The Galletly Report:
Reading-accuracy development, difficulties and instruction in Australia

Chapter 3
English orthographic complexity

Until recently, there seems to have been very limited discussion in reading research on the idiosyncratic nature of English reading development due to its orthographic complexity (National Research Council, 1998a; Wolf, Pfeil, Lotz, & Biddle, 1994). Despite extensive literature-searches on reading and phonological development, the first hint of orthographic complexity as a key factor in reading difficulties in English-text readers came from *Time Magazine* in an article entitled *Deconstructing dyslexia: Blame it on the written word* which commented

> *English has 1120 different ways of spelling its 40 phonemes, the sounds required to pronounce all its words. By contrast, Italian needs only 33 combinations of letters to spell out its 25 phonemes.....the reported rate of dyslexia in Italy is barely half that in the US where 15% are affected to varying degrees.*

(Kher, 2001, p. 56)

Subsequent literature searches using terms such as '*reading development*' and '*Italy*' located Goswami's seminal paper, *Phonology, reading development, and dyslexia: A cross-linguistic perspective* (Goswami, 2002c), and reading of articles referenced there enabled location of current crosslinguistic studies on reading development, leading to the discussion contained here.

Until the past decade, most reading research focussed on English-text readers, with reading development in other languages assumed to be similar. This has proved to be decidedly not the case (Goswami, 2002c; Seymour et al., 2003), and the price of the assumption is perhaps decades of delay in effective reading instruction for at-risk English-text readers. Non-English-text researchers seem to have begun using crosslinguistic perspectives about a decade earlier than English-text researchers (Wimmer, 1993; Wimmer & Hummer, 1990). Aro (2003) comments that: '*It has taken some time for the English researchers to adopt a crosslinguistic point of view*.'

This chapter explores key aspects of English orthography and orthographic complexity as it impacts on reading-accuracy development in all readers, and particularly at-risk readers, and therefore on reading-accuracy instruction. It establishes reading-accuracy of English-text as a highly complex task due to the impact of English orthographic complexity on reading-accuracy development, and definitely not the relatively simple task implied by reading-accuracy instruction based on Whole Language philosophies. This complex-task nature of reading-accuracy development in readers of English-text suggests a basis for   at-risk readers needing carefully scaffolded intense reading-accuracy skills development.

The early discussion of the chapter (Sections 3.1-2) is an analysis of the research literature on this area, while the remaining sections are theorising from this literature analysis. The sections of the chapter are as follows:

3.1. The structure of written English

This section explores reasons for the complexity of English orthography, and how this complexity impacts early reading.

3.1.1. The multiple bases of English orthography

With 26 letters making over 40 sounds, which are represented by well over 1,000 different spelling patterns (Bryson, 1990; Kher, 2001), English is a very complex alphabetic language. This complexity stems from its strong morphemic, orthographic and phonological bases. English's morphemic base means the spelling patterns of morphemes override use of different letter patterns to show different sounds in words, e.g., the morpheme *electric* is contained in *electrical, electricity, electrician* despite the final letter *c* saying different sounds in these words; the morpheme *mean* is held constant in *mean, meant* despite *ea* representing two different sounds. The morphemic base of English-text is powerful once students have mastered a reasonable level of reading skill but offers relatively little support to beginning readers.

The orthographic base of English-text means that in addition to single letters representing single sounds (e.g., *p l*), letter groups are also used to represent sounds (e.g., *th sh ch igh*). With minimal spelling reform in recent centuries, considerable orthographic complexity has evolved. In addition to orthographic patterns from words introduced into English from other European orthographies e.g., *antique, beautiful*, this complexity is also due to changes in spoken language which have not been matched by spelling change, e.g., *er ir ur* now represent the same sound, but were said with different sounds when dictionaries were first written; *ough* is now said with 8 different sounds (e.g., in *bough, cough, dough, tough, through, thought, thorough, hiccough*) but was probably originally one sound; *kn* used to be pronounced with a /k/ but now is not (Bryson, 1990).

The phonological base of English-text involves English letters and letter patterns representing the sounds of spoken English. This allows reading to be mastered through phonological recoding, the recoding of written words to their spoken form through phonological processing of letters, letter patterns (e.g., *igh sh ar*), syllables, and whole words (Galletly, 2004). Because of its phonological base, fluent phonological awareness and phonological processing skills are prerequisite to reading success. Fluent phonological skills seem to allow English-text readers to progress relatively smoothly through reading-accuracy mastery, cracking the codes of English as they progress, so that they cope, not just with regular words, but also with irregular words. Irregular words have fewer simple letter-sound cues than regular words, but virtually every word has sufficient phonological cues to be phonological recoded, e.g., *yacht* has initial and final sounds correctly represented. Four of the most opaque English-text words are highly frequent words, *was one two eight*, all of which have only one appropriate letter-sound cue. The phonological base of English-text is a powerful aid to reading and spelling accuracy, seen in English-text high-school students efficiently reading 20,000 words while Chinese high-school students, after the same number of years of instruction, are only able to read 2000 Chinese words, due to Chinese being a logographic, not phonological, language (Tunmer, 1999).

3.1.2.   The myriad spelling patterns of English

With 29 common vowel graphs representing 18 common vowel sounds (Galletly, 2001), and common graphs and phonemes said and written in so many different ways, English is far from simple (see Figures 3.1 and 3.2).

<u>Common sounds of English</u> (40): 22 consonant sounds and 18 vowel sounds <u>Consonant sounds</u> (22) b d f g (as in go) h j k l m n p r s t v w y z ch sh th ng <u>Vowel sounds</u> (and written graphs) (20) a mat   e met (ea)   i mit   o mot   u mut a-e mate (a ai ay)   e-e mete (e ea ee y)   i-e mite (i ie igh y) o-e mote (oa) u-e mute (ew ue) ar car (a)   er her (ir ur ear)   or for (aw au al)   ow now (ou)   oo foot ou you (oo)   oi oil (oy)   schwa (neutral vowel, bitt<u>er</u>) ear dear   air bear
<u>Less common sounds of English</u> air hair (ear)   ear year (eer)   zh (treasure)
<u>Confusable consonants</u> (through lack of 1:1 letter: sound correspondence) g (as in gem)   c (k and s sounds)   q (kw)   x (ks)

Figure 3.1. The complex relationships of the letters, sounds, and graphs of English (from Galletly, 2003b)

<u>One graph to many sounds</u> p (4 sounds) pin phone psyche pneumatic c (6 sounds) <u>c</u>at/ki<u>c</u>k ri<u>c</u>e/<u>sc</u>ent <u>c</u>heese s<u>ch</u>ool <u>C</u>heryl/so<u>c</u>ial y (4 sounds): yet my baby gym ough (8 sounds): bough cough dough tough through thorough hiccough a (14 sounds): at later / g<u>au</u>ge / r<u>ay</u> / gr<u>ea</u>t / g<u>ao</u>l any / s<u>ai</u>d / s<u>ays</u> / d<u>ea</u>d s<u>ea</u> <u>ai</u>sle / <u>aye</u> w<u>a</u>s b<u>eau</u> / g<u>oa</u>l / mauve b<u>eau</u>ty ask / f<u>ar</u> / half / l<u>au</u>gh <u>ear</u>n <u>ear</u> <u>air</u> / d<u>ar</u>e naughty / w<u>ar</u> ago <u>One sound to many graphs</u> f (3 graphs): <u>ph</u>one <u>f</u>un tou<u>gh</u>   sh (6 graphs): <u>sh</u>in sta<u>ti</u>on mis<u>si</u>on so<u>ci</u>al <u>ch</u>ef <u>s</u>ugar al (5 graphs): can<u>al</u> litt<u>le</u> pan<u>el</u> speci<u>al</u>   er (5 graphs): h<u>er</u> s<u>ir</u> t<u>ur</u>n l<u>ear</u>n w<u>or</u>d or (11 graphs): f<u>or</u> s<u>ore</u> p<u>our</u> r<u>aw</u> <u>awe</u> t<u>augh</u>t b<u>ough</u>t s<u>au</u>ce t<u>al</u>k r<u>oar</u> w<u>ar</u> <u>Silent letters</u> lam<u>b</u> si<u>c</u>k bri<u>dg</u>e hor<u>s</u>e <u>g</u>nome w<u>h</u>en <u>k</u>nee ca<u>l</u>m cupboard fe<u>t</u>ch <u>w</u>ho

Figure 3.2. Common English orthographic patterns which create complexity for beginning readers (from Galletly, 2003a)

3.1.3.   English orthography's multiple grainsizes

Goswami (2002) suggests that English orthography is far more transparent (regular) if it is considered as having three grain-sizes (Goswami, 2002c; Treiman, Mullennix, Bijeljac-Babic, & Richmond-Welty, 1995):

1. Phonemes: high consistency (>90%) of initial and final consonants makes phonological recoding the strongest reading-accuracy strategy.

2. Rime patterns: high consistency of rimes, e.g., *-igh –all,* and of vowels when they are part of rimes increases the regularity of vowels from 51% as single letters to 77% when linked to following consonants, thus instruction on highly regular rime letter patterns is a further valuable level of instruction.

3. Whole words: teaching highly irregular words, e.g., *one, was*, and words that are not yet regular due to two letter vowels and rime patterns not yet having been learned, e.g., *now, car*, is highly valuable in building reading skills of common words. It also supports developing awareness of English orthographic complexity, how it is acceptable that not all words 'obey the rules' the child has learned thus far.

Conclusion

This section has explored the complexity of written English, establishing it as a very complex orthography. Orthographic complexity is not a major issue for fluent readers, but it strongly impacts very beginning readers. It seems useful for beginning readers to consider English-text words as being of three types: regular (phoneme grainsize), pattern (irregular orthographic unit grainsize), and tricky (wholeword grainsize). This is a simple and useful means of reducing the confusion which beginning readers encounter, while at the same time building their awareness of English orthography.

3.2.   Crosslinguistic research findings on reading-accuracy development

Findings from crosslinguistic research studies provide valuable knowledge on diverse aspects of reading-accuracy, including the complexity of mastering reading of English-text, and the ease with which both normal-progress and at-risk readers learn to read transparent orthographies.

3.2.1.   Orthographic complexity and ease of reading-accuracy development

In highly consistent orthographies (herein referred to as transparent orthographies), reading-accuracy and phonemic awareness are mastered to high levels in the first year of reading instruction. This is evidenced in the findings of the 2001 COST-A8 study of reading-accuracy development in European languages (Seymour, Aro, & Erskine, 2003). These findings showed

1. Highly transparent-orthography readers (Norwegian, Dutch, Icelandic, Swedish, Spanish, Italian, Finnish, Turkish, German and Greek students) were reading real words and nonwords with 90% to 98% accuracy by the end of their first year of instruction.

2. Readers of slightly more opaque languages (French, Danish and Portuguese) were reading with well over 70% accuracy.

3. Readers of English, a vastly more most opaque and complex orthography, were vastly slower:

   a. Reading with only 34% accuracy by the end of their first year.

   b. Reading with only 76% accuracy a year later (after twice the amount of instruction as the transparent-orthography readers had received to reach ceiling level).

The study measured not just accuracy, but also speed of response. Seymour, Aro, & Erskine (2003) comment that most students from the highly transparent orthographies were at ceiling level halfway through the year. Thus students from numerous European countries are not just accurate readers but also fluent readers within their first school year. This very early mastery of reading-accuracy is similarly evidenced in Holopainen, Ahonen, & Lyytinen's (2001) categorisation of beginning Finnish readers as

1. Precocious readers: Students who were reading when they started Grade 1 (approximately one third of their student population).

2. Early readers: Students who read well within four months of schooling.

3. Average readers: Students reading well within nine months of schooling.

4. Delayed readers: Students who are not reading well within eighteen months of schooling.

Numerous other European researchers similarly comment on early mastery of fluent reading-accuracy by the vast majority of transparent-orthography readers (Aro, 2004; Cossu, Gugliotta, & Marshall, 1995; A.Y. Durgonglu & Oney, 2002; N. C. Ellis et al., 2004; Goswami, 2002c; Hoxhallari, Van Daal, & Ellis, 2004; Jong & Leij, 1999, 2003; Landerl, 2000; Heikki Lyytinen et al., 2004; Schneider, Ennemoser, Roth, & Kuspert, 1999; Spencer & Hanley, 2003, 2004; Wimmer & Hummer, 1990; Wimmer & Mayringer, 2002; Ziegler & Goswami, in press; Ziegler, Perry, Jacobs, & Braun, 2001).

Transparent-orthographies have close to one: one correspondence of graphs to phonemes. They therefore provide highly consistent (often fully consistent) feedback for every early decoding attempt which students make, which powerfully supports self-learning. This stands in strong contrast to beginning English-text readers who, knowing all letters and their common sounds, would not be able to recode one word of '*The boy was here last night.*' In transparent orthographies, knowing one's letters and sounds makes every word available to be read i.e., visible, the words unfold, and students make very rapid progress in reading and writing. Because the task of working out unfamiliar words is not arduous once letters and their sounds are known, mastery of reading-accuracy does not require high levels of working memory efficiency or intelligence, and students need relatively little instructional support. After initial phonics instruction to learn their letters and sounds, they learn to read by reading authentic words and sentences, mastering reading-accuracy quickly and effectively. In most transparent-orthography countries, children's spelling development is almost or as rapid as their reading-accuracy development (Aro, 2004; Cossu et al., 1995).

It would seem that those English-text readers who master reading relatively effortlessly when compared to their classmates are nonetheless hugely delayed when compared to transparent-orthography readers, being far slower than even lower-progress readers of transparent orthographies (Hanley, Masterson, Spencer, & Evans, in press; Seymour et al., 2003). For almost all English-text readers, Stage 2 mastery and cracking the codes of

English is long, challenging hard work, and instruction to build reading-accuracy takes many years, probably taking an average 2.5 times longer than transparent-orthography readers (Seymour et al., 2003).

It is possible too that in many transparent-orthography countries, it is not just words that are transparent. It would seem that their letter-names are also far more transparent than they are in English (Aro, 2004; Huang & Hanley, 1997). Many transparent-orthography countries seem to teach letter sounds rather than letter names. From comments made by teachers and researchers in Finland, Estonia, Italy and Wales, it would seem that their letter-names sound very similar to their letter-sounds. Reflection on English letter-names shows

1. Only eight letters have their letter-sound as the initial sound of the letter-name (b d j k p t v z).

2. In six letter-names, the letter sound is at the end of the name (f l m n s x).

3. For the remaining 12 letters, the letter-name either does not contain the letter's commonest sound, or has more than one sound, one of which is not heard in the letter name (a c e g h i o q r u w y).

Some writers are strongly considering letter-knowledge a powerful tool in building phonemic awareness (Aro, 2004; Huang & Hanley, 1997), and it would seem likely that strong consistency of letter-sounds to letter-names would support this. Lack of consistency of English letter-names is likely to mean that knowledge of English letter-names will not similarly contribute to building of phonemic awareness.

Dr Mikko Aro, a Finnish researcher we met with is exploring an extremely interesting aspect of Finnish reading-accuracy development - it being common for Finnish people to be able to remember the exact moment, time and place that they learned to read, and that this seemed in contrast to English-text readers. When the Finnish Kindergarten teachers were subsequently asked about this comment, they strongly identified with the idea, both in their own learning to read, and in the learning of the children with whom they work. One teacher commented that the previous day, she had noticed one child sitting quietly, alone and extremely preoccupied in the anteroom, and went to check that the child was not distressed. But the child was focussing intently on a notice on the wall in the anteroom. She slowly sounded out the words on the sign, then asked if the words she had said were correct.

Discussion among our Australian group suggested that very occasionally, beginning English-text readers whom we have taught have this moment of revelation, but that this is the exception rather than the rule, and while we can remember this moment of wonder in relation to other milestones in ourselves and our offspring (e.g., the moment we first swam or rode a bike on our own), we were unable to think this way in relation to reading instruction. One colleague, who had used International Teaching Alphabet (*ITA Foundation Website*) as part of her linguistics studies, commented that she had that feeling when able to examine an ancient language translated in ITA, and she suddenly found herself able to 'see' its morphemes and grammatical units. This moment of wonder in Finnish, but not English, readers would seem to have implications on the speed and simplicity of reading-accuracy development in Finnish- vs. English-text readers.

3.2.2. Rapid gains to average level by delayed readers of transparent orthographies

Whereas weak English readers are characterised by both poor accuracy and slow rate, weak readers of transparent orthographies are characterised by high accuracy and slow rate (Jong & Leij, 1999; Wimmer & Mayringer, 2002). Wimmer and Mayringer comment that German children with dyslexia have no reading-accuracy difficulties and are known only for their slow reading speed (Landerl, Wimmer, & Frith, 1997; Wimmer, 1993), while Tressoldi, Stella and Faggella (2001) found dyslexic Italian readers to have excellent reading-accuracy, but reading speed increasing by only.3 syllables per second per grade, a growth rate approximately half that of normal-progress readers, and equivalent to normal-progress readers rates for reading lists of pseudowords. The pervasiveness of high level reading-accuracy is seen in Greece, Austria and the Netherlands not having standardised tests of reading-accuracy, due to the lack of need (Jong & Leij, 1999; Porpodas, 1999; Sideridis, 2002; Wimmer, Mayringer, & Landerl, 2000). They do use tests of reading speed (Wimmer, Mayringer, & Raberger, 1999).

It seems there are significant crosslinguistic differences in the rate of reading-accuracy progress, once children have started to build reading-accuracy skills. In a class of English-text readers, one would expect wide variability in their rate of progress, with delayed readers showing much slower progress than normal-progress readers. In contrast, studies of Finnish beginning readers show that

1. All children reach a point where they start to progress and then progress rapidly from that point.

2. While children's starting points are at different times in the school year, their rates of progress are highly similar.

Aro (2004, p.26) comments that '*The analysis revealed that in the development of reading and spelling accuracy, there was variation only in the initial level of accuracy (intercept), and not in the type of development (slope).*' Perhaps there are no 'slow learners' in Finland - only 'slow starters'.

Discussion with Finnish teachers suggested that up to 10% of Finnish children currently have ongoing reading difficulties, a comment which seems highly compatible with the statement of Lyytinen and colleagues (Heikki Lyytinen, Aro et al., in press):

> *We emphasize that although the process of acquiring fluent reading in Finnish can be relatively effortless, a substantial number of children still face problems in learning to master reading completely. Roughly 6% cent of children do not achieve accurate reading skill (at least 90% accuracy in reading pseudo-words) despite three or four years of schooling, and 4% are still relatively slow in reading. Thus, approximately 8% (due to the overlap of these two groups) of Finnish children still face reading problems by the time they should be fluent and accurate readers.*

During our visit to Finland, both researchers and teachers commented on reading and spelling errors in Finnish children not being on vowels, which are highly regular, but on use of single vs. double letters in words. All phonemes can be long or short, and phoneme duration is represented by single vs. double letters, e.g., *kisa* (competition) vs. *kissa* (cat), *tuli* (fire) vs. *tuuli* (wind). We formed a strong impression that the significant reading-accuracy difficulties which the Finnish teachers were concerned about, are far milder than the reading-accuracy difficulties commonly experienced by English-text readers.

Although intelligence and working memory are strong predictors of English-text reading achievement, several studies show that they do not relate significantly to reading-accuracy achievement in transparent-orthography readers (Cossu, 1999a; Jimenez, Siegel, & Lopez, 2003). Reading-accuracy of transparent orthographies seems to be mastered far more simply by children with intellectual disability. Teachers in Finnish and Italian schools we visited seem to expect that most children with moderate to severe intellectual development will master reading-accuracy. Cossu (1999) discusses Italian children with Down Syndrome, with mean IQ of 44 (range 40-56), showing reading-accuracy levels of 93.8 % correct reading of real words, and 88% correct reading of nonwords (Cossu, 1993, 1999a; Cossu, Rossini, & Marshall, 1993). He concludes that general intelligence and working memory are largely irrelevant factors for the acquisition of Italian reading-accuracy (Cossu, 1999a). This is a comment that could never be made about learning to read English. In our discussions with him, Professor Cossu commented that in the population of Italian students with Down Syndrome from whom the research sample were drawn, there were many students who were much better readers than the sample

students, and that one criteria for selection was being students whose reading was not yet well-developed (Cossu, 2005; Cossu & Marshall, 1990). Cossu, Rossini, & Marshall (1993, p.299) comment

> *What impresses us is that, whatever impairments the children with Down's Syndrome undoubtably show [in other areas], these deficits have not precluded the children from acquiring the transcoding skills involved in reading…. despite a mean IQ of 44, these children read (regular words, irregular words and nonwords) with the same [accuracy] as normal Italian 7 year olds.*

The reading intervention for delayed readers which we observed in Finnish schools, consisted of reduced group numbers while working on the same tasks as the rest of the class. Welsh reading-accuracy intervention at the school which I visited, consisted of daily 10 minute sessions of reading to an adult, and weekly selection of three words the student has found difficult to read, which are written down for the student to practise. When I asked if children didn't perhaps simply remember the three words once they'd been told them, such that their 'reading' was more the parroting of words (the response I would expect of Australian students if this task was used), the teachers were surprised, and replied that students did not do this, but continued to focus on reading the words by sounding them out, syllable by syllable. It is interesting that these delayed readers have not taken the relatively-obvious 'easy' option, and are instead assiduously working on the very skill which will improve their reading-accuracy. This seems to indicate a very strong sense that reading is only done through recoding the sounds and syllables of a word, and that they know that they will work the word out effectively.

This Welsh intervention, which seems extremely mild compared to Australian reading interventions, is found extremely effective. When I asked the learning support teacher at the Welsh school I visited about his work with older students in the school, he commented that he did no work on Welsh reading or spelling for older students as this was not needed, and that his work was mostly focussed on helping them master spelling of English (their second language). (He also commented on their being relatively few students with major maths difficulties, and few classroom behaviour problems, which seemed curious, given that the school is in a very low SES district with high unemployment.)

I was particularly impressed with the reading of one Grade 4 boy who had received this intervention throughout his Grade 3 year. While the lad's written work showed immature handwriting and spacing, similar to what an Australian child of the same age with reading and writing difficulties might do, his reading of both English and Welsh books was extremely impressive, being error-free, fast and fluent.

