Gleitman, 1977, p.3). Goodman would disagree with this statement and claim that focussing attention on single sounds distracts from the act of reading.

One major difficulty encountered in the process of becoming aware of the phonological substratum of speech is that of *coarticulation*. Coarticulation is explained as the overlapping and merging of the articulatory movements that produce the phonologically significant aspects of the speech sound. Liberman (in press) explains that coarticulation has evolved as a result of selection pressure for gestures that took advantage of of the independence of the several parts of the articulatory apparatus, gestures that could be overlapped, interleaved and merged. As a result of coarticulation the word *bag*, which actually consists of three phonemes, when spoken consists of a single segment of sound, see Figure 2.2 (Liberman, Shankweiler & Liberman, 1989).

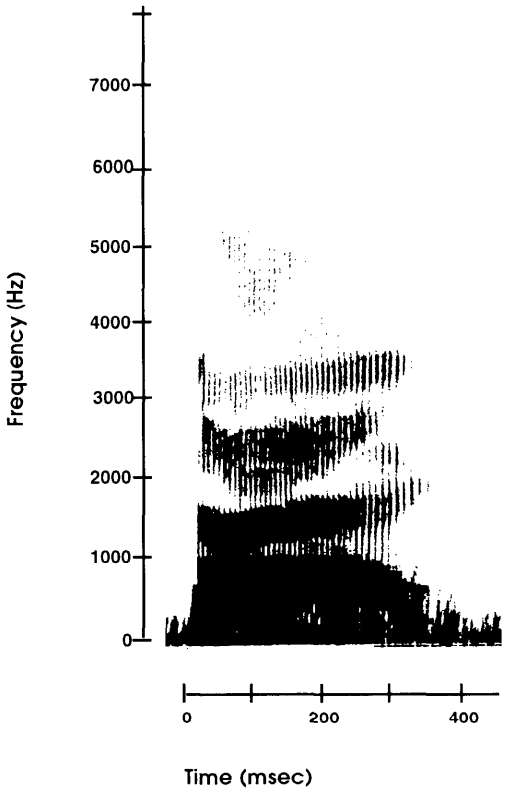


**Figure 2.2** Sound spectrogram of the spoken word "bag."

The darker an area or point, the more acoustic energy is present at that frequency and time (Gleitman & Rozin, 1977, p. 40).

The mismatch between speech and print also occurs at the word level. Words are certainly an easier unit of speech to conceptualise than the phoneme, but the same coarticulation problems are encountered with words as with phonemes. Figure 2.3 demonstrates that there are no clear demarcations between the spoken words "were you away a year ago." Therefore it is important to ensure that beginning readers are aware of word boundaries. In the present study the children will be made aware of word boundaries in the context of shared book reading.

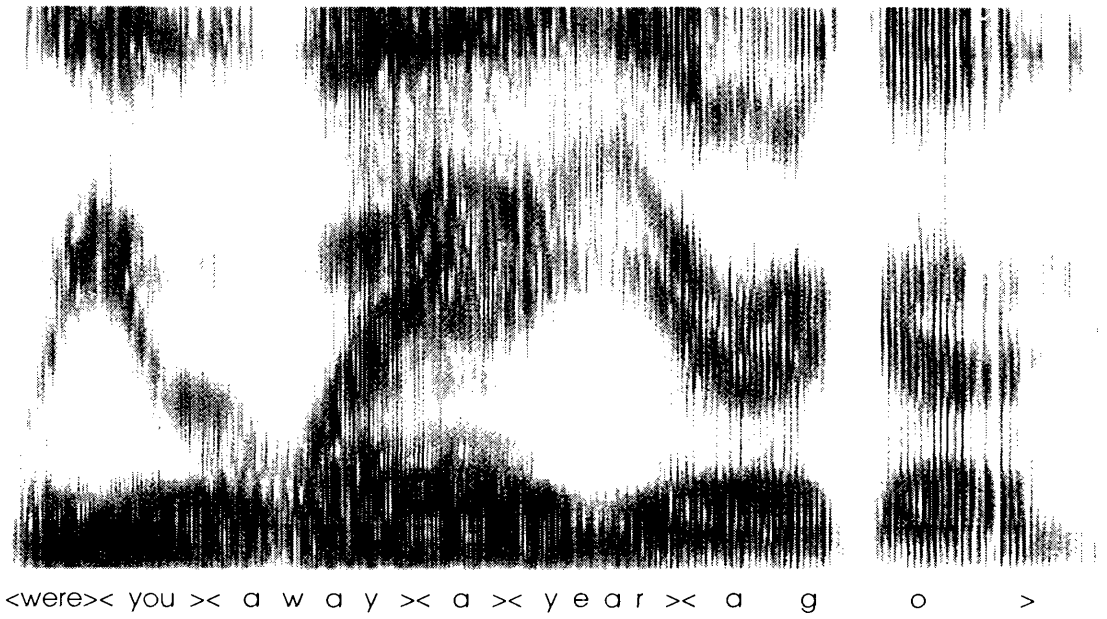


**Figure 2.3** Sound spectrogram of spoken language

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At a more detailed level, mismatches between speech and print are also caused by the influence of one phoneme on the surrounding phonemes. Figure 2.4 represents the effect of different vowels following the same consonant. The consonants are represented by the initial, *changing* portions of the formants, the vowels by the longer, *stable* portions. The information in the vowels is reasonably uniform but this is not so for the consonants. For example, the /d/ portions in /di/, /da/, /du/ are all different. This may have important implications for beginning reading instruction. For example a child may be confused by the instruction that /d/ , which has several sounds is represented by only one grapheme. To overcome this potential problem it may be wise to introduce the vowels individually. For the afore mentioned reasons, only the short vowel /a/ will be learned by the children in the proposed study.

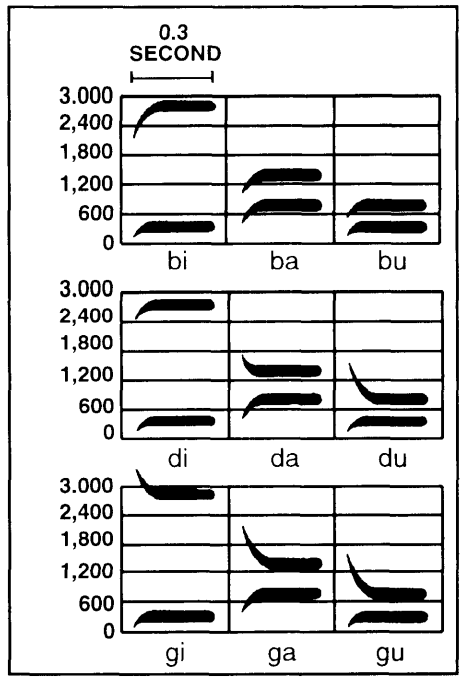


**Figure 2.4** (Miller, 1981, p. 67.)

In summary, the novice reader needs to understand that letters map onto phonemes and that these phonemes map onto articulatory targets, but this relationship is highly complex and context dependent.

