

Phonics self-teaching materials for foundation literacy

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Abstract

The effect of irregular English orthography (spelling) on foundation literacy, and in particular on alphabetic decoding, is discussed within the context of the orthographic depth hypothesis. A method for circumventing the retarding effects of traditional English orthography, based on the support provided for Chinese pupils learning their character-based system of writing, is described. Evidence for the beneficial effects of a regularised form of English to support conventional orthography is presented in the form of a case study and a small group experiment, both carried out in a primary school in the North of England.

Key words: Phonics, orthography, foundation literacy, self-teaching

Introduction

The orthographic depth hypothesis (Katz and Frost, 1992) suggests that the ability to read a text is dependent not only on factors related to the reader, such as personal characteristics and abilities, but also on factors associated with the orthography of the language and, in particular, the regularity of the transcription of phonemes. Orthographies that have a regular one-to-one mapping between phonemes and graphemes are classed as shallow, whereas those with irregular transcriptions, such as English, are classed as deep. Seymour et al. (2003) have indicated that because of the complexity of rules for deep orthographies, readers take longer to acquire fluency in both reading and spelling in those languages, estimating that, compared with most other European languages, reading English takes an additional 2 or 3 years to master.

Italian has a consistent orthography that facilitates reading: the 25 sounds (phonemes) are represented by a total of 33 letter combinations (graphemes), giving a ratio of 1:1.3 (Lepschy and Lepschy, 1981). However, English has been shown to be more complex, with 461 graphemes representing 54 phonemes, a ratio of 1:8.4 (Gontijo et al., 2003). Cossu et al. (1995) found that young Italian readers achieved 92% accuracy on word-reading tests after only 6 months of schooling, whereas learning to read in English took much longer. Paulesu et al. (2000) confirmed the effects that irregular orthographies have on speed of processing. Using

PET scans, they found that the pronunciation of a stimulus word in English involves access to more regions of the brain than does a comparable stimulus in Italian, and that this requires both time and brain resources. They conclude that "reading in Italian can proceed more efficiently because of the consistent mapping between individual letter sounds and whole-word sound" (p. 93).

Although orthographies have been classified as shallow or deep, the terms have been used in a 'quasi-intuitive' manner (Seymour, 2004) for most studies. There is, however, an increasing demand for the terms to relate more closely to language metrics, such as the correspondences between orthographic and phonological rimes (Treiman et al., 1995) that are more predictable (80%) than vowels in isolation (62%), or the finer grain measures of word reading (70%) and spelling (30%) consistency (Ziegler et al., 1996, 1997). In several recent studies Spencer (1999, 2001) has demonstrated that such measures can be used when modelling both the spelling and the reading performance of children.

Share (1995) has pointed out that English does not support self-teaching, and this is a great handicap for many early readers. By this, he means that English is replete with inconsistencies that inhibit young children from decoding new texts independently and, consequently, in the early stages of learning to read English, decoding can take place only with the help of an expert reader. Children who have few opportunities to work with expert decoders will be disadvantaged when learning deep orthographies. This may, in part, account for the particularly strong relationship between parental income and adult literacy in the UK (OECD, 1995).

Self-teaching in Chinese orthography

Chinese has a deep logographic orthography, and although there were originally connections between a spoken word and the form of its character, these have been lost over time for most words. Reform of many complex characters in the 1950s did not produce the fall in illiteracy that had been anticipated, and so a new system, providing a self-teaching mode, was introduced. Pinyin, a system of romanisation for Mandarin Chinese, was adopted in 1979. It consists of the 26

letters of the Roman alphabet, a further 21 combinations of letters (mainly digraphs) and also diacritical symbols to indicate the four tones of Mandarin. Pinyin is a shallow orthography, with a high degree of consistency, and can be taught to first-year primary pupils in 60 hours. Initially, texts for primary school children are produced only in pinyin, but conventional Chinese characters are rapidly introduced in the first year, forming a dual system of writing, as Figure 1 shows, with characters supported by their pinyin form. This acts as a self-teaching bridge to the character-based system. The pinyin support in textbooks is available for several years of schooling, but is eventually phased out. Pinyin was not introduced as an alternative to the character-based system; the emphasis has always been on a system that enables pupils to learn the characters more easily, to boost character-based literacy skills.

Of course, in the 1960s, the experimental initial teaching alphabet (i.t.a.) was used for similar reasons in the UK. It was a shallow orthography, designed to provide a consistent environment for young children, who eventually transferred to conventional English spelling. It used the 26 alphabetic characters and introduced 18 new characters, designed to be unambiguously associated with the 44 English phonemes. Although it was used successfully for primary school children, it was criticised because some children faced difficulties when, after several years of i.t.a. they transferred to traditional orthography (t.o.).