Crosslinguistic comparisons of delayed readers show English-text delayed readers to be experiencing far more severe difficulties, e.g., Landerl, Wimmer and Frith (1997), studying English and German dyslexic readers, found orthographic complexity had strong impact, with German readers reading 3 syllable nonwords with higher accuracy than the English readers read single syllable nonwords, and the English readers made 324 errors on vowels while the German readers made only 20 vowel errors.

A further contrast of transparent-orthography vs. English-text readers is seen in very high responsiveness by weak transparent-orthography readers to interventions combining phonemic awareness and reading-accuracy instruction. Phonemic awareness instruction has been shown to be highly effective in supporting the progress of both normal and low-achieving transparent-orthography children (Olofsson, 1993; Poskiparta, Neimi, & Vauras, 1999; Schneider, Ennemoser, Roth, & Kuspert, 1999). There are also indicators that transparent-orthography interventions do not need to be as intensive as English-text reading-accuracy intervention:

This is seen in Poskiparta, Neimi, and Vauras' (1999) study in which

1. Intellectually-disabled children became average decoders with relatively nonintensive intervention given their disabilities (one school year of daily 10 to 15 minutes training on phonological awareness and reading) and continued to read at average level, as measured at followup testing over the next two years. Poskiparta et al. describe their representative population of low-achievers as multiply-handicapped, showing low verbal intelligence, working memory, counting skills, and letter knowledge.

2. Their matched control group, of low-intelligence low-progress readers, made negligible progress, i.e., it was the intervention, not maturation, which improved the experimental group.

3. Their other control group, of average-intelligence low-progress readers, became close to average decoders and spellers without any additional help.

Orthographic complexity and the different roles of phonological and phonemic awareness in transparent-orthography vs. English-text reading-accuracy development and difficulties may offer some insights on the

phenomenon of *treatment resisters* (Vellutino, 2000; Vellutino et al., 1996), children who make extremely low progress despite intensive intervention. Numerous studies are showing that a proportion of English-text weak readers respond poorly to interventions (Torgesen, 2000; Vellutino, 2000; Vellutino et al., 1996), such that Torgesen and Davis (1996) suggest that mean effects of phonological awareness training on reading growth may be the result of accelerated skills in students who would have learned to read normally without the intervention, rather than reflecting reading growth in very weak readers. Studies investigating characteristics of these poor responders are invariably finding that extremely poor phonological awareness is a basis to their slow development (Torgesen, 2000; Vellutino, 2000; Vellutino et al., 1996). Analysis of articles on interventions with students in the lowest 10% of achievers in different countries indicates orthographic complexity as a significant factor dictating response to intervention:

1. In Finland, Poskiparta, Neimi and Vauras (1999), studying the impact of intervention on the lowest 10% of Finnish students (these students having significant intellectual and other disabilities), found that they made very significant progress, in contrast to a matched control group. At follow-up, only 4% of the intervention students were 1 SD behind the total sample for spelling and only 8% similarly behind in reading.

2. In Germany, Schneider and colleagues studied not the lowest 10%, but whether phonological awareness training was equally suited to all students of a given age cohort, or whether it is more effective for students with initially higher levels of phonological awareness (Schneider et al., 1999; Schneider, Kuspert, Roth, & Vise, 1997). The students received daily 10-15 minute sessions for 6 months. After training, the experimental at-risk group (lowest achieving at baseline) outperformed the control group on phonological awareness at post-test and transfer tests. They held this gain over the 2 years they were followed, with significantly higher achievement on reading and spelling tests in late Grade 2. The performance gap between at-risk and initially advanced students did not increase over time, and although the at-risk readers performed worse on the reading and spelling measures than the initially advanced students, the mean differences were not substantial.

3. In Denmark, Olofsson (1993) studied the effect of phonological awareness intervention on the 10% of preschoolers scoring lowest on a pre-intervention phonological awareness task, and followed their reading and spelling for several years. This group achieved significantly higher than the control group on word-reading speed, sentence reading, and spelling, with the gap increasing over time. Danish is a more complex orthography than German and Finnish, though still markedly less complex than English. It is possible the strong effects represent an interaction of moderately transparent orthography with increased age and maturity of the students learning to read.

4. Torgesen, Wagner, & Rashotte (1997) found that 24% of the lowest 10% of students were still at least 1 standard deviation behind age level after intensive 1:1 phonological awareness intervention over a 2.5 year period, and that a significant number of students are making virtually no progress.

5. O'Connor, Jenkins, Leicester, & Slocum (1993) examined the feasibility of teaching phonological manipulation skills to preschool American students with disabilities. The students learned the skills effectively but demonstrated little or no generalization of those skills both to highly similar tasks (e.g., from one blending task to another) and dissimilar tasks (e.g., blending to segmenting).

While other studies are needed to confirm this principle it seems from analysis of these studies that failure to respond to intervention is perhaps an English-text phenomena, not occurring in transparent-orthography delayed readers. The lowest 10% of achievers learning simple orthographies (Finnish, German) make very significant progress, while the lowest 10% of English-print students make very little progress. Interestingly, neither Schneider et al. (1999), nor Poskiparta et al. (1999) comment on orthographic complexity as a variable, and both cite other reasons for their better results, with Schneider concluding '*Our findings indicate that the potential of phonological training per se may have been underestimated in previous research* (Schneider et al., 1999 p.435)'. It seems likely orthographic transparency supports the progress of at-risk readers. Aro (2004, p.35) comments:

> *A transparent orthography treats even a phonologically immature reader in a lenient manner. It helps in explicating the alphabetic principle, the correspondence between spoken and written language...it does not burden the beginning reader with a plethora of correspondence rules; and together with systematic phonics teaching it provides the beginning reader with a simple tool for successful word recognition.*

An interesting outcome of the transparent-orthography studies above, one which is rarely seen in studies of delayed English-text readers (Ehri, Nunes, Willows, & Valeska Schuster, 2001; Ehri, Stahl, & Willows, 2001; National Research Council, 1998b; H Lee Swanson, Hoskyn, & Lee, 1999), is that these lowest 10% of readers not only caught up to an average level, but also maintained their gains. This would indicate that once transparent-orthography readers 'catch' reading-accuracy, they do not lose it but instead go from strength to strength, and that this trajectory happens even if they are delayed readers with significant intellectual disability. This would seem in strong contrast to English-text at-risk readers who commonly lose some of their gains after an intervention is completed, or after a holiday break (H. Cooper, 2003; National Research Council, 1998a).

In Finland, we attended a presentation that reading researchers were presenting to executives from the Finnish department of education. Commenting on their study investigating use of a motivational game to support Finnish children to master letter-sounds, one researcher commented rather triumphantly that their study showed evidence of something which had not been shown before - that some children forget what they have learned. We Australian researchers smiled at this comment, considering it somewhat naïve, and talked later about how children forgetting what they have learned is something every primary school teacher knows. Subsequent reflection, in the light of studies showing that gains by transparent-orthography intellectually-disabled students are not reduced at followup, has caused me to wonder whether children forgetting is perhaps also an English-text phenomenon.

Learning to read transparent orthographies really does seem as though it may be as simple as learning to swim and ride a bike. These skills all seem to involve:

1. A distinct point of transition between being unable to do the skill, and being able to.

2. This point being reached by different children at different points of time.

3. A need for integration of skills which can be relatively easily scaffolded.

4. Little cognitive load apart from this integration of skills – it seems likely that the brief time up to 'cracking the code' (gaining insight of phonemic recoding) is the point of highest cognitive load, and that the rapid progress made from that point indicates dramatically reduced cognitive load from that point.

5. An accompanying 'moment of wonder' at the point of reading-accuracy insight which probably marks the start of rapid reading-accuracy progress.

6. Extremely rapid progress to ceiling level from that point.

7. All children's progress trajectories being parallel.

8. Seemingly no forgetting once that point has been reached, i.e., the skill is no longer complex thus effective long-term memories are made even by children with working memory or intellectual difficulties.

9. Extra support for slower learners being very modest in size and intensity, and being no different to ordinary instruction, i.e., no difference in strategies, but simply more time spent practising till the moment of transition is reached.

It would seem likely that in transparent-orthography at-risk readers this point of transition may not be as discreet, but that the other characteristics are highly similar.

3.2.2.2. English orthographic complexity as the exception to the norm

English orthography is exceptionally complex. Aro (2004, p.12) comments that

> *Studies investigating the effect of orthographic consistency have done so usually in comparison with the extreme, namely English. The 'transparency' of an orthography can be best thought of as a continuum. Whereas we might remain uncertain where on this continuum each orthography is objectively located, we can be certain of the extreme positions… English is one of the most irregular alphabetic orthographies, and Finnish is certainly one of the most regular.*

While there has been very little awareness of orthographic transparency among reading scientists, a search for transparent orthographies shows them to be so common that complex orthographies may be the exception rather than the rule. In addition to the thirteen countries studied in the COST-A8 study above (Seymour, Aro & Erskine, 2003), other countries with transparent orthographies encountered in the research literature or in visits and discussions overseas, include Welsh, Estonian, Albanian, Scottish (Gaelic, though this is read by very few Scots), Japanese, Korean, Croatian, Chinese and new orthographies developed by Wycliffe Bible Translators (Goswami, 2002c; Harris & Hatano, 1999; Hoxhallari et al., 2004; Mountney, 2004). There are doubtless many others. In countries with logographic orthographies e.g., Chinese and Japanese, a highly transparent-orthography is used as a first-orthography – children are taught to use this transparent-orthography, then it in turn is used to scaffold reading of logographic units. Transparent orthographies developed by Wycliffe Bible Translators are used in isolated Aboriginal communities in Australia.

One Australian community using a transparent-orthography is the Ngaanyatjarra community in Central Australia. Community members, both adults and children, are learning to read in Ngaanyatjarra, which has been designed for orthographic advantage, being '*absolutely perfectly wonderfully regular*' (Mountney, 2004). Spoken Ngaanyatjarra uses many very different phonemes to English, and these different phonemes are represented by three graphs using [l], three using [t], and three using [r]. Fluent speakers of Ngaanyatjarra are able to smoothly master reading of Ngaanyatjarra once they learn the graphs for each of its 23 phonemes. Ngaanyatjarra has no spelling rules beyond perfect one: one correspondence of each phoneme to its own graph i.e., just these 23 phoneme: graph spelling rules (see Table 3.1).

Table 3.1. Ngaanyatjarra orthography

Vowels	a aa i ii u uu
Consonants with just one form	k m p w y ng
Three forms of [l]	l ly rl
Three forms of [n]	n ny rn
Two forms of [r]	r reading research
Three forms of [t]	t tj rt

Learning to read Ngaanyatjarra can be a little confusing initially for fluent English readers as there are multiple graphs using the letters /a u i n y r t l/, but the graphs have been very carefully chosen so there is perfect one: one correspondence of phonemes: graphs thus no difficulty exists for Ngaanyatjarra speakers who learn to read (Mountney, 2004).

It would be interesting to map the literacy and phonemic awareness development of children learning to read initially in Ngaanyatjarra, and later moving on to English-text reading. It is possible that high level phonemic awareness developed through reading Ngaanyatjarra may support later mastery of spoken and written English, in similar ways to the possible advanced language progress seen in Hanley and Spencer's studies of Welsh first-language children mastering English as a second language.

3.2.3.   Cognitive load as a central factor in crosslinguistic differences

From reflection on the findings discussed above, it would seem that cognitive load of reading-accuracy development is the pivotal factor in crosslinguistic differences in reading-accuracy between English-text and transparent-orthography readers. It seems likely that there are several aspects of this cognitive load:

1. The volume of content to be learned:

    a. In transparent orthographies, just letters and their sounds have to be learned, and if letter-names and letter-sounds are highly similar, there would be vastly less cognitive load involved.

    b. In English-text, there is far more content:

        i. Letter-sounds and letter-names are different, which greatly increases the number of abstract concepts to be mastered (approximately 88 concepts, see Table 3.2).

        ii. High frequency sight words are usually also learned – for beginning readers, each sight word would count as one abstract concept.

Table 3.2 The number of concepts to be mastered in learning English letters' names, sounds, lower-case and capital forms, when only commonest letter-sounds are used

	English letter units																													Number of concepts
Unit	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z	ch	sh	th	---
Name	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z				26
Sound	a		c 2		e	f	g 2	h	i			l	m	n	o		q	r	s		u	v	w	x	y		ch	sh	th	24
Letter	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t	u	v	w	x	y	z				26
Capital	A	B		D	E		G	H				L		N			Q	R		T									Th	12
Total number of new concepts to be learned (because of dissimilar shapes, names and sounds)																														88

2. Emotional supports of orthographic transparency:

    a. Strong emotional supports for transparent-orthography readers:

        i. Consistent feedback from all reading attempts.

        ii. A point of mastery after which one knows one can read.

        iii. Strong feelings of being in control.

    b. Strong lack of emotional support for English-text readers:

        i. Highly inconsistent feedback from early reading attempts (unless only regular words are used).

        ii. For delayed readers: Possible increased lack of confidence and anxiety through feeling not-in-control.

Support for this notion of high cognitive load being the basis of the crosslinguistic differences is found in many of the studies and observations discussed above, not least in

1. The low (transparent-orthography) vs. high (English-text) correlation of working memory and intelligence to reading-accuracy achievement (Gathercole & Pickering, 2000b; Gathercole & Pickering, 2001; J. E. Jimenez, Siegel, & Lopez, 2003), epitomised by Cossu's (1999a, p.30) comment:
Since a transparent orthography is mastered with no special effort by normal children, it is not surprising that even (some) mentally retarded children can easily grasp the orthographic principles and become efficient readers and writers (qua decoders). This particular condition shows that general intelligence, verbal memory or psycho-motor skills are largely irrelevant factors for the acquisition of literacy.

2. Many studies showing that reading-accuracy of transparent orthographies is a simple task mastered quickly and effortlessly by average readers (Cossu, 1999a; Galletly & Knight, 2004; Goswami, 2002c; Hanley, Masterson, Spencer, & Evans, 2004; Jong & Leij, 1999, 2003; Heikki Lyytinen, Ahonen et al., in press; Heikki Lyytinen, Aro et al., in press; Spencer & Hanley, 2003, 2004; Wimmer, 1993; Wimmer, Mayringer, & Raberger, 1999):

    a. Many children learning to read before starting school.

    b. Most reading well within nine months of schooling.

    c. Few experiencing reading difficulties, and those who do responding well to intervention.

3. The 'riding-a-bike' ease of acquisition of reading by Finnish readers.

4. Transparent orthographies being the genre chosen by makers of new orthographies (Mountney, 2004).

5. Transparent-orthography children mastering reading-accuracy with ease being so widespread that many transparent-orthography countries do not have any tests of reading-accuracy - they are not needed as all children master reading-accuracy (Jong & Leij, 1999; Sideridis, 2002; Wimmer & Hummer, 1990).

Contrasting the orthographic and reading-accuracy characteristics of Italian and English reveals the factors contributing to high cognitive load for mastering of English-text reading-accuracy, and low cognitive load for mastering transparent-orthography reading-accuracy (see Table 3.3).

Table 3.3 Factors impacting cognitive load of learning to read Italian vs. English (Bryson, 1990; Cossu, 1999a; Paulesu et al., 2000)

	Italian	English
Orthographic Complexity	Simple	Complex
Letters and sounds	Each letter has one sound	26 letters make over 40 sounds
Spelling rules	Less than 40	More than 1100
Basis of rules	Phonemes	Morphemes Phonemes Orthographic patterns
Regularity of letter sounds	Almost 100%	Initial consonants 95% Final consonants 90% Isolated vowels 51% Vowels in rimes 77%
Levels of instruction needed	Phonological recoding at one level: letter sounds	Phonological recoding at three levels 1. Letter sounds 2. Rimes & patterns e.g., igh, all, ow, ough 3. Whole words, e.g., one, was, eight
Potential for early self-learning	Extremely high	Low
Mastery of reading-accuracy	Rapid success for all	Slower acquisition, lower success rates
Mastery of phonemic awareness	Rapid success for all	Slower acquisition, lower success rates
Need for phonemic awareness.	Low: Italian is easy to decode.	Very high: Success with complex orthographies requires phonemic expertise.
Need for working memory	Low	Very high
Need for adequate intelligence	Low	High

3.2.4. Reading-accuracy instruction for transparent orthographies is uncomplicated

Reading-accuracy instruction for English-text readers is a highly complex and much debated issue involving innumerable conferences, university courses, research studies and journal articles. Perhaps due to the simplicity of reading-acquisition by transparent-orthography readers, reading-accuracy instruction seems a very simple matter in transparent-orthography countries. From descriptions of Dutch and German reading instruction (Jong & Leij, 1999; Mann & Wimmer, 2002; Wimmer & Mayringer, 2002), there seems to be little controversy over methods, different methods are used in different countries, and most countries use just one method. In both countries, very little prereading instruction at home and kindergarten is the norm, then reading instruction commences in Grade 1 using a brief period of intensive phonics instruction, then focussing just on reading of authentic texts.

Wimmer and colleagues comment that in Germany, Grade 1 students are taught the sounds, not names of letters, using an intensive synthetic phonics approach. Each sound is not introduced in isolation but is instead introduced in a blending process, so the children make words with the newly introduced sounds (Mann & Wimmer, 2002; Wimmer & Mayringer, 2002). Systematic reading instruction teaching letter-sounds via synthetic phonics takes place at the start of the first year in school, and is the only reading-accuracy instruction provided, as from this time, '*children are expected to gain fluency by practice* (Wimmer & Mayringer, 2002, p.275)':

> *They are introduced to the graphemes one by one (no letter names) and immediately learn to blend the sounds into syllables without uttering the sounds in sequence. The first letters are vowels and continuants so that blending into syllables can be demonstrated and practiced easily. The resulting synthesized pronunciations in the beginning hardly ever sound fully correct (e.g., vowels and continuants tend to be too long) but are close enough to the target pronunciations to allow recognition. Little attention is given to reading fluency because children are expected to pick up recurring letter patterns in words from self-reliant reading.*
>
> <div align="center">Wimmer, Mayringer, and Landerl (2000, p.669)</div>

3.2.4.1. Diminished impact from top-down instruction

While reading instruction in most transparent-orthography countries seems strongly bottom-up with children taught letter-sounds and phonemic recoding, the reading instruction of some transparent-orthography countries is in some ways more top-down, e.g., Turkish reading instruction begins with children memorising sentences then drills down into letters and sounds (A.Y. Durgonglu & Oney, 2002).

As discussed later in the thesis, Whole Language reading-accuracy instruction as a sole method is not recommended for English-text at-risk readers (Hempenstall, 1996, 1999, 2003; T. Nicholson, 1985, 1991; T. Nicholson, Bailey, & McArthur, 1991; T. Nicholson, Lillas, & Rzoska, 1988). There would seem very little value in using Whole Language reading-accuracy instruction in countries with transparent orthographies, given the ease with which children master reading-accuracy through phonemic recoding. The popularity of Whole Language in English-text countries nonetheless does seem to be impacting transparent-orthography countries, e.g., Albania, a country with a completely transparent orthography, has recently introduced Whole Language reading-accuracy instruction using whole-word instruction as its official teaching method (N. C. Ellis et al., 2004; Hoxhallari et al., 2004). This would seem a very inappropriate move, given the almost complete transparency of Albanian orthography, and the rapid rate of reading-accuracy development of Albanian readers under traditional phonics instruction (N. C. Ellis et al., 2004; Hoxhallari et al., 2004).The lower demands that transparent orthographies place on working memory and intelligence, in combination with older school starting-ages, may mean such instruction may do less damage to at-risk readers of transparent orthographies. Where countries are instituting Whole Language reading-accuracy instruction, it will be interesting to observe rates of reading-accuracy progress in both normal-progress and at-risk readers.

No documentation on Finnish Whole Language instruction was found, but one of the Finnish OECD researchers commented that when it had been trialled in Finland, the children (aged 7 years) soon realised that letters were very significant, and requested teachers teach them letter-sounds and, as a result, traditional letter-sound instruction quickly moved back into place.

3.2.4.2. Diminished anxiety about reading-accuracy instruction

There seems a distinct lack of anxiety in transparent-orthography countries about reading-accuracy development and reading-accuracy instruction. Parents seem unconcerned about their children's likelihood of mastering reading-accuracy. While reading extensively to their preschool children, few focus attention on building reading-accuracy skills. Reading-accuracy instruction is not a controversial subject in schools and universities. There do not seem to be transparent-orthography Reading Wars.

These low anxiety levels contrast markedly with the continuing high levels of angst with respect to reading-accuracy development and instruction, experienced by English-text teachers and parents. It therefore seems likely that much of this English-text angst may be because English orthographic complexity makes reading-accuracy mastery a much less guaranteed outcome for English-text students. It also seems likely that lack of awareness of the impact of English orthographic complexity on reading-accuracy development and instruction may be a major factor perpetuating Reading Wars in Australia and other English-text countries.

3.2.4.3. Strong perceptions that reading-accuracy leads to reading-comprehension

The role of reading-accuracy in reading development would seem the key issue in Reading Wars controversies. One aspect of this is whether reading-accuracy leads to reading-comprehension, or whether reading-accuracy is developed through reading-comprehension i.e., develops through large amounts of reading involving effective reading-comprehension. Using the modified simple model (*Reading-comprehension = reading-accuracy* x *language comprehension + reading-comprehension strategies*), it seems a matter of which of the four components are core components. From the writings of reading researchers in transparent-orthography countries, and from observation of teachers and instruction in four of those countries (Finland, Estonia, Italy, Wales), there seems overwhelming reliance on reading-accuracy being the core skill of reading-comprehension, i.e., reading the words leads to reading the meaning., and surprise that people might consider the reverse pattern (reading-comprehension building reading-accuracy) as an option.

3.2.4.4. Effective reading-accuracy instruction closes may close the crosslinguistic achievement gap

Some crosslinguistic studies are showing that intense phonics instruction reduces the impact of English orthographic complexity (J. R. Hanley, 2005; Landerl, 2000). Landerl (2000) compared groups of 7, 8 and 9 year old children in three categories:

1. Austrian (German-speaking) children receiving usual instruction (intensive phonics instruction using words and nonwords, which commences when four letters have been learned. as soon as four letters are).

2. English readers receiving intense phonics instruction using *Jolly Phonics* (Lloyd, 1992), a program that teaches 43 common grapheme-phoneme correspondences of English, and moves into word reading as soon as the first six letters are taught.

