Real books vs reading schemes: a new perspective from instructional psychology

Jonathan Solitya* and Janet Vousdenb

aKRM: Psychological and Educational Research Consultants, P.O. Box 4562, Leamington Spa, CV31 9EW, UK; bUniversity of Coventry, Coventry, UK

(Received 30 November 2008; final version received 9 June 2009)

A fiercely contested debate in teaching reading concerns the respective roles and merits of reading schemes and real books. Underpinning the controversy are different philosophies and beliefs about how children learn to read. However, to some extent debates have largely been rhetoric-driven, rather than research-driven. This article provides a theoretical perspective derived from instructional psychology and explores the assumptions that have been made about the use of real books and reading schemes, which have tended to polarise arguments about their respective strengths and limitations. It analyses the structures of adult literature, children’s real books, and reading schemes, and examines the demands that they make on children’s sight vocabulary and phonic skills. The critical high-frequency words and grapheme–phoneme correspondences (GPCs) are identified that will enable children to read the majority of phonically regular and irregular words that they encounter which, perhaps surprisingly, occur more often in real books than structured reading schemes. Learning additional sight words or GPCs is of limited value due to their relatively low occurrence in written English and, thus, potentially minimal impact on children’s reading. Finally, the implications of this research for teaching reading are considered, particularly the complementary roles of real books and teaching methods derived from instructional psychology. In the past they have been viewed as diametrically opposed and mutually exclusive.

Keywords: reading schemes; phonics; real books; instructional psychology; sight vocabulary

Background

A long-running debate in teaching reading concerns whether children learn best through the use of ‘reading schemes’ or ‘real books’. Underpinning the controversy are different philosophies and beliefs about how children learn to read, in particular about the roles of phonics and whole language approaches to teaching reading and their impact on children’s progress. The tensions between the two were recognised over 30 years ago in the Bullock Report (Department of Education and Skills [DES], 1975) which commented:

Some would put so much emphasis on the ‘mechanics’ of reading that certain children would be handicapped rather than helped ... [whereas] others advocate so keenly the virtues of mature reading from the beginning that they are in danger of leaving it too much to trust that the skills will be acquired on the way. (pp. 77–78)
Just over 20 years later the Literacy Task Force (1997) noted that there had been few more vigorous educational controversies about teaching reading in recent years, and wrote: ‘Opposing sides in a vigorous national debate took to the barricades with banners proclaiming their loyalty to “phonics” or “real books”’ (p. 16). Differences between the two approaches have become particularly acute since the publication of the report on teaching children to read by the House of Commons Education and Skills Select Committee (HMSO, 2005) and the Rose Report (Rose, 2006).

Although the respective roles of reading schemes and real books have aroused strong passions, the debates about their relative merits have largely been rhetoric-driven, rather than research-driven. There has been extensive research into the development of phonological awareness but not into the reading materials that most appropriately support children’s acquisition of early literacy skills. There has been a major assumption that these materials will be reading schemes, but this has rarely been supported by empirical studies examining the content of adults’ and children’s written literature.

This article begins by describing the principles embodied by the use of reading schemes and real books. It summarises some of the factors that have led to a focus on the teaching of phonics, and highlights some of the criticisms associated with phonics teaching and reading schemes. It then examines the assumption that reading schemes provide the most suitable starting point for beginning readers to acquire and apply their phonological, phonic, and sight vocabulary skills.1

**Reading schemes**

Reading schemes consist of a series of specially-written books that are sequenced and graded according to their level of difficulty. They are based on the premise that written English is largely irregular and difficult to learn, and therefore needs to be simplified for beginning readers. As a result schemes contain a restricted, carefully controlled vocabulary consisting of high-frequency and phonically regular words that are introduced gradually and repeated frequently.

Typically, children are taught skills out of context to mastery before they are applied to texts. So they would be taught to recall individual high-frequency whole words (referred to as sight vocabulary) written on cards (known as flash cards) and to relate individual graphemes to the phonemes that they represent (known as phonics), which are also presented on cards out of context before they are seen in books (HMSO, 2005). It is thought that prior practice of this type increases the likelihood of children reading these sight words when they appear in continuous prose, and applying their phonic skills appropriately. Children then progress through the scheme, one book at a time, learning additional high-frequency words and grapheme–phoneme correspondences (GPCs) out of context so that they can then read more difficult books.

The emphasis on decoding, rather than understanding, when using reading schemes was represented in evidence presented to the Education Select Committee by those arguing for ‘phonics first, fast, and only,’ who summarised the position as follows:

Children are only taught to read through texts fully within their current phonological ability. So, although children might encounter words they do not understand, they are not given texts they cannot decode and are therefore not expected to infer words from context or syntax. (HMSO, 2005, p. 14)
Criticisms of reading schemes

Goodman (1976, 1986), Smith (1973, 1978), and Smith and Goodman (1971) are among those who have been highly critical of reading schemes, arguing that they are artificial, stilted, and offer little intrinsic value, and so are neither sufficiently engaging or interesting for beginning readers. The emphasis on teaching sight vocabulary and phonics skills is seen to be potentially seriously damaging for children by changing the nature of reading, from understanding, appreciating, and evaluating what is read, to memorising phonic rules and decoding. According to Smith, reading cannot be regarded as a process of sequential word recognition, which he believed was implied by a phonic approach. At best Smith saw phonics as giving children a ‘clue’ to what an unknown word might be, but stated that other strategies, particularly those based on using context and meaning, would generally be more valuable.

This view is evident in the National Literacy Strategy (NLS; Department for Education and Employement [DfEE], 1998), which proposed that children had four potential decoding strategies (referred to as ’searchlights’) through using their knowledge of phonics, word recognition, grammar, and context. The NLS has been revised and incorporated into the Primary National Strategy (PNS; Department for Education and Skills [DfES], 2006). The PNS has now rejected the searchlights model and recommended phonics as the first and most useful decoding skill for beginning readers.

Real books

Real books reflect what has become known as a whole language (also known as psycho-linguistic) approach to reading. Smith (1973, 1978) argued that learning to read should be regarded as a natural process, like learning to walk and talk, which should be reflected in how children are taught. He claimed that children would learn to read through looking for meaning in what they read, and that they would decode unfamiliar words through their understanding of texts rather than through the application of phonic skills taught out of context. It was thought that successful readers do not look at the features of individual letters within words. Thus, developing children’s motivation to read and familiarity with books and stories were seen to be the necessary prerequisites for learning to read, rather than knowledge of letters or sight vocabulary.

Real books are chosen on the basis of their interest and capacity to engage and entertain, even if they are too difficult to be read independently. Stories are written by a variety of authors and there would not be an obvious link between them, although some may well be written by the same author or be on a similar theme. No attempt is made to select books where the content is controlled or restricted in terms of vocabulary or phonic regularity. Equally, there is no sense in which book selection is based on perceived level of difficulty. Smith (1973, 1978) suggested that children would acquire an extensive sight vocabulary of immediately identifiable words, not through flashcards and word lists presented out of context, but from meaningful passages of text. Similarly, he argued that children would learn phonic rules on their own through reading. Overall it was felt that children would develop their sight vocabulary and phonic skills through the repeated exposure to words and GPCs in the literature that they were motivated to learn.

Criticisms of the real books approach

Recent research has, however, identified weaknesses in the whole language approach. Share and Stanovich (1995) examined the differing ways in which higher and lower
achievers used context to decode unknown words and, in contrast to the predicted outcomes, found that it was lower rather than higher achievers who relied more on context and higher, not lower, achievers who looked at the features of individual letters. Stuart, Masterson, and Dixon (2000) tested the claim that children would learn new sight vocabulary through repeated exposure to words in texts, and found that sight vocabulary is most effectively taught explicitly, out of context, through flashcards, rather than through reading the words in books or through a mixed strategy of reading words in books together with the prior presentation of key words on flashcards.

Reid Lyon, Shaywitz, Chhabra, and Sweet (2004), writing about evidence-based practice in education, argued that a whole language approach and the use of real books is an example of a curriculum and instructional philosophy based on untested theories and assumptions about teaching and learning – which have nevertheless been widely recommended and implemented despite the absence of evidence of their effectiveness.

### The move towards phonics and reading schemes

In England the publication of the Plowden Report (Central Advisory Council for Education, 1967) gave considerable impetus to a whole language approach to reading. However, by the late 1980s, teachers taught phonic skills to young children through reading schemes and very rarely used real books in the ways articulated by Smith (1978), (see DES, 1990; Mortimer, Salmons, Stoll, Lewis, & Ecob, 1988). Current evidence suggests that reading schemes are widely used and are frequently supplemented by other books which are either from another reading scheme or graded according to their perceived level of difficulty (Stuart, Dixon, Masterson, & Gray, 2003; Wragg, Wragg, Haynes, & Chamberlin, 1998). There is little evidence to suggest that schools in the UK are currently teaching reading primarily through the use of real books. The PNS has reinforced the role of phonics in teaching reading, and implicitly the use of reading schemes, through Letters and sounds (DfES, 2007) which has emphasised that systematic, high quality phonic work should be the prime means for teaching children how to read and spell.

A number of factors have contributed towards a clear move towards teaching reading through phonics and structured reading schemes rather than real books. From a theoretical perspective, there is a clear advantage in learning to read through being taught phonic skills: acquiring phonic knowledge greatly reduces what children have to memorise. Gontijo, Gontijo, and Shillcock (2003) analysed 160,595 different word types (the number of unique words, i.e. the number of different words) and found that they can be represented by just 195 graphemes and 461 grapheme–phoneme associations. Thus, despite inconsistencies in GPCs, teaching phonic skills is in some respects a more efficient approach to teaching reading than learning individual words. Aside from theoretical advantages, a number of other factors have contributed to a clear move towards teaching reading through phonics and structured reading schemes rather than real books.

### Research in cognitive science

Research with preschool children (Lundberg, Frost, & Petersen, 1988), children beginning school (Bradley & Bryant, 1983), programmes designed to prevent difficulties (Blachman, Tangel, Ball, Black, & McGraw, 1999; Byrne & Fielding-Barnsley, 1995; Foorman, Francis, Fletcher, & Schatschneider, 1998; Hatcher, Hulme, &
Educational Psychology 473

Snowling, 2004; Rhine, 1981; Stebbins, St. Pierre, Proper, Anderson, & Cerva, 1977; Torgesen et al., 1999), and low-achieving pupils in school (Hatcher, Hulme, & Ellis, 1994) has found that children with good phonological skills make better progress in reading than those who appear to experience difficulties in developing phonological skills. Despite disagreements about the specific nature of the phonological skills that best predict reading (Bryant, 1998, 2002; Hulme, 2002; Hulme et al., 2002; Hulme, Muter, & Snowling, 1998; Savage & Carless, 2005), and about those that should be taught to school-age children (Carnine, Silbert, & Kameenui, 1997; Goswami, 1994; Goswami & Bryant, 1990; Seymour & Evans, 1994; Wyse & Goswami, 2008), there is a general consensus that the teaching of phonological and phonic skills is essential to children’s subsequent progress.

**Phonics and declining standards**

Whenever there have been concerns about declining standards, it is suggested that too many children are being taught to read through real books and too few through systematic phonics and reading schemes (Reid Lyon et al., 2004; Turner, 1990). The DES (1990), after investigating Turner’s (1990) claim, concluded that there was ‘a clear link between higher standards and systematic phonic teaching’ (p. 7), and that the very small number of teachers who described their approach to teaching as real books:

> gave too little attention to the systematic teaching of skills for tackling print. Many simply assumed that the children’s repeated experiences of hearing stories and sharing books would enable them to gain independence and discern essential patterns in the print with minimal help from the teacher. (DES, 1990, p. 33)

The Office for Standards in Education (Ofsted, 1996) has also attributed low standards, in part, to the frequently poor quality of children’s phonic skills. Ofsted noted that in too many instances phonics was seen as a ‘last resort’ for pupils with reading difficulties rather than a ‘first resort’ for all pupils, and that in too many cases children were left to discover grapheme–phoneme relationships for themselves. Likewise, the failure of the NLS to raise standards as anticipated has been attributed to the phonic element of the strategy not being delivered sufficiently well (DfEE, 2000, 2001; DfES, 2003). In sharp contrast, the link between systematic phonic teaching and higher standards has been observed by both the DES (1990) and Ofsted (1996).