As a result of these complexities, many researchers have recommended instruction in the phonological structure of speech before attempting to match speech to writing. But surely if a child knows the difference between the words 'cat' and 'rat' then that child must be aware of the phonological structure of speech? One word begins with a /k/ and one with an /r/, a difference of one phoneme. However most four-to-five-year-old novice readers are not *consciously* aware of this fact (Byrne & Fielding-Barnsley, 1991; Maclean, Bryant and Bradley, 1987). They know that the words are different at the semantic level, but they do not know that they differ by only one phoneme. The answer to the child's problem lies in the fact that the analysis of the sound stream by the ear is carried out below the level of consciousness (Liberman,

1973). However, reading involves a higher level of *conscious awareness*. "Reading is a comparatively new and arbitrary human ability for which specific biological adaptations do not, so far as we know, exist" (Gleitman & Rozin, 1977). Useful analogies have been made by Fowler (1991) and Byrne (1992) where they liken gaining a conscious awareness of phonemic segments to being aware of the movements that go into crawling or walking. Similarly, a driver may have no conscious memory of changing gears until he/she accidentally grinds the gears which may draw attention to the activity which is ordinarily submerged or unconscious (Rozin & Gleitman, 1977). Nevertheless, as reading becomes more "automatised" this too joins the ranks of unconscious acts.

If the relationship between speech sounds and the phoneme is so abstract, what can be done to make it less so? Liberman, Cooper, Shankweiler and Studdert-Kennedy (1967) suggest that the process of speech perception is related to the process of speech production. If we can utilise the fact that there is a relationship between the alphabetic unit and its articulatory origin we may be on the right track to making the phoneme less obscure. Liberman (in press) suggests that "...the elements of speech are not sounds, but gestures of the articulatory organs and that those gestures are discrete, invariant, and categorical motor processes that control changes in the cavities of the vocal tract, and so produce the sounds of speech." This is the rationale behind the teaching methods used by Lindamood and Lindamood (1969); a full description of these methods is given in Chapter 3.

> *In short, the hypothesis that attention to articulation is crucial for developing phonemic awareness has received some empirical support. Although phonemes are not represented as discrete units in the speech*

*percept, articulatory cues to phonemic information could be exploited to reconstruct phonemic representations at a conscious level* (Morais, 1991, p.230).

In conclusion, an ability to distinguish phonological elements smaller than syllables seems to be necessary to make use of an alphabetic orthography (Gough, Juel, & Griffith, 1992). Therefore the present study will include explicit instruction in phonemic awareness..

## 2.4 Phonological and Phonemic Awareness

The terms *phonological awareness* and *phonemic awareness* have been used interchangeably in the literature, but they do differ. "Phonological awareness subsumes at least the following: awareness of phonological strings; awareness of syllables; awareness of phonemes; and awareness of phonetic features" ( Morais, Algeria, & Content, 1987). Phonemic awareness refers to the ability to consciously manipulate the individual phoneme as distinct from an awareness of units larger than a single phoneme (Liberman, Shankweiler, & Liberman, 1989; Morais, 1991; Stahl & Murray, 1994). These definitions of the terms will be used in the following discussion. Emphasis will be placed on phonemic awareness tasks that best predict reading acquisition rather than those which develop as a result of reading acquisition.

It is important to understand the difference between phonemic awareness and the tacit ability, normally present at birth, to be able to *perceive* and *discriminate* speech sounds. This ability is only weakly related to the ability to explicitly identify, isolate and manipulate these sounds ( Stanovich, Cunningham & Cramer, 1984; Yopp, 1988).

Longitudinal and training results (reviewed in Chapter 3), both indicate that the phonological awareness that young children acquire before they learn to read has a powerful influence on their eventual success in reading and spelling. Children who have not developed phonological awareness at an early age apparently need help if they are to succeed in reading and spelling (Bryant & Bradley, 1985). If children are not given this assistance and experience failure in the early stages of reading there can be a detrimental compounding effect on later reading. These effects have been noted by Stanovich (1986) who states that since children who experience early failure will read less, they will be exposed to less print, will practice less, and will fail to establish automatic word recognition strategies. Stanovich terms this compounding effect "The Matthew effect" as when the rich get richer and the poor get poorer in respect to their reading.

It is important to justify why so much emphasis is placed on instruction in phonemic awareness as opposed to, say, instruction in rhyme, a measure of *phonological awareness*. The justification is in the fact that rhyme is a more natural or global ability than detecting, for example, that "bat" and "boy" begin with the same sound, a measure of *phonemic awareness* (Morais, 1991). Therefore there is not such a need to teach rhyme. Children as young as 3 years of age are reasonably good at judging whether words rhyme or not (Adams, 1990; Maclean, Bryant, & Bradley 1987; Treiman, 1985). Illiterate adults are also able to detect rhyme but fail in tasks of phoneme counting or deletion (Morais). The failure to detect that "bat" and "boy" begin with the same sound is therefore not due to a general inability to make judgements about the organisation of speech, as evidenced by the awareness of rhyme, but by an inability to detect differences at the level of the phoneme. Unfortunately it

is the knowledge at the level of the phoneme that is required for an understanding of the alphabetic script. It has been suggested that the rhyme segment may involve speech units which are too global to help with acquisition of the alphabetic principle. Nevertheless the more natural ability of detecting rhyme may serve as a guide in focussing explicit attention on the internal structure of the syllable (Morais; Treiman & Zukowski, 1991).

An important aspect to understand about the development of phonological awareness is that it develops along a continuum, rather than being an all-or-none phenomenon. Performance on phonological awareness tasks varies with the cognitive demands of the task and the linguistic level that it taps (Treiman & Zukowski, 1991). The development of phonological awareness in children can be demonstrated by testing their ability to segment words into their constituent elements. Liberman, Shankweiler, Fischer and Carter (1974) tested children's ability to segment spoken words into syllables and phonemes. They found that awareness of the phoneme segments was harder to achieve than awareness of the syllable segments. Treiman (1983) studied children's awareness of an intermediate level of subunits, between the syllable and phoneme, the 'onset' and the 'rime'. For example, the word 'trip' constitutes one syllable and four phonemes but can be divided into the onset 'tr' and the rime 'ip'. It was found that a task measuring this intermediate stage of onset and rime was easier than the phoneme task and harder than the syllable task. As a result of these findings Treiman (1985) suggests that correspondences between print and speech could be introduced at the level of onsets and rimes rather than at the level of single phonemes. Treiman (1985) also studied the comparative difficulty of onsets beginning with a single phoneme and onsets composed of consonant clusters. It was

easier for children to detect that the syllable "san" began with an /s/, than the syllable "sna".