Because of publishers' doubts about the extension of i.t.a., resource materials were scarce: only one reading scheme and a few storybooks were published. A further disadvantage was that parents often reported the frustration of children not yet ready to transfer to traditional orthography who attempted to read printed material at home. Some parents complained that they were unable to give help to children in the home because of the unfamiliar orthography. There were also difficulties for children who moved from i.t.a. schools to t.o. schools. Generally, the research did not demonstrate a substantial reading and writing gain after the transitional period (Thorstad, 1991). However, it did show that a shallow orthography was more effective for young readers (Warburton and Southgate, 1969).

Phoneme-grapheme knowledge and decoding skills in foundation literacy

The following studies were designed to explore the potential of a self-teaching method similar to the use of the dual-text pinyin system in Chinese schools. A regularised orthographic version of English was developed to help children experiencing decoding difficulties in the foundation literacy phase.

In the UK, most phonic schemes introduce the basic phonemes and graphemes quite rapidly. *Jolly Phonics*



Figure 1: Example of pinyin supported Chinese primary text

Table 1: Long vowel graphemes for phonics programmes and % frequency values, based on Spencer (1999)

Long vowel	Phonic schemes	% value	Actual most frequent grapheme	% value
/ae/	ai	15	a	40
/ee/	ee	28	ea	33
/ie/	ie	1	i-e	42
/oe/	oa	6	o	51
/ue/	ue	8	u	29

(Lloyd, 1992) and the *Fast Phonics First* programme (Johnson and Watson, 1997), for example, introduce 20 basic phonemes in four to eight weeks. The phonemes are usually associated with their most frequent grapheme, but the 'long vowels' are not easily represented. As Table 1 shows, in these schemes, long vowels are not represented by the graphemes most frequently used to represent them in written English. This is unfortunate because representations that are infrequent in English orthography will provide few opportunities for reinforcement as children work with their reading books, and it seems plausible to suggest that children may have difficulty remembering such graphemes. Indeed, it may be unwise to use such representations for a regularised system of English.

This position is confirmed by the data presented in Table 2, collected from a small-scale study of a class of 24 six-year-olds in a typical school in northern England that has adopted a phonics approach to early reading (*Fast Phonics First*). Basic graphophoneme knowledge was good, for the 26 alphabetic single graphemes, with most of the class knowing the phoneme associated with single letters. This was also the case for their advanced graphophoneme knowledge for most digraphs (Compton, 2000). However, for long vowels with grapheme values of less than 20%, none of the children could provide the correct phoneme. It is

recognised that these results were obtained from only one cohort, and that there will be considerable variation in the rate of acquisition of grapheme–phoneme correspondences, depending on the teaching methods. Nevertheless, the results are indicative of a problem associated with low-frequency grapheme–phoneme correspondences within this context.

Table 2: Knowledge of basic alphabetic and advanced graphophonemes

a	100%	u	100%	ar	83%
c	100%	w	100%	sh	83%
f	100%	x	100%	ee	75%
h	100%	b	96%	ch	71%
i	100%	e	96%	or	71%
j	100%	g	96%	er	67%
k	100%	l	96%	th	63%
m	100%	y	96%	oo	25%
n	100%	z	96%	ow	17%
o	100%	v	92%	oi	4%
r	100%	d	88%	ai	0%
s	100%	p	88%	ie	0%
t	100%	q	29%	oa	0%
				ou	0%
				ue	0%

Knowledge of graphophoneme connections has been identified as a powerful indicator of reading ability (Treiman et al., 1998), and in this study the decoding scores for 150 high-frequency words were positively correlated with the pupils' basic and advanced graphophoneme knowledge. The high-frequency words were taken from the LOB corpus of English words (Hofland and Johansson, 1984) and have been used in several recent studies (Spencer, 2000, 2001) investigating reading and spelling. Table 3 confirms previous research, with a significant positive correlation (0.42) between basic letter–sound knowledge and reading performance. That is to say, children with more extensive knowledge of alphabet letter–sound correspondences have a tendency to read more of the high-frequency words. A highly significant, stronger relationship was found between advanced graphophoneme knowledge and decoding (0.74), which increased slightly (0.77) for total graphophoneme knowledge (combining basic and advanced knowledge).