**Evidence-based practice**

In general, when instructional programmes have been compared, those that explicitly teach phonic skills alongside reading schemes with phonically regular texts achieve higher learning outcomes for children than those based on whole language approaches (Becker, Engelmann, Carnine, & Rhine, 1981; Foorman et al., 1998; Fuchs et al., 2001; Torgesen et al., 1999). For example, Foorman et al. (1998) compared a direct instructional model that taught phonic skills systematically and explicitly with a whole language instructional model, and found that children made considerably better progress when taught phonics skills explicitly through direct instruction. Rhine (1981) reported the impact of numerous instructional models including those that explicitly taught phonic skills through direct instruction (Becker et al., 1981; Engelmann & Carnine,
1982) and whole language approaches (Stebbins et al., 1977). Direct instruction emerged as the most effective approach to teaching reading. Bruck, Treiman, Caravolas, Genesee, and Cassar (1998) found that the spelling skills of a group of children taught through a phonics programme were superior to those in receipt of whole language instruction. Thus, the general consensus from the available evidence is that programmes that teach children to read should include systematic and direct phonic instruction (see also National Reading Panel, 2000; Snow, Burns, & Griffin, 1998).

**Impact of phonics on lower-achieving pupils**

Although it is now common practice to teach children sight vocabulary and phonic skills so that they can decode phonically regular texts, Ofsted has registered concern about this approach for a significant proportion of lower-achieving pupils. Ofsted (2004) noted that higher-attaining pupils read reading scheme texts quickly and were then free to choose books that appealed to them. In contrast, those who struggled read books from a tightly structured scheme and stayed with the scheme for longer. In many schools, pupils saw this as something to be worked through until they became a ‘free reader’ (p. 11). However, lower-attaining pupils often found that the books they really wanted to read were too difficult, which did little to encourage positive attitudes to reading. Lack of competence often led to negative attitudes, which were reinforced by a lack of independence in selecting books. These pupils saw reading simply as a chore.

The Progress in International Reading Literacy Study (PIRLS; National Foundation for Educational Research [NFER], 2003) into the literacy standards of 10-year-old pupils found that although children from England came third out of 35 countries on measures of reading accuracy, they scored poorly in terms of attitudes towards reading, read less often for fun (see also Bell, 2005) than pupils in comparable countries, and a significant proportion failed to meet the expected targets. The 2006 PIRLS (Twist, Schagen, & Hodgson, 2007) showed that England had dropped to 15th in reading accuracy, and that attitudes of 10-year-old children in England to reading remain poor compared to those of children in many other countries, and have declined slightly since 2003.

To summarise: there is now a considerable research base demonstrating the benefits of teaching children phonological and phonic skills. It is assumed that this is best done through the type of restricted, controlled vocabulary that characterises reading schemes. However, to date there has been no systematic comparison between reading schemes and real books in terms of the prevalence of high frequency words and core phonic skills represented. Furthermore, some limitations of reading schemes have been noted, particularly in relation to their impact on children’s enjoyment of reading and in relation to lower-achieving pupils; they have been found to have a negative impact on pupils’ motivation and perceptions of the reading process.

**The current study**

The typical starting points for those researching how to teach reading have been to identify the characteristics of effective teachers (Medwell, Wray, Poulson, & Fox, 1998; Wragg et al., 1998) or the cognitive skills required by children to become competent readers (Goswami, 1988). In contrast, instructional psychology (Solity, 2008) takes an analysis of the learning environment as its starting point, with the viewpoint that determining whether to support children’s acquisition of sight vocabulary and phonic skills through reading schemes or real books is best achieved through analysing the literature
that children will be expected to read, rather than pupils’ cognitive development and individual differences. Therefore, the aim of the current study is to examine whether the demands placed on beginning readers in terms of sight vocabulary and phonic skills differ between reading schemes and real books. Thus, a (preferably optimal) set of sight vocabulary and phonic skills must be identified so that their representation within reading schemes and real books can be analysed and compared. Instructional psychology guides the choice of sight vocabulary and phonic skills for such a comparison.

**Instructional psychology**

Instructional psychology analyses what is to be taught and identifies the critical skills required by learners. It draws upon rational analysis (Anderson, 1990; Brown, 1996, 1998), direct instruction (Carnine & Becker, 1982; Carnine et al., 1997; Engelmann & Carnine, 1982), and behavioural psychology (Solity, 1991; Solity & Bull, 1987; Wheldall & Carter, 1996). Both rational analysis – a theory developed within the field of cognitive psychology – and direct instruction shift the emphasis from what happens ‘in the mind’ to the structure of the environment and how it influences cognition (Anderson, 1990). Ultimately, what children learn is determined by the nature and quality of their informal and formal learning experiences. So, the phonological skills of the pre-literate child are seen to reflect specific learning experiences prior to formal education, (e.g., attending a nursery or play group, hearing stories, singing nursery rhymes, watching *Sesame Street*, etc.) rather than established cognitive structures.

**The theory of optimal instruction**

The theory of optimal instruction states that there is an optimal amount of information to teach that will lead to maximum generalisation. Too little information will not provide a sufficient basis for generalisation, whereas too much information may require the child to retain information that is either perplexing or simply of little or no use. Brown (1996, 1998) applied a rational analytic approach to adult reading, and proposed that the cognitive abilities of skilled adult readers will develop in such a way that performance will be statistically optimal with respect to the structure of the English spelling-to-sound mapping system. An optimal system retains what occurs frequently, because it is seen to be useful, and forgets what occurs infrequently, because it is determined to be less important. The implication is that teaching high-frequency words at a sight level and frequently occurring GPCs will lead children to infer that this information is useful and therefore needs to be retained. This will be beneficial to beginning readers, as such words and GPCs will subsequently occur frequently in the books that they read, thus confirming their overall status and general utility. In contrast, the cost of teaching children low frequency sight words and GPCs would be high and not outweigh the potential gains due to their relatively low occurrence in written English.

The view that adult reading corresponds to the optimal representation and statistical properties of the language, together with evidence that children are able to take advantage of language regularities (at multiple levels) in learning to read (Brent & Siskind, 2001; Gershkoff-Stowe, 2002), has important implications for reading instruction – and in particular for whether it is possible to identify an optimal amount of information to teach children. Pareto’s Principle (Koch, 1999) provides a conceptual framework
for identifying the optimal level of sight vocabulary to teach children, and frequency distributions that obey Zipf’s Law (Zipf, 1999) are likely to conform to Pareto’s Principle.

**Zipf’s Law and Pareto’s Principle**

Zipf’s Law states that when words are arranged in rank order, from high to low frequency, the frequency with which those words occur starts high and then tapers off rapidly. This pattern of word frequency distribution reflects Pareto’s Principle, which proposes that a minority of causes, inputs, or effort usually leads to the majority of results, outputs, or rewards (Koch, 1999).

As Stuart et al. (2003) report, a small number of words occur very often and account for a large percentage of written English, whereas a large number of words occur with low frequency. This reinforces the notion that a small number of words have high utility and occur with considerable frequency, and that a large percentage of written English occurs with low frequency and is therefore, less useful in terms of the knowledge that is afforded to the beginning reader.

The aim within instructional psychology is to design curricula and teaching approaches that enable students to adapt more quickly to their environment, which, in relation to sight vocabulary and phonics, is the words and GPCs that children are exposed to most frequently in the books that they read. Therefore, it follows that useful items should be presented out of context frequently and explicitly so that they are learned at a statistically optimal level. Frequent occurrence would indicate that these words and GPCs are likely to appear in the future and are therefore worth remembering. Equally, a statistically optimal system would recognise that it is not critical to remember low frequency words as they are less likely to be encountered in the future.

It is well known that English word usage obeys Zipf’s Law, and therefore conforms to Pareto’s Principle. Stuart et al. (2003) analysed the vocabulary in 685 books drawn from a variety of reading schemes. They identified 9748 different word types (the number of unique words), which yielded a total number of 268,028 word tokens (the total number of words). They found that the 100 most frequently occurring words, which represented just over 1% of all word types and accounted for 54.1% of all word tokens. In contrast, 51% of word types appeared only once or twice and accounted for just 2.4% of all word tokens. McNally and Murray (1964) estimated that the 100 most frequently occurring words in written English accounted for approximately half the word tokens. Similarly, Vousden (2008) examined the frequency of occurrence of whole words and GPCs in the CELEX database of written and spoken English (Baayen, Piepenbrock, & Gulikers, 1995), which contained 54,675 word types and a total of 15,524,774 word tokens. She demonstrated that the frequency distributions of both words and GPCs in adult-directed text obey Zipf’s Law very closely.

**Structure of the current study**

It is generally assumed that reading schemes contain more high-frequency and phonically regular words than real books. This is why they are used so widely when teaching beginning readers. Although the level of repetition creates texts that have an artificial structure compared to the broader and less predictable content found in children’s and
adult literature, reading schemes are immediately accessible and give children an early opportunity to read a complete book independently. In contrast, although real books are more engaging, it is thought that they would not necessarily present the key sight vocabulary and GPCs with sufficient frequency or consistency, in order to give beginning readers the appropriate opportunities to practice newly taught skills. However, to date, no analyses have tested these assumptions and compared the structure and content of adult texts, children’s real books, and reading schemes.

The research reported in this article therefore examines a sample of adult literature and children’s real books together with two reading schemes, the Oxford Reading Tree and Rhyme World, to explore their similarities and differences, and thus suitability for use with beginning readers. It extends the analyses of McNally and Murray (1964), Stuart et al. (2003), and Vousden (2008) in four ways. First, it compares the incidence of high-frequency words in four data sets. Second, it considers whether the incidence of GPCs in reading schemes is any different from that in children’s real books or adult texts. Third, it analyses high-frequency words and GPCs to reflect the two main strategies that teachers typically adopt to teach decoding skills, and so mirrors typical classroom practice as well as the views of ‘dual route theorists’ (Coltheart, 1978; Coltheart, Curtis, Atkins, & Haller, 1993) and the ‘simple view of reading’ promoted in England through the PNS (DfES, 2006). Fourth, the research provides a theoretical rationale derived from instructional psychology for the choice of appropriate literature to support children’s acquisition of high-frequency words at a sight level and phonic skills.

Comparison of incidence of high-frequency words

Method

Materials

An electronic database was constructed for each of the four sets of written materials, such that each word’s orthographic and phonemic representation was noted along with its frequency count. All of the materials examined were written in English. One of the sets of written materials comprised texts suitable for adults. These were extracted from the MRC Psycholinguistic Database (Coltheart, 1981) of adult fiction and non-fiction (Kucera & Francis, 1967), with the restriction that they had a Kucera-Francis frequency of at least 1. The other sets of materials comprised texts suitable for children. One set (children’s real books) was taken from the content of 66 books, listed in Appendix 1. Another set was taken from the content of books from Stages 2–10 (inclusive) of the Oxford Reading Tree (ORT) reading scheme, and the last set was taken from the content of books in the Rhyme World (RW) reading scheme. All the books were aimed at children aged between four and seven years. Words were excluded if they were non-English (e.g., ‘sans’), interjections, or were not real words (e.g., ‘Mmmm’). This resulted in a list of English words and their frequency for each set of texts.

Procedure

The wordlists for each of the four databases were first arranged in descending order of frequency and then plotted as a frequency distribution. Four analyses were conducted on the resulting databases.
The first determined whether the frequency of occurrence of vocabulary in the four databases reflected the same or similar structures. Thus, a power law function was fitted to each plot to assess whether the data obeyed Zipf’s Law.

The second analysis examined the frequency of the 100 high-frequency words (as listed in Appendix 2) used in the Early Reading Research (ERR; Shapiro & Solity, 2008; Solity, 2000, 2003; Solity, Deavers, Kerfoot, Crane, & Cannon, 1999, 2000; Solity & Shapiro, 2008). These words were based on the Ladybird Key Word List (McNally & Murray, 1964) and formed part of the ERR literacy framework, which was introduced to schools in an experimental investigation into the framework’s impact on children’s progress in learning to read. McNally and Murray showed that these 100 words account for approximately 50% of all written English. An analysis was conducted to ascertain whether these 100 words occurred more frequently in the reading schemes, which is what would be expected, than in the adult literature or children’s real books.