It is now established that there are different levels of phonological awareness that develop in young children on a continuum. Consequently, it is important to ask which of these levels best predict reading acquisition and how do we measure the acquisition of these levels? Research has established that there is a causal connection between phonological awareness and reading acquisition. By teaching children phonological and phonemic awareness it has been possible to improve their reading (Bradley & Bryant, 1983; Byrne & Fielding-Barnsley, 1991, 1993; see details in the literature review, Chapter 3). An important aspect of phonemic awareness is that it is a better predictor of reading acquisition than general intelligence, (Stuart, 1990), nonverbal intelligence, vocabulary or listening comprehension (Stanovich, 1994).

Some researchers have concluded that people can acquire phonological awareness without reading instruction but they can only acquire phonemic awareness when provided with instruction in some written code (Morais, 1991). The evidence provided by the research of such teams as Bentin and Leshem (1993), Bryant and Bradley (1983,1985), Byrne and Fielding-Barnsley (1991), Lundberg, Frost and Peterson (1988), Naslund and Schneider (1996), and Torgesen, Morgan and Davis (1992) contradict these findings and have all shown that it is possible to teach aspects of phonemic awareness without the use of a written code. More importantly, children with low phonological awareness may not assimilate letter-to-sound relationships easily, despite extensive exposure (Naslund & Schneider). For this reason it may be wise to ensure that children are secure in their understanding of phonological awareness before introduction of the written code.

2.4.1 Phonological awareness tasks as predictors of reading.

Certain levels of phonological awareness, either as measured by different tasks or by different levels of linguistic complexity, *precede* learning to read , whereas more advanced levels may result from *learning* to read (Bentin & Leshem, 1993). As an example, it has been suggested that the tapping task developed by Liberman, Shankweiler, Fischer and Carter (1974), which requires children to tap out the number of phonemes in a word, may be influenced by children's reading ability, rather than the other way around (Adams, 1990).

The phonological awareness tasks that best predict reading acquisition according to Bradley and Bryant (1983) are rhyme and alliteration. It is necessary to look at the separate contribution made by these two measures to the acquisition of reading. Bryant et al. (1990) found that preschooler's rhyming scores were reliable predictors of later reading ability. By analysing the results from their 1983 study, using a fixed order multiple regression, Bryant et al. determined that rhyme made a significant contribution over and above that of phoneme identity. However, others have failed to replicate these findings (Lundberg, Frost, & Petersen, 1988; Stanovich, Cunningham, & Cramer, 1984; Yopp, 1988).

Phoneme identity, which included identifying initial and final sounds, was a strong predictor of early literacy measures in Byrne and Fielding-Barnsley's 1993 study. The literacy measures which Byrne and Fielding-Barnsley included were real and pseudo-word reading and spelling.

At this point other measures of phonemic awareness will be discussed. The Byrne and Fielding-Barnsley (1993) study incorporated phoneme elision, in addition

to phoneme identity as a measure of phonemic awareness. Phoneme elision consists of asking the child what is left when the first or last sound is stripped from the test item, eg., 'pink/ink' for initial sound and 'moon/moo' for ending sound. However, elision did not predict early literacy gains. The reasons for this were that aspects of elision depend on the acquisition of spelling and decoding and therefore cannot be thought of as predictors of reading. Morais (1991) questions whether phoneme elision/deletion is a measure of phonemic awareness or phonological awareness, arguing that deletion of the consonant in a CV syllable is more reliant on the vowel, requiring isolation of the rime not the initial consonant. While this may be true, it emphasises the point that certain phonemic awareness tasks are more suitable to measure progress in reading whereas others are better predictors of reading. Morais confirms this hypothesis by stating that consonant deletion is not easy to achieve: "Perfect scores are seldom obtained by kindergarteners" (p.9). Algeria, Pignot and Morais (1982) found that a similar deletion task administered to first graders learning to read by a whole-word method produced a score of only 15% correct whereas those learning to read by a phonic method scored 58% correct.

If we are interested in phonemic awareness tasks that predict reading acquisition then we must ask which of these tasks do the job that we are asking them to do. The problem is that several of these tasks are confounded by the cognitive demands that are required to perform them (Backman, 1983; Lewkowicz, 1980; McBride-Chang, 1995; Stanovich, Cunningham & Cramer, 1984). There are usually, at least four operations required to isolate a phoneme from a given word. It is necessary to: perceive the speech segment; to hold the speech segment in memory long enough to isolate the phoneme; manipulate, delete, identify the speech segment

and the results must then be communicated to the experimenter (McBride-Chang, 1994).

The best way to measure the predictive power of different phonological tasks is to test prereaders and then obtain a standardised measure of reading ability at the end of first grade, which is what Stanovich et al. did with a sample of fifty-eight kindergarten children. Ten phonological tasks were assessed, three rhyming tasks and seven non-rhyming tasks. The rhyming tasks displayed low correlations with the other phonological tasks and with first-grade reading ability. These results could be attributed to ceiling effects on rhyming tasks. A floor effect was found for one of the non-rhyming tasks, strip initial consonant (e.g., "Listen to the word *pink*. If you take away the /p/ sound , what word is left?" p.180). Byrne and Fielding-Barnsley (1993) also found that children had great difficulty with this task even after a year of reading instruction. Of the six other non-rhyming tasks, the ones that best predicted scores on the Metropolitan Reading Survey test were 'initial consonant different' and 'initial consonant not the same' (basically the same task but worded differently). These two tasks accounted for 66.2% of the variance in reading ability in a regression analysis. Contrary to the findings of Treiman and Zukowski (1991), discussed earlier, was the fact that the variance of cognitive demands in the different tasks did not obscure the underlying phonological abilities of the children.

Adams (1990) categorised phonological awareness tasks into five levels of difficulty: an ability to remember rhymes; recognition of rhyme and alliteration in words such as Bradley and Bryant's oddity task (1983); awareness that syllables can be divided into phonemes measured by blending and isolating initial phonemes;

segmentation of the component phonemes as in Liberman et al.'s (1974) tapping task; and lastly those that require the child to delete or move phonemes within a word.