Having confirmed earlier research that demonstrated a relationship between orthographic knowledge and decoding skills, the present study was also designed

Table 3: Correlations for pupil graphophoneme knowledge ($N = 24$) and decoding scores for 150 frequent words

	150 frequent words	Total knowledge	Advanced knowledge	Basic knowledge
150 frequent words				
Pearson correlation	1	0.769**	0.738**	0.425*
significance (2-tailed)		0.000	0.000	0.039
N	24	24	24	24
Total knowledge				
Pearson correlation	0.769**	1	0.937**	0.604**
significance (2-tailed)	0.000		0.000	0.002
N	24	24	24	24
Advanced knowledge				
Pearson correlation	0.738**	0.937**	1	0.287
significance (2-tailed)	0.000	0.000		0.173
N	24	24	24	24
Basic knowledge				
Pearson correlation	0.425*	0.604**	0.287	1
significance (2-tailed)	0.039	0.002	0.173	
N	24	24	24	24

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 4: Descriptive statistics, number of pupils decoding words (maximum = 24)

	N	Mean	Standard deviation
Descriptive statistics: 150 frequent words			
Traditional orthography	150	14.66	6.33
Regularised orthography	150	14.55	6.44
Number of graphemes	150	3.80	1.23
Number of phonemes	150	2.85	0.84
Frequency	150	3331.21	7178.33
Descriptive statistics: simple phonetic words			
Traditional orthography	24	21.25	2.21
Regularised orthography	24	21.38	1.93
Descriptive statistics: complex phonetic words			
Traditional orthography	16	15.81	3.85
Regularised orthography	16	16.38	3.56
Descriptive statistics: high-phoneme knowledge words			
Traditional orthography	59	13.78	6.14
Regularised orthography	59	15.56	4.97
Descriptive statistics: low-phoneme knowledge words			
Traditional orthography	51	12.22	6.38
Regularised orthography	51	9.61	6.32

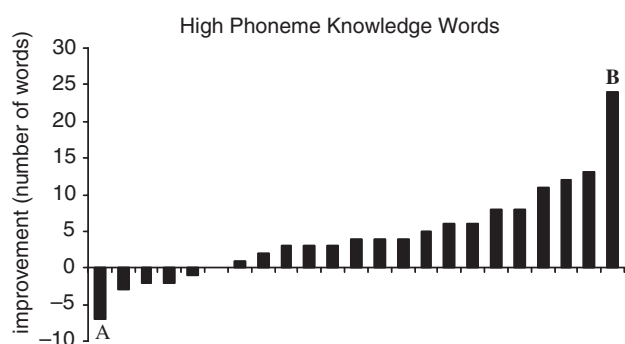


Figure 2: Improvement in decoding regularised high-phoneme knowledge words for 24 pupils

to provide insights into the usefulness of strategies for the regularising of English words. Regional dialects can be seen as an obstacle to regularising English spelling, and to avoid this problem the Oxford English Dictionary (OED) version of the pronunciation of the words, written in the international phonetic alphabet (IPA), was used for the conversion into regularised English. The most common form of representation was adopted for each phoneme, based on Spencer (1999), except for long vowels, which used the *Fast/Jolly Phonics* representation.

The descriptive statistics in Table 4 show that the average number of children decoding the 150 words remained the same when the words were regularised. But this is not the whole picture. Of the 150 words, 40 can be classed as 'phonetic' words, because they are

already in a regularised form. Of these, 24 are simple phonetic words such as 'not', in which there is a one-to-one correspondence between grapheme and phoneme. There are a number of complex phonetic words, such as 'much', that have one or more phonemes represented by digraphs. The mean number of children decoding these 40 words correctly was no different in the traditional or the regularised presentation.

The remaining regularised words (110) can be classified as either high- or low-phoneme knowledge words. The high-phoneme knowledge words, such as 'people', can be converted to phonetic versions (regularised) using graphemes shown in Table 2 as having frequency values above 25%. In this case, 'people' would appear as 'peeppl'. The remaining low-phoneme knowledge words, such as 'make' and 'like', were 'regularised' with graphemes for vowels that are common in phonetic schemes ('maik' and 'liek'), but that none of the pupils had recognised during the initial tests.

The mean number of children decoding the 59 high-phoneme knowledge words improved when the words were converted to a phonetic, regular form, even though this was produced within the context of OED pronunciation rather than an English dialect. The difference between the means for traditional (13.8) and regularised (15.6) forms is statistically significant ($t = -3.0$, $df = 58$, $p = 0.004$, 2-tailed), representing a 13% increase in the number of children decoding these words.