The third analysis was conducted to investigate Pareto’s Principle among the next 50 most frequently occurring words (i.e., words 101–150) from the adult database, to see whether they occurred with comparable frequencies in the four databases (see Appendix 3). Words were selected from the adult database for this analysis as Solity, McNab, and Vousden (submitted) have found that this database contains more generalisable vocabulary (i.e., vocabulary more like to occur in the three other databases) than the other materials, which tend to contain more scheme-specific vocabulary (e.g., names of story characters that are unlikely to occur in the other databases). All children will move on to adult literature at some point as they become more experienced readers, and so it was of interest to establish the frequency of such words to determine whether they could usefully be taught at a sight level.

The fourth analysis identified the high-frequency words that are also phonically regular and so can be decoded through applying the GPCs listed in Table 5. An alpha level of .05 was used for all statistical tests.

Results and discussion

Does the vocabulary in each database follow Zipf’s Law?

Figures 1–4 show the plot of the proportion of word tokens for each database that can be read as a function of the rank frequency of each word, with the line of best fit of a power function, for words of all syllable lengths. The power function for each database (\(y = 112269x^{-1.0423}\) in adult; \(y = 3127.1x^{-0.9361}\) in real books; \(y = 5775.9x^{-1.0435}\) in ORT; \(y = 431.58x^{-0.8117}\) in RW) provides an excellent fit to the data (\(r^2 = .997\) in adult; \(r^2 = .993\) in real books; \(r^2 = .978\) in ORT; \(r^2 = .993\) in RW), indicating that word usage in these materials obeys Zipf’s Law very closely. This analysis shows that the four databases conform to the same structure, in terms of distribution of vocabulary. As predicted by Zipf’s Law, a small number of words occur frequently and a far larger percentage of words occur with relatively low frequency.

Frequency of the ERR 100 high-frequency words in each database

The ERR 100 words were analysed, to establish their frequency in the four data sets and to see whether Pareto’s Principle applied. Table 1 lists the number of word types and word tokens for each set of written materials.
It can be seen that approximately 50% of all word tokens encountered will be one of the 100 high-frequency words. These words accounted for more words within the adult texts (53%) than in the real books (49%), ORT (52%), or RW (43%) texts. Thus, in England during the 120 school weeks when children attend Reception, Year 1, and Year 2 between the ages of four and seven, children need to learn less than a word a week to be able to decode approximately 50% of any material they are given. It is interesting to note that the proportion of word tokens accounted for by the 100 high-frequency words in the real books and ORT datasets compared favourably with the coverage achieved in the adult dataset.

Further evidence of the similarity between the databases is presented in Table 2, which shows the intercorrelation matrix for the relative frequency with which the 100 high-frequency words occur across the databases.2 As can be seen from Table 2, all the correlations are highly significant, indicating that the 100 high-frequency words appear in similar proportions in all the databases. In other words, the most frequent words in any one database are also the most frequent words in all the other databases.

However, measures of correlation only assess the pattern of occurrence for the 100 high-frequency words across databases, and not whether the 100 high-frequency words occur more frequently in some databases than others (as reading schemes predict). A paired t test comparing the mean frequency of occurrence of the 100 high-frequency words between the real books and adult databases revealed no significant difference ($t[99] = 1.75, \ p = .08$). Likewise, there was no significant difference between the real books and ORT databases ($t[99] = −0.07, \ p = .95$). However, the 100

![Figure 1. Word frequencies and rank of frequency of vocabulary in adult texts.](image-url)
most frequent words occurred significantly less often in the RW than the real books database \((t[99] = 3.51, p < .001)\). These analyses show that there is no evidence that the 100 high-frequency words occur less frequently in the real books database than in any other – in fact, the analyses provide evidence to the contrary, in that the 100 high-frequency words actually – appear more often in the real books database than in some reading schemes (in this case, RW).

Overall, the analyses revealed that a small fraction of children’s vocabulary (3–5%) accounts for around 50% of all words encountered. In the case of the adult literature, the 100 words represented 0.58% of word types and 53% of word tokens. This data reflects Pareto’s Principle that a minority of causes usually leads to a majority of results. According to Pareto’s Principle, the next 50 most frequently occurring words should account for a relatively small proportion of the remaining word tokens in the texts examined. This is in fact what the analysis showed (see Table 3).

**Figure 2. Word frequencies and rank of frequency of vocabulary in children’s real books.**

\[ y = 3127.1x^{-0.9361} \]
\[ R^2 = 0.9931 \]

*Frequency of the next 50 most frequently occurring words (words 101–150)*

The next 50 most frequently occurring word types were taken from the adult database, as discussed above, as it contained more generalisable vocabulary than the other materials, which contained more scheme-specific vocabulary (Solity et al., submitted). The proportions of word types and tokens accounted for by the next 50 most frequently occurring words across the databases are listed in Table 3. These words represented
0.29% of the word types in the adult database, 1.57% of the word types in the real books database, 2.52% of the words in ORT, and 2.79% of the words in RW. These word types accounted for 7.55% of word tokens in the adult database, 4.57% of the word tokens in the real books database, 4.53% of the word tokens in the ORT, and 2.95% of the word tokens in RW.

By the time the majority of children have reached the point, instructionally, when they might benefit from being taught these extra 50 words, they would also typically have been taught a number of core phonic skills (see next section) which would enable them to decode a proportion of these 50 word types through the application of GPCs. As a result, the percentage of word tokens that would then be read by a purely orthographic route, after excluding those that could be read phonically, would be 3.66% in the adult texts, 2.38% in the real books, 2.63% in ORT, and 1.73% in RW. Thus, the proportion of word tokens that can be read through learning to read the next 50 high-frequency words drops dramatically in comparison to the first 100 words, suggesting that the vocabulary in all the text types analysed reflects Pareto’s Principle.

It is potentially counter-intuitive to find that these 50 words account for a slightly larger percentage of word tokens in the adult texts than in the two reading schemes, and that the proportion of words accounted for in the real books and ORT and are almost the same. However, it indicates that high-frequency words occur as often in adult literature and children’s real books as in the two reading schemes analysed.
High-frequency words that can be decoded by the GPCs listed in Table 5

The instructional programme from which the 100 words were derived teaches high-frequency words at a sight level, so that children are able to decode a high proportion of the texts that they encounter. However, children are also taught GPCs alongside high-frequency words (see the next section for further details on the GPCs taught). As a result, children would initially decode high-frequency sight vocabulary through word recognition skills, but over time would also be able to do so through the application of taught GPCs. Of the 100 high-frequency words (see Appendix 2), 39 could

Table 1. Word counts for the four databases and 100 high-frequency ERR words.

<table>
<thead>
<tr>
<th>Database</th>
<th>Types</th>
<th>Tokens</th>
<th>Percentage of word types accounted for by 100 high-frequency words</th>
<th>Summed frequency of 100 sight vocabulary words</th>
<th>Percentage of word tokens accounted for by 100 high-frequency words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>17,246</td>
<td>845,406</td>
<td>0.58</td>
<td>449,471</td>
<td>53.17</td>
</tr>
<tr>
<td>Real books</td>
<td>3,183</td>
<td>29,140</td>
<td>3.14</td>
<td>14,345</td>
<td>49.23</td>
</tr>
<tr>
<td>ORT</td>
<td>1,985</td>
<td>30,283</td>
<td>5.04</td>
<td>15,802</td>
<td>52.18</td>
</tr>
<tr>
<td>RW</td>
<td>1,790</td>
<td>6,876</td>
<td>5.59</td>
<td>3,022</td>
<td>43.95</td>
</tr>
</tbody>
</table>
be read, at some point, by applying GPCs. Table 4 shows the proportion of word tokens that ultimately could also be read using phonic skills and those that can only be read at a sight level.

The proportion of high-frequency word tokens (of the total number of word tokens for each database) that can be read by applying GPC rules is similar across all four databases. Slightly more can be read in the adult database (15.93%), with the lowest proportion being found in RW (14.75%). However, when the proportion of phonically

<table>
<thead>
<tr>
<th>Database</th>
<th>Real</th>
<th>ORT</th>
<th>RW</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>.8</td>
<td>.7</td>
<td>.68</td>
<td>0.23</td>
<td>0.75</td>
</tr>
<tr>
<td>Real</td>
<td>.85</td>
<td>.82</td>
<td>.27</td>
<td>0.74</td>
<td></td>
</tr>
<tr>
<td>ORT</td>
<td>.81</td>
<td></td>
<td>.27</td>
<td>0.82</td>
<td></td>
</tr>
<tr>
<td>RW</td>
<td></td>
<td>.21</td>
<td></td>
<td>0.71</td>
<td></td>
</tr>
</tbody>
</table>

Note: All coefficients are significant at \( p < .0001 \).

<table>
<thead>
<tr>
<th>Database</th>
<th>Types</th>
<th>Tokens</th>
<th>Percentage of 50 next most frequent word types</th>
<th>Summed frequency of 50 next most frequent word tokens</th>
<th>Percentage of 50 next most frequent word tokens excluding phonologically regular words</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>17,246</td>
<td>845,406</td>
<td>0.29</td>
<td>63,817</td>
<td>3.66</td>
</tr>
<tr>
<td>Real books</td>
<td>3183</td>
<td>29,140</td>
<td>1.57</td>
<td>1333</td>
<td>2.38</td>
</tr>
<tr>
<td>ORT</td>
<td>1985</td>
<td>30,283</td>
<td>2.52</td>
<td>1372</td>
<td>2.63</td>
</tr>
<tr>
<td>RW</td>
<td>1790</td>
<td>6876</td>
<td>2.79</td>
<td>203</td>
<td>1.73</td>
</tr>
</tbody>
</table>

Table 4. Proportion of word tokens derived from the high-frequency words that can and cannot be decoded by the GPCs listed in Table 5.
regular word tokens, out of the total number of word tokens accounted for by the 100 high-frequency words is calculated, slightly more are accounted for in RW (33.55%) than in the children’s real books (32.03%), with the lowest proportion being found in the adult database (29.97%). This indicates that although the 39 phonically regular high-frequency words appear less often in RW as a whole than in the other three databases, proportionally more of the high-frequency words used in RW are phonically regular.

Once the first 100 high-frequency words have been taught, there is probably little utility in teaching any further high-frequency words at a sight level, as doing so accounts for relatively few word tokens – certainly not enough to justify the time that might be involved in teaching them or the additional demands that they make on children’s memories. It is therefore of more use to learn generalisable skills that can be applied more widely. To this end, we examined the frequency of GPCs in the four databases.

Investigation into the frequency of GPCs in the four databases

Previous research into GPCs indicates that there are approximately 195 graphemes in the English language, that there are 461 possible grapheme–phoneme mappings, and that on average each grapheme corresponds to 2.4 phonemes (Gontijo et al., 2003). This measure is known as the orthographic depth of a language and measures the diversity of spelling-to-sound mappings. Languages that have a high orthographic depth are thought to be more irregular than languages with a low orthographic depth. English, with an orthographic depth of 2.4, contrasts with transparent languages such as Portuguese that have an orthographic depth of almost 1 (i.e., each grapheme corresponds to mainly one phoneme). However, although the English spelling-to-sound mapping appears highly irregular, the vocabulary as a whole is much more regular (Berndt, D’Autrechy, & Reggia, 1994; Berndt, Reggia, & Mitchum, 1987; Hanna, Hanna, Hodges, & Rudorf, 1966). For example, although the grapheme ‘ea’ represents a multiple mapping between graphemes and phonemes (where one grapheme represents two or more phonemes or when one phoneme is represented by two or more graphemes), ‘ea’ mostly represents the phoneme /i/ as in ‘eat’. Thus, although many pronunciations are possible, for some graphemes one is used much more frequently than the others.