3. English readers receiving usual instruction (weekly phonics lesson and whole word reading).

Landerl (2000) found that the English children receiving intensive phonics did almost as well as the Austrian children. Accuracy was at similar levels, and while the younger English readers were somewhat slower, the older readers' speeds were at similar levels. This is in keeping with comments made by researchers in England that the effectiveness of the National Literacy Strategy (intensive phonics) seems to be narrowing the reading-

accuracy achievement gap between English and Welsh students learning to read in Wales (J. R. Hanley, 2005). The findings thus far are only very vague indicators, e.g., the measures Landerl used seem relatively inadequate, being a small list of real words (number words from two to twelve, e.g., *four seven*) and a list of nonwords developed from these words. There would seem urgent needs for more research in this area as findings that systematic phonics narrows the gap offers a way out of orthographic disadvantage. In the same way that English orthographic complexity impacts low-progress readers far more than it impacts higher-progress peers, and phonological awareness may prove to be more needed in at-risk readers, it may be that English orthographic complexity creates a far greater need for systematic reading-accuracy instruction to prevent reading-accuracy difficulties in at-risk readers.

Conclusion

This section has explored the findings of crosslinguistic studies of reading-accuracy development. English orthography is established as an anomaly in alphabetic languages due to its being so highly complex - many researchers consider it not so much as being at the end of a continuum of orthographic complexity, but rather as an outlier to the continuum (Aro, 2005; Ziegler & Goswami, in press). English orthographic complexity would seem to be having major effects on the reading development of English-text readers, including slower reading-accuracy and phonemic awareness development.

There is strong belief in transparent-orthography countries that reading-accuracy leads to reading-comprehension, and their reading instruction consists of systematic letter-sound instruction then authentic reading. The divisiveness associated with English-text reading instruction does not seem present in transparent-orthography countries.

These findings confront many assumptions about Australian reading development, difficulties and instruction, and provoke considerable reflection. The evidence on impacts of English orthographic complexity is growing, with findings being highly consistent, making it an area highly worthy of consideration.

3.3. The stronger impact of English orthographic complexity on at-risk readers

Studies of Welsh vs. English developing readers by Hanley and Spencer (Hanley et al., 2004; Spencer & Hanley, 2003, 2004) show evidence indicating that it is likely that the impact of English orthographic complexity is less significant on high achieving readers, and increasingly major as achievement levels lessen, with the lower half of English-text readers being severely at-risk of ongoing failure (see Figure 3.3). Their longitudinal study of Welsh and English students found the achievement gap in the top quartile of English vs. Welsh students was nonexistent at one year and mild after two years. For the 2nd quartile, a mild gap at one year widened significantly at two years; by then English students in this quartile read just better than the Welsh lowest achievers (Spencer & Hanley, 2003).
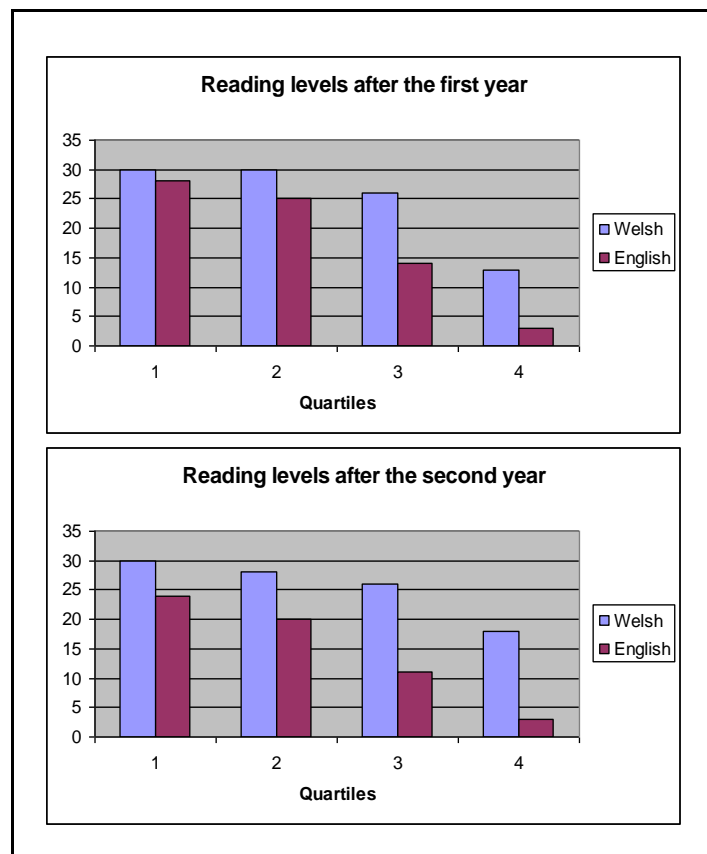
Figure 3.3. Achievement levels of English and Welsh students after 1 year and 2 years of instruction (from Spencer & Hanley, 2003)

The performance of the lower two quartiles in Spencer and Hanley's study is far more worrisome. After two years, the third quartile of English readers were reading less than half as well as the Welsh third quartile. The English fourth quartile were virtually nonreaders, in strong contrast to the Welsh lowest quartile whose reading was almost as good as the English second quartile. It seems likely that, whereas virtually all readers of transparent orthographies will spend almost all their school years working on advanced literacy learning, a high percentage of English would-be readers will remain as delayed readers, continuing to experience the cognitive load complexities of reading-accuracy weakness.

This notion that orthographic complexity has far more deleterious impact on lower-progress complex-orthography readers than normal-progress complex-orthography readers is supported from other sources, e.g., studies showing that English-text delayed readers respond significantly less well to intervention than transparent-orthography delayed readers (Olofsson, 1993; Olofsson & Niedersoe, 1999; Poskiparta et al., 1999; Schneider et al., 1999; Schneider et al., 1997; Torgesen, 2000; Vellutino, 2000; Vellutino et al., 1996). Additionally, a second (current) COST-A8 study is also finding supporting evidence of greater impact on

lower achievers (Seymour, 2005; Seymour & Duncan, 2002). This study has measured the reading progress of children in five countries at four test points in their first year of instruction (by which time the transparent-orthography children were at ceiling level accuracy). A further two test points in their second year were used for the Scottish readers, to accommodate their progress being so much slower than that of the transparent-orthography children (Seymour & Duncan, 2002). The data for all countries is not yet collated, but data for Scottish, Finnish and Icelandic children has now been processed (Seymour, 2005). Comparison of individual-progress trajectories of the full-range of readers is showing that

1. On average, the English-text readers at Test Point 5 (end of Grade 2), were at the same level of achievement as the Icelandic readers at Test Point 3 (end of Grade 1). The Finnish readers reached this level at Test Point 2 (Test Point 1 was in Kindergarten, prior to formal reading instruction occurring).

2. All Finnish readers reached a point of a rapid transition at various times during Grade 1, from which point they moved rapidly to ceiling level reading-accuracy.

3. The trajectories of the lower 50% of Scottish children show a wide spread of achievement at all test points.

4. The lower 50% of Icelandic readers show a relatively wide spread of achievement, less than the English readers, but far more than the Finnish readers. While Icelandic is a highly transparent orthography, it is far less transparent than Finnish, which is an example of an almost completely transparent language.

3.3.1.   This impact is long-lasting, diverse, and not due to sociocultural factors

Other findings of Spencer and Hanley's study as it progressed longitudinally are extremely thought-provoking. Their study is particularly powerful, being longitudinal, and having many sociocultural variables controlled. Welsh schools in a single education district are administrated by the same local education authority, and follow highly similar curricula and teaching approaches. The English- and Welsh- speaking children are the same age at school entry, and live in the same town. The only major obvious difference is likely to be the language of instruction (Spencer & Hanley, 2003; Ziegler & Goswami, in press). Findings from the students' first year at school (Spencer & Hanley, 2004) include

1. Irrespective of impacts of sociocultural differences and low age of school entry, orthographic transparency results in faster development of reading-accuracy and phonemic awareness. Significantly stronger reading-accuracy and phonemic awareness were present in Welsh students after just four months instruction, with the gap considerably wider after eight months instruction, despite

    a. Welsh being more complicated than English through its having a larger alphabet which includes significant numbers of digraphs.

    b. Welsh test words with equivalent numbers of letters as English words being more complicated through having more syllables and more phonemes.

2. Phonemic awareness ability (or those aspects of phonemic awareness ability measured in the study) is either a consequence of development of reading-accuracy or a closely parallel developing skill such that reading-accuracy is possibly a vital precursor of phonemic awareness development. No differences were present in the two groups before reading skills were acquired, but they were significantly in evidence present after only four months of instruction, once Welsh reading-accuracy skills were present.

3. Rhyme showed as an important basis of English reading-accuracy mastery. Rhyme skills did not distinguish English vs. Welsh young readers, but rhyme correlated more highly with English reading achievement than Welsh reading achievement, even in beginning English readers.

4. The close to 100% consistent feedback of Welsh letters to phonemes has more impact on development of reading-accuracy and phonemic awareness than explicit instruction on words, letters, and sounds has, given that English and Welsh groups were equivalently focussed on words, letters and sounds.

5. Low age of school entry may well have an effect on reading-accuracy mastery, given that Welsh readers' reading-accuracy skills do not seem as high as readers from transparent-orthography countries where children start school at older ages (Hanley et al., in press; Seymour et al., 2003; Spencer & Hanley, 2003, 2004). Factors other than age may well have been involved in this achievement discrepancy however.

6. Whole-word substitutions may be a feature of weak reading-accuracy just in English readers. Many English readers' errors were real words, while Welsh readers' errors were always nonwords, possibly due to the 100% feedback of Welsh words quickly building strong reliable phonological recoding and thus dependence on this strategy.

Findings from measuring the progress of the students in their reading development over a five year period from age five to ten years (Hanley, 2004; Hanley et al., 2004) include

1. That Welsh readers are reading with virtually adult reading-accuracy skill in their second year of schooling (when aged 7 years).

2. It takes a very long time to build powerful English-text reading-accuracy skills, such that even in their sixth year of formal reading instruction, English readers are still learning reading-accuracy. Spencer and colleagues found that English readers at this stage were now equal to Welsh readers for reading of regular and high frequency irregular words, but were still significantly weak on irregular English-text words of moderate and low frequency. This weakness was evident even in the best English readers. Hanley and colleagues' finding is compatible with that of Jackson and Coltheart (2001) who found that by age 10 to 11 years, average-progress English-text readers read regular monosyllabic pseudowords at near adult levels, and their comment that other studies and tests of pseudoword reading show children are at ceiling level on such words from this age. Jackson and Coltheart comment of irregular word reading that, in contrast to regular word reading, children at this age are not at ceiling level, but that their mature reading system seems in place and does not change in significant ways from this time, such that children continue to acquire mastery of irregular words, and read more and more efficiently from this point.

3. Over the six years of instruction, the most significant detrimental effects of English orthographic complexity were on the lowest quartiles of English readers.

4. Reading-accuracy difficulties seem almost exclusively a complex-orthography phenomenon, and not a transparent-orthography one. Welsh poor readers were characterised by low speed but good accuracy, whereas English poor readers were characterised by very low accuracy and very low speed.

5. Welsh children read familiar words more quickly than unfamiliar words, thus showing incomplete reliance on phonological recoding as a single strategy, and indicating the likelihood of phonological recoding being an interactive process with multiple components, even for transparent-orthography readers.

6. Phonemic awareness development is still delayed in English readers at age ten years, even though by this age they read regular words well.

    a. In older Welsh and English readers showing equivalent skill in reading regular words, Welsh children were significantly stronger than English readers in phoneme tapping and final consonant awareness.

    b. These older English readers did develop equivalent phonemic skills to their Welsh counterparts in skills in tasks involving beginning consonant sounds and rhyme, which is perhaps indicative of the stronger consistency of these factors in English orthography (De Cara & Goswami, 2002; Treiman, Mullennix, Bijeljac-Babic, & Richmond-Welty, 1995).

7. After six years of reading instruction, English readers had better reading comprehension than the Welsh readers. This might indicate stronger monitoring of reading comprehension developing in English readers due to their needing to rely more on contextual cues while reading because English orthographic cues are weaker. It is possible that this is an indicator of why English-text nations achieved at comparable levels to transparent-orthography nations in reading of 15 year olds (Program for International Student Assessment (PISA), 2002a). For those children who master reading-accuracy

and thus have unfettered access to reading-comprehension, this early reliance on reading-comprehension may have powerful impacts on subsequent literacy and language development.

8. The Welsh students made significantly faster progress at mastering English as a second language than the English students did at mastering Welsh as a second language.

The fact that Spencer and Hanley's English-text readers' reading-accuracy is still significantly delayed at Grade 6 lends support to the possibility discussed in Chapter 2 that reading-accuracy weakness may be a pivotal factor in the large proportions of teenagers and adults experiencing authentic reading weakness (International Literacy Year Secretariat, 1990; Program for International Student Assessment (PISA), 2002a, 2002c). It seems possible that in English-text delayed readers, the reading-accuracy gap between English-text and transparent-orthography readers may never close. There would be great value in assessing the reading-accuracy skills of adults and teenagers with weak authentic reading skills.

Conclusion

This section has explored the impact of English orthographic complexity on at-risk readers. It would seem that English orthographic complexity has far greater impact on at-risk readers than normal-progress readers, and that the impact of English orthographic complexity on these readers may be far greater than the impact of sociocultural factors.

Transparent-orthography readers, both normal-progress and at-risk readers, reach ceiling level reading-accuracy very early in their schooling, with at-risk readers needing only mild intervention to catch up to average levels. In contrast, there would seem to be many English-text readers with reading-accuracy difficulties after six years of schooling. This provokes the question as to the proportion of these readers who never close the achievement gap which English orthographic complexity creates between transparent-orthography readers and English-text readers.

Evidence offering support to English orthographic complexity being the basis of high proportions of continuing reading 'failure' by English-text readers comes from their seeming to be high, and possibly similar, rates of reading weakness in primary school children, teenagers and adults. There seem strong needs to research reading-accuracy development of Australian at-risk readers from early primary school to 'ceiling' level, to gain knowledge of the proportion of readers who remain weak in reading-accuracy.

3.4.   The role of phonological awareness in reading-accuracy development

Crosslinguistic studies are yielding findings which suggest there is a need to rethink the role of phonological and phonemic awareness in English-text reading-accuracy development.

Research over many decades has explored phonological awareness in English-text readers from many different perspectives. For English-text readers, very strong associations have been shown between children's early phonological awareness and their subsequent reading-accuracy progress (M. J. Adams, 1990; L. Bradley & Bryant, 1985b; Byrne & Fielding-Barnsley, 1995; Chard & Dickson, 1999; Hatcher, Hulme, & Ellis, 1994; Munro, 1998; National Research Council, 1998a; S. B. Smith, Simmons, & Kameenui, 1998a, 1998b; Torgesen, 2001; Torgesen & Davis, 1996; Vellutino, 2000; Vellutino et al., 1996; Wagner et al., 1997). Phonemic awareness instruction has been shown to strongly support reading progress in normal, at-risk and delayed English-text readers (Adams, 1990; Ehri et al., 2001; National Reading Panel, 2000; National Research Council, 1998), though there is still a significant proportion of English-text weak readers who do not respond to such interventions (Torgesen & Davis, 1996; Vellutino, 2000; Vellutino & Scanlon, 1998). Tunmer and Hoover (1992) discuss

1. Measures of phonological awareness obtained on students before they begin formal reading instruction predict their later reading achievement even when those showing any preschool reading ability are excluded, or when the influence of preschool reading ability is statistically controlled.

2. Phonological awareness strongly influences reading comprehension indirectly through phonological recoding ability such that weakness in phonological awareness results in weakness in reading comprehension.

3. The more successful readers in strictly whole-word reading programs are the students who score highest on tests of phonological awareness.

4. Training in phonological awareness during or before reading instruction produces significant experimental advantages in reading achievement

There is very wide consensus that for English-text students with reading-accuracy difficulties, weakness in phonological awareness is a key factor in failure to master reading-accuracy, and that phonological and phonemic awareness intervention is extremely effective (L. Bradley & Bryant, 1983, 1985b; Byrne & Fielding-Barnsley, 1991, 1995; Byrne, Fielding-Barnsley, & Ashley, 2000; Ehri, Stahl et al., 2001; National Research Council, 1998a; S. B. Smith et al., 1998b; Torgesen, 1998, 2002; Torgesen, Alexander, & Wagner, 2001; Vellutino, 2000; Vellutino & Scanlon, 1998). As discussed in Chapter 6, the National Reading Panel's (2000) meta-analysis of phonological awareness intervention studies found phonological awareness instruction to be highly effective in increasing phonemic awareness, reading-accuracy, spelling and reading comprehension achievement in both normal-progress and at-risk readers. Their findings are entirely compatible with the findings of myriad single studies and other large reviews.

While skill building in phonological awareness is an extremely valuable prevention and intervention tool for at-risk readers, many practitioners working with students with literacy difficulties are keenly aware that, even with maximised phonological awareness skills, these students' phonological awareness and processing is still not fully optimised, i.e., that despite maximum intervention, phonemic awareness skills are not at ceiling level.

The findings of recent crosslinguistic studies shed light on this observation that is it difficult to build English-text readers' phonemic awareness skills to ceiling level. These studies seem to remove the grounds for any broad assumptions that phonemic awareness acquisition is linked to either a maturational stage or to the age at which reading-accuracy instruction commences (Lundberg, 1999; Olofsson & Niedersoe, 1999), and even that phonemic awareness skills build once attention is given to letters, letter sounds and words. They seem to show clearly that phonemic awareness development, as measured by current measures, is matched overwhelmingly to students' levels of reading-accuracy mastery (Goswami, 2002c; Hanley et al., in press; Seymour et al., 2003; Spencer & Hanley, 2003, 2004), such that phonemic awareness would seem to develop in parallel to reading-accuracy development - at the present time the exact relationship, causal or otherwise, is not yet known.

As mentioned in the findings of Spencer and colleagues' English-Welsh comparison studies, it is not only reading-accuracy in which readers of transparent orthographies excel. It is likely that, as a consequence of reading-accuracy development, they master phonemic awareness while they master reading-accuracy (Goswami, 2002c; Hanley et al., in press; Seymour et al., 2003; Spencer & Hanley, 2003, 2004; Wimmer, 1993; Wimmer & Mayringer, 2002; Wimmer et al., 2000). There are thus huge differences between English-text and transparent-orthography populations in rate of phonemic awareness development. While transparent-orthography readers develop phonemic awareness rapidly, being well ahead of English-text readers after 4 months of school, phonemic awareness development for all English-text readers is delayed for many years, with significant lags still present after six years of schooling (Hanley et al., in press; Spencer & Hanley, 2003, 2004). Additionally, similar to reading-accuracy difficulties, phonemic awareness weakness seems virtually nonexistent in transparent-orthography countries after the first few school years, while weak phonemic awareness in present in weak English-text readers through to adulthood (Goswami, 2002c; Seymour et al., 2003).

It also seems highly likely that the building of reading-accuracy is more important for development of phonemic awareness than are factors such as pre-existing phonological awareness (syllable, rhyme) skills, age and maturity (Goswami, 2002c; Hanley et al., in press; Jong & Leij, 1999; Spencer & Hanley, 2003, 2004; Wimmer, 1993; Wimmer & Mayringer, 2002; Wimmer et al., 2000). It is possible learning letters contributes to phonemic awareness development, given that letter-sounds seem highly similar to letter-names. Given the likelihood that fluent phonemic awareness is paralleled by increased sophistication of phonological representations, it is possible that lack of fluent phonemic awareness when learning to read has major implications on English-text readings.

In contrast to English-text reading-accuracy development, phonological and phonemic awareness skills do not seem nearly as important for children learning to read transparent orthographies. As an example, both Jong and Leij (1999), studying Dutch children, and Wimmer and Mayringer (2002), studying German children, comment on the lack of early-childhood emphasis on phonological and prereading preparation for reading at home and Kindergarten, due to its not being needed. Both groups found their Kindergarten children had negligible phonological awareness skills, probably due to this lack of prereading emphasis. Additionally, as mentioned above, Jong and Leij (1999), studying the association of phonological and reading-accuracy skills in Dutch students from Kindergarten to Grade 2, found Kindergarten phonological awareness skills did not predict the students' reading progress. With reading instruction commencing in the Netherlands at the start of Grade 1, and strong phonics instruction preceding the reading of words, the researchers found that phonological awareness skills measured after two months of reading instruction in Grade 1, did predict reading progress for that year, but not subsequent years. They comment (Jong & Leij, 1999, p.470)

> *After 1 year of instruction, the relationship between phonological abilities and reading ability has stabilized. Individual differences in phonological ability do not influence the further acquisition of reading, although these abilities remain an important component of reading (Perfetti, 1992). The time-limited importance of phonological abilities in the present study is likely to be due to the consistency of the Dutch orthography, probably in combination with phonics teaching methods. The implication is that success in learning to read in a more transparent orthography is to a large extent determined by the ease with which phonological abilities are acquired in the first months of reading instruction (for a similar conclusion, see Wimmer et al., 1991).*

In like manner, Holopainen, Ahonen, & Lyytinen (2001) found that while slow progress Finnish readers were characterised by low phonological awareness skills relative to the skills of their faster progress peers, phonological awareness levels at Kindergarten did not predict these children's poor reading. They comment on Torgesen and Burgess' (1998) conclusion from studies of English-text readers that directional influences were stronger from phonological processing to reading than from reading to phonological processing (Holopainen et al., 2001, p. 406):

> *This relationship may be different in transparent languages, where grapheme-phoneme/phoneme-grapheme correspondences are one-to-one and where teaching emphasizes the use of phonics (Holopainen, Ahonen, Tolvanen, & Lyytinen, 2000; Wimmer, 1993). Thus, the relationship between reading acquisition and phonological awareness is often thought to be reciprocal because usually children do not attain full development of explicit phonological awareness until reading instruction begins (Torgesen et al., 1994).*

Although to date phonological and phonemic awareness weakness have tended to be grouped together, Goswami's (2002) proposition that reading-accuracy development parallels phonemic awareness development suggests the importance of separating phonemic awareness from phonological awareness. This proposition is supported by Spencer and colleagues' findings (Hanley et al., 2004; Spencer & Hanley, 2003, 2004). It has been possible to isolate this factor more effectively in Welsh-English comparison studies than in comparisons of English students with students from other European countries, because so many of the factors impacting the Welsh and English students in Hanley and Spencer's studies were naturally environmentally controlled - the Welsh and English students had strongly similar instructional methods and age of school entry, and were probably strongly matched on many sociocultural factors including home environment factors and print experience.