This improvement in performance was gained without any additional teaching: it shows what the children could do when the words were simply regularised, although most were new to the children (peep^l, wer^ld, woz, etc.). The data can be read in two ways: the number of children decoding each word (as represented above), and the number of words decoded by each child. Figure 2 presents the data in the second way, showing the effect of regularising the high-phoneme knowledge words on each of the 24 children, with 70% showing an improvement.

Although both performed at the same level on traditional orthographic words, and both were in the lowest class quartile, in their approaches to decoding, pupils A and B illustrate the two extremes. Pupil A did not benefit from the regularising of the frequent words because her phonic decoding skills were not well developed, and her decoding strategy was based on memorising whole words. However, pupil B, who possessed well-developed decoding skills, showed a 40% increase in performance with regularised orthography, but was confused by irregular traditional orthographic representations.

For the low-phoneme knowledge words, changing their form had an inhibiting effect on performance, with fewer children decoding the words in this 'regularised' form (mean = 9.6) than in their traditional orthographic form (mean = 12.2). This difference was also statistically significant ($t = 3.4$, $df = 50$, $p = 0.001$, 2-tailed).

In terms of a scheme to regularise English words for self-teaching, the main implication of these results is that high-frequency graphemes should be considered to represent long vowels, rather than the low-frequency graphemes used in many schemes. However, this poses a problem, in that the letter 'o' frequently represents both long and short vowels, as shown in 'most' and 'not'. Thus, confusingly, the grapheme that has the highest frequency is the same letter for both long and short vowels.

There is, of course, a simple solution: a diacritical mark to indicate a change from short to long vowel. This was not the solution proposed in the i.t.a. scheme, but was used in Fry's 'diacritical marking system' (1969), designed as an alternative to the introduction of totally new graphemes. Diacritical marks have the advantage of preserving more of the original appearance of regularised words.

Scaffolding self-teaching in foundation literacy: a case study

Seymour (1999) has suggested that within his four-phase model for literacy acquisition, the foundation literacy phase represents the initial response to formal instruction in the primary classroom, and is strongly

influenced by teaching methods. The following case study and small-scale intervention study are exclusively concerned with this initial school-based phase and the attendant 'alphabetic' decoding skills.

Pupil D was selected for the case study because of his poor reading performance. He occupied the 24th position in the class of 24, and was on the special needs register.

He knew most of the basic graphophonemes (60%), but very few of the common 150 words (6%). The words that he could decode were simple, regular two-phoneme words, such as 'in' and 'at'.

A special reading scheme was prepared for this pupil, based on the frequency of individual phonemes in the 150 high-frequency words (Spencer, 2003). To emphasise the correspondence between digraphs and a single phoneme, a special font was created that placed each digraph within the boundary of a circle. The difference between short and long vowels was indicated by placing a circumflex accent over the vowel letter, as shown in Figure 3.

The scheme provided a regular phonic environment for the pupil. As each new phoneme was introduced, new words were created, based on the preceding phonemes. New sentences were also produced, which included all the phonemes that had been introduced at that point in the scheme, to provide continuous reinforcement of all phonemes. The words produced were real English words, but in regularised form. The scheme was designed to provide maximum support for the pupil, who could decode all words by 'sounding out' the letters.

The pupil worked with the prepared materials for 20–30 minutes, 3 days per week, covering 36 phonemes in 8 weeks. The sequencing and regularising of the materials enabled the pupil to decode a majority of the texts without assistance. Progress from one sequence to the next was based on mastery and fluency: once the pupil's responses to the regularised version were fluent, demonstrating a high level of mastery, he was introduced to a dual text version, with regularised superscript; when this was mastered, with little support from the regularised text, he moved on to the traditional orthography version. Once the 36 phonemes had been introduced, dual text versions of the school reading scheme were prepared, enabling him to make rapid progress along with his peers.

th^{at} wⁱz ^old man sed y^o cud
 that wise old man said you could
 ke^ep a lo^om az a fⁱn t^ol
 keep a loom as a fine tool

Figure 3: Example of 'bridged' text

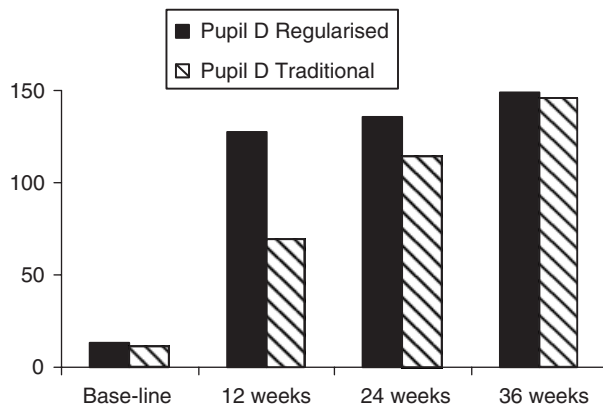


Figure 4: Pupil D, decoding scores for 150 high-frequency words in traditional and regularised orthographic form