Under the theory of optimal instruction, children are best taught only the most frequently occurring mappings between graphemes and phonemes, as described by Carnine et al. (1997). Teaching all the possible multiple mappings could lead to considerable confusion and it is not clear on what basis children would be able to choose one possible pronunciation over another. Furthermore, if Pareto’s Principle holds, teaching all possible pronunciations may not have the anticipated impact on children’s reading, as certain mappings will occur rarely in written English. The theory of optimal instruction, while acknowledging the irregular nature of much written English, hypothesises that although a relatively small proportion of word types are phonically regular they will nevertheless account for a relatively large proportion of word tokens.

Method

Materials

The phonics analysis was conducted on the same four datasets as the analysis of high-frequency words, after the exclusion of the 100 ERR high-frequency words examined in the previous section and all polysyllabic words.
Procedure

Sixty-one of the most frequently occurring GPCs, as determined by Carnine et al. (1997), were analysed, as these have formed the basis of the phonic programmes taught within direct instruction programmes in the USA (Carnine et al., 1997) and within the ERR framework for teaching literacy in the UK (Shapiro & Solity, 2008; Solity et al. 2000; Solity & Shapiro, 2008), which is also derived from direct instruction. They are listed in Table 5, together with the geminate rule (a sequence of two identical sounds, usually consonants), past tense suffix ‘ed’, and the plural suffix ‘s’, resulting in a total of 64 GPC rules. The GPCs were grouped into three categories.

The first category contained those GPCs where a phoneme maps on to a single letter grapheme. Words following this pattern are termed ‘phonically regular’ within the ERR programme. For example, in a word such as ‘cat’ each single letter grapheme

<table>
<thead>
<tr>
<th>Single-letter Grapheme</th>
<th>Pronunciation</th>
<th>Multiple-letter Grapheme</th>
<th>Pronunciation</th>
<th>Suffix Grapheme</th>
<th>Pronunciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>b</td>
<td>bed</td>
<td>ai</td>
<td>aid</td>
<td>ed</td>
<td>t or d</td>
</tr>
<tr>
<td>c</td>
<td>kiss</td>
<td>air</td>
<td>chair</td>
<td>s</td>
<td>s or z</td>
</tr>
<tr>
<td>d</td>
<td>dog</td>
<td>ar</td>
<td>barn</td>
<td></td>
<td></td>
</tr>
<tr>
<td>f</td>
<td>fish</td>
<td>au</td>
<td>cause</td>
<td></td>
<td></td>
</tr>
<tr>
<td>g</td>
<td>golf</td>
<td>aw</td>
<td>claw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>h</td>
<td>help</td>
<td>ay</td>
<td>bay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>j</td>
<td>jump</td>
<td>ea</td>
<td>beam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>k</td>
<td>kite</td>
<td>ear</td>
<td>clear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>l</td>
<td>lamp</td>
<td>ee</td>
<td>creek</td>
<td></td>
<td></td>
</tr>
<tr>
<td>m</td>
<td>man</td>
<td>er</td>
<td>fern</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>nip</td>
<td>ew</td>
<td>screw</td>
<td></td>
<td></td>
</tr>
<tr>
<td>p</td>
<td>pad</td>
<td>ey</td>
<td>key</td>
<td></td>
<td></td>
</tr>
<tr>
<td>q</td>
<td>quick</td>
<td>igh</td>
<td>fight</td>
<td></td>
<td></td>
</tr>
<tr>
<td>r</td>
<td>run</td>
<td>ir</td>
<td>float</td>
<td></td>
<td></td>
</tr>
<tr>
<td>t</td>
<td>tap</td>
<td>oi</td>
<td>foil</td>
<td></td>
<td></td>
</tr>
<tr>
<td>v</td>
<td>van</td>
<td>oo</td>
<td>food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>w</td>
<td>wet</td>
<td>oor</td>
<td>door</td>
<td></td>
<td></td>
</tr>
<tr>
<td>x</td>
<td>ox</td>
<td>or</td>
<td>born</td>
<td></td>
<td></td>
</tr>
<tr>
<td>y</td>
<td>young</td>
<td>ou</td>
<td>bound</td>
<td></td>
<td></td>
</tr>
<tr>
<td>z</td>
<td>zap</td>
<td>oy</td>
<td>toy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a</td>
<td>cat</td>
<td>ur</td>
<td>blur</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e</td>
<td>bed</td>
<td>ch</td>
<td>chip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i</td>
<td>sit</td>
<td>ck</td>
<td>buck</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o</td>
<td>log</td>
<td>kn</td>
<td>know</td>
<td></td>
<td></td>
</tr>
<tr>
<td>u</td>
<td>sun</td>
<td>ph</td>
<td>photo</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a_e</td>
<td>make</td>
<td>qu</td>
<td>quick</td>
<td></td>
<td></td>
</tr>
<tr>
<td>e_e</td>
<td>eve</td>
<td>sh</td>
<td>shop</td>
<td></td>
<td></td>
</tr>
<tr>
<td>i_e</td>
<td>life</td>
<td>th</td>
<td>thin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>o_e</td>
<td>code</td>
<td>wh</td>
<td>what</td>
<td></td>
<td></td>
</tr>
<tr>
<td>u_e</td>
<td>mute</td>
<td>geminate</td>
<td>as single</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(c, a, and t) represents a single phoneme. Children read these word types by applying letter–sound correspondences and blending individual phonemes together to pronounce words. These words include various combinations of consonants (C) and vowels (V) (see Table 6). The vowel structure consonant, vowel, consonant, then ‘e’ (CVCe) is referred to as the modified ‘e’ (it has also been referred to as the ‘magic e’) and is also classified as a single letter GPC. For each database the total number of word types and word tokens that would be pronounced correctly (and incorrectly) through the application of the 31 single-letter GPCs was calculated. For example, the word ‘time’ has the CVCe structure and is viewed as phonically regular since it would be pronounced correctly by applying ERR skills, whereas a word such as ‘face’ (phonemically /feIs/), although it also has a CVCe structure, would not be pronounced correctly because not all the graphemes correspond to the most frequently associated phonemes (f - > /f/, a+e - > /el/, but decoding c - > /k/ is wrong as the grapheme ‘c’ in this case represents the phoneme /s/). Similarly, although ‘mind’ has a CVCC structure where one phoneme is represented by one grapheme, applying the ERR GPCs to reading ‘mind’ would lead to an incorrect pronunciation as the grapheme ‘i’ should be pronounced /aI/ rather than /I/ as in ‘win’.

The second category contained 31 GPCs where more than one letter constitutes a grapheme (referred to as a letter combination), and therefore each letter combination represents one or more phonemes. For example, in the word ‘ship’ the grapheme ‘sh’ represents a single phoneme (/S/) and in the word ‘paid’ the grapheme ‘ai’ represents the phoneme (/el/). Although several graphemes represent more than one phoneme, children within direct instruction programmes are only taught the most frequently occurring mapping between grapheme and phoneme, as defined by Carnine et al. (1997). As a result the analysis included 30 letter combinations together with the geminate rule where a phoneme is represented by a double letter. For each database, the total number of word types and word tokens that would be pronounced correctly or incorrectly by applying the 31 letter combinations was calculated. Examples of

<table>
<thead>
<tr>
<th>CV structure read correctly</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>CCCVCC</td>
<td>scrap</td>
</tr>
<tr>
<td>CCCVCCC</td>
<td>strand</td>
</tr>
<tr>
<td>CCCVCe</td>
<td>scrape</td>
</tr>
<tr>
<td>CCVC</td>
<td>slip</td>
</tr>
<tr>
<td>CCVCC</td>
<td>crest</td>
</tr>
<tr>
<td>CCVCCC</td>
<td>prompt</td>
</tr>
<tr>
<td>CCVCe</td>
<td>tribe</td>
</tr>
<tr>
<td>CV</td>
<td>ha</td>
</tr>
<tr>
<td>CVC</td>
<td>pat</td>
</tr>
<tr>
<td>CVCC</td>
<td>bend</td>
</tr>
<tr>
<td>CVCCC</td>
<td>tempt</td>
</tr>
<tr>
<td>CVCCe</td>
<td>haste</td>
</tr>
<tr>
<td>CVCe</td>
<td>made</td>
</tr>
<tr>
<td>VC</td>
<td>ox</td>
</tr>
<tr>
<td>VCC</td>
<td>end</td>
</tr>
<tr>
<td>VCe</td>
<td>ale</td>
</tr>
</tbody>
</table>
words that would not be pronounced correctly by following these rules are ‘bread’ (which would be pronounced /briːd/) and ‘chef’ (which would be pronounced /tɛʃ/).

The third category contained those GPCs that handled the suffixes ‘ed’ and ‘s’.

For each database, all words that could be read correctly and incorrectly through the application of any combination of the above phonic skills were listed for comparison. In addition, a count of the number of different onsets and rimes contained within each list was calculated to provide some comparison with a unit larger than a standard GPC, as Treiman, Mullennix, Bijeljac-Babic, and Richmond-Welty (1995) found that vowel graphemes are pronounced more consistently when part of a rime unit. The NLS (DfEE, 1998) emphasised the teaching of onset-rime, and Goswami (1986, 1994, 2005) has also argued that they should be taught to beginning readers.

As with high-frequency words, the ideal is for a small proportion of GPCs to enable children to read a large proportion of word tokens. So, only 64 GPCs are taught out of a possible 461 (13.88%; Gontijo et al., 2003), and for Pareto’s Principle to apply the aim is for this relatively small proportion of taught skills to enable children to read a relatively large proportion of both word types and word tokens. Thus, a further indication that the skills taught are the most useful for beginning readers would be provided if the proportion of word types or word tokens that can be read using the GPCs taught is high, as this reflects a high level of generalisation.

Finally, to assess the consistency of the grapheme to phoneme mappings being analysed, the number of pronunciations for each grapheme in all the GPCs was determined for each database. Graphemes that had only one pronunciation had the highest consistency, whereas graphemes that had many pronunciations had low consistency. According to the proponents of reading schemes, consistency within the reading scheme databases should be higher than in either the real books or adult databases.

**Results and discussion**

**Phonically regular words**

As shown in Table 7, about a quarter of all monosyllabic word tokens in the adult and real books databases were phonically regular and would be read correctly through the application of the 31 single-letter GPCs taught within the ERR. For the ORT and RW databases, this figure rises to nearly a third.

The differences between the reading schemes and the adult literature might realistically have been predicted to be even greater, given that the schemes have been prepared with the specific purpose of giving children practice in applying their phonic skills to phonically regular texts. It is potentially salient that the percentages of word tokens in the ORT and RW were very similar, as were the percentages of word tokens in the real books and adult databases. It suggests that the two reading schemes reflect similar structures, as do the real books and adult databases, in terms of the distribution of phonically regular words.

**Multiple letter GPCs**

Table 7 also shows the proportion of word types and tokens that can be read when the 31 multiple-letter GPCs are known in addition to the 31 single-letter GPCs. Overall, a similar number of words (types and tokens) can be read correctly across all three of the children’s databases although, surprisingly, slightly more word types and tokens can be read correctly in the adult literature than in the other databases. Approximately...
Table 7. Potential impact of taught phonic skills.