Although numerous researchers have commented on phonemic awareness developing in response to reading-accuracy development (Morais, Bertelson, Cary, & Alegria, 1986; National Research Council, 1998a; C. Perfetti, Beck, Bell, & Hughes, 1987; Wagner & Torgesen, 1987), this relationship seems to have been assumed as a comfortable mutuality with phonemic awareness helping reading-accuracy develop while reading-accuracy helped phonemic awareness develop. My perceptions for many years from reading the research on the area had been that

1. Early phonemic awareness skills such as blending 3 or 4 sounds to make words, listing the sounds of 3 to 4 sound words, and identifying the sound at the beginning, middle or end of a three sound word, were prerequisite to and supported the development of phonemic recoding.

2. Phonemic recoding was then perquisite to the development of advanced phonological awareness skills such as phoneme deletion, spoonerisms, and 'Pig Latin (atcay/cat, ogday/dog)'.

Now I am not so sure. This sense of a friendly mutually beneficial relationship is also evidenced by other writers (Morais et al., 1986; National Research Council, 1998a; C. Perfetti et al., 1987; Wagner & Torgesen, 1987). Goswami's proposition, supported by Spencer and Hanley's findings, suggests it may be a far less friendly relationship, with high levels of phonemic awareness unable to be developed in English-text beginning readers, because their reading-accuracy development is delayed. Thus English orthographic complexity may be causal in denying English-text readers the rapid phonemic awareness development available to transparent-orthography readers.

Orthographic complexity and reading-accuracy development being such major factors in phonemic awareness development turns many assumptions of reading-accuracy development and instruction on their heads. At the current time, when weak English-text readers are assessed and found to be weak in reading-accuracy and phonemic awareness, a causal relationship from phonemic awareness weakness to reading-accuracy weakness is assumed, with intervention taking place to build phonemic awareness skills as a supposed prerequisite to subsequent reading-accuracy progress. It is likely this assumption has occurred many times in reading research, e.g., Juel (1988) tested six dimensions of phonemic awareness, found her weak reader group had lower phonemic awareness shortly after school entry, and discusses phonemic awareness weakness as a cause of the weak readers' reading difficulties. It seems equally possible however, that their weak phonemic awareness might be the result of early reading weakness. Adams (1990, p.8) comments insightfully,

> A Catch-22 emerges. Closer analysis indicates that children who have learned their letters and acquired a solid level of phonemic awareness before entering school have also begun to learn to read before entering school. By implication, we are left with the conclusion that the likelihood that a child will succeed in the first grade depends, most of all, on how much she or he has already learned about reading before getting there.

This implication, that it is reading-accuracy level rather than phonemic awareness level that predicts subsequent reading-accuracy development, receives support from studies showing that the factor most strongly predicting responsiveness to intervention is the child's previous reading-accuracy achievement level. This is a somewhat depressing finding, given that the aims of the intervention studies have been to arrive at interventions that improve low reading-accuracy achievement levels. There are strong needs to observe and research the interplay of reading-accuracy development and different aspects of phonemic awareness development in at-risk, normal-progress, and delayed readers, e.g., to explore whether delayed readers have

1. Phonemic awareness weakness without phonological awareness weakness, i.e., phonemic awareness weakness which is not a progression from weak phonological awareness, but instead a consequence of failure to acquire reading-accuracy,

2. Genuine phonological weakness, in rhyme, syllable and other nonphonemic aspects of phonological awareness, underlying their reading difficulties, or

3. Subtle dimensions of phonemic awareness development yet to be elucidated, some of which precede reading-accuracy development, and others which develop in parallel to or as a result of reading-accuracy development.

The stronger relationship of phonological skills to reading progress for English-text readers may mean that only complex-orthography students have vital needs for efficient phonological and phonemic awareness. It may also mean that only at-risk complex-orthography students have vital needs, and that conclusions on the role of phonological awareness have been built from group averages rather than analyses of deciles of student reading-accuracy achievement. A frustrating paradox seems present: Because English orthography is highly complex, children learning to read English-text are far more in need of fluent phonemic awareness than children learning to read transparent-orthographies, yet, equally because English orthography is highly complex, they take years to master reading-accuracy so do not develop excellent phonemic awareness skills. In seeking ways forward to increase rate and efficiency of phonemic awareness progress, there are strong needs to develop detailed knowledge of the specific characteristics of the phonemic awareness developed by transparent-orthography and complex-orthography readers. Although ceiling-level reading-accuracy mastery seems the pivotal factor in ceiling-level phonemic awareness, it is highly likely that major contributions to phonemic awareness development are nonetheless made by factors including preschool phonological awareness levels, knowledge of letter-sound concepts, awareness of print concepts on phonemic awareness instruction. It will be valuable to map the contribution of these different aspects, and to seek ways to boost phonemic awareness earlier in reading-accuracy development than currently occurs, particularly in at-risk readers.

3.4.1. Crosslinguistic differences in predictors of reading-accuracy development

Phonological awareness and letter-sound knowledge before formal instruction commences are strong predictors of reading-accuracy progress in English-text readers (Adams, 1990; Ehri, Nunes, Willows, & Valeska Schuster, 2001; National Research Council, 1998). They also predict reading-comprehension progress, probably because of the role effective reading-accuracy plays in supporting reading comprehension (Catts & Hogan, 2003; Chard, Simmons, & Kameenui, 1998; Dymock & Nicholson, 1999; Shankweiler, Lundquist, Katz, Stuebing, & Fletcher, 1999; Stanovich, 1986). Their power as predictors seems to fall markedly once children have begun to make reading-accuracy progress, with the best predictor of reading outcomes in later grades being initial reading success or failure itself e.g., Catts, Fey, Tomblin and Zhang (2002) found the best predictor of fourth-grade reading achievement was second-grade reading. The predictors of reading progress in transparent-orthography readers seem to be very different (see Table 3.4).

Table 3.4 Kindergarten predictors of Year 1 reading-accuracy in English-text and transparent-orthography readers (M. J. Adams, 1990; Heikki Lyytinen, Aro et al., in press; National Research Council, 1998a)

	English-text readers	Transparent-orthography readers
Kindergarten characteristics which correlate highly with Year 1 reading-accuracy levels	Knowledge of letters. Phonological awareness. Working memory. IQ levels. Speech & language levels. RAN.	Knowledge of letters. Visual analogical reasoning.

As discussed earlier, while intelligence and working memory are both strong predictors of English-text reading achievement (Gathercole & Pickering, 2000; Gathercole & Pickering, 2001; Siegel, 2003), they do not correlate significantly with transparent-orthography reading-accuracy achievement levels (Cossu, 1999a; Jimenez et al., 2003).

A similar contrast is seen in the role of rapid naming. While it is a significant predictor of reading-accuracy for English-text (Catts, Gillispie, Leonard, Kail, & Miller, 2002; Manis, Doi, & Bhadha, 2000), it does not predict reading-accuracy for transparent-orthography readers. It does play a strong predictive role, however, in predicting reading fluency in transparent-orthography readers, e.g., Holopainen, Ahonen, & Lyytinen (2001) found a composite of Kindergarten object, colour and digit naming speed was the best predictor of Finnish reading fluency at the end of Grade 2.

Further strong contrasts seem present in the role of language skills as predictors (Heikki Lyytinen, Aro et al., in press). Language skills have long been considered strong predictors of reading-accuracy development (Bishop & Adams, 1990; Catts, Fey, Tomblin, & Zhang, 2002; Catts, Fey, Zhang, & Tomblin, 1999, 2001; Catts & Hogan, 2003b; Catts, Hogan, & Fey, 2003), but it is likely this strength is restricted to English-text readers, rather than being language-universal. Several studies of transparent-orthography readers are finding little relationship between preschool language skills and reading-accuracy development (Jong & Leij, 1999; Heikki Lyytinen, Aro et al., in press). It therefore seems likely that the relationship of language skills (including speech, syntax, semantics, pragmatics, and oral narrative skills) to reading-accuracy development in English-text readers, is not a causal (predictive) one, but instead correlational, with the strength of the relationship being through shared variance with phonological awareness. The phenomena of hyperlexia also offers strong evidence of reading-accuracy development not being dependent on language skills (Cossu & Marshall, 1990; Grigorenko, Klin, & Volkmar, 2003; Jackson & Coltheart, 2001; Nation, 1999).

3.4.1.1. Confusion on phonological awareness as a predictor of reading-accuracy development

Whereas phonological awareness is touted as a strong predictor of reading-accuracy for English-text readers, it seems highly likely that it is not a strong predictor of reading-accuracy for transparent-orthography readers.

There seem to be conflicting findings in this area. Several studies emphasise phonological awareness as a strong predictor of reading-accuracy development in transparent orthographies (Ingvar Lundberg, Frost, & Peterson, 1988; Schneider et al., 1997), due to low-progress children having weak phonological awareness and responding well to intervention focussed on building phonological awareness. Other studies show that weakness in phonological awareness at school entry is not commonly associated with reading-accuracy weakness in transparent-orthography children and that these students may start school with negligible phonological awareness, and still make excellent reading-accuracy (and phonemic awareness) progress. (Holopainen et al., 2001; Jong & Leij, 1999; Wimmer, 1993; Wimmer & Mayringer, 2002; Wimmer et al., 2000; Wolf & Bowers, 1999). Indeed, Holopainen, Ahonen, & Lyytinen (2001) found Kindergarten visual analogical reasoning was more effective than phonological awareness in distinguishing delayed and advanced readers - letter knowledge and visual analogical reasoning explained above 90% of the difference between these groups.

These conflicting findings perhaps become more aligned when groups of normal-progress vs. at-risk readers are considered. Given that several studies are showing indication that the impact of orthographic complexity falls far more heavily on at-risk readers (Hanley et al., 2004; Seymour, 2005; Seymour & Duncan, 2002; Spencer & Hanley, 2003, 2004), it seems possible that weak phonological awareness skills at young ages similarly are more a factor for those readers. As such, they may be highly correlated with the slow reading-accuracy development of weak readers, yet not significantly correlated with the reading-accuracy development of normal-progress transparent-orthography readers (and with group averages when normal-progress and at-risk readers are grouped together). As such, phonological awareness would not be considered a predictor from young ages. The evidence for phonological and phonemic awareness as prerequisites for transparent-orthography at-risk readers is not strong however. There is certainly more to be discovered in this area. Aro (2004, p.23) comments of an intensive longitudinal study of six Finnish at-risk readers learning to read (Aro, Aro, Ahonen, Rasanen, & al, 1999):

> *Observation of the individual development of phonological skills revealed considerable inter-individual variation in the development of these skills. The children achieved basic reading ability with varying sets of phonological abilities. Syllable-deletion and phoneme-identification skills seemed to be the phonological subskills that most consistently preceded reading acquisition, even though they did not seem to predict the time-point of learning to read. It was concluded that the predictive value of phonological abilities was not high at the individual level. On the basis of the findings, it seemed justifiable to ask, whether the tests of phonological manipulation skills measure abilities that are cognitively independent and separate from reading skill, or whether they merely reflect emerging literacy skills, especially in an orthography where single letters are consistently related to corresponding phonemes. It was also hypothesised that in a transparent orthography, phonemic awareness might be more strongly related to letter knowledge, and develop simultaneously.*

It is also likely that this low predictiveness of phonological awareness aligns with the findings of Catts, Fey, Tomblin and Zhang (2002) for English-text readers that phonological awareness is a poor predictor of later reading achievement once reading accuracy is mastered. If transparent-orthography readers master reading-accuracy very quickly, then the time period for phonological awareness to be a predictor is necessarily very short. This notion is supported by the finding of Jong and Leij (1999), studying Dutch students, that only in the very early stages of reading-accuracy instruction did phonological awareness significantly predict subsequent reading, and then only reading achievement at the end of Year 1, but not subsequent years. (It seems likely the impact of language comprehension on reading comprehension would be similarly affected – whereas reading-accuracy and not language comprehension predicts English-text reading comprehension in the first years of schooling, and language comprehension predicts reading comprehension in later years, it is likely language comprehension would predict transparent-orthography reading comprehension from very early in reading development.)

It would seem valuable to revisit studies showing phonological awareness to be a strong predictor of English-text reading-accuracy development, to examine the impact of early phonological awareness on different deciles of students. It is possible that overgeneralisations have been made as to the role and importance of phonological awareness in English-text reading-accuracy development, e.g., Schatschneider, Carlson, Francis, Foorman, & Fletcher (2002) discuss the relationship of phonological awareness to English-text reading-accuracy and reading comprehension in Grades 1 and 2 being curvilinear, with phonological awareness strongly related to the low reading achievement of weak readers, but increasingly less related to such reading achievement in effective readers.

3.4.2.   Double deficit groups differ for simple vs. complex orthographies

Many researchers are exploring the relationship between rapid processing and reading, often focussing on working memory, speed of processing, and automisation deficits (Catts, Gillispie et al., 2002; Fawcett & Nicholson, 2001; Fawcett, Nicholson, & Maclagan, 2001; Hitch, Towse, & Hutton, 2001; Hoskyn & Swanson, 2000; Swanson, 1993, 1999). There has also been extensive exploration of the role of RAN, rapid automised naming of items such as letters, objects and colours. Measures of RAN are indications of efficiency in accessing and activating stored phonological representations for visually processed items, skills parallel in many ways to the processing involved in fluent reading-accuracy (Manis et al., 2000). While for some time, many researchers have viewed rapid naming as one aspect of phonological awareness (O'Shaunessy & Swanson, 2001; Wagner & Torgesen, 1987; Wagner et al., 1997), there has been emerging consensus that rapid naming and phonological awareness are best considered separate entities (Catts, Gillispie et al., 2002; Hammill, Mather, & Allen, 2002; Manis et al., 2000).

In their article, *The double-deficit hypothesis for the developmental dyslexias*, Wolf and Bowers (1999) acknowledge the strong relationship and commonalities of phonological awareness and rapid naming, while using the power of exploring their unique traits. Drawing on extensive evidence from a range of research areas, including crosslinguistic differences in reading-disability characteristics (Wolf et al., 1994), they propose two distinct sources of reading dysfunction:

1. Phonological deficits.
2. Deficits in processes underlying naming-speed deficits.

In their model disabled readers experience one or both deficits, and students with double-deficit (weakness in both areas) are the most severely disabled (Wolf & Bowers, 1999; Wolf, Bowers, & Biddle, 2000; Wolf & O'Brien, 2001). Wimmer and colleagues comment

> *The double-deficit hypothesis was developed by Maryanne Wolf and Patricia Bowers as an extension of the dominant phonological-deficit explanation of developmental dyslexia (e.g., Bowers & Wolf, 1993; Wolf & Bowers, 1999). The phonological-deficit hypothesis postulates an early difficulty in acquiring phonological awareness, which interferes with the acquisition of grapheme-phoneme coding as a word recognition mechanism, which in turn results in reduced self-teaching of orthographic word representations (Share, 1995). The early problem with phonological awareness is seen as resulting from less sharp phoneme boundaries in speech perception (Fowler, 1991) or from less distinct phonological word representations (Elbro & Peterson, 1998).*

Wimmer et al. (2000, p.668)

Use of the double-deficit model very clearly reveals the different weakness patterns of weak readers of simple vs. complex orthographies (see Table 3.5). In studies of weak English-text readers using the three groups defined by the double-deficit model, i.e., rapid automised naming deficit, phonological awareness deficit, double-deficit (Lovett, Steinbach, & Frijters, 2000; Manis et al., 2000), findings show all three deficit groups to have significant reading-accuracy weakness, with the double-deficit group having the most severe weakness. When the model is used with weak readers of transparent orthographies however, because of the ease of reading-accuracy acquisition in transparent-orthography readers, the three transparent-orthography deficit groups evidence very different traits to those shown by those three deficit groups in English-text readers (Wimmer & Mayringer, 2002; Wimmer et al., 2000). English-text readers vary on severity of reading-accuracy weakness, and speed is not a differentiating variable as reading-accuracy weakness precludes rapid reading. In contrast, speed is the major differentiating variable for transparent-orthography weak readers, and it is the rapid automised naming deficit which predicts low speed (Wimmer & Mayringer, 2002; Wimmer et al., 2000; Wolf & Bowers, 1999; Wolf, Pfeil, Lotz, & Biddle, 1994).

Table 3.5
Characteristics of English-text and transparent-orthography weak readers grouped by double-deficit model weaknesses (Wimmer & Mayringer, 2002; Wimmer et al., 2000; Wolf & Bowers, 1999; Wolf et al., 1994)

	Phonological deficit	Rapid automised naming (RAN) deficit	Double deficit
English-text readers	Reading-accuracy weakness	Reading-accuracy weakness	Very severe reading-accuracy weakness
Simple-orthography readers	Good speed	Low speed	Very low speed

It would seem that RAN is an indicator of fluency which is a relatively subtle characteristic, whose effects are overwhelmed by the impact of phonological awareness weakness in English-text weak readers. When a student has weak reading-accuracy, fluency is automatically lost. When a student has good reading-accuracy the impact of RAN (or perhaps automising) deficits can become evident. Doubtless these effects of RAN (i.e., the skills RAN measures) are present in weak English-text readers, but they are too subtle to notice, when swamped by the massive impact of phonological awareness and reading-accuracy weakness. It is likely RAN's subtlety is similar to that of visual analogical reasoning which was shown to be the strongest predictor of transparent-orthography reading-accuracy progress (Holopainen, Ahonen, & Lyytinen, 2001), but has not shown as a significant marker of English-text reading-accuracy progress.

Interestingly, with German being highly transparent for reading but more complex for spelling, double-deficit grouping of German students (Wimmer & Mayringer, 2002; Wimmer et al., 2000) showed spelling weakness was associated with phonological-deficit, not rapid automised naming deficit (see Table 3.6).

Table 3.6 Reading-accuracy, reading speed and spelling achievement by German children (Wimmer & Mayringer, 2002; Wimmer et al., 2000) grouped by double-deficit model weaknesses

	Phonological deficit	Rapid automised naming deficit	Double deficit
Reading-accuracy	Good	Good	Good
Reading speed	Good	Weak	Very weak
Spelling	Weak	Good	Very weak

This would seem to parallel phonological-deficit English-text weak readers being characterized by weakness in both reading-accuracy and spelling-accuracy, as English-text is complex for reading and spelling, while German orthography is complex only for spelling. This finding of German students needing phonological awareness only for spelling provides further evidence that it is orthographic complexity which is the reason English-text readers need fluent phonological awareness skills.

3.4.3. Possible interactions of orthographic complexity with other factors

Many reading scientists are investigating the impact of phonological, phonological-orthographic, frequency and semantic characteristics of the words used in different languages on children's reading and writing development. Using measures of reaction time, and length of word reading, in addition to measures of accuracy, they are finding that there are many variables which interact with orthographic complexity in reading-accuracy and spelling development (Aro, 2005; Aro et al., 1999; Cossu, 2005; Cossu et al., 1995; A.Y. Durgonglu & Oney, 2002; Hoxhallari et al., 2004; Jong & Leij, 2003; Landerl, 2000; Heikki Lyytinen, Ahonen et al., in press; Nation, Clarke, Marshall, & Durand, 2004; National Research Council, 1998a; Seymour, 2005; Ziegler & Goswami, in press; Ziegler, Perry, & Jacobs, 1997; Ziegler et al., 2001; Ziegler, Tan, & Perry, 2000).

While orthographic transparency is common to many alphabetic orthographies, the spoken languages these orthographies represent have many diverse characteristics, for example,

1. Finnish, Estonian and Albanian are complicated not just by phonemic duration (represented by double vs. single letters), but also by being highly syntactically agglutinative – verbs may have over a thousand different forms, due to their syllables representing many syntactic and semantic aspects of the subject and object of the verb as well as verb tense. Words may thus be hugely lengthy, which adds high cognitive load to phonemic recoding.

2. Some languages use only simple syllables, and have few consonant blends, e.g., the majority of Finnish, Italian, Spanish, and Japanese syllables are consonant-vowel.

3. English has a strong onset-rime structure while other languages have little. De Cara and Goswami (2002) found that for English monosyllabic words, rime neighbours (e.g., m<u>an</u>/p<u>an</u>, b<u>oy</u>/t<u>oy</u>) are the commonest phonological neighbours, far more common than consonant neighbors (e.g., <u>c</u>ut/<u>c</u>ot, <u>b</u>at/<u>b</u>it) or lead neighbors (e.g., <u>ca</u>t/<u>ca</u>r, <u>he</u>r/<u>he</u>n).

4. Languages vary in intonation patterns, with some languages having highly regular stress patterns, e.g., Finnish and Estonian stress the first syllable of words, and every second syllable thereafter, while other languages use more variable intonation patterns.

It is possible that characteristics of spoken languages impact the phonological development of those children, and that these patterns of phonological development then interact with characteristics of the orthography when children learn to read, and thus impact reading-accuracy development (Goswami, 2005; Seymour, 2005), for example

1. Ziegler, Tan, & Perry (2000) found that phonological frequency (how frequently the stimuli are heard in general spoken-language usage) impacts even Chinese readers, who are reading a highly logographic language. They found mature Chinese readers read characters which had high phonological-frequency significantly faster than they read low-frequency characters, with the characters matched on orthographic frequency. They discuss this phonological effect in Chinese readers as being indicative of language-universal phonological activation during reading-accuracy, and suggest that the word-frequency effect (words used more frequently in general spoken-language usage being read more quickly) noted by many researchers may have a strong phonological component in addition to its semantic component.

2. Aro, Aro, Ahonen, Rasanen, & al (1999) found no relationship between Finnish reading-accuracy development and scores on rhyme and phoneme identity, and only relatively weak relationships of reading-accuracy development to syllable awareness and phoneme blending. It is possible Finnish students come to reading already strongly aware of syllables, given Finnish's regular intonation pattern, common CV syllable structure, and syllables in words carrying subtle syntactic and semantic distinctions. Finnish being so highly bidirectionally transparent, once children know letter sounds, it may be that students need only a minimum of syllable awareness and phoneme blending skills (to blend the two sounds of each syllable) to master Finnish.