Yopp (1988) administered 10 different phonological tasks to a group of kindergarteners to assess reliability and validity of each measure. Yopp found that the tasks fell into two distinct groups, those that required skill in phonemic awareness and those that also required a memory component to perform the task. However, Yopp did not control for linguistic difficulty of the task. As Treiman (1992) has noted, there are different levels of complexity in segmenting words into their constituent parts. Stahl and Murray (1994) re-examined the items on Yopp's measures by assigning a weight for each level of linguistic complexity. Their findings suggested that linguistic complexity may be an important factor in phonological awareness. Levels of linguistic complexity accounted for more variance than task analysis when defining phonological awareness. Stahl and Murray suggested that linguistic complexity across tasks is a better way of defining phonological awareness.

Stahl and Murray (1994) also reported on the effects of different categories of phonemic awareness on reading acquisition. They found that the ability to manipulate onsets and rimes within syllables related most strongly to reading, with the proviso that letter recognition must also be in place. However, the ability to isolate a phoneme from either the beginning or the end of a word seemed to be crucial to beginning reading. Nearly all the children who could not perform this task in their study, 113 in total, did not achieve reading at preprimer level.

Liberman et al. (1974), also noted that for some children, awareness of the phoneme segment may never develop. Even after one full year at school, thirty percent of children had not gained an understanding of the phonemic structure of

words. Recent research has suggested that some children may be more resistant to acquiring phonemic awareness because of an hereditary factor (Byrne, Fielding-Barnsley, Ashley, & Larsen, 1996). These 'at risk' preschool children were selected from families where there was a history of reading difficulties. An intervention program that enhanced phonemic awareness in a 'normal' sample of preschool children was not as successful with these at risk children.

In conclusion, phonological awareness can be assessed prior to school entrance (Blachman, 1989; Byrne & Fielding-Barnsley, 1991; Maclean, Bryant & Bradley, 1987). Phonological awareness can also be increased with appropriate preschool programs and this training results in a significant increase in word recognition and spelling skills (Byrne & Fielding-Barnsley, 1993). A child who is oblivious to the phonemic structure of speech, for whom spoken words are indivisible wholes, will have no way of generating a pronunciation for an unfamiliar word even if that child has mastered all the letter sounds (Share, 1995).

Even when children are taught to recognise a large number of sight words they are unable to deduce the alphabetic principle by themselves. Seymour and Elder (1986) followed the progress of a kindergarten class which was taught a "sight vocabulary" by a whole-word method, with no phonics included . A posttest at the end of the year indicated that their word recognition skills did not generalise to unfamiliar words. These children had not become independent readers as a result of learning a stock of sight words within a meaningful text.

The first question which needs further investigation at this juncture is whether there is a need to teach phonemic awareness prior to reading acquisition or is it best left until reading instruction begins? The second question which requires further

investigation is, whether children are able to discover the alphabetic principle without explicit instruction? These questions will be investigated in the following section.

## 2.5 Models of Reading Acquisition

An illustration of different models of reading acquisition, discussed in this chapter, is presented in Figure 2.5.

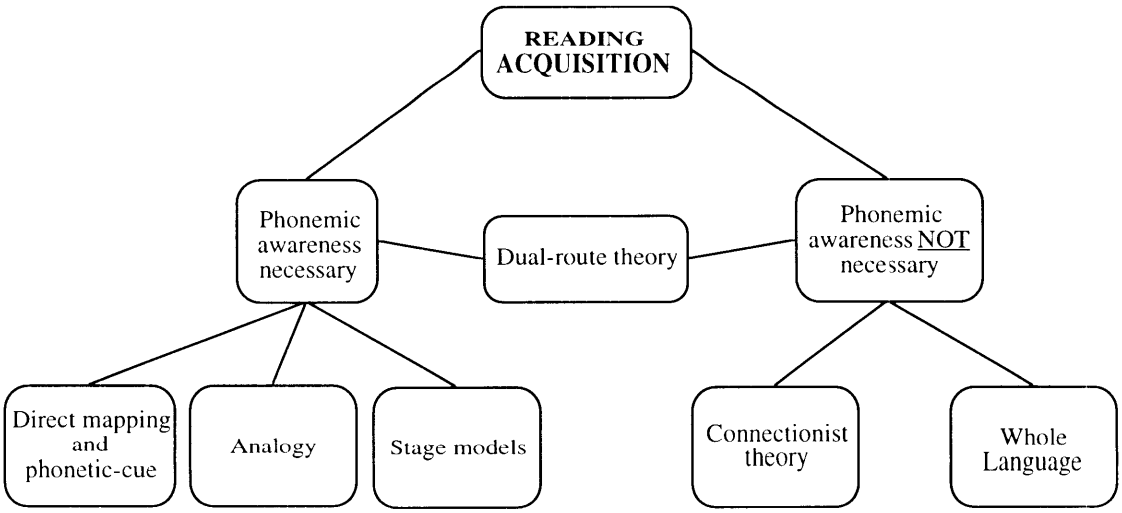


**Figure 2.5** Models of reading acquisition

Several theories have been postulated for the acquisition of reading. In essence these theories fall into two distinct groups, those that recognise that phonemic awareness is necessary to understand the alphabetic principle and those that do not (see **Figure 2.5**). A further distinction may be made into those theories that do accept the importance of phonemic awareness but believe that it can be self-taught and those who promote that phonemic awareness must be taught explicitly.

Of those who hold that phonemic awareness is necessary to understand the alphabetic principle, some conclude that the relationship is strongest from phonemic awareness to reading acquisition (Bradley & Bryant, 1983; Treiman & Baron, 1983),

while others view the relationship as being stronger in the other direction (Ehri, 1979; Morais, Cary, Algeria, & Bertelson, 1979; Perfetti, Beck, Bell, & Hughes, 1987). The latter group see the relationship as being reciprocal, where the acquisition of each skill is dependant upon the other.

A brief description of the 'stage' models of reading, dual-route models, analogies and direct-mapping will be presented as they demonstrate how children might learn to read in the absence of *explicit* instruction in phonemic awareness. What is more important is that these theories demonstrate how some children may fail to accommodate the alphabetic principle and come to treat reading as a visual memory task.

### 2.5.1 Stage models

Marsh, Friedman, Welch, and Desberg (1981) suggest a four-stage theory beginning with a "linguistic guessing" stage, followed by guessing based on visual clues, sequential decoding by coordinating series of letters with their sounds, and finally hierarchical decoding involving those skills already acquired combined with higher order rules and analogies. This theory suggests that it is the increased exposure to words that forces the child to resort to the decoding stage.