<table>
<thead>
<tr>
<th>Words grouped by phonic skill</th>
<th>Correct?</th>
<th>Adult</th>
<th>Real Books</th>
<th>ORT</th>
<th>RW</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
<td>Type</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Token</td>
<td>Token</td>
<td>Token</td>
<td>Token</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>1046</td>
<td>42907</td>
<td>344</td>
<td>2199</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(33.92)</td>
<td>(25.28)</td>
<td>(24.12)</td>
<td>(25.56)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>434</td>
<td>24386</td>
<td>155</td>
<td>1195</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(14.07)</td>
<td>(14.37)</td>
<td>(10.87)</td>
<td>(13.89)</td>
</tr>
<tr>
<td>Words containing both single-letter GPCs and multiple-letter GPCs</td>
<td>Yes</td>
<td>1115</td>
<td>65027</td>
<td>385</td>
<td>2449</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(36.15)</td>
<td>(38.31)</td>
<td>(27.00)</td>
<td>(28.46)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>270</td>
<td>30359</td>
<td>106</td>
<td>1091</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(8.75)</td>
<td>(17.89)</td>
<td>(7.43)</td>
<td>(12.68)</td>
</tr>
<tr>
<td>Words containing single-letter GPCs, multiple-letter GPCs, and suffixes</td>
<td>Yes</td>
<td>160</td>
<td>4455</td>
<td>331</td>
<td>1063</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(5.19)</td>
<td>(2.62)</td>
<td>(23.21)</td>
<td>(12.35)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>59</td>
<td>2591</td>
<td>105</td>
<td>607</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.91)</td>
<td>(1.53)</td>
<td>(7.36)</td>
<td>(7.05)</td>
</tr>
<tr>
<td>Subtotal</td>
<td>Yes</td>
<td>2321</td>
<td>112389</td>
<td>1060</td>
<td>5711</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(75.26)</td>
<td>(66.22)</td>
<td>(74.33)</td>
<td>(66.38)</td>
</tr>
<tr>
<td></td>
<td>No</td>
<td>763</td>
<td>57336</td>
<td>366</td>
<td>2893</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(24.74)</td>
<td>(33.78)</td>
<td>(25.67)</td>
<td>(33.62)</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>3084</td>
<td>169725</td>
<td>1426</td>
<td>8604</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>986</td>
<td>8785</td>
<td>1005</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2613</td>
<td>2011</td>
<td>602</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>792</td>
<td>78.81</td>
<td>213</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>729</td>
<td>76.96</td>
<td>213</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>2011</td>
<td>76.96</td>
<td>602</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>213</td>
<td>76.96</td>
<td>602</td>
</tr>
</tbody>
</table>
10% more words can be read correctly in the adult database, suggesting that children’s reading materials in general contain fewer words that contain a multiple-letter GPC. Overall however, as a comparison of the correct and incorrect pronunciation rows in Table 7 shows, the majority of words that contain a multiple-letter combination will be read correctly, reflecting the theory of optimal instruction. It should be noted that the letter combination ‘ph’ does not occur at all in the three children’s databases.

**Suffixes**

Table 7 also shows the proportion of word types and tokens that can be read successfully when the suffixes ‘ed’ and ‘s’ are present, in addition to the 31 multiple-letter GPCs and the 31 single-letter GPCs. A similar proportion of text (both word types and tokens) across all three children’s databases can be read correctly and there was very little difference between either of the reading schemes and the children’s real books. However, in the adult database, even though they could largely be read correctly, there are fewer words that contain a suffix (‘ed’ or ‘s’). This suggests that texts aimed at children contain more past tense and plural words than occur in adult language. The fact that so many words in the children’s databases contain the past tense and plural suffixes underlines the value of teaching them.

**Monosyllabic words that can be read using the ERR GPCs and high-frequency words**

We also calculated the percentage of monosyllabic words that could be read by combining all 64 GPCs and the ERR monosyllabic high-frequency words, of which there are 89 (see Table 8). This analysis indicated that a large majority of words (around 90%) could be read across all databases. There were essentially no differences between any of the children’s databases, or between the children’s and adult databases. It is potentially significant, in terms of the structures of the various text types, that there is this similarity between the two reading schemes and the children’s and adult texts. It suggests that there is something similar in the way they are structured, which potentially has implications for how effectively children will generalise from one text type to the other. It is interesting to note that for RW, in comparison to the other databases, relatively more text was accessible via phonic skills than sight vocabulary.

Given the total number of high-frequency words and GPCs that could potentially be taught, it is also highly significant from an instructional perspective that such a relatively small number of core skills can have such benefit for children’s reading. A

<table>
<thead>
<tr>
<th>Database</th>
<th>Words accounted for by ERR high-frequency words</th>
<th>Words accounted for by all ERR phonic skills</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>437,355 (72.04)</td>
<td>112,389 (18.51)</td>
<td>549,744 (90.56)</td>
</tr>
<tr>
<td>Real books</td>
<td>13,810 (61.61)</td>
<td>5711 (25.48)</td>
<td>19,521 (87.09)</td>
</tr>
<tr>
<td>ORT</td>
<td>15,329 (63.57)</td>
<td>6314 (26.18)</td>
<td>21,643 (89.75)</td>
</tr>
<tr>
<td>RW</td>
<td>2924 (52.81)</td>
<td>2011 (36.32)</td>
<td>4935 (89.13)</td>
</tr>
</tbody>
</table>
considerable amount of time could be spent in teaching additional high-frequency words and GPCs that would contribute very little to children’s capacity to read and spell. Again, this reflects Pareto’s Principle that the majority of gains result from a minority of core skills.

A comparison of words read through GPCs and onset-rimes

To highlight the effectiveness of an approach to teaching phonic skills based on the theory of optimal instruction, the number of words that can be read using the ERR phonic skills can be compared with the number of onsets and rimes that would need to be taught to read exactly the same proportion of words tokens in each of the four databases (i.e., the word tokens identified in Table 7). The results of this analysis are shown in Table 9.

As can be seen, a much larger number of onsets and rimes need to be learned in order to read the same number of word tokens that can be read through learning 64 GPCs. Indeed, there would have to be a fourfold increase in the amount of information children would need to learn to read material aimed at children, and an eightfold increase to move on to adult-directed text. This again illustrates the benefits of identifying a small percentage of optimal skills that enable children to read the majority of word types and tokens that they will encounter. Teaching a limited number of high-frequency words and core GPCs reduces the information that children have to memorise, while at the same time providing them with a very good outcome from the optimal number of skills that they are taught.

Consistency

Table 10 shows the mean number of pronunciations per single- and multiple-letter grapheme for each database. An analysis of variance (ANOVA) on the mean number of pronunciations per taught grapheme was conducted, with grapheme size (single-letter or multiple-letter) as the between-subjects variable and database (adult, real books, ORT, RW) as the within-subjects variable. The main effect of grapheme size was not significant, and the interaction between grapheme size and database was also non-significant, indicating that there was no difference in the consistency of single- and multiple-letter GPCs, and that the variation in consistency of single- and multiple-letter GPCs across the four databases was the same. The main effect of database was significant ($F[3,180] = 21.95, p < .0001$), indicating that the consistency of the GPCs under consideration was different across the four databases. Post-hoc matched $t$ tests for pairs of databases (corrected for multiple tests of comparison using Bonferroni’s correction) revealed that consistency was lower in the adult database than in the real

<table>
<thead>
<tr>
<th>Database</th>
<th>Onsets</th>
<th>Rimes</th>
<th>Total $n$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adult</td>
<td>63</td>
<td>471</td>
<td>534</td>
</tr>
<tr>
<td>Real books</td>
<td>54</td>
<td>280</td>
<td>334</td>
</tr>
<tr>
<td>ORT</td>
<td>48</td>
<td>234</td>
<td>282</td>
</tr>
<tr>
<td>RW</td>
<td>55</td>
<td>210</td>
<td>265</td>
</tr>
</tbody>
</table>
books database \((t[61] = -3.74, p < .0005)\), and also lower than in both reading schemes (ORT: \(t[61] = -5.75, p < .0001;\) RW: \(t[61] = -5.86, p < .0001\)). Consistency was also lower in the real books database than both reading schemes (ORT: \(t[61] = -3.28, p < .005;\) RW: \(t[61] = -3.60, p < .001\)), but there was no difference in consistency between the two reading schemes.

**Discussion**

The conventional wisdom when teaching sight vocabulary and phonic skills is that children will have more opportunities to apply their skills to texts if they read books drawn from a reading scheme, rather than non-reading scheme books. This view has been reinforced in recent years by research illustrating the importance of phonological awareness in preventing and overcoming literacy difficulties. Those advocating the use of reading schemes have argued that it is more important that children are given texts to read that they can decode accurately, even if they could not be fully understood. These debates have taken place in the absence of a detailed analysis of how frequently key sight vocabulary and GPCs occur in both reading schemes and real books.

**Sight vocabulary**

Given the debates surrounding the use of real books and reading schemes, it is reasonable to expect that reading schemes contain more high-frequency words than non-reading scheme texts, and that the overall word frequency distributions are different. These assumptions were tested through four analyses. The first analysis showed that the vocabulary in each database was structured in the same way and corresponded to Zipf’s Law – when words are arranged in rank order, from high to low frequency, the probability with which words occur starts high and then tapers off rapidly. These results are consistent with the findings of Vousden (2008), who showed that Zipf’s Law applied to the CELEX database (Baayen et al., 1995) for written and spoken English. Thus, the proportions of high-frequency words across all four databases were very similar. These findings highlight the importance of this feature of the English language from an educational perspective, because they provide a theoretically motivated rationale for teaching young children a small number of high-frequency words at a sight level.

The second analysis demonstrated that 100 words accounted for approximately 50% of the word tokens in each data set. Although this might have been predicted for
reading schemes, especially as it mirrors the results of the analysis conducted by Stuart et al. (2003), it would probably not have been predicted for the adult or real books databases. Additionally, there was a significant relationship between the databases in terms of the relative frequency of occurrence of the 100 words – the most frequent words in the real books and adult databases were the same as the most frequent words in the reading scheme databases. Remarkably, these 100 words appeared no less often in the adult literature than in the other databases, even though they accounted for fewer word types in the adult database (0.58%) than other materials. Again, this is not what might have been predicted, as the assumption is generally made that high-frequency words occur most often in reading schemes. In fact, the 100 high-frequency words accounted for the least text in the RW database, where the incidence of these words was significantly lower than for the real books database, again contrary to expectations.

The third analysis showed that the percentage of word tokens accounted for by the next 50 most frequent words reduced dramatically across all databases. The percentage decreased further when words that are phonically regular or contain multiple-letter GPCs (also referred to as letter combinations) were excluded. This strongly suggests that there is an optimal number of sight vocabulary words for children to learn when beginning reading, and reflects Pareto’s Principle that a majority of the effect is explained by a minority of causes.

The fourth analysis indicated that although 39 out of the 100 (39%) high-frequency words can also be decoded by applying ERR GPCs, the phonically irregular words accounted for proportionally more sight vocabulary word tokens than the phonically consistent word tokens. This suggests that there are considerable advantages to teaching children to read high-frequency words at a sight level. Failing to do so would mean that 50% of monosyllabic word tokens in the adult database, 59% in the children’s texts, 44% in the ORT, and 36% in RW could not be decoded and so severely disadvantage the beginning reader. However, it should also be remembered that although 61 high-frequency words cannot be decoded by applying the ERR GPCs, these words nevertheless contain some consistent mappings between graphemes and phonemes. For example, the word ‘because’ is phonically irregular but the graphemes ‘b’ and ‘c’ represent generally recognised consistent mappings between graphemes and phonemes. So, although children cannot rely solely on their grapheme–phoneme knowledge to lead to a correct pronunciation, such knowledge potentially provides a clue to accurate decoding, particularly when the initial grapheme represents a consistent grapheme–phoneme mapping. In fact the initial grapheme in 39 (63.93%) of the phonically irregular high-frequency words has a consistent grapheme–phoneme mapping.

Phonic skills

The analysis of phonic skills showed that 64 GPCs accounted for a similar proportion of word types in the adult database as in the real books and both reading schemes (75%), which is not what would have been predicted. The assumption is that key single-letter graphemes and letter combinations will occur more often in specially prepared, phonically regular reading schemes than in adult literature. However, although a similar proportion of word types can be read across all four databases given knowledge of the 64 GPCs, a greater proportion of word tokens can be read in the ORT and RW than in the adult or real books databases. This suggests
that words containing the 64 GPCs are presented relatively more frequently within the reading schemes (although also note that on average all words are presented less frequently in the reading scheme databases), meaning that the context in which those GPCs appear is much less diverse than in the real books or adult databases (we return to the issue of contextual diversity below). Importantly, the children’s real books contain a similar distribution of the most frequent GPCs as the adult database, as can be seen from the similar proportion of words that can be read by using the 64 GPCs. Thus, with knowledge of the 64 GPCs not only is it possible to read a large proportion of words encountered in real books, it is likely that these skills will generalise well to more adult-appropriate texts because of their similar distribution of GPCs.