Figure 4 illustrates the rapid progress made during the initial stage of phonics support, and how this was sustained and improved upon for the traditional form of the words over the ensuing 24 weeks. There was little room for further improvement for the regularised words: after the 12-week phonics course, he could decode 85% of these. This is similar to the progress many children in continental Europe make when they are first introduced to their shallow orthographies. His slower progress with the irregular English words in conventional spelling indicates the negative effect of traditional English orthography. But it also reflects his growing confidence with decoding traditional English, as he moved from remediation to mainstream activities. After a total of 24 weeks, he had improved from 24th position to 11th in the class of 24 pupils, in his decoding of the 150 frequent words.

Figure 5 demonstrates the retarding effect that irregular words have on pupil D's performance. For the simple and complex phonic words, the difference between traditional and regularised words is slight, as would be expected. However, there are large discrepancies between traditional and regularised versions for the high- and low-phoneme knowledge (irregular) words. For all categories of the regularised words, the level of decoding is high (mean = 88%) as would be expected for a shallow orthography. However, for the traditional orthography test, while performance remained high for the 'phonetic' words, decoding of the irregular words fell off, resulting in a lower overall performance (mean = 32%).

Unfortunately for children learning to read in English at the foundation phase, the majority of high-frequency words are irregular (for example 'was' and 'one'), which has a severely detrimental effect on some pupils. Although Pupil D was identified as having decoding difficulties, it is apparent that these could be easily remediated, and if he lived in a country that had a regular script, such as Italy or Finland, he would probably make rapid progress, once he had acquired knowledge of the graphemes for most of the phonemes in the language. However, for English, a pupil will only

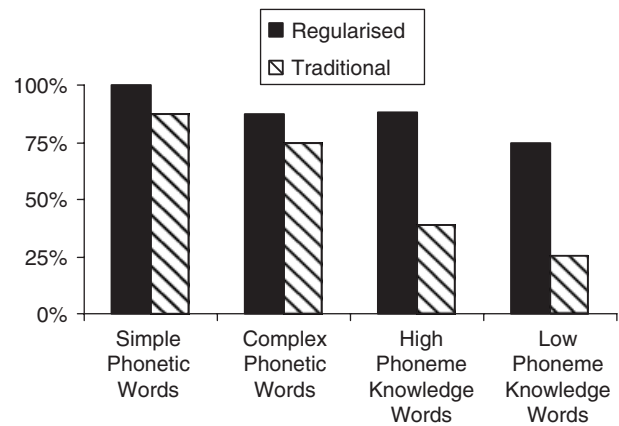


Figure 5: Pupil D, decoding scores for 150 high-frequency words in traditional and regularised orthographic form, by word category, after 12 weeks of phonics support

be able to apply this knowledge to 25% of high-frequency words. So, although pupil D could read 88% of regular words (simple and complex) within 12 weeks of remediation, he would probably have required an additional 24 weeks to master the remaining irregular words that make up 75% of the 150 frequently used words. This fits well with Seymour et al.'s (2003, p. 143) conclusion that "the rate of development of English is more than twice as slow as in shallow orthographies".

Scaffolding self-teaching in foundation literacy: small group study

Pupil D improved to such an extent that after the 12-week intervention period, he was removed from the SEN register. However, within the school it was considered unwise to extrapolate from a single case study to a general policy for using regularised English as a bridge to traditional orthography in the foundation phase. Concerns, similar to those raised against the i.t.a. scheme, were expressed by teachers and parents. A particular worry for parents was that the regularised format would inhibit the development of reading conventional orthography and might cause difficulties with traditional spelling.

So a small-scale intervention was undertaken, with the cooperation of parents, for those children who were placed in the lowest quartile for scores on the 150 high-frequency word test, a total of six children. Three were randomly assigned to the intervention group. Figure 6 indicates the baseline performance for the six pupils, showing good levels of basic graphophoneme knowledge, but lower levels of advanced knowledge (mean = 5.0) when compared with the class average (mean = 7.5). Pupil R was unable to identify any of the advanced graphemes.