Frith's (1980) theory proposes three phases of reading acquisition. Similar to the theory proposed by Marsh et al. (1981), Frith describes the first stage as logographic which is when an arbitrary symbol represents a word, for example the symbols *$*, *&*, and *%*. This stage does not include any correspondences between print and sound borne out by the fact that " logographic reading is impotent in the face of a novel word and therefore has no functional value in view of the task ahead" (Share,

1995, p. 159). Share goes on to suggest that if logographic reading were in any way related to reading development, one would expect to find positive correlations with reading ability but this has not been the case according to Masonheimer, Drum, and Ehri, (1984). The second phase is termed the alphabetic stage, when children begin to use letter-sound correspondences to decipher words. The third phase is termed the orthographic stage when children are able to analyse words into orthographic units without phonological conversion. This model seems to make a series of leaps from recognising single letter-sound connections to parsing letter strings into grapheme groups, to instantly recognising whole-words. No mention is made of the very necessary stage of using higher order complex and conditional rules to reach this orthographic stage.

Seymour and MacGregor (1984) include higher order rules in their three broader and overlapping stages of reading. These stages closely follow Frith's model of logographic, alphabetic and orthographic reading. Seymour and MacGregor recognise the importance of grapheme-phoneme correspondences, morphemic functions and the use of lexical analogies in reading new words. Seymour and MacGregor argue for the possibility of two lexicons being in place as permanent parts of the reading system. These two lexicons are described as logographic and orthographic. The logographic lexicon is formed by the ability of the reader to discriminate between words from a known vocabulary. The orthographic lexicon requires the reader to pass through a decoding stage from print to sound.

All the above stage theories of reading involve the children passing through the non-phonological logographic stage. However, Stuart and Coltheart, (1988); and Stuart and Masterson, (1992) question this assumption by suggesting that it is possible

that children who are phonemically aware before learning to read may not pass through the logographic stage. If children do not pass through the logographic stage they are less likely to treat reading as a visual memory task. The children in the proposed study will be given the opportunity to become phonemically aware before being introduced to reading words.

The following self-teaching models include analogy, direct-mapping and phonetic-cue models. According to the self-teaching hypothesis, each successful decoding encounter with an unfamiliar word provides an opportunity to acquire word-specific orthographic information that is the foundation of skilled word recognition and spelling. Phonological recoding acts as a self-teaching mechanism enabling the beginning reader to gain a knowledge of orthographic conventions (Share & Stanovich, 1985). The success of self-teaching strategies depends upon the frequency and correct renditions of a particular word. Several studies have shown that it requires very few successful readings of a word for the acquisition of word-specific orthographic information (Manis, 1985; Reitsma, 1983). High frequency words may be recognised visually with minimal phonological recoding in the very early stages of reading acquisition. Less familiar words will, in contrast, rely more on phonological recoding.

The following reading models rely to some extent on self-teaching mechanisms, including partial decoding as implemented in Ehri's (1987) model of phonetic cue reading and Goswami's (1986) analogy model.

2.5.2 Analogies

"Analogies in reading involve using the spelling-sound pattern of one word, such as beak, as a basis for working out the sound-spelling correspondence of a new word, such as peak" (Goswami, 1995, p.139). The reasoning behind using analogies in beginning reading lies in the fact that an awareness of rhyme develops before phonemic awareness. The claims made for rhyme and analogy in the classroom are that "...it will reduce the spelling-sound ambiguity of written English, it will enable the decoding of many new words by rime analogies, and it exploits a phonological distinction that apparently comes naturally to young children" (Goswami, 1995, p.142). Rack, Hulme, Snowling, and Wightman (1994) see the use of analogies as an additional tool to bridge the gap between phonemic awareness and learning to read: "The ability to draw analogies might be thought of as another type of self-teaching mechanism for the beginning reader" (p.43). However, novice readers must have the resources to decode unfamiliar words that contain no obvious analogies.

This approach to reading should be seen in perspective and not taken as implying no role for phonemic awareness. Goswami (1995) has answered her critic, Chew (1994), stating that "...few psychologists, 'rhyme researchers' included, would advocate the use of a *single* method of teaching reading" (p.143). Most importantly, Goswami reminds us that analogy does not necessarily enable children to learn spelling-sound correspondences spontaneously, without explicit instruction. This model of reading may be more appropriate for skilled readers who have built up a repertoire of rhyme/rime units from which to draw their inferences (Ehri, 1987; Marsh, Friedman, Welch, & Desberg, 1981).

Several studies have failed to find correlations between exposure to analogies and successful transfer to reading pseudowords (Nation & Hulme, in press; Thompson, Cottrell & Fletcher-Flinn, 1996; Walton, 1995). Others have found that even when there has been successful use of analogy cues there was no effect on subsequent spontaneous identification responses to transfer words (Bruck & Treiman, 1992).

Therefore the proposed study will not include any explicit teaching of analogies.

2.5.3 Direct-mapping and phonetic-cue models

Rack, Hulme, Snowling, and Wightman (1994) claim that "...the direct mapping mechanisms that we advocate, and have provided experimental support for, stands in stark contrast to most current theories of the mechanisms involved in learning to read" (p.66). "The direct-mapping refers to the automatic activation of (possibly partial) information about words' pronunciations from cues present in the printed words' letter sounds or letter names" (p.44). This corresponds to Ehri's (1992) claim that children automatically activate partial cues to a word's pronunciation from information about letter names and sounds. However, Ehri's theory differs from the direct-mapping hypothesis in that "...the kind of connection enabling readers to find specific words in memory is a *systematic* connection between spellings and pronunciations rather than an *arbitrary* connection between spellings and meanings" (p.108). (See **Figure 2.6**).