Other studies are suggesting that orthographic patterns strongly guide the development of reading-accuracy strategies not just for novice readers, but also for mature readers. An example is seen in Zeigler, Perry, Jacobs, Braun's (2001) study of English and German mature readers. The stimuli they used were cognates (words which had the same spelling and pronunciation in both languages), and nonwords built from these words. They found

1. English adults showed stronger rhyme effects (e.g., read words and nonwords with which rhymed with many common words, i.e., had many rime neighbours, far more quickly that words and nonwords with less rime neighbours) while

2. German adults showed negligible rhyme effects and significant length effects (they took longer time to read longer words).

These findings suggest that expert English readers have been influenced by English's lack of consistency and stronger onset-rime structure (De Cara & Goswami, 2002; Treiman et al., 1995), and process words using rime units in addition to phonemes, while German adults have been influenced by German's high transparency for reading, and have not developed rime strategies, because phonemic recoding has always been so highly successful for them.

Support for the idea that English orthographic complexity forces English-text readers to develop multiple strategies is found in studies of developing readers (Hanley et al., 2004; Landerl et al., 1997; Spencer & Hanley, 2003, 2004). Spencer and Hanley's Welsh-English study showed that, while rhyme skills did not distinguish English vs. Welsh young readers, rhyme correlated more highly with English reading achievement than Welsh reading achievement, even in beginning English readers. Additionally, both Spencer and Hanley's Welsh-English study and Landerl, Wimmer and Frith's (1997) German-English study found that the transparent-orthography children used phonemic recoding exclusively, while English children often used whole word substitutions – Landerl et al's English readers made whole-word substitutions seven times more frequently for real words, and six times more frequently for nonwords, than the German readers did. The English children also used whole-word processing successfully, reading familiar one syllable words as quickly as the German children did, while being twice as slow when reading nonwords. (Landerl et al's study did not include focus on rime units so no information was available on this area.) Landerl (2000) found English children had relatively high rates of refusals, while transparent-orthography children made no refusals, which also suggests English readers' reliance on whole-word strategies.

When considering the strategies which mature and developing English-text readers demonstrate during assessment, it is of course important to consider the reading-accuracy instruction the English-text subjects have been receiving. There are needs to establish whether English-text readers' tendency to use whole-word and perhaps rime-analogy recoding in addition to phonemic recoding is a natural consequence of English orthographic complexity, or if they are artefacts of the reading-accuracy instruction which has been received. Conflicting findings are being found in some areas, particularly on the role of onset-rime and reading by rime analogy in reading-accuracy development (Goswami, 2002b; Heikki Lyytinen, Aro et al., in press; Seymour, 2005; Ziegler et al., 2001). This is perhaps understandable as it is an area of controversy not just in crosslinguistic research, but also in research on English-text readers (Nathlie A. Badian, 1998, 2001; Bowey, 2002; L. Bradley & Bryant, 1985b; Peter E. Bryant, Maclean, Bradley, & Crossland, 1990; Goswami, 1992b, 1999; Goswami & Bryant, 1990; Hatcher & Hulme, 1999; Hulme et al., 2002; Nation, Allen, & Hulme, 2001; Neilson, 1999b; Seymour, 2005; Treiman, 1992; Treiman et al., 1995). It is possible that some of these differences will be found to involve differences in aspect of research design.

The variable transparency of orthography for reading vs. spelling also seems to significantly impact reading-accuracy development. Orthographies such as Finnish, Estonian and Albanian have bidirectional high transparency - both reading and spelling are highly transparent, i.e., there is only one way to say each graph, and there is only one way to write each phoneme. Other orthographies have transparency which is more unidirectional - either reading or spelling is transparent, and the other is more complex, e.g., French and German are far more transparent for reading than they are for spelling. Ziegler and Goswami (in press) discuss the results of the first COST-A8 study (Seymour, Aro & Erskine, 2003) with respect to spelling-reading transparency. The study showed English readers to be severely delayed (34% accuracy) relative to highly transparent-orthography readers (90-98% accuracy), while Danish, Portuguese and French were positioned midway (approximately 70% accuracy). Ziegler and Goswami (in press) suggest this is consistent with aspects of spelling-reading consistency in that

1. English is bidirectionally highly inconsistent, i.e., both reading and spelling are highly inconsistent, while

2. The transparency of Danish, French and Portuguese is more unidirectional:

   a. Danish is highly transparent for spelling, but less transparent for reading (every phoneme has just one graph, so spelling is transparent, but some graphs represent several phonemes, so reading is less transparent i.e., there are more phonemes than graphs).

   b. Portuguese and French are highly transparent for reading, but less transparent for spelling (every graph represents just one phoneme, so reading is highly transparent, but some phonemes are written with more than one graph, so spelling is less transparent, i.e., there are more graphs than phonemes).

Studies of unidirectional vs. bidirectional transparency, or *feedforward* and *feedback consistency* as it is sometimes called (Ziegler & Goswami, in press; Ziegler et al., 1997; Ziegler et al., 2001; Ziegler et al., 2000), are likely to reveal subtle aspects of reading-accuracy development, e.g., Wimmer and colleagues' finding, discussed later, that phonological awareness seems needed for German spelling but not German reading (German being transparent for reading, but less so for spelling), sheds light on why English-text readers may need phonological awareness for both reading and spelling (Wimmer & Mayringer, 2002; Wimmer et al., 2000). A further example is perhaps seen in Cossu and Marshall's (1995) finding that, similar to Spanish children, Italian children's reading-accuracy development is at a faster rate than their spelling development, as it may be that mild directional transparency effects are in place.

It would be useful to compare spelling and reading accuracy in children using orthographies of different levels of transparency and directionality, to gain awareness of the relationship between reading-accuracy and spelling development, when separated from orthography effects. There is much yet to be discovered on the subtleties of reading-accuracy development. There is likely to be continued focus on the interaction of phonological and orthographic variables by crosslinguistic researchers. It will be interesting to watch the developing knowledge in this area, as it is likely to become increasingly refined, and build clearer understanding of English-text reading-accuracy (and spelling) development and difficulties.

3.4.3.1. Possible advantages of second language learning

In their longitudinal study of Welsh and English students, Spencer and Hanley found that the Welsh students made significantly faster progress at mastering English as a second language than the English students did at mastering Welsh as a second language (Hanley et al., 2004; Spencer & Hanley, 2003). My visit to a Welsh primary school caused me to wonder whether having mastered Welsh significantly accelerates mastery of English-text reading-accuracy:

1. The boy who had attended remediation because of reading difficulties was now reading English with a very high level of fluency and accuracy.

2. The learning support teacher said that he did not need to help older children in the school with their reading of English, as the students did not have problems reading English. He worked just on English spelling, as they found this difficult.

These were curious findings. When English-speaking children are learning to read English, one expects at least 10% of children to have significant reading-accuracy difficulties. At this Welsh school, there did not seem to be this 10% of students with English-text reading difficulties, even though they were learning English as a second language. Logically, with English being their second language, one could expect them to have far more difficulty reading English-text than first-language English speakers, yet this was not the case. This would seem an area worthy of investigation, perhaps incorporating spelling-accuracy as well as reading-accuracy. Perhaps the lowest 25% of readers at this low-SES Welsh school are reading (and perhaps spelling) English-text more successfully that the lowest 25% of first-language English-text readers.

If lower achieving Welsh children are reading English-text better than lower achieving English-speaking children, there would seem strong grounds for providing first-language English-text readers with reading of fully transparent English-text prior to conventional learning of English. This would seem likely to boost their phonemic awareness and increase the sophistication of their phonological representations. It seems likely that there is a subtle mechanism involved, e.g., sophisticated phonological representations, as the mechanism by which Welsh second-language learners read English so well. This mechanism, which would seem to be a form of cognitive restructuring, may be a basis for widespread multilingualism in Europeans, many of whom fluently speak more than three languages. This notion is not intended to contradict established knowledge that children's saturation in different languages while they are learning to speak as toddlers builds multilingual competence. It applies to those students who are not multilingual when starting school, e.g., the children we saw in schools in Finland, Estonia, Italy and Wales, but who are fluent speakers of English and other languages as teenagers and adults.

Offering further insights into this area are the findings of studies of those countries with logographic orthographies which commence reading-accuracy instruction by teaching children to read a highly transparent alphabetic orthography. While the alphabetic orthography is then used to scaffold learning and self-learning of logographic word characters, it seems a by-product of this intensive period of transparent-orthography reading is a very significant increase in phonemic awareness. Huang and Hanley (1997, pp.250-251) comment that

> *Before they are taught any characters in school, all Taiwanese children learn a system known as Zhu-Yin-Fu-Hao, an alphabetic script similar to Pinyin which is the alphabetic system used in mainland China. In Zhu-Yin-Fu-Hao, each phoneme is represented by an unique visual symbol (in Pinyin, the written symbols comprise letters from the Roman alphabet). There is a total of 37 symbols in Zhu-Yin-Fu-Hao. Zhu-Yin-Fu-Hao is taught during the first 10 weeks of the 1st grade in Taiwan…it is not permitted to teach any Chinese characters during [this time]. The only teaching material is a textbook of the Chinese language (the first volume) concerned with Zhu-Yin-Fu- Hao… After 10 weeks, the children learn Chinese via Zhu-Yin-Fu-Hao. A representation of the pronunciation of the appropriate word written in Zhu-Yin-Fu-Hao appears on the right side of the characters in primary school textbooks. Knowing Zhu-Yin-Fu-Hao thus helps children to pronounce new characters using sublexical phonology without assistance from the teacher.*

Huang and Hanley (1997) found that students' phonological awareness skills improved markedly during their 10 week Zhu-Yin-Fu- Hao training. It is interesting that the students (aged 6 years) needed only 10 weeks to master 37 symbols and their sounds, and reading of Zhu-Yin-Fu- Hao well enough to be useful for learning to read logographic Chinese.

3.4.4. Attacking the source of orthographic complexity through spelling reform

Spoken language changes over time, creating mismatches between spoken and written language forms. This is why English orthographic complexity is so complex. English orthography is reported to have been fully transparent when King Alfred used it in 600AD. By the time dictionaries had stabilised spelling, preserving historical rather than transparent spellings, the complex multiculturalism engendered by invasions of Normans, Danes, and Romans meant spelling was relatively complex (Baron, 2000; Bryson, 1990; DeFrancis, 1989). From that time, its complexity would seem to have proliferated inexorably.

Prior to the advent of dictionaries and enthusiasm for standard spelling, words were often spelled different ways, and as speech changed, so too did spelling. Indeed, flexible spelling seems to have been a source of pride. There are quotes attributed to one of the early American presidents worded as '*Any man of intellect can spell a word at least six ways*', and '*It's a damn poor mind that can think of only one way to spell a word,*'. Bryson (1990) comments of the six known signatures of Shakespeare, no two are spelled alike. With the advent of dictionaries, speech has changed over time, but spelling has been constant. As a result, spelling has become increasingly harder to explain using spelling 'rules' and the number of such rules has proliferated (Baron, 2000; Bryson, 1990; DeFrancis, 1989).

To maintain the high transparency of their orthographies in the face of changes in spoken language, it seems that transparent-orthography countries use systematic spelling reform. It may also be the case that highly regular spelling has resulted in less change in spoken language in those countries over time. There seemed little research literature on maintaining regularity, or on managing differing accents (which usually involve primarily differences in vowel pronunciation) other than comments that spelling reform is accepted practice in Wales and Italy (Cossu, 1999a; Spencer and Hanley, 2003).

It seems logical for the reading-accuracy and phonemic awareness development of transparent-orthography students to be Australia's benchmark to aim for in students and/or spelling reform. Interventions which remove all English orthographic complexity include:
1. Changing English orthographic complexity to English orthographic simplicity through major spelling reform of Australian English.
2. Use of transitional modified orthographies.
3. Combinations of spelling reform and transitional modified orthographies.

Comprehensive spelling reform, removing English orthography's morphemic and orthographic bases so that it was purely a phonemic orthography, would solve all orthographic complexity issues, e.g., the phonemic orthography as depicted in Figure 3.4 would automatically remove orthographic complexity.

a	mat	b	bat	sh	shat
ae	mate	d	dat	ch	chat
e	met	f	fat	th	that
ee	meet	g	gat	ng	tang
i	mit	h	hat		
ie	mite	j	jat		
o	mot	k	kat		
oe	mote	l	lat		
u	mut	m	mat		
ue	mute	n	nat		
ar	mart	p	pat		
er	mert	r	rat		
or	mort	s	sat		
ow	cow	t	tat		
oo	foot	v	vat		
ou	you	w	wat		
oy	boy	y	yat		
air	hair	z	zat		

Figure 3.4. The 40 graphs of *Fleksispel*, an English-text transparent-orthography
(see Appendix to this chapter)

Howevu, whiel thair wood then bee noe difeekulteez in reeding and speling, bie iethu mutueu reeduz or veree beeginning reeduz, reeding iz not just an akshun. Reading is also a strong sociocultural issue, and such revolutionary reform may confront the Australian sociocultural status quo too violently and receive strongly negative reaction, e.g., governments attempting to introduce it might lose at electiontime.

There would seem to be three ways to use spelling reform: transitional orthographies, spelling reform, and combinations of the two.

Transitional modified orthographies would make English orthography transparent through altered spelling patterns. Different models could be used, for example,

1. A preliminary totally-transparent English orthography which children would learn to read, before starting to read Standard Australian English.

2. A stage model, with slightly decreased transparency, so children would move through different stages of transparency, from complete transparency to Standard Australian English.

Use of transparent orthographies would seem likely to enable students to make faster reading-accuracy and, perhaps more importantly, fluent phonemic awareness which is likely to support effective progress into reading of Standard Australian English.

Spelling reform would make permanent changes to English spelling, i.e., changes to dictionary spellings. Spelling reform would lower the demands on all readers, while transitional orthographies reduce the task cognitive load of beginning reading learning and instruction, and thus support readers to overcome the major hurdles of early reading-accuracy development.

Combinations of transitional modified orthographies with permanent spelling reform do both actions, lowering the task load of Standard Australian English, which must eventually be reached, while also lowering task load for early reading-accuracy development.

Spelling reform is accepted practice in countries such as Wales and Italy that work systematically at reforming spelling to keep their orthography simple (Cossu, 1999a; Spencer & Hanley, 2003), so is worthy of consideration for Australia and other English-text countries. While the notion of spelling reform is radical, it is nonetheless highly valid. Its relevance is evidenced in consideration of four issues.

First, Australia has already effectively instituted national reform of currency and measurement, moving from imperial measures to decimal measures, and this reform has been highly effective. It is thus highly likely that spelling reform is potentially achievable from the perspective of implementation. Currency and other measurement units were completely regular prior to reform, and the reason for their reform was one of convenience and reducing the likelihood of accidents through maths errors. In contrast, Standard Australian English is highly irregular, and producing widespread 'accidents' in reading failure. Spelling reform would

thus seem to have far greater grounds, than currency and other measurement unit reforms which have been actioned with enormous success.

The second issue is the enormous social justice issues involved in English orthographic complexity causing high levels of reading failure. As discussed elsewhere in this thesis, reading-accuracy is a core skill supporting development of reading comprehension, vocabulary development, and academic learning; and low reading proficiency after a few years of schooling is also strongly associated with increased levels of behaviour difficulties, low academic achievement, and low employment achievement; and increased likelihood of depression, unemployment, and imprisonment. If reading-accuracy failure is largely confined to complex orthography countries, and does not occur in simple-orthography countries, then perhaps 25% of Australians are being denied access to effective literacy progress primarily because of the complexity of English spelling.

A third important issue is that spelling reform is already occurring in minor ways as dictionaries follow patterns of common usage, but the reformed words tend to be words confronting advanced not beginning readers, e.g., acceptance of American spellings of words such as *program* and *recognise*, rather than reforms of those frequently occurring, highly irregular words which provide confusing orthographic feedback to beginning readers, such as *was one come eight two*. Indeed, finding my personal experience to have been mirrored in the experience of many peers, one wonders whether wide reading of American literature and difficulties changing computer *Spellcheck* programs from American English to Australian English on a permanent basis have been the major factors in Australian spelling reform to date. Widespread reading failure would seem a far more important reason.

A final reason why spelling reform deserves strong consideration, and also evidence of spelling reform to become socioculturally accepted is that in some sectors of the community, there seems a sociocultural loosening of demands for very high levels of spelling precision. This is seen in modified spelling used in advertising, e.g., *luv, nite*, *tuff*. It is also seen in internet chatline and email communication where modified spellings and spelling errors seem accepted practice (Baron, 2000). This loosening of demands for correct spelling is possibly also influenced by many high-achieving adults being publicly open about their personal difficulties with print, and thus providing role models of spelling precision not being prerequisite to success and self-esteem (B. Smith, 2004).

Use of a transitional, highly transparent, orthography until readers have developed fluent reading-accuracy and phonemic awareness would seem to have potential to resolve many difficulties. It would be enormously impractical, thus would only be done if studies showed it to be highly effective, but is nonetheless a possibility worthy of consideration.

Probably the most effective means of spelling reform would be an approach combining top-down and bottom-up perspectives, with sufficient flexibility to include both current Standard Australian English and reformed spelling as options for expert readers. Such an approach would include:

1. Use of a multilevel transitional orthography:

    a. The first level being completely transparent.

    b. Students moving into later stages as ready.

    c. The final stage being Standard Australian English.

    d. Early reading literature (and possibly many students' picture books) being printed with both the modified orthography and Standard Australian English, with all words written both ways so early readers are exposed to both, and attention may thus be applied to orthographic features as a comfortable exploration rather than as essential, due to the transitional orthography allowing fluent reading-accuracy.

    e. If needed to maximise phonemic awareness to ceiling level, a brief daily session of Level 1 reading continued till phonemic awareness is maximised.

2. National spelling reform

    a. Reform of the highly irregular spelling of many words.

    b. Spelling usage being flexible, such that

        i. Standard Australian Spelling is fully acceptable.

<ol type="i" start="2">
Reformed Australian Spelling is fully acceptable.
It being acceptable for writers with difficulties to use earlier levels of the modified orthography to also be used in writing (with the possible exception of legal documents).

<ol type="a" start="3">
Spellcheck software to be developed such that spellings at earlier levels can be converted to Standard Australian spelling.
A moratorium period for perhaps 5 years to take place using these alternate forms of Australian spelling before any national decisions or referendums are enacted, to allow cultural moulding of these alternate systems over time, and subsequent evaluation of strengths, weaknesses and possibilities.

The advantages of such a system are many:

1. Rapid development of fluent reading-accuracy of texts written with modified orthography would allow much earlier development of reading comprehension skills, higher-order thinking, and text-reading in other subject areas (in texts written with the modified orthography).

2. It is likely to support development of ceiling level phonemic awareness which will subsequently support smooth progress into reading and writing of standard Australian English, i.e., it removes the irony of transparent-orthography readers having phonemic awareness in abundance but not needing it, while English-text readers seem to have huge needs for it, but being denied it through English orthographic complexity.

3. It removes the major cognitive load disadvantage of English-text writing, by allowing equivalence of students' writing vocabulary to their spoken vocabulary, such that writers of all levels have access to effortless written expression.

4. It may remove the expanding disadvantage effects of early reading-accuracy difficulties.
(On a light-hearted note, Stanovich's *Matthew Effects*, taken from Matthew 25: 29 '*For to all those who have, more will be given, and they will have an abundance. But from those who have nothing, even what they have will be taken away* (*Holy Bible: New revised standard version*, 1991, p.29).' referring to people's faith in Jesus for salvation, can become the far more encouraging *'New' Matthew Effects*, taken from Matthew 11.28-30, '*Come to me all you who are weary and heavy laden, and I will given you res… for my burden is light* (*Holy Bible: New revised standard version*, 1991, p.12).' Interestingly, Hebrew is a highly transparent-orthography.)

A decision was made not to investigate transitional modified orthographies and spelling reform in great depth within the pragmatic focus of this study, and merely to flag it as an area requiring investigation. The only further exploration done on the area was to spend two days reflecting on the practicalities and possibilities of creating modified orthographies, and selecting words to reform. The brainstorm resulted in *Fleksispel*, a system combining modified orthography and spelling reform (see Appendix to this chapter). It has five levels students move through, and potential for easy transitions from effective reading of a fully transparent English-like orthography using the transparent orthography in Figure 3.4, above (Level 1), through to effective reading of Standard Australian English (Level 6).

This transitional orthography is in no way meant to be the definitive Australian transitional orthography and was developed purely as an exercise in whether it is possible to develop a logical transitional orthography. It certainly was not found an arduous task to develop a combination of transitional orthography and spelling reform. Doubtless there are many, and better, modified orthography and spelling reform systems available, and equally doubtless, they have not had major impact on Australian spelling to date. Given the impact of English orthographic complexity on reading-accuracy and academic progress, modification of English orthography seems an area highly worthy of investigation. For any Australian reform to be effected, it would seem necessary to do strong preparatory explorations and thinktanks, and to promote a community ethos of openness to consideration of

1. The high levels of disadvantage from current English orthography.

2. The gap between English-text reading-accuracy development and possible reading-accuracy development if spelling were reformed.

3. Practical possibilities for reform, and results of researched trials of reform options.

Conclusion

The impact of orthographic complexity seems to have many subtle ramifications beyond slower reading-accuracy and phonemic awareness development. It seems possible that learning to read an orthography to ceiling level may create cognitive restructuring which advantages students in future learning. This notion will

be explored further in this chapter and the next chapter. If significant cognitive advantaging does occur, then disadvantage from English orthographic complexity is very great indeed.

This provokes thinking at many levels. Given that it is merely an accident of birth or relocation whether a child learns to read English-text or a transparent-orthography,

1. Should the aim of optimal Australian reading instruction be to reach the rates of reading-accuracy development of transparent-orthography countries, or just optimal English-text reading-accuracy development?

2. Should our accepted rate of reading-accuracy difficulties be that of transparent-orthography countries (0% after two years schooling), or the best which can be achieved in English-text countries (It is likely this latter rate is not yet established)?

3. What are the best ways of reducing the impact of English orthographic complexity?

If the effects of English orthographic complexity as suggested in this chapter are established through rigorous replicated research, it would be useful to consider options of transitional orthographies and spelling reform, and combinations thereof, to increase rate of reading-accuracy development and reduce the impact of English orthographic complexity.