Equally, it is possible that differences will be experienced generalising from reading schemes to real books due to the differing contexts in which GPCs occurred. Children initially taught through reading schemes would potentially expect a higher proportion of text to be phonically regular, which would impact on their reading accuracy when reading real books or adult literature.

The analysis of GPCs further supports Berndt et al.’s (1987) claim that despite the English spelling-to-sound mapping system being apparently riddled with irregularities, the low frequency with which those irregular mappings occur suggests that the language as a whole is much more regular than it appears. Therefore, despite having a high orthographic depth, the usage of spelling-to-sound mappings in English has high regularity.

**GPCs and onset-rimes**

Finally, it has been suggested (Goswami, 1986) that onset-rimes should be taught instead of GPCs, as they lead to more consistent pronunciation. More recently, Wyse and Goswami (2008) have suggested that there are numerous ways of teaching phonics systematically and effectively, including methods based on onset-rimes, and not only those that focus on GPCs. However, Treiman et al. (1995) looked at the pronunciation of 1329 words, consisting of a consonant grapheme followed by a vowel grapheme followed by a consonant grapheme, that would be known by college students. They found that orthographic rimes and vowel graphemes with a final consonant grapheme had more consistent pronunciations than single- or multiple-letter graphemes representing a single phoneme. Although vowel graphemes are pronounced more consistently when part of a rime unit than when they appear on their own, there is a considerable cost in terms of the amount of information that has to be learned (Vousden, 2008). Furthermore, the words used to demonstrate the consistency of rime units do not necessarily reflect the content of texts available to beginning readers, and so do not provide insights into the instructional process. For this we need to focus on the vocabulary presented in children’s reading materials.

The major problem with teaching onset-rimes, from an instructional perspective, is the additional demands they make on children’s memories (Solity et al., 1999). This point was highlighted by the results of the analysis undertaken here, which showed that up to an eightfold increase in onsets and rime mappings would need to be learned in order to enable beginning readers to read the same amount of text that could be read through knowledge of the 64 GPCs. Additionally, Vousden’s (2008) analysis of the CELEX database suggests that the problem of inconsistency is not restricted to the use of GPCs. Her analyses showed that for English monosyllabic text although 21.8% of
grapheme–phoneme mappings were inconsistent 14.3% of onset mappings were inconsistent and, perhaps more surprisingly, 14.8% of rime mappings were also inconsistent. Thus it would seem that it is not practical to teach solely onsets and rimes, or even possible to avoid problems due to inconsistency.

**GPC consistency**

It is perhaps surprising that there is such a relatively small difference between the adult and real books, on the one hand, and the two reading schemes on the other, in terms of the percentage of words that can be read, given that the adult literature and children’s books are not written with the intention of making them phonically regular. This similarity in the amount of text that is readable with knowledge of core GPCs exists despite differences in GPC consistency between the reading scheme databases and the other two databases. Within the two reading schemes one encounters fewer alternative pronunciations (referred to as multiple mappings, where one grapheme represents more than one phoneme or where one phoneme is represented by more than one grapheme) than in the adult and real books databases, as shown by the consistency analyses. However, a similar proportion of word types can still be decoded correctly across all databases, as the alternative pronunciations evident in the adult and real books databases occur infrequently, which should minimise decoding errors.

**GPC frequencies across the databases**

The words that contain taught GPCs in the reading scheme texts seem to be high-frequency relative to the remaining words that do not contain taught GPCs. However, it should be remembered that the ratio of types to tokens for words that are readable using the taught GPCs is much smaller in each of the three children’s databases (real books, 1:5; ORT, 1:8; RW, 1:3) than in the adult database (1:48). Thus, individual word types that contain taught GPCs are repeated less frequently overall in RW than in both the adult or real books databases. So, although RW offers a restricted vocabulary it provides children with fewer overall opportunities to practise reading words which include taught GPCs in context than either the adult or real books databases, which is not what would be predicted given the debates about reading schemes and real books. Furthermore, in RW seven GPCs (not including the grapheme ‘ph’) account for 10 or fewer word tokens, suggesting that the books in RW would not provide many practice opportunities. This is true for three GPCs in the children’s books and only two GPCs in the ORT. The instructional implication is that teachers would need to practice these specific GPCs out of context on a regular basis to ensure that they are learned.

**Multiple mappings**

The irregular nature of written English is seen to be the main problem in learning to read, as the mappings between phonemes and graphemes are not consistent and there are numerous multiple mappings between graphemes and phonemes. For example, a single phoneme can be represented by more than one grapheme and an individual grapheme can represent more than one phoneme: the grapheme ‘a’ represents nine phonemes (/æ/-had; /ə/-about; /ə/-after; /ɛ/-taken; /ð/-was; /ɔ/-all; /e/-many; /ɪ/-manager; and /eə/-various). The analysis of grapheme–phoneme associations
conducted by Gontijo et al. (2003) indicated that only in approximately 20% of instances is there a direct one-to-one mapping between grapheme and phoneme. The majority of these one-to-one mappings have a frequency of once or less every 10,000 words. Similarly, the majority of letter combinations (where one phoneme is represented by two or more letters) also represent multiple associations between graphemes and phonemes. This lack of regularity in written English can be seen to illustrate the demanding nature of the task facing beginning readers.

Therefore, it is surprising to note that knowledge of the 64 GPCs, combined with knowledge of the monosyllabic high-frequency words, enables children to read approximately 90% of all monosyllabic words in adult and children’s literature. This would appear to be a very good outcome for learning 153 pieces of information (89 high-frequency monosyllabic words, 64 GPCs, and two suffixes which represent two phonemes each). This supports Berndt et al.’s (1987) claim that despite the English spelling-to-sound mapping system being apparently riddled with irregularities, the low frequencies with which those irregular mappings occur suggests that the language as a whole is much more regular than it appears. So, despite English’s high orthographic depth, the usage of its spelling-to-sound mappings has high regularity. This has been reflected in the above findings that a large proportion of each database can be decoded accurately via key phonic skills. It is equally unexpected to find that children will have either the same, or more, opportunities to practise newly acquired phonic skills in the adult literature and children’s books than in the specially prepared reading schemes. However, although the theory of optimal instruction suggests that it is preferable to teach only the most frequently occurring phoneme for each grapheme, clearly some graphemes can represent several phonemes and the critical question is whether children would benefit from learning multiple mappings.

There are two major problems with teaching multiple mappings. The first, as previously stated, concerns the low frequency of some of the alternative representations. For example, the NLS (DfEE 1998) and Teaching Handwriting, Reading, and Spelling Skills (THRASS; Davies & Ritchie, 2003) teach 20 and 18 additional letter combinations respectively to those taught within the ERR. However, the letter combination ‘dge’, which is taught in the NLS and THRASS, has seven word types in the children’s real books (e.g., ‘fridge’, ‘porridge’, ‘trudged’) and 11 word tokens out of a possible 29,140. Thus, it is debatable whether there is any value to a beginning reader in being taught letter combinations such as ‘dge’. The second problem relates to how the beginning reader determines which alternative mapping to articulate when reading. For example, the combination ‘ie’ represents nine different phonemes, 66 word types, and 267 word tokens in the children’s literature. Children have no basis for determining which particular phoneme is being represented other than through a process of trial and error.

**Generalisation to polysyllabic words**

The analyses reported in this article have focussed on monosyllabic words. Vousden (2008) reported that the majority of all written and spoken text (approximately 70%) comprises monosyllabic words. However, it is important that any strategy for teaching reading at the monosyllabic level should also apply to multi-syllabic words as well, to increase generalisation of the strategy to novel words. When applying the grapheme–phoneme mappings most frequently found in monosyllabic text to multi-syllabic text, the issue is whether the frequencies are similar for mono- and multi-syllabic text.
Comparison with grapheme–phoneme mapping frequencies obtained from multi-syllabic text (Gontijo et al., 2003) shows that the correlation between mappings in monosyllabic and multi-syllabic text is very high (Vousden, 2008). So, although there may be grapheme–phoneme mappings that are found only in multi-syllabic words, the mappings learned for monosyllabic text are generalisable to multi-syllabic text.

**Instructional issues and implications**

The analysis of high-frequency words and GPCs across different materials indicates that the assumed differences of reading schemes, and thus their suitability for beginning readers, cannot realistically be substantiated. As a result, it can be argued that where children are taught a core sight vocabulary of 100 words, and the 64 GPCs described here, real books provide appropriate opportunities for students to apply their knowledge to continuous prose. It should be stressed that a key difference between the role of real books being articulated here and the arguments made in the past by adherents of a whole language approach is that here the importance of teaching sight vocabulary and GPC skills explicitly, out of context, and through direct instructional methods is recognised as essential to the use of real books. There are additional instructional factors which also support the use of real books.

**The importance of representation**

There are other principles that support the use of real books over reading schemes. Brown (1998) draws attention to the need to give beginning readers appropriate representations of written English which allow them to extract the relevant structures to facilitate maximum levels of generalisation. If the endpoint of reading instruction is to enable children to develop statistically optimal behaviour, then the material they read should ideally be representative of the structures contained within written English as a whole. If the texts they encounter are artificially created and do not represent the broader-based structures in written English, pupils will potentially develop reading systems that, although performing optimally within the confines of the restricted texts used, will perform less well when a wider range of reading material is presented. So not only do the adult literature and children’s real books reflect the statistical properties of the spelling-to-sound mapping system in English, they also give children opportunities to practise reading the core high-frequency words and GPCs as often as artificially created reading schemes.

**Contextual diversity**

Recent research into contextual diversity (Adelman, Brown, & Quesada, 2006; Brown, 1998; Shillcock & Westermann, 1997) has suggested that the context in which words are seen is an important factor in their retention and accessibility (the more diverse, the better the performance). This is thought to be more important than the frequency with which words are encountered. Reading schemes are based on the assumption that frequency of occurrence alone is important in acquiring new skills and, while this is certainly the case to an extent, Adelman et al. have shown that it is perhaps more important to see newly-taught words in a variety of diverse contexts as well. Thus, real books offer children frequent opportunities to read high-frequency words and apply their phonic skills to a wide range of text types, which will, in turn,
enable children to generalise their knowledge to previously unfamiliar and unseen texts.

Interleaved learning

Brown (1998), Haring and Eaton (1978), and Seabrook, Brown, and Solity (2005) have stressed the importance of ‘interleaved learning’, whereby children’s skills acquisition is promoted by practising newly-taught information alongside older and more familiar items. As the content of real books is not predetermined or structured in such a way that children will only encounter newly-taught skills, it is much more likely that real books will provide more opportunities for interleaved learning than reading schemes where the content is more carefully controlled. Each new book in a scheme primarily gives children opportunities to practice the most recently taught skills, rather than revisiting and revising older material at the same time.

Real books in the classroom

There are four areas to consider when using real books in the classroom. The first relates to teaching core high-frequency words and phonics skills, the second to reading with children, the third to the vocabulary encountered, and the fourth to whether real books need to be levelled or graded according to their perceived level of difficulty so that there is a suitable match between the books children read and their skill levels.

The use of real books being advocated is underpinned by instructional psychology and the explicit teaching of core phonological, phonic, and sight vocabulary skills through direct instruction. This requires that skills are practised out of context until they have been mastered to high levels of fluency, and that children are shown how to apply their knowledge to a diverse range of texts. Therefore, the role of real books being articulated here is fundamentally different from the arguments advanced by Goodman (1976, 1986), Smith (1973, 1978), and Smith and Goodman (1971). They envisaged children learning key high-frequency words indirectly through the process of reading rather than through any explicit direct teaching. This contrasts with the theoretically-driven rationale here, whereby real books are seen as highly compatible with teaching an optimal number of core skills through direct instruction methodologies, and the use of reading schemes or specially prepared phonically regular texts (e.g., DfES, 2007) is explicitly rejected.