The intervention was designed to raise the children's advanced graphophoneme knowledge quickly and to provide a consistent phonetic environment within which to practice decoding skills. In hour-long sessions, 3 days per week for 3 weeks, 12 advanced graphophonemes were introduced to the group, in the following order: th, ee, oo, er, or, ô, î, â, ow, ch, sh, ar. Each new grapheme was presented in a page of text of 25–30 words (70–90 phonemes), with 4–8 instances of the new grapheme; to provide opportunities for continuous practice, the text included all phonemes introduced previously. Each text was presented in 3 versions: (a) regularised spelling, (b) dual regularised-conventional (regularised as superscript), (c) conventional English spelling. The children in the experimental group first read the regularised version of the text, in turn. When the three children could read the text without any mistakes, they were presented with the dual text, and were encouraged to read the conventional English script, but using the regularised words to help decode difficult conventionally spelled words. Finally, when the group could read the dual text fluently, they were presented with the version with conventional spelling. The group experienced few difficulties with the conventional only version, this having been well primed during the dual text session. Following the 9 hours of intervention, the pupils were given a dual text booklet containing the 150 high-frequency words, which they were encouraged to read.

The control group read their reading scheme books with a teacher during the intervention period. The six pupils were re-tested 12 weeks after the intervention had started. Figure 6 shows the improved advanced graphophoneme knowledge for the intervention group. There was a slight improvement in advanced knowledge for the control group, as would be expected during 12 weeks of schooling.

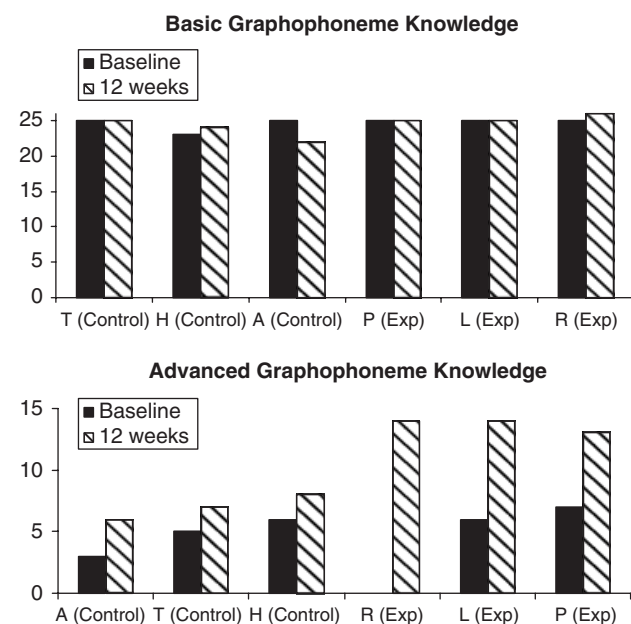


Figure 6: Basic and advanced graphophoneme knowledge, lowest quartile pupils

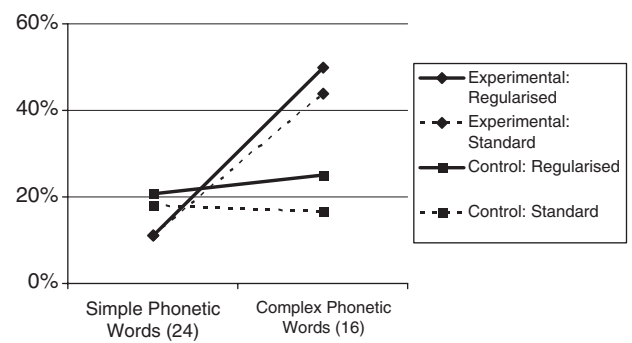


Figure 7: Mean % Gain Scores, Phonetic Words

Figure 7 summarises the results for the two groups of children when tested with the 40 high-frequency phonetic words after 12 weeks. Gain scores were used to illustrate the improvement, taking account of the baseline measure before the intervention period. The gains were expressed as a percentage of the total possible score for the given group of words. For the simple phonetic words, which show a one-to-one correspondence between single letters and phonemes, the gains were similar and small for both groups, because all the children demonstrated high levels of basic graphophoneme knowledge at the start of the study. However, the complex phonetic words showed the benefit to the intervention group of their more complete knowledge of the advanced graphophonemes (see Figure 6). Use of the regularised text, which clearly identifies digraphs by the graphic device of a containing circle (see Figure 3), yielded a 30% improvement for the experimental group when compared with the control children. This improvement remained even when the pupils were tested on words presented in conventional spelling.

Figure 8 summarises the results for the 110 high-frequency irregular words.