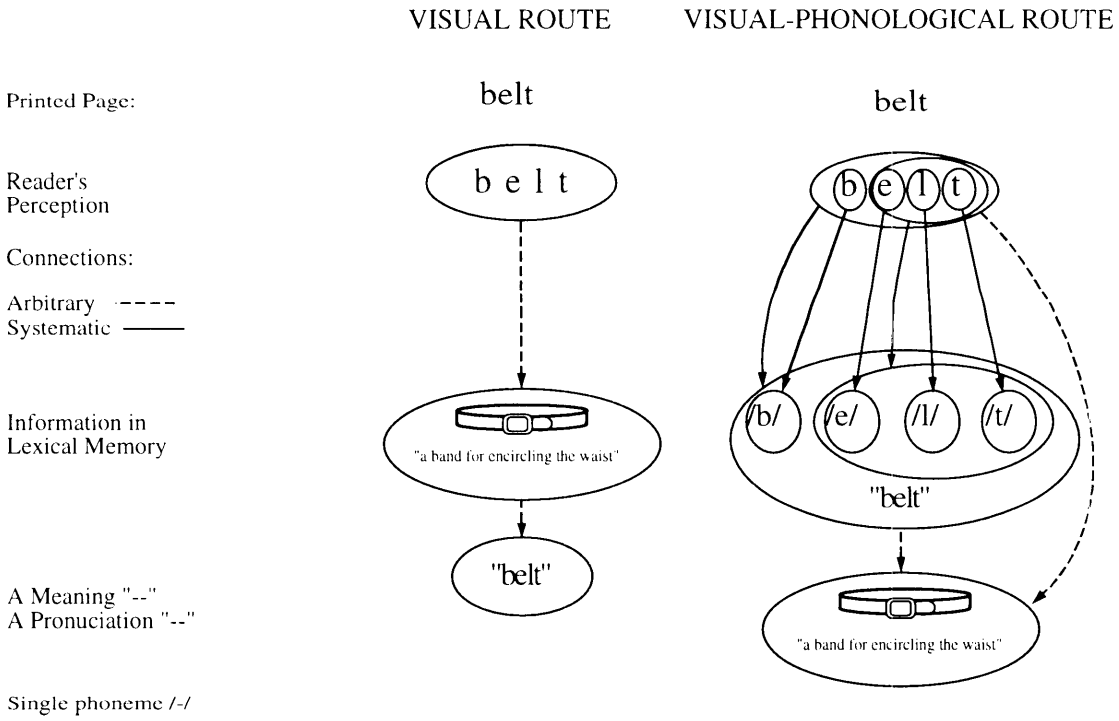


**Figure 2.6** Diagram contrasting the connections that are established in reading words by the visual-semantic route of dual-route theory and the visual-phonological route (Ehri, 1992. p. 115).

The critical connections in Ehri's (1992) theory are those which connect specific words in the lexicon via a visual-phonological route rather than by meanings. These multiple connections include letters, letter groups and whole-words.

It is noted that Ehri (1992) has included the analogy route in her theory. Connections are formed out of letter sequences. The rime stem *-elt* is used to make a connection with other known words, for example, *melt, felt, pelt,* and *welt.* However, it may be argued at this point that it is unlikely that many of these words would form part of a beginning reader's vocabulary, therefore being unavailable as a resource from which to draw the necessary inferences.

Ehri and Wilce's (1987) 'phonetic cue' reading precedes a more mature form of reading, the 'cipher' stage. Phonetic cue reading involves readers developing low-level phonemic awareness plus the sounds or names and shapes of the alphabet letters. This knowledge enables the beginning reader to focus on the beginning and ending sounds of words. Detecting the first and last sounds of a word is easier than detecting the embedded sounds. Even at this stage of reading the reader must be able to draw on a rudimentary form of phonemic awareness and be able to detect the separate sounds in the pronunciation of words. Readers form more letter-sound relations and are then able to move through the various phases of Ehri's (1992) model, from visual cue to phonetic cue to the more mature cipher reading. Cipher readers possess phonological recoding skill and they use this to analyse spellings fully as visual symbols for phonemic constituents of pronunciations (Ehri & Wilce, 1982). Ehri emphasises that sight word learning is not a process of rote learning but that of making systematic connections which enable readers to recognise words quickly, and what is more important also enables them to read novel words.

One potential problem for novice readers in Ehri's (1992) model is that it allows for some form of guesswork at the visual and phonetic cue phases. The example given by Ehri of how a child might mistake the word *jail* for *jewel* is an example of guessing a word's reading. How is the beginning reader to establish the correct reading of the word? The child has a choice of guessing from context or asking a reader. Whichever way is chosen, there is room for initial error. In addition, a child who either skips an unfamiliar word or derives a contextually appropriate but orthographically mismatched word forgoes the opportunity to acquire word-specific

orthographic information and to refine knowledge of orthography-phonology relationships (Share, 1995).

As Share (1995) suggests, an initial set of simple one-to-one correspondences between graphemes and phonemes may represent the logical starting point since it offers a minimum number of rules with the maximum generative power. Share also puts into perspective the comparative value of phonological and orthographic skills for beginning reading. Both components make independent contributions, although the phonological component is primary. The orthographic component (overall appearance of a word) represents an additional, independent but secondary component. Phonological ability represents the sine qua non of reading acquisition (p.156).

Self-teaching theories offer some interesting insights into how some children might learn to read. Nevertheless it has been established that phonemic awareness and alphabet knowledge are both necessary for the acquisition of reading and that these skills do not develop spontaneously in the course of exposure to alphabetic writing (Byrne & Fielding-Barnsley, 1989, 1990). At best self-teaching theories may offer the child a rudimentary self-teaching skill (Share, 1995). As Coltheart (1980) has noted, preparing children for reading requires teaching them the skills that they will need in order to read. Therefore it might be prudent to question the efficacy of all self-teaching theories: why risk the possibility of failure when it is possible to teach the skills explicitly and monitor the beginning reader's progress? Self-teaching strategies could be accommodated as additional tools in the beginning reader's armoury but certainly not as the only resource. As suggested previously, these theories fit more comfortably into the skilled reader's repertoire and not into the

acquisition stage of reading per se. What the beginning reader requires is a basic understanding of one-to-one correspondences that will offer a workable set of rules to generate basic orthographic representations.

Accordingly, the writer suggests that if the soundest parts of each theory were amalgamated into one new theory we would have a convincing solution to the acquisition of reading. Ehri (1994) suggests that before students can begin to read independently they need to be taught letter shapes, names, and sounds plus rudimentary phonetic segmentation skill. Letter-sound associations are fostered through the use of picture mnemonics and phonetic segmentation by practice in invented spelling. The one area in which the writer deviates from the ideas proposed by Ehri is that phonemic awareness instruction should precede the independent reading stage. As Ehri suggests, even though the children may induce the cipher from the use of phonetic cues, "Few will be able to induce the system on their own" (p.138). Phonetic cues could retain their place as part of the overall reading strategies but they should not replace a solid grounding in phonemic awareness. "It is explicit instruction in letter-sound knowledge together with some basic phonemic awareness that bring the decoding possibilities of an alphabetic orthography to a child's attention" (Share, 1995, p. 160).

Even though we have several theories espoused by the above mentioned researchers they all agree that phonemic awareness must be in place either before or during the early stages of reading instruction, whether this is made explicit or not. The connectionists, however, challenge this assumption.