I developed *Fleksispel*, a transitional orthography which can be used in combination with spelling reform (See Figure 3.4 and Appendix to this chapter), as an exercise in whether it was possible to develop a logical transitional orthography. I feel strongly that while failure to reform English spelling is probably the reason for Australians having reading difficulties, it is probably very unwise in the current Australian reading climate to openly promote spelling reform. With reading-accuracy currently viewed in Australia as a simple skill, and orthographic complexity as irrelevant to reading development, suggestions of spelling reform would likely be ridiculed. This would draw attention away from the impact of orthographic complexity on reading-accuracy development, and contribute to further Reading Wars divisiveness rather than resolution of Reading Wars and cohesive building of effective Australian reading instruction. It is in order to avoid possible over-emphasis that the Appendix containing Fleksispel is attached to the end of this chapter, not at the end of the thesis document as is usual practice with appendices.

3.5. A theory of orthographic advantage and disadvantage

This section explores aspects of advantage and disadvantage conferred on each nation because of the orthographic complexity of its written language. It is considered as having two levels – impact on the individual learner, and cumulative impact beyond the learner, i.e., at classroom, school, system, workplace and national levels.

3.5.1. Aspects of personal orthographic advantage and disadvantage

The impacts of orthographic complexity and transparency are strong, varied and numerous. It is likely the main disadvantages experienced by English-text readers are

1. High cognitive load during reading-accuracy development, and delayed reading-accuracy mastery.
2. High cognitive load during spelling-accuracy development, and delayed spelling-accuracy mastery.
3. Delayed equalisation of oral-mode and print-mode vocabularies and modes of comprehension and expression (discussed below).
4. Probable delayed development of important aspects of phonemic awareness
   a. Which might have supported students' acquisition of English-text reading-accuracy instruction, had it been acquired earlier.
   b. Which may impact subsequent development of phonological representations, literacy and language.
5. Secondary impacts of delayed reading- and spelling-accuracy skills:
   a. High cognitive load of written expression.
   b. Extensive time and effort which could have been spent on higher learning and is instead spent
      i. Mastering reading-accuracy, spelling-accuracy, and written expression.
      ii. Waiting for vocabularies and comprehensions to equalise.
6. Possible cumulative effects of these delays (discussed below).

Reading-accuracy and phonemic awareness are discussed in other sections of this chapter and subsequent chapters. In keeping with the pragmatic focus of this study, whose aim is to *seek directions towards improving reading-accuracy instruction*, rather than explore the impact of current English-text reading-accuracy development, the other listed items are flagged here as being highly important, but not warranting further exploration in this thesis. For purposes of explanation, two sections will be briefly explored:

1. Equalisation of vocabularies and modes of comprehension and expression.
2. Cumulative effects of delays experienced by English-text readers.

3.5.1.1. English-text vocabulary & reading-comprehension disadvantage

Print is a secondary mode through which meaning is conveyed. It is an alternative mode one can use instead of verbal communication, which is our primary mode for conveying meaning. It is useful to consider different types of vocabulary and modes of comprehension and expression which develop during school learning:

1. Vocabularies:
   a. Oral-mode vocabularies:
      i. Listening vocabulary: words we hear or might hear, whose meaning we understand.
      ii. Speaking vocabulary: words we use or can use in our speaking, whose meaning we understand.

    b. Print-mode vocabularies:
- i. Reading vocabulary: words we read, whose meaning we understand.
- ii. Writing vocabulary: words we write in written expression, whose meaning we understand.

    Listening- and reading-vocabulary are receptive vocabularies.

    Speaking- and writing-vocabulary are expressive vocabularies.

2. Modes of comprehension and expression:
    a. Oral-modes of comprehension and expression:
- i. Listening comprehension.
- ii. Verbal expression.

    b. Print-modes of comprehension and expression:
- i. Reading comprehension.
- ii. Written expression.

    Listening- and reading-comprehension are language comprehension.

    Verbal- and written-expression are language expression.

It is also useful to consider the role of reading-accuracy development in development of these oral and print modes. When English-text readers are fluent readers and spellers, their listening and reading (receptive) vocabularies and comprehensions are highly similar to each other, as are their speaking and writing (expressive) vocabularies, and verbal and written expression. In beginning and developing English-text readers, they are widely different. Equalisation of vocabularies and modes of comprehension and expression would be likely to occur as a consequence of reading- and writing-accuracy being mastered. Taking a pragmatically simple view (in that there will always be subtle differences between receptive and expressive modes), once students are fluent at reading- and spelling-accuracy

1. Students are then able to read and understand any word they would understand when given information verbally, i.e.,
   a. Reading vocabulary approximately equals listening vocabulary.
   b. Reading comprehension approximately equals listening comprehension.

2. They are also able to write any words, which they might use verbally, in their written expression, i.e.,
   a. Writing vocabulary approximately equals speaking vocabulary.
   b. Written expression approximately equals verbal expression.

Rapid development of reading- and spelling-accuracy by transparent-orthography readers means equalisation of vocabularies and modes of comprehension and expression occurs very early in their schooling. Delayed equalisation would thus seem to be an English-text phenomenon, not occurring in transparent-orthography readers. In comparison to transparent-orthography readers, there would seem to be moderate and lengthy disadvantaging of normal-progress English-text readers, and severe and extremely prolonged disadvantaging of delayed English-text readers.

In contrast, even with the most skilful teaching, English-text piles complexity upon complexity not just for the first years of writing, but for the many years until spelling has become fluent and effortless. English-text readers are often unable to write what they would like to say, and instead have to filter their intended words using a criterion of 'words which I can spell'. Thus '*The young man splashed out and bought his true love an extravagant diamond and sapphire ring.*' becomes '*He got her a ring.*' with every word spelt perfectly, but complex expression sadly lacking.

In like manner, English-text readers also experience delay in equalising language-comprehension and reading-comprehension – the words written in the texts they are to read need to be filtered using a criterion of 'high proportions of words which can be read'. This is likely to affect not just reading vocabulary but also the range of sentence structures which readers are exposed to. Transparent-orthography readers would seem likely to experience far more sophisticated reading vocabulary and range of sentence structures than English-text readers do.

No reading research literature on crosslinguistic differences in development of print vocabularies was encountered. This is curious, given that crosslinguistic differences in vocabulary development would seem a logical consequence of early mastery of reading- and spelling-accuracy. The impact of delayed reading-accuracy development on written language development would seem a valuable area for future research.

3.5.1.2.   The much higher cognitive load of writing

Reading-accuracy development supports the development of spelling and written expression. For beginning readers, the relationship is likely to be reciprocal in many ways, with the development of spelling and writing helping children to build stronger schemas of the words they try to write, i.e., increasingly sophisticated phonological and orthographic representations. Even when beginning readers are actively engaged, reading can be impulsive, whereas the slow handwriting of beginning readers reduces impulsiveness (Frith, 1985). Time slowed by writing allows time for reflection on the sounds heard in a word, the letters which make those sounds, and whether the written form closely resembles the word the child has seen in print.

Orthographic complexity would seem to impact the cognitive load of spelling and writing as much if not more than it impacts reading-accuracy. It would seem likely that the effects would be similar to the effects on reading-accuracy in many ways, with very strong impact of phonemic regularity modified slightly by the impact of syllabic complexity, e.g., English and German use complex syllables containing many two and three letter consonant blends, while Italian and Spanish use open syllables with virtually no consonant blends. Aro and colleagues found highly similar rates of spelling and reading-accuracy development, and comment that '*the concurrent development of early reading and spelling skills is thought to reflect the symmetrical, bidirectional regularity of the Finnish orthography* (Aro, 2004, p.27)'. Cossu, Gugliotta and Marshall (1995), studying Italian students, found mild but significant differences between rates of spelling vs. reading-accuracy development, with the gap still present at Grade 2, and suggest a partial dissociation between the two skill areas. The spelling development of the Italian students, similar to that of the Finnish students, was nonetheless far more rapid that English-text spelling development. This rapid development of spelling-accuracy highlights two important aspects of cognitive load and written expression:
1.   The high cognitive load of spelling a particular word.
2.   The high cognitive load of spelling restrictions on vocabulary used.

Myriad spelling patterns means the high cognitive load of writing a word whose spelling is not known uses available central literacy processing resources, thus diminishing performance on other aspects of written expression. Crosslinguistic differences in this cognitive load aspect would seem rather similar to the cognitive load differences observed in the writing of fluent vs struggling English-text spellers.

3.5.1.3.   Rethinking the Matthew Effects

It is likely that phonemic awareness development significantly increases the complexity and maturity of readers' phonological representations. Given that mastery of English-text reading-accuracy takes several years, it is highly likely that transparent-orthography readers have had sophisticated phonological representations several years in advance of average-progress English-text readers. It is also likely that the phonological representations of low-progress English-text readers may never develop this level of sophistication.

As discussed in early chapters, there are strong linkages between reading-accuracy development and syntactic, semantic, and phonological aspects of receptive and expressive language development in English-text readers (Baker, Simmons, & Kameenui, 1998; Catts & Hogan, 2003; Dodd et al., 1995; Gillon & Dodd, 1993; Nippold & Schwarz, 2002; Taylor, 2002). With this close linkage, it is quite possible that mastery of phonemic awareness plays a significant role in fluent readers' subsequent language development, through the influence of refined phonological representations and phonological processing. As such, English-text readers may be experiencing phonemic disadvantage relative to transparent-orthography readers, not just in terms of reading-accuracy development but also in terms of development of subsequent language and learning skills. Perhaps this is evident in researchers' findings that the diagnoses of Speech-Language Impairment and Learning Disability are often equally valid for many school-aged children, due to parallel weakness in both language and literacy (Galletly, submitted-a; Nippold & Schwarz, 2002; Taylor, 2002).

As a practitioner, it is my experience that, regardless of whether or not a child had significant spoken language weakness in preschool years, virtually all children with reading-accuracy difficulties show significantly weak grammar in their written texts. While the high cognitive load of written expression for weak spellers will be one factor in written language weakness, it is possible immature phonological representations also play a role. In transparent-orthography readers, simply mastering reading-accuracy and spelling-accuracy so soon after starting school is likely to result in lower rates of written language weakness, but perhaps sophisticated phonological representations impact language development even further. Perhaps Stanovich's (1986) Matthew Effects (weak syntactic and semantic development thought to build from lack of independent reading due to poor reading-accuracy skills) may prove not to stem just from lack of independent reading, but to result from an interaction of

1. Students' reading-accuracy, spelling, writing, vocabularies and reading experience.
2. Their underdeveloped phonological representations (the product of their delayed phonemic awareness development), and
3. (Particularly in delayed readers), aspects of affect, attention, behaviour and social-emotional functioning.

There would seem to be major needs to elucidate the complexities of the role of phonemic awareness in language and literacy development, in order to more fully understand the impact of the lack of fluent phonemic awareness experienced by English-text readers.

3.5.2. Aspects of broader orthographic advantage and disadvantage

Disadvantage from English orthographic complexity moves from being a personal disadvantage of each individual English-text weak reader, to being disadvantage at increasingly broader levels (child, family, class, year level, school, district, system, nation and adult, workforce supports and expenses, nation) when one considers

1. The massive extra time and funds spent on reading-accuracy instruction, curricula and interventions compared in English-text vs. transparent-orthography countries.

2. The cost of supporting and compensating for poor readers in the workforce.

3. The time, funds and emotional cost of secondary and tertiary disadvantages from reading-accuracy failure, e.g., higher rates of depression, low-income, unemployment, divorce, crime.

Early and easy mastery of reading-accuracy offers considerable educational advantage to countries with transparent-orthographies in that, as discussed earlier, it is likely that it takes 2.5 times as long for students to master English-text reading-accuracy as it takes students to master reading-accuracy in transparent-orthographies (Seymour et al., 2003). This difference in ease of reading-accuracy mastery creates a comparative level of orthographic advantage which would impact all areas of school instruction. The orthographic advantage of countries with transparent-orthographies would include the following aspects:

1. Very little time is needed to support mastery of reading accuracy, perhaps often less than one year of formal instruction.

2. Very little emphasis is needed on reading-accuracy instruction in schools.

3. Students have very early readiness for advanced literacy and academic learning:

4. It is possible later age of starting school in most transparent-orthography countries might interact with this early readiness, in that older children are developmentally more mature at an earlier stage of their schooling.

5. Significantly more time is available for emphasis on higher-order literacy skills:

   a. Preservice and in-service instruction would have more time for building teacher skills in advanced literacy, other subject areas and higher-order thinking skills.

   b. Teachers have more time in each child's school life for development of these skills.

6. Less emphasis on reading-accuracy is needed in teacher supports:

a. Very little instructional time (approximately one week, Aro, 2005) is needed in teacher preservice training.

b. Negligible teacher in-service training would be focussed on reading-accuracy.

c. Development of reading-accuracy curricula is very simple.

d. There is little need for discussion of reading-accuracy development and instruction in conferences, journals and professional literature.

7. Strong phonemic advantage occurs.

8. Vocabulary equalisation occurs.

9. Spelling mastery occurs.

10. Relatively effortless mastery of these skills would be likely to promote high self-esteem and academic identity (Brooks, 2001; Carrie & Ellen, 2003; Elbaum & Vaughn, 2004; Milich & Settle, 1999; Mishna, 2003; Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003).

The vital importance of excellent reading-accuracy instruction can be seen in extrapolation from findings from crosslinguistic studies of reading skill in students in their first year of instruction (COST-A8 study, Seymour et al., 2003) and in students at age 15 years (Program for International Student Assessment (PISA), 2002a). Integration of results from these two studies shows that many countries do not achieve the potential offered through orthographic advantage. In Figure 3.5, columns on the far right show Australian, English and OECD averages for 15 year olds in the PISA study. The left-most columns show the achievement levels of 15 year olds in ten countries with transparent-orthographies also involved in the COST-A8 study of 1st year reading acquisition (Seymour et al., 2003). These ten countries are ordered from left to right in order of effectiveness of reading acquisition of reading-accuracy by 1st year students. Students in the four left-most countries read real and non words with 97-98% accuracy at the end of six months of instruction, the next six read them with over 90% accuracy, while students learning to read English print read at vastly lower levels (real words 34%, nonwords 41%) at this time.
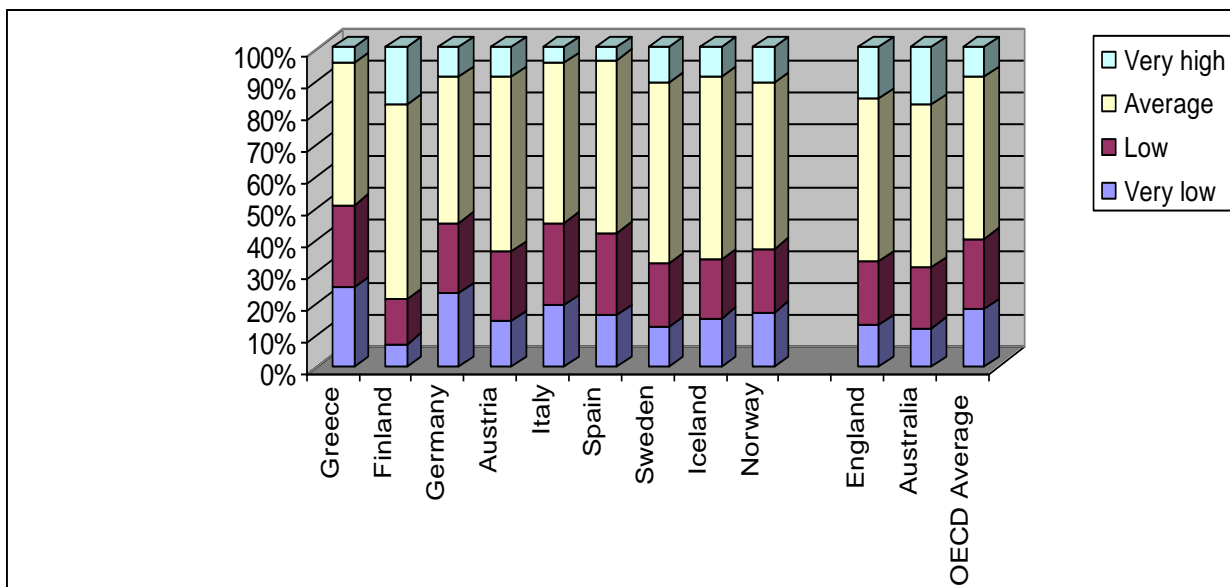
Figure 3.5. Spread of reading achievement scores for 15 yr olds in the OECD-PISA study (Program for International Student Assessment (PISA), 2002a), showing results for Australia and countries studied in the COST-A8 Year 1 comparison study (Seymour et al., 2003)

A look at the performance of 15 year olds shows that only Finland seems to have held its orthographic advantage, and that Australian and English students have caught up and are now reading as well as, if not better than, their European counterparts. While sociocultural differences are doubtless involved in the lack of continued advantage in students of the 9 European countries who seemed to start so well but are no longer

ahead in secondary school, it is highly likely that differences in reading instruction account for most of this change in strength of reading achievement which occurs over students' school years. Finland seems to be the only country to take full benefit of its orthographic advantage

Finland was clearly the world leader in reading in the OECD-PISA comparisons of 15 year olds, being significantly ahead of all other countries. This lead occurred despite the Finnish students having had one year's less instruction than most English-speaking countries at the time of testing due to Finnish students starting school at age six years. Finland was also a very high achiever in maths and science, topped only by Japan and Korea, the clear world leaders for maths and science (and which also have transparent orthographies). Examination of instructional differences between Finland and English speaking countries shows many similarities, and strong sociocultural differences in both teachers and students (Crace, 2003; Program for International Student Assessment (PISA), 2002b). In Finland, students start school at age six years, spending a year at Kindergarten before beginning formal education. School retention is high, with 97% of students continuing to upper secondary education, and 65% of students going on to tertiary education (Crace, 2003). Finnish instructional practices seem to have few special features distinguishing them from other countries (Crace, 2003). Features relating to reading-accuracy acquisition include

1. Reading-accuracy instruction seeming to occur across Kindergarten and Grade 1.

2. Much lower adult: child ratios and increased teacher supports for literacy instruction, achieved not through lower class sizes but through staggered starting times, high numbers of teacher aides, and possibly some extra teachers, e.g., the school we visited had

   a. Two teachers of English who worked with only half a class at a time, thus classroom teachers have only half the class to work with at this time.

   b. A teacher and separate classroom for students with emotional difficulties.

3. A strong emphasis on early intervention.

4. Possibly low between-school SES differences, due to the country being physically small, the population being small (6,000,000), and the private school sector being very small, such that almost all children (and thus the full range of SES levels) attend state schools.

5. There being no school usage of academic streaming of any type (Crace, 2003; Program for International Student Assessment (PISA), 2002b).

There are likely to be strong sociocultural strengths in Finnish teachers compared to their Australian counterparts. Teaching is one of the most preferred and esteemed professions in Finland, often listed in the two most preferred professions in opinion polls (Crace, 2003). University teacher preservice courses are difficult to get into because of the popularity of teaching as a profession, such that it is likely that large numbers of the country's best students become teachers. Teaching positions are readily filled, with large numbers of applicants for each job (Crace, 2003; Program for International Student Assessment (PISA), 2002b):

> It's not about the money…because teachers are comparatively poorly paid, but about the conditions. Finnish teachers aren't being constantly watched and monitored, they don't have to comply with masses of government bureaucracy and they are allowed the freedom to teach the way they want. And above all, they are valued and respected.

Andreas Schleicher, OECD, cited in Crace (2003)

These sociocultural strengths are perhaps in contrast to the sociocultural characteristics of teachers in Australia. Teaching in Australia would seem a far less esteemed and preferred profession, with many universities having entry requirements which are extremely low compared to those for comparable careers such as engineering, medicine and law, and many teachers leaving the profession due to low work satisfaction (Beare, 1994; Crowther, Andrews, Dawson, & Lewis, 2001; Ingvarson & Chadbourne, 1996).

As a result of these sociocultural differences, many Australians might see the differences in reading achievement between Finland and Australia as strongly sociocultural and related to strong professional competence and conditions (Crace, 2003):

> Above all, you get a sense of a mature education system, where problems can be anticipated, not merely reacted to, where debate and questioning are not perceived as political heresy but as constructive argument, where

improving education is seen not as a government issue but as a social one…Much of what Finland does is what educationalists have campaigned for years.

Closer analysis of Finnish education reveals strong differences in reading-accuracy acquisition which are likely to give Finland a strong advantage over countries reading English-text, given that Finland is currently using principles of excellent teaching (Adams, 1990; National Reading Panel, 2000; National Research Council, 1998; Scheerens, 1992):

1. Children master reading acquisition quickly and easily, e.g., an average of 98% accuracy for reading real and nonwords after six months of formal schooling (Seymour et al., 2003).

2. Children of normal intelligence do not experience reading-accuracy difficulties.

3. Early intervention on reading-accuracy works extremely effectively.

4. Countries with transparent-orthographies have significantly longer time periods to conduct excellent instruction on advanced literacy and academic skills than countries with complex orthographies. If learning-to-read takes approximately six months in Finland, then reading-to-learn can commence from the first year of reading instruction. In contrast, in English-text countries, it is likely that several years of this time must be spent on learning-to-read.

5. Finnish students are 1.5 years older than Australian students in their first year of instruction and thus likely to be able to move into higher-order thinking and learning from early in their education.

6. Teachers in training do not require in-depth instruction on Finnish orthography and reading-accuracy instruction, as Finnish orthography and reading-accuracy development are simple processes (Seymour et al., 2003), thus preservice instruction can focus on developing skills for teaching advanced literacy, other subject areas and higher-order processes. In Finland, preservice teachers spend approximately one week learning reading-accuracy instruction, and this would seem to be sufficient, given current Finnish reading levels.

Reflection on these variables allows the strong possibility that the 'Finnish difference,' leading the world in student achievement, is due to sensible use of opportunities created by orthographic advantage in teacher training and school instruction for focus on building of higher order skills.