The second area to consider is how best to read with children. Irrespective of whether teachers are using a reading scheme or real books, effective instruction requires that they must listen to children read to ensure that they can apply their skills accurately and fluently. The assumption has always been that the graded structure and phonically regular content of reading schemes will give children more opportunities to do this than real books. The analyses presented in this article suggests otherwise. This is further illustrated in two accounts of the well-known children’s story The Billy Goats Gruff. The reading scheme Read, Write Inc. (RWI, 2008) includes a phonically regular version called Billy the Kid, which appears early on in the scheme at Level 3C and aims to give children practice in reading extended stories. In order to read this book with 100% accuracy children would have to be taught: 12 phonically irregular words (Billy, for, his, I, is, me, no, put, said, the, then, you); to blend phonically regular words containing up to four phonemes (VC, VCC, CVCC, CCVC); and one letter combination (sh). Table 11 identifies the number of word types (43) and tokens (198)
encountered in this book. The phonically regular words comprise 72.09% of the word types and 69.19% of the word tokens. Interestingly, even in a phonically regular scheme, approximately 30.00% of the word tokens and types are phonically irregular.

This can be contrasted with the real books version of the same story, *The Three Billy Goats Gruff* (Sharratt & Tucker, 2004). Table 11 shows the number of word types (283) and tokens (612) encountered when reading the story. It is clearly a more difficult version of the story than *Billy the Kid*, given that children require mastery of more phonic and sight vocabulary skills to read the increased number of word types and tokens with 100% accuracy. So the child who had the skills to read *Billy the Kid* with 100% accuracy would, with identical skills, only be able to read 39.22% of Sharratt and Tucker’s *The Three Billy Goats Gruff*.

Paradoxically, however, further inspection of Table 11 reveals that the real book version gives children more opportunities to apply their phonic and sight vocabulary skills. *Billy the Kid* contains 31 phonically regular word types, the majority of which are CVC words (17). This can be contrasted with the real book which has fewer CVC word types (14) but overall more phonically regular word types (47). Furthermore, readers encounter 156 phonically regular word tokens in the real book compared to 137 in the phonically regular text. In relation to the high-frequency words contained in *Billy the Kid*, children would again have more opportunities to practise these 12 words in the real book as they account for 84 word tokens compared to 61 in *Billy the Kid*.

<table>
<thead>
<tr>
<th></th>
<th>Reading scheme book</th>
<th>Real book</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Billy the Kid</em></td>
<td><em>The Three Billy Goats Gruff</em></td>
</tr>
<tr>
<td>Type Token</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of words</td>
<td>43 198</td>
<td>283 612</td>
</tr>
<tr>
<td>V</td>
<td>1 11</td>
<td>1 16</td>
</tr>
<tr>
<td>2.33% 5.56%</td>
<td>0.35% 2.61%</td>
<td></td>
</tr>
<tr>
<td>VC</td>
<td>12 2</td>
<td>6 21</td>
</tr>
<tr>
<td>4.65% 1.01%</td>
<td>2.12% 3.43%</td>
<td></td>
</tr>
<tr>
<td>VCC</td>
<td>1 4</td>
<td>2 31</td>
</tr>
<tr>
<td>2.33% 2.02%</td>
<td>0.71% 5.07%</td>
<td></td>
</tr>
<tr>
<td>CVC</td>
<td>17 73</td>
<td>14 38</td>
</tr>
<tr>
<td>39.53% 36.87%</td>
<td>4.95% 6.21%</td>
<td></td>
</tr>
<tr>
<td>CVCC</td>
<td>2 3</td>
<td>12 16</td>
</tr>
<tr>
<td>4.65% 1.52%</td>
<td>4.24% 2.61%</td>
<td></td>
</tr>
<tr>
<td>CCVC</td>
<td>7 43</td>
<td>8 30</td>
</tr>
<tr>
<td>16.28% 21.72%</td>
<td>2.83% 4.90%</td>
<td></td>
</tr>
<tr>
<td>CCCVsh</td>
<td>1 1</td>
<td>4 4</td>
</tr>
<tr>
<td>2.33% 0.51%</td>
<td>1.41% 0.65%</td>
<td></td>
</tr>
<tr>
<td>Total phonically regular words</td>
<td>31 137</td>
<td>47 156</td>
</tr>
<tr>
<td>72.09% 69.19%</td>
<td>16.61% 25.49%</td>
<td></td>
</tr>
<tr>
<td>Phonically irregular words</td>
<td>12 61</td>
<td>12 84</td>
</tr>
<tr>
<td>27.91% 30.81%</td>
<td>4.24% 13.73%</td>
<td></td>
</tr>
</tbody>
</table>
The reading scheme and real book versions of the *Billy Goats Gruff* illustrate the nature of the choice that teachers face when reading with children. Children with the skills identified in Table 11 would read *Billy the Kid* alone without requiring any assistance from their teacher. In contrast, children who read the real book version would read the words for which they had the appropriate skills, and let the teacher read the rest. So, although they would read a smaller proportion of the entire book, in this instance they would actually have more opportunities to practise their blending and sight vocabulary skills.

Overall when using real books rather than reading schemes there is a shift in emphasis: from selecting books which are perceived to be matched to children’s skill levels to selecting books that they most want to read or would engage, motivate, and interest them; from reading a whole book independently with 100% accuracy to sharing a book with a teacher, reading the words for which they have the skills, and leaving the teacher to read the rest; and from reading books within a scheme in sequence according to their perceived level of increasing difficulty to reading a greater percentage of books as phonological, phonic, and sight vocabulary skills improve.

The third area to consider when using real books comprises the broader goals of reading and the wider opportunities for developing children’s vocabulary knowledge. For example, the only word used to describe the way in which the various characters speak to each other in *Billy the Kid* is ‘said’, which is repeated on 11 occasions. In the real book ‘said’ is also repeated 11 times; however, eight different words and phrases are also used (e.g., ‘shouted out’, ‘grunted’, ‘said with a grin’, ‘replied’, ‘roared’, ‘snapped’, ‘a cry of’, ‘spluttered’) to describe how the different characters speak to each other.

Finally, there is the question of whether there is any merit in ‘levelling’ or ‘grading’ real books. When parents and carers read to beginning readers they are not advised to ‘level’ their choice of books. Their selection is based on the extent to which a book is interesting, enjoyable, and appealing to children. These criteria would be the same when choosing books for children to read. However, the key point is that the analyses presented in this article indicate that the core phonic and sight vocabulary skills that are most useful for children occur with comparable frequency across all text types. Thus, any attempt to level books is likely to be fairly arbitrary and unconvincing.

For example, the Reading Recovery Programme (Burroughs-Lange, 2008; Douëttil, 2007; Sylva & Hurry, 1995) levels books (Reading Recovery National Network, 2004) and has identified *Ketchup on your cornflakes?* (Sharratt, 1994) as Level 1, *Dear zoo* (Campbell, 1982) as Level 9, *Not now Bernard* (McKee, 1984) as Level 13, *The very hungry caterpillar* (Carle, 1970) as Level 16, and *Where the wild things are* (Sendak, 1963) as Level 19. The criteria with which books are levelled is not made explicit in the *Reading Recovery Guide to Book Selection* but appears to be based on the observations of Reading Recovery teachers, tutors, and trainers and their perceptions of children’s responses to different books.

Table 12 shows the proportion of each book that could be read by children that had been taught to blend up to four-letter phonically regular words (VC, CVC, CVCC, CCVC), where one phoneme is represented by a single grapheme, and high-frequency words. The phonically regular words included 24 out of the original 100 ERR high-frequency words listed in Appendix 2 (e.g., ‘a’, ‘and’, ‘at’, ‘big’, ‘can’, ‘did’, ‘from’, ‘next’, ‘went’). This therefore left 76 words which have been termed high-frequency words.
### Table 12. Comparison of word types and tokens in books of different levels of difficulty.

<table>
<thead>
<tr>
<th></th>
<th>Ketchup on your cornflakes?</th>
<th>Dear zoo</th>
<th>Not now Bernard</th>
<th>The very hungry caterpillar</th>
<th>Where the wild things are</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Reading Recovery Level 2</td>
<td>Reading Recovery Level 9</td>
<td>Reading Recovery Level 13</td>
<td>Reading Recovery Level 16</td>
<td>Reading Recovery Level 19</td>
</tr>
<tr>
<td><strong>Total Number of words</strong></td>
<td>33</td>
<td>82</td>
<td>39</td>
<td>123</td>
<td>57</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>3.03%</td>
<td>3.66%</td>
<td>2.56%</td>
<td>6.50%</td>
<td>1.75%</td>
</tr>
<tr>
<td><strong>Token</strong></td>
<td>1</td>
<td>8</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>VC</strong></td>
<td>3</td>
<td>12</td>
<td>4</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td><strong>VCC</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>CVC</strong></td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>11</td>
<td>6</td>
</tr>
<tr>
<td><strong>CVCC</strong></td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>17</td>
<td>1</td>
</tr>
<tr>
<td><strong>CCVC</strong></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total phonically regular words</strong></td>
<td>8</td>
<td>19</td>
<td>11</td>
<td>39</td>
<td>13</td>
</tr>
<tr>
<td><strong>High-frequency words</strong></td>
<td>2</td>
<td>21</td>
<td>10</td>
<td>60</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total phonically regular and high-frequency words</strong></td>
<td>10</td>
<td>40</td>
<td>21</td>
<td>99</td>
<td>32</td>
</tr>
<tr>
<td><strong>Other words</strong></td>
<td>23</td>
<td>42</td>
<td>18</td>
<td>24</td>
<td>25</td>
</tr>
</tbody>
</table>

V: 3 letters; VC: 2 letters; VCC: 1 letter.
On the basis of the analysis presented in Table 12, it appears that books are levelled according to the number of word types and tokens, which gradually increase between Levels 2 and 19. This can be contrasted with the proportion of phonically regular and high-frequency words that appear within each level. The beginning reader who has mastered the skills identified in Table 12 would be able to read just over 80% of the word tokens in *Dear zoo* (Level 9) and 56% of the word tokens in the Level 19 text *Where the wild things are*. The book with the lowest proportion of word types and tokens is the Level 2 book, *Ketchup on your cornflakes?* (30.30% of word types and 48.78% of word tokens), which is perceived to be the easiest book and is 17 levels below *Where the wild things are*. *Ketchup on your cornflakes?* has the highest proportion of VC word tokens but the lowest proportion of CVC word tokens. The three ‘hardest’ books (*Not now Bernard*, *The very hungry caterpillar*, and *Where the wild things are*) all have a higher proportion of high-frequency word types (33.33%, 18.10%, and 24.81%, respectively) than the easiest, *Ketchup on your cornflakes?* (6.06%). Ultimately it is the hardest book, *Where the wild things are*, that gives children the most opportunities to practice their core phonic and sight vocabulary skills, as it contains 191 word tokens, 88 of which are phonically regular words and 103 of which are phonically irregular ERR higher frequency words.

This brief discussion of the proportion of phonically regular and high-frequency word types and tokens that appear in books at different levels illustrates that any attempt to level or determine the difficulty of a book is highly problematic. Various criteria can be applied that may reflect the number of words, print size, or frequency of use of critical phonic and sight vocabulary skills. However, when the expectation is that children will share books with a teacher (or other experienced reading partner) and are taught phonic and sight vocabulary skills on the basis of their frequency of occurrence in written English, any book will be at a suitable level. The child who has only mastered one high-frequency word would nevertheless have opportunities to practise reading that word in a variety of different contexts. Thus, the child that had mastered the word ‘the’ would encounter it 16 times in *Where the wild things are*, 14 times in *Not now Bernard*, seven times in the *Very hungry caterpillar*, and once in *Dear zoo*, but not at all in *Ketchup on your cornflakes*? As the words and skills being identified are the optimal ones to teach due to their frequency of occurrence, beginning readers will encounter them, whatever they read. Furthermore, as they appear in a variety of contexts their mastery will be further facilitated and the likelihood of children generalising their skills to unfamiliar texts will be increased.