2.5.4 The connectionist model

It is not possible to give a full account of the connectionist model of reading in the confines of this thesis but a brief description will be given. Following this description, reasons will be given why this model does not describe adequately the acquisition stages of reading. Adams and Bruck (1993) liken the connectionist model to the whole language approaches to reading, which will be discussed later. They state that the connectionist model " emphatically asserts that literacy development depends critically and at every level on the child's interest and understanding of what is to be learned. Further, for learning to be efficient and productive, these models make clear that literacy cannot be fostered one piece at a time" (p.117).

Connectionism treats learning as a sort of statistical modelling (Fodor & Pylyshyn, 1988). Connectionists see the mind as made up of networks. These networks consist of large numbers of multiply interconnected nodes. These nodes are simple, numerous and interact without supervision from a central processing unit. The network's information is encoded in the weights between the nodes. Typically, these weights are modifiable. The network's capacity to learn, its memory, depends on this modification process. Learning proceeds by slight modifications of the weights between nodes. This is known as 'training' a network (Sterelny, 1990, p.169). Connectionist models are also referred to as neural net or parallel distributed processing (PDP). These models are built on the assumption that learning progresses as we respond to the relationship between a series of patterns or events. In the case of reading this would refer to a series of words.

So how does this work regarding the act of learning to read? How do we train the network? Without going into the complexities of how the network recognises

words, basically different strokes fire different nodes. Therefore there must be a huge input of words to establish the weightings. Networks can be trained to recognise patterns but they cannot do this without an outside agent to correlate the teaching stimuli with their correct classifications. To take a recent example, Seidenberg and McClelland (1990) excused the poor performance of their model in reading non-words by the fact that they had exposed the model to only 3,000 words. This was considered to be a limited size for a training corpus. In a more recent experiment they claim that after 250 training sweeps through the corpus, amounting to about 150,000 word presentations, the network correctly named all but 77 words (Plaut, McClelland, Seidenberg, & Patterson, 1996, p.61). The present argument is not that this is an insignificant achievement in itself, but it cannot be equated with the child's acquisition of literacy. It is impossible to think of a child remembering 3,000 words let alone 150, 000 to establish the networks required to be a fluent reader. Of course it is possible for a child to read 3,000 words once the alphabetic principle has been mastered, but successful word identification does not in itself result in learning the alphabetic principle. Here we are back to the 'chicken and the egg' problem. To establish the networks required for word recognition we first need to learn enough words to establish the networks. So how do we learn those first words? If it were just a matter of learning say an arbitrary number of 100 words then it would be feasible. However, as the connectionists have established, it is necessary to learn about 3,000 words to establish the networks. Adams (1994) also alerts us to the necessity of "setting up the system" and states "...one cannot, after all, interrelate what's not there" (p.15).

It is very difficult to relate the connectionist model to the real world of classroom based instruction where children are taught the explicit rules required to become efficient readers. Connectionist models hold that rule-like performance in reading does not spring from explicit instruction in the rules. It comes instead from detection of the correlational structure defined across input (print) output (speech) pairs after suitable exposure to a corpus of such pairs (Byrne, 1992). Van Orden, Pennington, and Stone (1990), who support the covariant theory of reading, have noted some inadequacies of both their own and the connectionist model of reading. These researchers suggest that beginning readers do make use of rules but that "later, through covariant learning, conscious rule application is replaced by the precise automatic phonologic coding that underlies skilled naming performance" (p.510).

A computer model of the brain, however, may have certain limitations. The first limitation is that of the comparative speed between the operation of a computer and the human brain. The brain can carry out many thousand instructions in the time that it takes a serial neurally-instantiated program to perform one hundred instructions (Fodor & Pylshyn, 1988). Therefore the brain must operate quite differently from computers. As Adams (1994) states " ...Even where the output of a machine resembles the output of a human being, this is scarce indication that the inner workings of the machine resemble the inner workings of a human being" (p.12).

As stated earlier, the connectionist model may fit the later stages of skilled reading as described by Adams (1994): " The more frequently that any pattern of activity has been brought to mind, the stronger and more complete will be the bonds that hold it together. Ultimately it is these bonds, these associations - as they pass excitation and inhibition among the elements that they link - which are responsible for

the fluency of the reader and the seeming coherence of the text" (p.9). The basic concept on which the structure of connectionist models was based, was from empirical evidence from skilled readers.

The main misgivings of the critics of the connectionist model are firstly, that the model fails to transfer to pseudo-words and secondly, that only monosyllabic words have been mastered. The first criticism has been challenged by Plaut, McClelland, Seidenberg, and Patterson (1996) who have included the reading of pseudo-words in their latest model. However, the second criticism remains valid.

Fodor & Pylshyn (1988) sum up the contribution of the connectionist model with these words, "Give up on the idea that networks offer a reasonable basis for modeling cognitive processes" (Fodor & Pylshyn, p.70). When we talk about the connectionist *model* we must remember that it is just that, *a model.*

### 2.5.5 Dual-route models

Dual-route models, as the title suggests, cannot be categorised into either a phonological or non-phonological code-based theory of reading as they adopt both theories. They include two alternate recognition pathways to the lexicon, a direct visual access route that does not involve phonemic awareness, and an indirect route through phonology that utilises stored spelling-to-sound correspondences.

A knowledge of the rules of grapheme and phoneme correspondence allows for regular words to be read, e.g., "man". However, this rule does not hold for irregular words, e.g., "yacht". Dual- route models allow for irregular words to be read on a direct, visual basis. These two routes are considered to operate independently when words are read. Words are read visually by retrieving associations between the

visual form and its meaning. The associations are formed in memory from repeated readings of the word, no sounds or recoding rules are involved.

Ehri questions the reasoning behind the definition of irregular words and why they should require a different strategy to read them. "Few English word spellings are totally arbitrary in the sense that they contain no letters that conform to English letter-sound spelling conventions.....for example, *island* and *sword* each contain only one irregular letter" (p.112). As Adams(1990) points out: "English is fundamentally alphabetic. With obvious exceptions, the letter sequences of its written words mimic the phonemic sequences of its spoken words. The majority of the irregularities are owed to the vowels" (p.219). It is highly unlikely that the similarity between regular and irregular words is ignored in favour of rote learning and committing the words to memory. There is no firm evidence to support the assumption that irregular words are more dependent on visual/orthographic factors than regular words (Stanovich & West, 1989). However, very little research has been undertaken into orthographic processing to question Stanovich and West's findings. Because the dual-route model makes a distinction between a visually based route and phonologically based route it cannot explain why beginning readers need both routes. It would be feasible to have beginning readers practice reading words by sight from the outset (Ehri, 1992). However, as mentioned previously, it is questionable whether it is possible to commit all the words in the English language to memory.