3.5.3.   The rich have abundance, the poor stay poor

As discussed earlier, the impact of English orthographic disadvantage is seen most strongly in lower achievers. While Australian levels of low achieving 15 year olds are healthy compared to many countries (see Figure 3.5), there are nonetheless almost one third of Australian 15 year olds not achieving at adequate levels (see Figure 3.6).
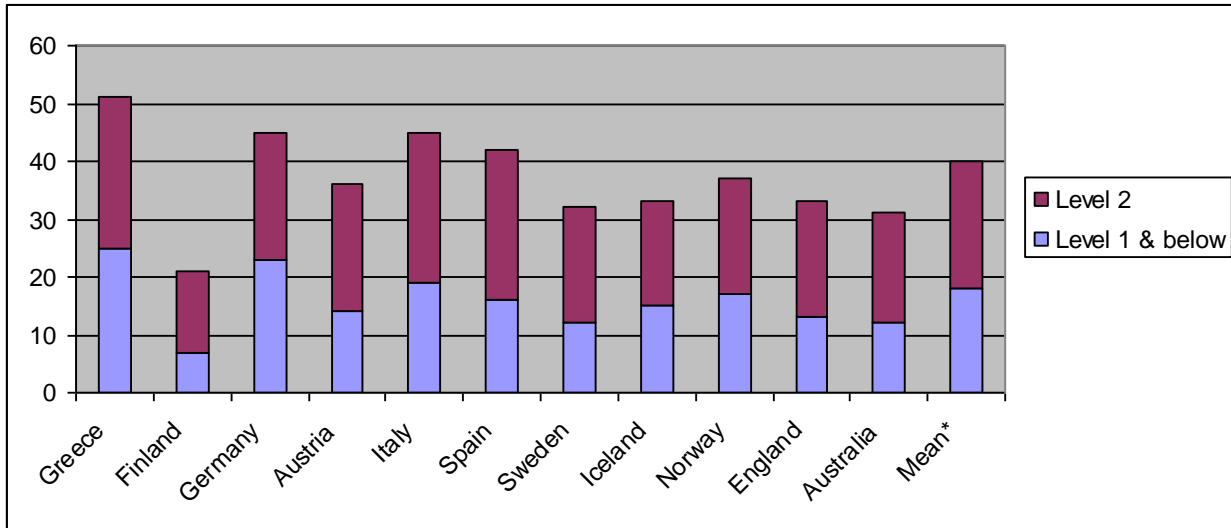

Figure 3.6. Percentage of students achieving at low levels in the OECD study, in Australia and COST-A8 countries

In spite of these high levels of low achievers, Australia was comfortably in the top ten countries in reading, maths and science in the OECD-PISA study. Other English-speaking OECD countries (Canada, England, New Zealand, and Ireland) scored at the same high level. (USA scored lower in all three areas: reading, science and maths. It had good levels of high achievers and high levels of low achievers, with possibly the largest standard deviation of all countries for each of the three areas. It is possible lower USA averages may relate as much to multicultural diversity and the complexities of organising education in an extremely large democratic multi-state country with education controlled at state level, as to less excellent instruction (Program for International Student Assessment (PISA), 2002a). These very high levels of achievement by English speaking countries, combined with their strong orthographic disadvantage and quite high levels of low achievers (30%), suggest that these countries are doing much that is excellent in their instruction of students.

The overall high achievement in combination with a very wide spread of Australia's scores, and the largest achievement gap of all countries between teenagers who read for pleasure and those who don't, suggests that in Australia, there are separate instructional implications for high and low achievers:

1. That many Australian students fail to successfully master effective effortless reading-accuracy, i.e., successful reading and writing accuracy that allows focus on advanced aspects of literacy.

2. That there are major needs to examine instructional practices and make changes to decrease this high proportion of students who fail.

3. That current literacy instruction for those students who do master efficient reading-accuracy is extremely effective such, that despite 30% of students being low achievers, Australia's average score was the sixth highest of all 32 OECD countries.

Conclusion

This section has explored aspects of orthographic advantage at personal and national level. At personal level, there would seem to be major aspects of orthographic disadvantage experienced by Australian students, which are not experienced by transparent-orthography readers:

1. High cognitive load over a long period in learning to read, spell, and express oneself in writing for all students.

2. Ongoing reading, spelling and writing difficulties for many students.

3. Denied access to oral vocabularies and comprehensions during reading and writing, for a long period for all students, and forever for many students.

4. Probable delayed development of phonological representations which underlie all verbal and literacy learning.

5. Secondary impacts of this delayed skill development, including

   a. Vastly less learning time available for higher-order learning.

   b. Social-emotional impacts, probably including behaviour and attention weakness.

   c. (Possibly) aspects of cognitive restructuring which support subsequent learning.

Orthographic disadvantage also impacts many aspects of schools, systems, workforces, and nations. As discussed in detail above, orthographic disadvantaging of all Australian students creates associated high demands for time and effort focussed on reading. This includes instructional time, preservice and inservice training, and curriculum development, and reading intervention. This time and effort spent on reading is then not available to be spent on higher order learning, as can be done in transparent-orthography countries. High rates of low literacy in workplaces, and resultant expense, is also orthographic disadvantage not experienced in transparent-orthography countries.

To overcome orthographic disadvantage thus involves far more than just reading-accuracy and phonemic awareness delay. It impacts all areas of literacy development including spelling, word complexity in texts children read, high cognitive load in written expression. The implications of English orthographic complexity on both normal-progress and at-risk readers is an area highly worthy of further investigation. At instructional level it is important that accommodations be made to accommodate these aspects of disadvantage, e.g., encouraging spelling approximations (phonemic equivalents) in rough draft writing equalises written and spoken vocabulary – children can thus write any word they think of. At-risk readers may need to be taught how to write phonemic equivalents. This could be formal e.g., using a transitional orthography like *Fleksispel*, or informal.

3.6. Further disadvantage through failure to consider orthographic complexity as an impacting variable

There would seem to be widespread lack of awareness among reading professionals of the impact of English orthographic-complexity on English-text reading-accuracy development, and of the high cognitive load of learning to read English-text. This lack of awareness would seem to have allowed erroneous assumptions to achieve wide acceptance. In this section, erroneous assumptions which have had major impact on Australian reading-accuracy instruction are explored. They include

1. Australian applications of Italian *Reggio Emilia* model of prereading development and instruction.

2. Australian sociocultural applications of the work of Paulo Freire to Australian reading-accuracy instruction.

3. Inappropriate interpretations of crosslinguistic research findings.

3.6.1. Inappropriate Australian application of transparent-orthography curriculum

Australian preschool instruction seems strongly influenced by Italy's *Emilio Reggio* model of preschool instruction. It is a popular topic at early childhood teacher conferences, and groups of Australian preschool teachers visit Italy to observe schools using those methods (Dunne, 2003; Queensland School Curriculum Council, 1998; Queensland Studies Authority, 2002a, 2002b). Montessori methods have also been very popular. In Italian kindergartens, there is no prereading instruction – it is not needed as Italian is highly transparent and reading-accuracy development is very rapid. There seems little or no awareness within the Australian enthusiasm for Italian Kindergarten instruction, that there are major differences in learning to read English vs. Italian, and that Italian children reading well after Italian Kindergarten instruction does not mean Italian Kindergarten instruction is adequate prereading instruction for Australian children. As a result there is a strong sense that no formal prereading is needed. Doubtless, we can learn much from Italian programs, but it must be interpreted from the perspective of Australian needs. There would seem much value in developing play-based prereading instruction for use in Australian Kindergarten instruction (Galletly, 2000b, 2000c, 2000d; Neilson, 1999a).

3.6.2. Misinterpretation of the work of Freire

Paulo Freire is known internationally for his theories on literacy and socio-political emancipation (Freire, 1972, 1973, 1974, 1978, 1985, 1998; Freire & Macedo, 1987). It is likely his theories have been highly influential on Australian reading-accuracy instruction in recent decades, moving systemic reading emphases from Whole Language philosophy to current sociocultural models of reading instruction (J. P. Gee, 1996; Kress, 1996; A. Luke, Comber, & O'Brien, 1996; C. Luke, 1996), which emphasise sociocultural and sociopolitical emancipation and empowerment as part of literacy and literacy development. A search for books by Freire in the Education section of my local campus library found 13 different books he had authored, many of these with multiple copies. Additionally, many Australian writers and writers influencing current reading instruction discuss Freire (Anstey, 1996; Anstey & Bull, 1996a; J. P. Gee, 1996; Gee, 2000; Giroux, 1987; Kincheloe & McLaren, 2000; Lankshear, 1996; Lankshear & Gee, 1997; A. Luke et al., 1996; C. Luke, 1996; Peters, Olssen, & Lankshear, 2003).

Freire was blatantly sociopolitical and this may well have been very appropriate for the Brazilian situation. He experienced poverty for a period of his childhood, and as an adult dedicated himself to overcoming its effects in his country. His primary agenda was sociopolitical emancipation; overcoming of illiteracy was a secondary agenda. Freire worked for 15 years in adult education focussed on sociopolitical emancipation before trialling his socio-political 'codifications' - a series of ten discussions using focus pictures to build awareness of nature, culture, man's role in culture, culture and power, including reference to the power of being literate. He then decided to trial integrating literacy

instruction into his socio-political emancipation, and added literacy lessons after the codification discussions were completed. The widespread illiteracy of his countrymen was one means by which the Brazilian poor were oppressed, e.g., prior to the 1960s only literate people could vote. Freire's literacy programs, which he called *culture groups*, were highly effective (Freire, 1972, 1973, 1974, 1978, 1985, 1998; Freire & Macedo, 1987).

However, there does not seem to be any awareness by Freire and those who have translated his teachings into pedagogical principles for English-text countries that there are major differences in learning to read transparent orthographies vs. English-text. Brazil's main and official language is Portuguese, and Portuguese orthography is highly transparent compared to English orthography, such that motivated illiterate adults would be likely to acquire it quite easily. Freire thus did not need a lengthy focus on teaching reading-accuracy in his literacy work. Learning to read transparent orthographies is a simple uncomplicated task; in contrast, mastering reading-accuracy of English-text is highly complex, takes much time, especially in at-risk readers, and requires careful teaching and extensive practice.

It seems likely that two erroneous and seemly highly compatible assumptions have been very influential in current marginalisation of reading-accuracy and reading-accuracy instruction in Australian reading instruction. One erroneous assumption is that reading-accuracy is a simple skill effortlessly developed through authentic reading (Cambourne, 1988; K. S. Goodman, 1986; Hempenstall, 1996, 1997). The second is that Whole Language reading-accuracy instruction is compatible with sociocultural models of instruction (Education Queensland, 2001c, 2002a; Queensland Department of Education, 1997; Queensland, 2002). It seems highly likely that inappropriate assumptions about Freire's reading instruction were instrumental in these assumptions seeming to support each other.

Whole Language philosophy was highly influential at the time Freire's work became known in Australia. It strongly emphasised reading-accuracy being a simple skill, acquired relatively effortlessly through authentic reading, even by at-risk readers (Cambourne, 1988; de Lemos, 2002b; K. S. Goodman, 1986; Hempenstall, 1996, 1997). Whereas Whole Language philosophy is largely constructivist, i.e., no explicit teaching or skill development required; sociocultural literacy instruction emphasises not just learning through authentic tasks, but also learning through explicit instruction, which empowers students through their awareness of and power in using the skills. This balance of authentic-task learning and explicit teaching to building metacognitive awareness and skills is seen in sociocultural instruction in all other literacy areas, including functional grammar and genres, reading-comprehension, handwriting, spelling, critical literacy, visual literacy and multiliteracies. Thus, whereas the authentic reading aspect of Whole Language reading-accuracy instruction was strongly in keeping with sociocultural literacy instruction, failing to empower students in skills and awareness of reading-accuracy was not.

It seems highly likely that assumptions that Freire was as rejecting of explicit instruction of reading-accuracy as he was of other aspects of curriculum, has resulted in Whole Language reading-accuracy instruction having being subsumed into current Australian sociocultural reading instruction. Not being aware of the impact of crosslinguistic differences in difficulty of learning to read, it would have been easy for mainstream reading academics to view Freire's work as providing very strong support for the veracity and effectiveness of Whole Language reading-accuracy instruction. Mainstream reading academics would have been strongly aware of the complete lack of attention which Freire paid to reading-accuracy in his writings and would easily have assumed this to be vindication of Whole Language based reading-accuracy instruction. In actual fact, Freire's lack of attention to reading-accuracy is likely to be because of the limited attention he needed to pay to reading-accuracy for engaged adults in highly supportive conditions.

Mainstream reading academics would have been very aware of Freire's rejection of *traditional* education, as a transfer of information from the teacher who knows the content to the learner as receiver of the content, which he termed *banking pedagogy* (Freire, 1972). While his culture groups used meaningful key words to introduce students to letters, these words were decontextualised, and it is almost certain Freire's cultural groups used banking pedagogy in the teaching of letter-sounds. Knowing letter-sounds plus rapid mastery of blending letter sounds to make syllables is all that is required in learning to read transparent orthographies. Highly-engaged carefully-scaffolded reading-accuracy instruction would seem to have been Freire's means to emancipation, not the object of his criticisms.

In contrast, large amounts of explicit teaching are required in the learning of reading-accuracy of English-text. It is possible that due to the small time Brazilian-Portuguese reading-accuracy development, Freire was unaware of the importance of teacher-to-learner transfer of understanding and skill in reading-accuracy. Alternately, his theories may have been misinterpreted, as his discussion seems focussed on other aspects of Brazilian education. His criticism of banking pedagogy is highly appropriate if it is in relation to Brazilians being forced to learn the dates and names of ancient Portuguese and English battles and kings, rather than socioculturally relevant concepts. It is not appropriate when thinking of complex skills which do require transfer of knowledge and expertise from teachers as experts, to students as novices.

Australian mainstream reading academics would have been strongly aware and excited about the effectiveness of Freire's literacy agenda, with people learning to read so quickly and effectively through his programs of sociopolitical emancipation, which so strongly emphasised education being socioculturally appropriate. Midst so many variables and with their own sociocultural background so strongly Whole Language, it would have been very easy to overlook that,

unlike other literacy curriculum areas, sociocultural reading instruction is not new, but is actually just continued Whole Language reading-accuracy instruction. As such, current reading instruction offers the empowerment of skills development and awareness provided in all other areas of sociocultural literacy instruction only to reading-comprehension, but not to reading-accuracy.

These factors would seem to have resulted in erroneous association of sociological emphases (sociocultural and emancipation issues) with effective mastery of reading by Australian at-risk and/or oppressed readers. It is likely that associations which can be drawn from analysis of Freire's Brazilian literacy programs include that

1. It is vital that learners are engaged and motivated to learn, and believe they are capable of learning. This would seem to be the reason why illiteracy was widespread, and Brazilian peasants did not learn to read before Freire showed them that they could?

2. Rather than sociocultural and sociopolitical empowerment being the basis of learning to read, it is likely to be that reading-accuracy is a basis of personal empowerment, allowing access to learning of whatever content area one wishes to engage. This might include accessing employment opportunities, mastering Brazilian embroidery as a leisure activity, or, as in Freire's case, socio-political emancipation.

It is quite likely that these two erroneous assumptions (reading-accuracy being effortlessly mastering through authentic reading, and sociopolitical emancipation being an integral part of literacy development) made by mainstream reading academics who transferred Freire's work into the Australian context have been highly influential in reading-accuracy being dropped from the Australian literacy agenda.

Development of early reading-accuracy skill in at-risk English-text readers would seem highly similar in key ways to development of early skill in other complex task skills such as house building, parachuting, and bomb disposal. These skills are most effectively mastered, with little loss of limb and self-esteem, when not learned exclusively in their authentic contexts with learners positioned as knowledge-equals to their teachers. Instead, until a certain point of learning is reached, banking pedagogy, i.e., teacher-to-learner transfer of understanding and skill, is the order of the day. As developed in later chapters of this thesis, the level of complexity and conceptual knowledge which needs to be taught and learned before the learner can start to thrive and continue self-learning in more authentic contexts, would seem to define whether banking pedagogy or more constructivist pedagogy is appropriate. For at-risk readers attempting to learn to read English-text, to deny students the opportunity of such teaching and learning would seem to constitute denial of their 'right to read'.

3.6.3. Citizens' 'right to read' as a sociocultural option

Consideration of sociocultural aspects and models of literacy, draws attention to orthographic complexity as a sociocultural option. Literacy is established as a skill leading to sociocultural emancipation in third world cultures (International Literacy Year Secretariat, 1990; Ingvar Lundberg & Linnakyla, 1992), and we are recently becoming familiar with concept of citizens '*right to read*' (Spear-Swerling, 2004; U.S. Congress, 2001). There seems little awareness in discussions on reading development and sociocultural and socio-political emancipation, of the role that orthographic complexity plays in dictating the level of difficulty each country's citizens will face in learning to read.

Choice of orthography and choices about spelling reform are options available to every country, and access to reading-accuracy development and literacy in many ways is thus decided by each country's orthographic choices. Reading-accuracy mastery is in no way guaranteed in transparent-orthography countries. This is evidenced in ongoing high levels of illiteracy in countries such as Brazil where the orthography is highly transparent. But whereas reading-accuracy mastery is virtually guaranteed in countries with transparent orthographies which provide a minimal amount of instruction, at the current time, significant rates of reading-accuracy failure by at-risk readers seem almost 'virtually guaranteed' in English-text countries even when enormous amounts of time and funding are focussed on reading development. It would seem that, given that orthographic complexity is a cultural option, consideration of orthographic complexity and citizen's right to read is an important issue.

While some writers would suggest that such denial of access to literacy reflects deep political agendas, it seems equally likely that ignorance of orthographic complexity is likely to be the culprit. Such lack of awareness has strong precedents, seen in past acceptance of racism, slavery and the Franklin expedition, as discussed in the introduction to this thesis. The expedition stands as an example to all researchers and other explorers who may miss the obvious. The orthographic complexity of English would seem one 'obvious' factor which has been overlooked by reading researchers and mainstream reading academics. Ignorance of the impact of orthographic complexity on reading-accuracy development by English linguists seems hard to imagine given that Europe is so close to the UK, but this ignorance combined with lack of spelling reform seems likely to be the basis of widespread reading weakness in English-text countries.

With reading-accuracy seemingly a pivotal factor in defining the haves and have-nots of society, and likelihood of reading-accuracy success being strongly dependent on orthographic complexity, it would seem that in its role in denying at-risk readers their 'right to read', orthographic complexity is a tool of discrimination as powerful as discrimination by gender, race, and SES. Reading-accuracy is a culturally provided tool, which differs in complexity according to the constraints each society places within it. It is thus likely that reading-accuracy is the sociocultural point where English-text societies are denying the rights which at-risk readers have to be able to read. If they were learning to read Finnish or Welsh, it is highly likely they would be reading effectively; it is highly likely that it is because they are learning to read English, that they are experiencing reading difficulties. While the option of reading-accuracy being extremely simple or extremely hard is an option which English-text nations have not reflected on, it is definitely an option however, particularly in a country such as Australia which has achieved highly successful reforms from complex measurement systems to decimal systems.

It is possible that Australians are being denied their right to read in two ways. First, English spelling has not been reformed to reduce orthographic complexity. Second, current instructional supports of reading-accuracy development seem focussed away from reading-accuracy development, being instead focussed primarily onto reading comprehension. If appropriate instruction were provided, instructionally disabled readers (readers who would have mastered reading-accuracy if given sufficient help) would master reading while constitutionally disabled children (e.g., children with dyslexia and speech-language weakness) would still have reading difficulties. If major spelling reform was conducted, virtually all children would be able to easily master reading-accuracy.

3.6.4. Research inadequacies through ignorance of crosslinguistic differences

This section explores two areas as examples of the impact of lack of awareness of orthographic complexity as a variable in reading research. The first example is one where errors would seem to have occurred through

failing to consider the crosslinguistic impact of orthographic complexity. The second example is one showing the potential of orthographic complexity as a research lens allowing the gaining of new knowledge from research studies conducted before reading researchers were aware of the effects of orthographic complexity.

3.6.4.1. Orthographic complexity as an overlooked variable in reading research

While crosslinguistic research offers enormous potential for building knowledge of reading development of and optimal instruction for English-text readers, the very nature of this potential means that it is important not to assume similarity transparent-orthography vs. complex-orthography populations in research studies. With different predictors, rates of progress, needs for intelligence and working memory, and development of phonemic awareness, simple- vs. complex-orthography populations are distinctly non-equivalent, and confusion results in experimental studies when equivalence is assumed. There are indicators that many researchers are not yet realising this is the case, e.g., in literature reviews of studies working to establish effective intervention for low-progress readers of simple vs. complex orthographies journal articles reporting (Lundberg, 1999; Lundberg, Frost, & Peterson, 1988; Olofsson, 1993; Olofsson & Niedersoe, 1999; Poskiparta et al., 1999; Poskiparta, Niemi, Lepola, Ahtola, & Laine, 2003; Schneider et al., 1999; Schneider, Kuspert, Roth, & Vise, 1997; Torgesen et al., 2001; Torgesen & Davis, 1996; Vellutino, 2000; Vellutino et al., 1996).

There is a plethora of high-quality research studies on reading gathered in recent decades, yet in almost all of it, the impact of orthographic complexity has not been considered as a variable. It is thus likely that revisiting this research while considering the variable of orthographic complexity will reveal powerful truths. Areas where this seems to be particularly the case include the citing of findings of studies of readers learning an orthography not equivalent in complexity to the orthography of the current study, similar lack of consideration of orthographic complexity in meta-analyses, conflicting findings on effectiveness of intervention with low achievers, and the deeper findings one can develop by reanalysing data of recent studies using orthographic complexity perspectives.

Many studies focussed on establishing effective intervention for low-progress readers seem to assume equivalence of orthographic populations in the studies they discuss in their literature reviews and findings (Al Otaiba & Fuchs, 2002; Bus & Ijzendoorn, 1999; Ingvar Lundberg, 1999; Ingvar Lundberg et al., 1988; Olofsson, 1993; Olofsson & Niedersoe, 1999; Poskiparta et al., 1999; Poskiparta et al., 2003; Schneider et al., 1999; Schneider et al., 1997; Share & Stanovich, 1995; Torgesen et al., 2001; Torgesen & Davis, 1996; Vellutino et al., 1996). The distinct non-equivalence of English-text and transparent-orthography populations means this practice can lead to confusion.