In conclusion, if children can apply their skills quite adequately in structured reading sessions that involve the use of real books, a considerable number of disadvantages emerge with reading schemes. The first is that when reading schemes are used children are being taught GPCs in a vacuum if they are not allowed to see texts until they can be read with 100% accuracy, which is advocated by those who promote phonics ‘first, fast, and only’. It may not be apparent to children that the associations they are making between phonemes and graphemes have anything to do with the process of reading. Equally, although stories may be read to them on a regular basis, it may not be obvious that what is read is determined by the graphemes on the page and the phonemes that they represent. Second, children may have to wait quite some time before they have been taught the necessary sight vocabulary and phonic skills either to begin to read or progress from one book to another. Third, children’s choice of reading material will be severely restricted. Initially there will only be a limited number of books that they can read independently. So, although all the material is
theoretically within their range of competence, as they have to wait to acquire new
skills between books and have a restricted choice they may actually spend less time
practising and applying newly-taught skills to texts than children who only read part
of a real book on a more regular basis. A fourth limitation of reading schemes is that
as children become more competent, there may be a greater tendency for them, and
possibly parents as well, to see the primary goal of reading as getting through the read-
ing scheme and becoming a ‘free reader,’ rather than deriving meaning and enjoyment
from what is read (Bell, 2005; Ofsted, 2004). Lastly, the limited vocabulary in reading
schemes reduces the opportunities to use books as a vehicle for increasing children’s
vocabularies and general knowledge; this is more likely to occur through reading real
books which are selected, in part, because of the broader educational goals that they
can serve.

Therefore, the advantages of real books are that they have the same structure and
representations of core skills as reading schemes and that children can start reading
them as soon as they begin school and are taught to read. As they see books and print
immediately, they have better opportunities to map newly acquired phonic and sight
vocabulary skills to texts and so may, initially, have a greater awareness of the rela-
tionships between phonemes, graphemes, and learning to read. It should also be
remembered that many books written for young children have a high degree of repe-
tition anyway, above and beyond high-frequency words (e.g., Dear zoo; Campbell,
1982). Furthermore, the vast choice of available books will potentially contribute to
children developing and extending their vocabularies and general knowledge. A major
difficulty in raising the attainments of older, failing readers is finding suitable texts
that will engage them. However, this problem is overcome if children and/or adults
are shown how to apply their skills to a variety of texts of their own choosing. Thus,
the analysis conducted here on different reading materials has identified an optimal
level of core skills which children can be shown how to apply to a variety of texts
which interest them most.

Raising standards through real books

It is one thing to highlight the most useful skills to teach and materials to use in teaching
reading in an abstract way divorced from the classroom, but quite another to illustrate
how these outcomes can be applied effectively in practice. An example of teaching
phonics with real books is the recent Early Reading Research (ERR; Shapiro & Solity,
2008; Solity, 2000; Solity et al., 1999, 2000; Solity & Shapiro, 2008). This research
has evaluated a framework for teaching literacy where phonological, phonic, and sight
vocabulary skills are taught through instructional principles derived from direct
instruction alongside the use of real books. A number of quasi-experimental, whole
class studies have taken place over two to three years, where the interventions have
been delivered by the children’s regular classroom teachers. The results to date have
been extremely encouraging, with a dramatic increase in the attainments of all children
and a drastic drop in the percentage of children seen to have literacy difficulties, from
the usual 20–25% to approximately 3%. This suggests that the use of real books, when
accompanied by highly systematic teaching of phonological skills, phonic skills, and
core sight vocabulary, can have a clear impact on children’s classroom learning.
Furthermore, approaches to raising the attainments of lower-achieving pupils such as
Making Up Lost Time In Literacy (MULTILIT, 2007) combine the teaching of phonic
and sight vocabulary skills with the use of real books in what is termed ‘MULTILIT
reinforced reading’, which uses a revised version of the ‘pause, prompt, praise’ procedure to help children apply their skills.

**Conclusion**

The debates about how best to teach reading, and whether to use reading schemes or real books, have been as heated since the publication of the *Rose Report* (Rose, 2006) on the teaching of reading in English schools as at any time in the past. It is interesting to note that the issues raised in the *Bullock Report* (DES, 1975) are almost indistinguishable from those currently being rehearsed. These arguments and issues have been addressed throughout this article. However, despite the research, legislation, and attempts by successive governments to improve reading standards over the last 30 years, a large proportion of children, approximately 25% according to government figures in the UK (Ofsted, 2005), continue to fail to learn to read. Clearly the pendulum has swung towards the teaching of phonics and the use of reading schemes. If the issues associated with the choice of reading materials are to be resolved and drawn to a conclusion, without the pendulum swinging in another 25 years away from phonics back towards a whole language approach, the research reported in this article offers a potential resolution.

This research draws on the work of Engelmann and Carnine (1982) in direct instruction and Brown (1998) in rational analysis, and examines the books available to beginning readers as the starting point in determining what to teach – rather than starting with children’s cognitive development and the individual differences between them or with identifying the skills of effective teachers. It appears that a large proportion of written English is highly regular, and that a small number of core skills will enable children to read the majority of monosyllabic words that they will encounter. When sight vocabulary and phonic skills are combined, children can read 90% of the monosyllabic words they would encounter in adult texts and 88% of monosyllabic words in children’s texts, irrespective of whether they occur in a reading scheme or real books. Thus, children will have opportunities to practise their skills as often within real books as within a reading scheme. The analysis also suggests that there is little difference, despite claims to the contrary, in the structure of reading schemes and real books, and many of the claimed advantages for reading schemes cannot be maintained in the light of the data presented.

As a result, the debate may be resolved by teaching an optimal level of core phonological, phonic, and sight vocabulary skills, rigorously and systematically in conjunction with the use of real books. However, this does not signal a return to the teaching methods of the 1960s and 1970s that fell foul of so many reading specialists, but rather recognises that the needs of all children are potentially best met through the respective merits of both real books and the direct and explicit teaching of phonic and whole word reading skills.

**Acknowledgement**

This research was supported by grant F/215/AY from the Leverhulme Trust and grant RES000222448 from the Economic and Social Research Council (UK).

**Notes**

1. It should be noted that the term ‘beginning reader’ refers to any individual (child or adult) who is still being taught the necessary literacy skills to become an independent, fluent
reader, and so is a term that is used to describe students of any age who require further literacy instruction.

2. The data were transformed prior to the correlation analyses and t tests with a log transform to establish normality. The means and standard deviations presented in Table 2 have been transformed back to the original measure, which is the frequency of occurrence, expressed as a percentage of the total database. The means presented in Table 2 correspond to the geometric mean of each database, which is the appropriate central tendency measure for log-transformed data.

References


Appendix 1. Titles of books in the set of real books

Jasper’s Beanstalk
Andrew’s Bath
The Doorbell Rang
Baby Goz
The Dragon Who Couldn’t Help Breathing Fire
The Elephant and the Bad Baby
Not Now, Bernard
Burglar Bill
A Giraffe on the Moon
Oscar Got the Blame
Would You Rather
Kipper’s Toybox
The Blue Balloon
Mr Gumpy’s Motor Car
Bad Mood Bear
Mummy, Where Are You?
Daddy, Can You Play With Me?
Pardon? Said the Giraffe
I Want my Dinner
Jen the Hen
The Silly Sheepdog
Mog and the Baby
Go Tell it to the Toucan
Kipper
Let’s Go Home, Little Bear
Mr McGee Goes to Sea
Cops and Robbers
Mister Magnolia
Shirley’s Shops
The Ugliest Dog in the World
Baby Bear’s Nose
Cock a Doodle Doo! - A Day on the Farm
The Park in the Dark
Whatever Next!
Mog and Bunny
My Grandma is Wonderful
Spot Goes to the Farm
Floss
The Tiger who Came to Tea
The Jolly Witch
Meg and Mog
Spot Goes to School
Peterkin’s Wet Walk
Spot’s Birthday Party
Oh Dear!
A Piece of Cake
The Night before Christmas
Noddy and the Milkman
The Very Hungry Caterpillar
Peepo!
Ladybird Moves Home
Paddington’s Garden
Five Minutes Peace
We’re Going on a Bear Hunt
Spot’s First Picnic
Mrs Smith’s Crocodile
Appendix 2. 100 high-frequency words
Words marked with an asterix have been classified as polysyllabic. Words followed by a tick can be decoded with the GPCs listed in Table 5.

<table>
<thead>
<tr>
<th>a</th>
<th>come</th>
<th>into *</th>
<th>once</th>
<th>they</th>
</tr>
</thead>
<tbody>
<tr>
<td>about *</td>
<td>could</td>
<td>is</td>
<td>one</td>
<td>this</td>
</tr>
<tr>
<td>after *</td>
<td>did</td>
<td>it</td>
<td>other *</td>
<td>three</td>
</tr>
<tr>
<td>all</td>
<td>do</td>
<td>last</td>
<td>our *</td>
<td>time *</td>
</tr>
<tr>
<td>am ✓</td>
<td>down</td>
<td>like</td>
<td>out ✓</td>
<td>to</td>
</tr>
<tr>
<td>an ✓</td>
<td>for ✓</td>
<td>little *</td>
<td>over *</td>
<td>today *</td>
</tr>
<tr>
<td>and ✓</td>
<td>from ✓</td>
<td>live</td>
<td>put</td>
<td>too ✓</td>
</tr>
<tr>
<td>are get ✓</td>
<td>look</td>
<td>said</td>
<td>two</td>
<td></td>
</tr>
<tr>
<td>as go</td>
<td>made ✓</td>
<td>saw ✓</td>
<td>up ✓</td>
<td></td>
</tr>
<tr>
<td>at ✓</td>
<td>got ✓</td>
<td>make ✓</td>
<td>see ✓</td>
<td>us</td>
</tr>
<tr>
<td>away *</td>
<td>had ✓</td>
<td>me</td>
<td>she</td>
<td>very *</td>
</tr>
<tr>
<td>back ✓</td>
<td>has</td>
<td>my</td>
<td>so</td>
<td>was</td>
</tr>
<tr>
<td>be have</td>
<td>new</td>
<td>some</td>
<td>we</td>
<td></td>
</tr>
<tr>
<td>because *</td>
<td>he</td>
<td>next ✓</td>
<td>take ✓</td>
<td>went ✓</td>
</tr>
<tr>
<td>big ✓</td>
<td>her ✓</td>
<td>not ✓</td>
<td>that</td>
<td>were</td>
</tr>
<tr>
<td>but ✓</td>
<td>here</td>
<td>now</td>
<td>the</td>
<td>what</td>
</tr>
<tr>
<td>by him</td>
<td>of</td>
<td>their</td>
<td>when</td>
<td>✓</td>
</tr>
<tr>
<td>call his</td>
<td>off ✓</td>
<td>them</td>
<td>will</td>
<td>✓</td>
</tr>
<tr>
<td>came ✓</td>
<td>I</td>
<td>old</td>
<td>then</td>
<td>with</td>
</tr>
<tr>
<td>can ✓</td>
<td>in ✓</td>
<td>on ✓</td>
<td>there</td>
<td>you</td>
</tr>
</tbody>
</table>
Appendix 3. High-frequency words ranked 101–150 in the adult database

<table>
<thead>
<tr>
<th>also</th>
<th>first</th>
<th>may</th>
<th>own</th>
<th>under</th>
</tr>
</thead>
<tbody>
<tr>
<td>any</td>
<td>good</td>
<td>men</td>
<td>people</td>
<td>way</td>
</tr>
<tr>
<td>been</td>
<td>how</td>
<td>more</td>
<td>should</td>
<td>well</td>
</tr>
<tr>
<td>before</td>
<td>if</td>
<td>most</td>
<td>state</td>
<td>where</td>
</tr>
<tr>
<td>being</td>
<td>its</td>
<td>much</td>
<td>still</td>
<td>which</td>
</tr>
<tr>
<td>between</td>
<td>just</td>
<td>must</td>
<td>such</td>
<td>who</td>
</tr>
<tr>
<td>both</td>
<td>life</td>
<td>never</td>
<td>than</td>
<td>work</td>
</tr>
<tr>
<td>day</td>
<td>long</td>
<td>no</td>
<td>these</td>
<td>world</td>
</tr>
<tr>
<td>each</td>
<td>man</td>
<td>only</td>
<td>those</td>
<td>would</td>
</tr>
<tr>
<td>even</td>
<td>many</td>
<td>or</td>
<td>through</td>
<td>your</td>
</tr>
</tbody>
</table>