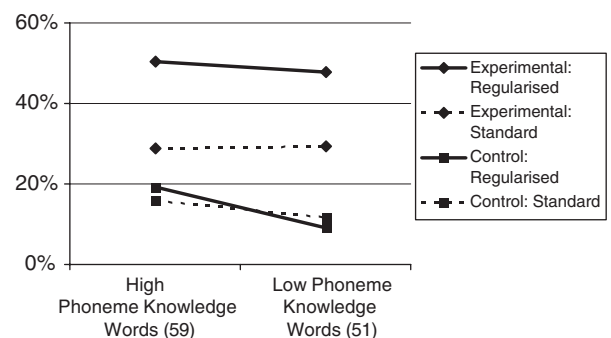


Figure 8: Mean % Gain Scores, Irregular Words

For the intervention group, it showed a dramatic improvement in the decoding of all regularised words, which again reflects the anticipated effect of a shallow orthography: following a relatively minor (9 hours) remedial process, the children could now decode most

of the words. When tested with traditional orthography, their scores fell but remained higher than for the control group.

The intervention pupils who had worked within a consistent phonic environment, learning that all words can be read letter by letter, showed that they had benefited when tested not only on the regularised words but also on the conventional English spelling, particularly the complex phonetic words. In part, this may be due to the provision of the dual text word lists after the experimental intervention period, which were designed to capitalise on the opportunities for self-teaching. However, there was no direct teaching involved during this phase, and no assessment of the use of the lists.

The principal objective of this small group study was to assess the manner in which the regularised texts interacted with the pupils' reading of conventional English orthography. The results demonstrate the immediate overall benefits of the regularised support for traditional orthography in the foundation literacy phase.

Conclusion

The studies described above are limited because of the small numbers of pupils taking part and also because they are rooted within one particular teaching regime and classroom context. There is no doubt, for example, that alternative teaching methods have differential impacts on the acquisition rates for advanced graphophoneme knowledge. It is also probable that the novel teaching materials and approach might have induced an exaggerated enthusiasm from pupils.

However, given the above limitations, there remain reasons for a cautious optimism concerning the provision of a consistent phonetic environment for foundation literacy acquisition. The materials provided did promote an increase in graphophoneme knowledge, which is highly correlated with reading performance. This knowledge base enabled pupils experiencing difficulties in their reading to decode most of the regularised high-frequency words, which had a beneficial effect on the decoding of traditional orthography. The approach was found to be very effective with one failing pupil, who made rapid progress and was removed from the special educational needs register following the brief intervention.

The irregular nature of English orthography has long been considered to be an obstacle to foundation literacy. The present study demonstrates how a supportive environment can be created, which may be used as a self-teaching mechanism in a manner similar to pinyin-supported Chinese characters. The immediate improvement that most children experience when reading a regularised form of English

illustrates their capacity for higher levels of performance within a shallow orthography. This regularised form of English, which is not used as an alternative to traditional orthography, can provide an effective means of decoding it, and because the regularised form operates as a self-teaching mechanism, it may circumvent the need for expensive remedial teaching for many failing pupils.

It must be recognised that there are many different ways in which English can be regularised. In this case, the phoneme structure of words was derived from the OED, although a closer fit may be possible by taking account of regional variation in pronunciation. Even without adjustments for regional dialect, the regularised orthography used in these studies provided substantial benefits.

Finally, whenever simplified or regularised English is proposed as a means to make foundation literacy more accessible to children, there is a concern that it will interfere with traditional spelling. This is unlikely to occur within the present scheme because the regularised script is used as a support structure and not as an alternative: there is immediate bridging between the regularised script and traditional orthography. It is anticipated that spelling in traditional orthography may actually improve because, having raised foundation literacy skills, pupils will read more and have more frequent contact with traditional orthography in their reading materials, and word frequency is an important factor in improving reading and spelling (Spencer, 1999, 2001). However, there is a need for further small-scale studies to provide detailed answers to such concerns.