### 2.5.6 Whole-language philosophy

Note that none of the above mentioned models of reading mention the "whole-language philosophy" espoused by Goodman (1967, 1976, 1986), and Smith (1971, 1979). Whole-language, or 'top-down' theorists believe that reading is a psycholinguistic guessing game. "Skill in reading involves not greater precision, but more accurate approximations based on better sampling techniques, greater control over language structure, broadened experiences and increased conceptual development" (Goodman, 1976, p.504). "Guessing at words is not just a preferred strategy for beginners and fluent readers alike; it is the most efficient manner in which to read and learn to read" (Smith, 1979, p.67). Conversely, as recent research has shown, it is poor readers who guess from context - out of necessity because their decoding skills are so weak (Stanovich & Stanovich, 1995).

Adams (1991) defines the principles of the whole-language philosophy as "teacher empowerment, child centred instruction, integration of reading and writing, a disavowal of the value of teaching or learning phonics, and subscription to the view that children are naturally predisposed toward written language acquisition" (p.41). The last two issues are the critical points of difference between the whole-language and phonics based philosophies, whereas the first three issues can be accommodated by both camps.

## 2.6 Spelling/Encoding instruction as an aid to Reading Acquisition

Several studies have examined the effects of phonological awareness instruction on children's spelling (Bradley, 1988; Perin, 1983; Tangel & Blachman,

1992), but there are very few studies that have examined the relationship of spelling instruction to reading acquisition (Ehri, 1987; Ehri & Wilce, 1987).

The difference between reading and spelling is that in reading, letters evoke sounds as responses whereas in spelling the reverse is true (Ehri & Wilce, 1987). The ability to spell words relies on knowledge of the general orthographic speech mapping system, including phonemic segmentation and phoneme-grapheme correspondence rules, and memory for the spellings of specific words (Ehri, 1986).

In Ehri and Wilce's (1987) study it was suggested that it was valuable to link spelling instruction to reading instruction when children first begin learning to read. In the process of learning to spell words children are taught to use decoding skills. They learn how to break the words up into their constituent sounds. They also learn to match each sound with its corresponding grapheme as they are spelling the words. This combines the two necessary skills that are required for the transition to efficient decoding. It may be argued that learning to spell does not provide practice in blending which is also necessary for efficient decoding. Hohn and Ehri (1983) found no transfer to reading novel words after spelling instruction. On the other hand if a child checks their spelling of a word by reading it, then this could necessitate some form of blending. However Ehri and Wilce refuted this claim and suggested that "...spelling instruction promoted word reading skill in beginning readers, not by enabling readers to sound out and blend, but rather by helping readers to store words in memory using letter-sound associations" (p.61). Conversely the same authors noted that their trained subjects attempted to sound out and blend some of the words, suggesting that they were looking not for visual clues but rather for phonetic cues as they were reading the test words.

It has been suggested that phonetic spelling instruction should be provided early, in conjunction with reading instruction, to enhance reading acquisition (Hohn & Ehri, 1983). The question remains whether children will discover the finer points of spelling and reading, such as consonant cluster segmentation, if they are not given explicit instruction. Results of a study conducted by Bradley (1988) suggested that the poor performance of a group trained in visual/orthographic strategies could be due to the fact that the children did not understand the connection between this strategy and phonological strategies. The proposed study will include groupings with and without explicit instruction in spelling. The proposed study will also include clusters in the training and transfer items to validate the research findings of Treiman (1985) who studied the comparitive difficulty of onsets beginning with a single phoneme and onsets composed of consonant clusters.

An important observation was made by Ehri and Wilce (1987) in that knowing phoneme-grapheme relations was not sufficient for a child to become a phonetic speller. Training in how to segment words into phonemes was also necessary. If spelling instruction does not include phonemic awareness there is a danger that children may treat spelling as a rote process and they may not acquire the phonetic skills needed to benefit their reading.

The proposed study will begin with training in phonemic awareness and will require measures to ascertain the effectiveness of this training. It has been suggested that spelling is a more sensitive measure of phonemic awareness than reading (Bryant & Bradley, 1980; Perin, 1983). Errors in spelling may detect a child with poor phonological skills. A child who is relying on a visual/orthographic route in the early stages of reading may be difficult to detect unless spelling measures are used

(Goulandris & Snowling, 1995). For these reasons spelling measures will be used in the proposed study. (See in case study, Lauren, Chapter 9).

## 2.7 Shared Book Reading

"Working away at phonological analysis without reference to reading and writing is of no help to poor readers. Similarly, and perhaps more controversially, working away at reading skills with no reference to phonics is equally unhelpful" (Hatcher, Hulme & Ellis, 1995, p. 154).

A group of children who were trained in phonemic awareness without any reference to reading or writing showed that even though their phonological skills improved, these skills were not transferred to improved reading or writing (Hatcher, Hulme & Ellis, 1995). Adams (1990) suggests that it is not enough just to read books to children, the books should be enjoyed, their form and content reflected upon, book reading should be a shared experience.

The writer proposes to integrate the introduction of phonemic awareness and alphabet knowledge within a framework of 'shared-book-reading'. The aim of shared book reading, as referred to by Arnold and Whitehurst (1994), is to make children active participants in shared picture book reading rather than passive listeners to stories being read by adults. Rather than simply reading the text, the reader provides models of language, asks the child questions, provides the child with feedback, and elicits increasingly sophisticated descriptions from the child.

Recent research suggests that shared book reading enhances language and preliteracy skills, which in turn help children in learning to read (Arnold & Whitehurst, 1994; Goldenberg, Reese & Gallimore, 1992; McCormick & Mason,

1986; Whitehurst, 1988; Whitehurst, Arnold, Angell, Smith & Fischel, 1994). There is substantial evidence that these language and preliteracy skills account for individual differences in learning to read (Adams, 1991).

## 2.8 Summary

In this chapter the major findings were that in order to be able to decode novel letter strings, a child must have an understanding of the phonemic structure of speech, an ability to match the sounds of speech to the letters of the alphabet, and an ability to transfer this knowledge to the tasks of decoding and blending. For these skills to develop, the child must be given explicit instruction within a meaningful context as these skills are not usually acquired intuitively.

Phonemic awareness may develop as a result of exposure to an alphabetic script or by explicit teaching prior to the introduction of reading. However, the preferred theoretical model for the present study will include explicit teaching of phonemic awareness and letter/sound correspondences prior to the onset of reading. This method is considered to pose less risk of failure than learning via exposure to an alphabetic script.