References

- COMPTON, D. L. (2000) Modeling the response of normally achieving and at-risk first grade children to word reading instruction. *Annals of Dyslexia*, 50, pp. 53–84.
- COSSU, G., GUGLIOTTA, M. and MARSHALL, J. C. (1995) Acquisition of reading and written spelling in a transparent orthography: two non parallel processes? *Reading and Writing: An Interdisciplinary Journal*, 7, pp. 9–22.
- FRY, E. (1969) Comparison of beginning reading with i.t.a., DMS and t.o. after three years. *The Reading Teacher*, 22.4, pp. 357–362.
- GONTIJO, P. F. D., GONTIJO, I. and SHILLCOCK, R. (2003) Grapheme-phoneme probabilities in British English. *Behaviour Research Methods, Instruments, and Computers*, 35.1, pp. 136–157.
- HOFLAND, K. and JOHANSSON, S. (1982) *Word Frequencies in British and American English*. Bergen: The Norwegian Computing Centre for the Humanities.
- JOHNSTON, R. S. and WATSON, J. (1997) *Fast Phonics First*. Spalefield: Spalefield Publishing.
- KATZ, L. and FROST, R. (1992) 'The reading process is different for different orthographies: the orthographic depth hypothesis' in R. FROST and L. KATZ (Eds.), *Orthography, Phonology, Morphology, and Meaning*. Amsterdam: Elsevier Science Publishers, pp. 67–84.
- LEPSCHY, A. and LEPSCHY, G. (1981) *La Lingua Italiana*. Milan: Bompiani.
- LLOYD, S. (1992) *The Phonics Handbook*. Chigwell, UK: Jolly Learning.
- Organisation for Economic Co-operation and Development and Statistics Canada (1995) *Literacy, Economy and Society*. Paris: Organisation for Economic Co-operation and Development.

- PAULESU, E., MCCRORY, E., FAZIO, F., MENONCELLO, L., BRUNSWICK, N., CAPPÀ, S. F., COTELLI, M., COSSU, G., CORTE, F., LORUSSO, M., PESENTI, S., GALLAGHER, A., PERANI, D., PRICE, C., FRITH, C. D. and FRITH, U. (2000) A cultural effect on brain function. *Nature Neuroscience*, 3.1, pp. 91–96.
- SEYMOUR, P. H. K. (1999) 'Cognitive architecture of early reading' in I. LUNDBERG, F. E. TONNESSEN and I. AUSTAD (Eds.), *Dyslexia: Advances in Theory and Practice*. London: Kluwer Academic Publishers, pp. 59–73.
- SEYMOUR, P. H. K., ARO, M. and ERSKINE, J. M. (2003) Foundation literacy acquisition in European orthographies. *British Journal of Psychology*, 94, pp. 143–174.
- SEYMOUR, P. H. K. and DUNCAN, L. G. (2004) Reading acquisition and dyslexia in the European orthographies. Paper presented at the Sixth BDA International Conference DYSLEXIA: The Dividends from Research to Practice, 27–30 March 2004, University of Warwick, UK.
- SHARE, D. L. (1995) Phonological recoding and self-teaching: Sine qua non of reading acquisition. *Cognition*, 55, pp. 151–218.
- SPENCER, K. A. (1999) Predicting word-spelling difficulty in 7- to 11-year-olds. *Journal of Research in Reading*, 22.3, pp. 283–292.
- SPENCER, K. A. (2000) Is English a dyslexic language? Orthographic transparency and multilingual teaching. *Dyslexia*, 6, pp. 152–162.
- SPENCER, K. A. (2001) Differential effects of orthographic transparency on dyslexia: word reading difficulty for common English words. *Dyslexia*, 7, pp. 217–228.
- SPENCER, K. A. (2003) *Simplified English*. Liverpool: Manutius Press, p. 138.
- THORSTAD, G. (1991) The effect of orthography on the acquisition of literacy skills. *British Journal of Psychology*, 82, pp. 527–537.
- TREIMAN, R., MULLENIX, J., BIJELJAC-BABIC, R. and RICHMOND-WELTY, E. D. (1995) The special role of rimes in the description, use, and acquisition of English orthography. *Journal of Experimental Psychology: General*, 124, pp. 107–136.
- TREIMAN, R., TINCOFF, R., RODRIGUEZ, K., MOUZAKI, A. and FRANCIS, D. J. (1998) The foundations of literacy: learning the sounds of letters. *Child Development*, 69, pp. 1524–1540.
- WARBURTON, F. W. and SOUTHGATE, V. (1969) *i.t.a.: An Independent Investigation*. London: Murray and Chambers.
- ZIEGLER, J. C., STONE, G. O. and JACOBS, A. M. (1996) Statistical analysis of the bidirectional inconsistency of spelling and sound in French. *Behavior Research Methods, Instruments and Computers*, 28.4, pp. 504–515.
- ZIEGLER, J. C., STONE, G. O. and JACOBS, A. M. (1997) What is the pronunciation for-ough and the spelling for/u/? A database for computing feedforward and feedback consistency in English. *Behavior Research Methods, Instruments and Computers*, 29.4, pp. 600–618.

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