One frequently occurring example of this potential confusion is researchers' frequent citing of Lundberg, Frost and Petersen's (1988) study of the effect on 6 year old Danish prereaders of 8 months intensive phonological awareness not including work with letters, conducted by class teachers who had received extensive training in the intervention program. Lundberg and colleagues (1988) inappropriately assumed equivalence of orthographic populations, in their building from Bryant and Bradley's (1983) study of phonemic awareness training with English readers. In turn their study has been cited by subsequent researchers of English readers who also assume equivalence of orthographic populations, as evidence that phonemic awareness training without letters has been found significantly effective. Danish is a relatively complex orthography, making it somewhat closer to English complexity than to other highly transparent orthographies, but the Danish children were older than English prereaders, the training was extensive, the intervention was extensive, and the effects were not large.

A more appropriate interpretation of the study might be that extremely intensive phonemic awareness training excluding letter training with 6 year old prereaders about to learn a relatively transparent-orthography has a small effect on subsequent reading, and a more significant effect on subsequent spelling, and that these findings are compatible with Danish orthography being simpler for reading but complex for spelling i.e., phonological awareness and phonemic awareness are not needed for Danish reading-accuracy development but are useful for developing Danish spelling skills. The very high expense of the program in terms of teacher training and instruction time and its having only modest effects means that the findings indicate significant value in replicating the study with the intervention including letter skills, and exploring less intensive intervention structures. It seems inappropriate to use the findings of this study to intimate that phonemic awareness training without letters given to young English readers will significantly boost reading and spelling.

Similar confusion could arise from Share and Stanovich (1995) discussion on pseudoword reading performance of normal-progress vs. low-progress readers, where non-equivalence of crosslinguistic populations does not seem to have been considered. They comment that '*studies often report little overlap in the distributions of pseudoword reading for disabled and control readers* (Share & Stanovich, 1995, p.26)'. Their one example is a study done with Danish students (Ingvar Lundberg & Hoien, 1990), and Danish is significantly less complex than English orthography. It would seem far more likely that little overlap of pseudoword reading achievement is seen in transparent-orthography populations, where extremely high rates of ceiling level reading-accuracy might create a dichotomy between normal-progress vs. low-

progress readers. For English-text readers, however, it is more likely that pseudoword reading achievement would be a continuum skill, similar to real word reading.

The National Reading Panel's meta-analysis of studies on phonemic awareness instruction (Ehri, Nunes et al., 2001) controlled for orthographic complexity to a large extent through categorising studies as English or '*languages other than English*'. Their findings are very compatible with the discussion points of this study, that phonemic awareness instruction has statistically larger impact in English-text readers than in non-English-text readers as regards acquisition of phonemic awareness (d = 0.99 vs. 0.65), improvement of spelling (d = 0.95 vs. 0.51), and improvement of reading in the short term (d = 0.63 vs. 0.36). They comment that English having much lower 'phonemic transparency' (i.e., orthographic complexity) than other languages means phonemic awareness interventions may make a much stronger contribution to English readers. The panel found no difference between the language populations, in the strong long-term gains achieved by both groups which is perhaps due to a confound (the strong long-term effects in English readers are likely due to effectiveness of the intervention; the equally strong long-term effects in transparent-orthography readers are more likely to be from the bootstrapping effects of orthographic simplicity than from the phonemic awareness intervention).

In contrast to the National Reading Panel's inclusion of orthographic complexity, other meta-analyses have not considered orthographic complexity at all (Al Otaiba & Fuchs, 2002; Bus & Ijzendoorn, 1999). Their discussion seems to reflect assumptions of population equivalence, e.g., between students learning to read English (L. Bradley & Bryant, 1983; Byrne & Fielding-Barnsley, 1995; Torgesen & Davis, 1996; Torgesen, Wagner, Rashotte et al., 1999), and students reading more transparent orthographies such as German and Danish (Ingvar Lundberg et al., 1988; Schneider et al., 1999; Schneider et al., 1997). Omission of orthographic complexity, likely to be a highly significant variable, is likely to have resulted in inaccurate effect sizes in many instances. Additionally, discussion in these analyses tends to focus on variables likely to be of far lesser impact e.g., in seeking reasons for higher rates of responsiveness in German vs. American lower achievers, Al Otaiba and Fuchs (2002) discuss the German interventions being done by classroom teachers while the American interventions were done by graduate students, with no mention of the fact that the learning to read German is a simple task, while learning to read English is far more complex. It seems likely that the omission of orthographic complexity as a variable has not heinously affected the results of these analyses, but it may prove powerful to reanalyse the data while including orthographic complexity as a variable.

3.6.4.2. The power of orthographic complexity as a research lens

The non-equivalence of crosslinguistic populations whose orthographies differ markedly in orthographic complexity offers enormous potential for building deep knowledge on reading-accuracy development, difficulties, and instruction for both transparent-orthography and English-text countries. In addition to use in future studies, orthographic complexity is a powerful research lens which can be used in re-examining studies in which orthographic complexity has not been previously considered, and thus gain deeper insights from the findings of those studies. This is evidenced in the following example:

3.6.4.2.1. A deeper focus on Finnish, Italian and Australian instruction

Orthographic complexity and disadvantage are used here as a lens for deeper examination of the results of the OECD-PISA study of authentic reading, maths and science skills in 15 year olds in 32 nations (Lokan, Greenwood, & Cresswell, 2002; Program for International Student Assessment (PISA), 2002a). Use of orthographic lenses reveals that only a few transparent-orthography countries seem to realise the potential offered by their orthographic advantage, and suggests that English-speaking countries overcome their orthographic disadvantage through their successful readers, but do poorly in supporting their weak readers through to reading success.

The OECD-PISA data shows clearly that, on average, English-text countries not only catch up, but pass most transparent-orthography countries, e.g., the top seven nations in the OECD-PISA study included five English-text countries (Canada, Australia, New Zealand, Australia, Ireland, and United Kingdom) and only two transparent-orthography countries (Finland and Korea). While much of the discussion on the ranking of different nations in the OECD-PISA study has focussed on sociocultural aspects, higher-order thinking, and high-school education, with little attention to early reading development, using the lens of orthographic advantage and looking beyond national averages to performance of the full range of students offers additional insights into countries' differing performances (see Figure 3.7).
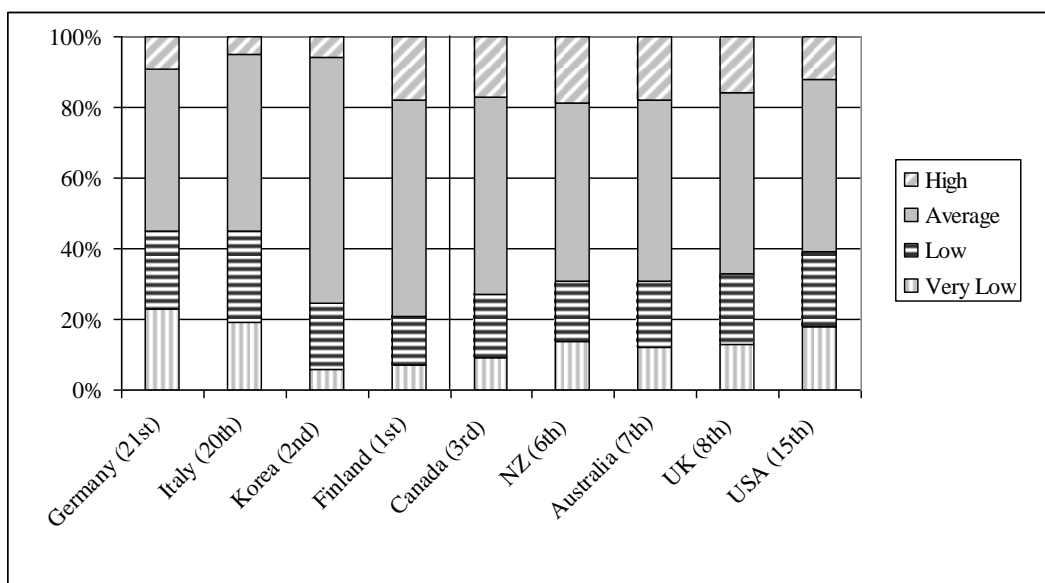
Figure 3.7. Transparent-orthography countries (Germany, Italy, Korea and Finland), and English-text countries (Canada, New Zealand, Australia, United Kingdom, USA) and their ranking by proportion of successful (average and above) readers (Program for International Student Assessment (PISA), 2002a)

Consideration of countries' rank order and their proportions of high, average and low achievers in Figure 3.7 suggests that Finland and Korea have maintained their orthographic advantage through excellent teaching-learning focussed on areas other than reading-accuracy i.e., advanced literacy, academic and higher-order skills. Korea was the world leader in science, Finland was the world leader in reading, and both countries were in the top four countries on all three areas studied. In contrast to these successful countries, Germany and Italy have failed to realise their orthographic advantage, probably through ineffective instruction-learning on areas other than reading-accuracy. Germany is reportedly '*alarmed*' by its poor performance and is instituting major reforms (Bulmahn, 2002). Italy places major attention on preschool

education but much less on primary education, such that, until recently, the preservice preparation of primary school teachers was merely the gaining of their high school diploma (New, 2002). Orthographic advantage would seem to be potential rather than guaranteed advantage.

The very wide spread of scores of English-text countries suggests that the high average of all English-text countries is due not to higher performance by readers at all levels (as evidenced in Korea's and particularly Finland's results), but to excellent achievement by good readers compensating for low achievement by large numbers of low achievers. The English-text countries have similar proportions of high level readers to Finland, but it is Finland and Korea's very proportions of poor readers that makes them world leaders. The proportions of low achieving 15 year olds (27-40%) in English-text countries are very similar to the proportions of young children experiencing early reading weakness shown in other studies (Alexander & Lyon, 2004; Hanley, Masterson, Spencer, & Evans, in press; Louden, Chan, Elkins, Greaves, House, Milton, Nichols, Rivalland, Rohl, & van Kraayenoord, 2000; Program for International Student Assessment (PISA), 2002a).

Analysis of the OECD-PISA data from an orthographic disadvantage perspective suggests that English-text countries are providing highly effective education for children who master early reading (including reading-accuracy), but that the proportion of children continuing to experience reading weakness may change little over time. Perhaps English orthographic complexity makes learning to read so complex for at-risk readers, that without expert instruction, they simply do not catch up. Spencer and Hanley's longitudinal English-Welsh studies showed the gap was still strongly present at age ten (Hanley et al., in press). The OECD-PISA study suggests the gap is still there at age fifteen. The rich grow steadily richer, while the poor lose hope.

Although the OECD-PISA studies assessed authentic reading and not reading-accuracy, there is a strong reading-accuracy component in authentic-reading weakness (Leach, Scarborough, & Rescorla, 2003; National Research Council, 1998a). Authentic-reading builds strongly from reading-comprehension skills, and reading-comprehension weakness stems from weakness in either language comprehension or reading-accuracy, or from weakness in both areas (Catts & Hogan, 2003a; de Lemos, 2002b; Hoover & Gough, 1990; Leach et al., 2003). Given that most of the English-text readers who demonstrated weak reading skills in the OECD-PISA study showed good comprehension in concurrent maths and science assessments (Program for International Student Assessment (PISA), 2002a), it is reasonable to conclude that the students' poor authentic reading is largely due to reading-accuracy weakness and not language-comprehension weakness. With English orthographic complexity the basis of reading-accuracy weakness, it is quite possible that English orthographic complexity is a major factor in the OECD-PISA students' weak reading.

Conclusion

The idiosyncratic impacts of English orthographic complexity and knowledge gained through crosslinguistic research are new and exciting research areas offering new depths of knowledge to be plumbed. Knowledge from recent crosslinguistic studies seems to overturn many longstanding assumptions on reading-accuracy development, difficulties and instruction.

This section has explored a few areas where assumptions would seem to need rethinking.
They include

1. The need to consider orthographic complexity as a variable in reading research.

2. Cautions in applying practices from transparent-orthography countries into Australian practice.

2. The potential to access new insights from existing research literature, using orthographic complexity as a research lens.

3. Awareness that orthographic complexity is not fixed, but rather a sociocultural choice which nations make.

3.7. Implications for Australian reading instruction

It is interesting to reflect on the findings on English orthographic complexity and transparent orthographies with respect to the three goals of the *Australian Language and Literacy Policy for the 1990s*, which were that

> *1. All Australians should attain and maintain competence in a range of contexts in spoken and written forms of English.*
>
> *2. The learning of languages other than English in Australia must be substantially increased to enhance educational outcomes and communication both within the Australian community and internationally.*
>
> *3. Those Aboriginal languages still actively transmitted to and used by children should be maintained and developed. All others should be recorded, where possible, for the benefit of the descendents of their speakers and for the nation's heritage.*

(*The language of Australia: Discussion paper on an Australian Literacy and Language Policy for the 1990s*, 1990, p.xiii)

All three of these goals would seem strongly influenced by orthographic complexity:

1. English orthographic complexity would seem to be making it very difficult for all Australians to attain competence in written English.

2. It seems likely that orthographic transparency strongly assists second language learning. It would seem likely that the early phonemic awareness, early reading-accuracy, and early vocabulary equalisation of transparent-orthography readers would interact with students' formal instruction in other languages, and greatly ease second-language acquisition. It is also possible that cognitive restructuring is involved. This may be a factor in why so many European speakers are fluent in three or more languages.

3. It is highly apposite that Aboriginal cultures are using transparent orthographies as they seem a powerful way to maintain and develop Aboriginal languages. Additionally, full instruction in children's Aboriginal language or learning to read an Aboriginal language before beginning to learn to read English may have potential in building not just students' cultural identity and prowess in their aboriginal language, but also fluent English-text reading-accuracy and literacy.

In this chapter, I have explored and theorised on the findings of recent crosslinguistic research and their impact on building understanding of reading-accuracy development and instruction for readers of English-text. The conclusions of the chapter include that

1. English has a very complex orthography, the complexity of which is reduced somewhat when it is considered as having three grainsizes.

2. The benchmarks for optimal reading development in both normal-progress and at-risk readers are much higher than had previously been considered possible, until the findings of recent crosslinguistic research.

3. Transparent-orthography reading-accuracy development is characterised by ease of acquisition and high rates of success:

   a. It seems characterised by low cognitive load.

   b. It does not make high demands on working memory and IQ.

   c. It does not require fluent phonological awareness skills.

   d. It takes very little time for most students to master.

   e. Normal-progress and delayed readers seem to have similar rates of reading-accuracy progress – they seem to differ in the point at which their reading-accuracy skills start to develop, but not in rate of progress once this point is reached.

   f. Delayed readers respond extremely well to increased instructional intensity.

   g. Reading-accuracy difficulties are almost nonexistent in children beyond the first few years of school.

   h. There is little anxiety among educators or the general public about reading-accuracy development and instruction.

4. Phonemic awareness develops as a consequence of reading-accuracy development in both transparent-orthography and English-text readers.

5. In contrast to transparent orthographies, the low regularity of English's complex orthography makes learning to read English a highly complex task which
    a. Prevents English-text readers from rapidly developing the effective self-learning skills of transparent-orthography readers.
    b. Makes significant demands on intelligence and working memory.
    c. Is very time-consuming, for all students and particularly for low achievers.
    d. Requires extensive instruction.
    e. Many students never fully master.
    f. May well be a strong contributing factor to high levels of angst about reading development and instruction in English-text countries.
    g. May be the basis of attention and behaviour problems in many students.
    h. Significantly delays development of reading-accuracy and phonemic awareness.
    i. Has far stronger negative impact on at-risk readers than on normal-progress readers.
    j. Is due to English orthographic complexity rather than sociocultural and instructional aspects.
    k. Takes at least four years longer than it takes to master transparent orthographies.

2. There are significant differences in many cognitive processing characteristics of reading-accuracy in transparent orthographies and English-text:
    a. All English-text readers, even average and advanced readers, experience several years of delay in phonemic awareness development.
    b. Weak English-text readers of all ages continue to experience phonemic-awareness weakness.
    c. Predictors of reading progress differ markedly for transparent-orthography vs. complex-orthography readers.
    d. Rapid naming and phonological awareness have distinctly different influences on reading in transparent orthographies vs. English-text.
    e. Phonological awareness weakness seems to specifically impact reading and spelling accuracy of complex orthography learners.
    f. Speed of visual and verbal processing of phonological representations, as reflected in RAN measures, affects speed of reading in transparent-orthography readers. This effect is not noticed in English-text weak readers where phonological awareness weakness and RAN weakness both result in reading-accuracy weakness which would mask any fluency weakness.
    g. It is possible delayed phonemic awareness development has ramifications not just on English-text reading-accuracy development but also on other aspects of children's development.
    h. It is possible that transparent-orthography delayed readers do not regress in their learning in the way at-risk English-text readers do.

3. Lack of awareness about English orthographic complexity may be a major factor creating confusion about reading-accuracy development and instruction of English-text readers, and thus perpetuating Reading Wars.

4. Spelling modification has potential for reducing the impact of English orthographic complexity on reading-accuracy and phonemic awareness development.
    a. There are already Australians reading transparent orthographies.
    b. Transparent-orthography countries use spelling reform to maintain high orthographic transparency.

The cognitive complexity of mastering English-text reading-accuracy has many important dimensions, but none is perhaps more demonstrative than the fact that whereas virtually all transparent-orthography readers master reading-accuracy, a high proportion, perhaps 30%, of Australians, seem never to master reading. It is quite possible that this is due to the impact of English orthographic complexity on their reading-accuracy

development. While all English-text readers are slower to master reading-accuracy than transparent-orthography readers, it seems that many English-text readers may never catch up.

This chapter has explored many implications and possibilities of orthographic complexity. These findings are condensed here into the following *Big Ideas* of this study:

1. English orthographic complexity is an optional cultural choice, which strongly impacts literacy development. It delays reading-accuracy, phonemic awareness, and written expression, and must be accommodated in theories of read and reading-accuracy development, difficulties and instruction. It creates broad national disadvantage as well as individual disadvantage.

2. English orthographic complexity makes reading-accuracy a complex skill with continuing high cognitive load in the early states of reading-accuracy development. It is likely that the disadvantaging of English orthographic complexity is through this continuing high cognitive load of reading-accuracy development.

These Big Ideas are expanded as follows:

Big Idea 1 English orthographic complexity is an optional cultural choice, which strongly impacts literacy development. It delays reading-accuracy, phonemic awareness, and written expression, and must be accommodated in theories of read and reading-accuracy development, difficulties and instruction. It creates broad national disadvantage as well as individual disadvantage:

1. English orthographic complexity is an optional cultural choice, which is probably significantly impeding Australian individuals, education systems, industries, and national functioning, through its effects on

   a. Individual Australians' levels of achievement and healthy functioning with respect to reading-accuracy, language, literacy, academic, social-emotional and life progress.

   b. Education systems needing to focus time and effort on building reading-accuracy skills, and overcoming and compensating for Australian students' delays and difficulties.

   c. Industry and social support services, through the effects of poor reading skills in many Australian adults, and high support needs of adults with secondary complications of reading-accuracy difficulties.

   d. National effectiveness, through the cumulative impacts of English orthographic complexity on individuals, education systems, industry and social supports.

Big Idea 2 English orthographic complexity makes reading-accuracy a complex skill with continuing high cognitive load in the early states of reading-accuracy development. It is likely that the disadvantaging of English orthographic complexity is through this continuing high cognitive load of reading-accuracy development:

1. English orthographic complexity creates very high cognitive load for beginning readers, thus reading-accuracy instruction for beginning and at-risk readers needs to be skilfully planned and implemented.

2. Through its high cognitive load, English orthographic complexity strongly delays the reading-accuracy and literacy development in all readers, and particularly at-risk readers, many of whom may never develop efficient reading-accuracy.

3. English orthographic complexity possibly interacts with aspects of students' cognitive processing (including phonological representations, phonemic awareness, working memory and long-term memory efficiency), such that it may impede other aspects of student development.

4. There are some indicators that skilful systematic phonics instruction may greatly reduce the impact of English orthographic complexity.

5. The impact of English orthographic complexity in causing reading difficulties seems far greater than currently considered variables such as sociocultural aspects, intelligence, phonological awareness and instruction.

6. There are major needs to gather data on the impact of English orthographic complexity and cognitive load on Australian readers, and its interaction with current reading instruction methods.

3.8. **Appendix to Chapter 3: Fleksispel**

Fleksispel is an option for a transitional simplified orthography including suggestions for spelling reform. It is a simplified orthography I developed while exploring ways to reduce English orthographic-complexity in order to decrease current levels of reading-accuracy difficulties in English-text readers. It could be used to introduce reading to beginning English-text readers, particularly at-risk readers, with an aim of scaffolding more rapid acquisition of reading-accuracy and phonemic-awareness.

Fleksispel has six levels, from complete transparency and 1:1 correspondence of graphs to phonemes at Level 1 (See Figure 3.4, repeated below), to standard Australian/English spelling at Level 6.

a	mat	b	bat	sh	shat
ae	mate	d	dat	ch	chat
e	met	f	fat	th	that
ee	meet	g	gat	ng	tang
i	mit	h	hat		
ie	mite	j	jat		
o	mot	k	kat		
oe	mote	l	lat		
u	mut	m	mat		
ue	mute	n	nat		
ar	mart	p	pat		
er	mert	r	rat		
or	mort	s	sat		
ow	cow	t	tat		
oo	foot	v	vat		
ou	you	w	wat		
oy	boy	y	yat		
air	hair	z	zat		

Figure 3.4. The 40 graphs of *Fleksispel*, an English-text transparent-orthography
(Repeated here, see also p.122)

Special issues considered in the development of Fleksispel include:
1. It has six levels which steadily increase the orthographic complexity of English-text:
    a. Level 1 is completely phonemically regular.
    b. Levels 2-4 represent steadily increased levels of common Standard English patterns.
    c. Level 5 represents English regularised to a suggested maximum level, apart from relatively illogical Standard English patterns for which permanent spelling reform is recommended.
    d. Level 6 is Standard English Spelling.
2. It is likely students might continue reading at Level 1 and 2 until advanced phonemic awareness and fluent Fleksispel reading-accuracy is developed.
3. It is intended that Fleksispel might be used on a continuing basis as an accepted spelling option for weak spellers, in order to equalise their spoken and written vocabularies, thus providing equity for them in written expression. The aim for all students would be to move their spelling prowess to Level 5 or 6, but lesser levels would be acceptable where there is significant evidence of difficulty mastering Standard English spellings.
4. The usual letters of English orthography have been used, with the omission of c, q and x, whose phonemes can all be represented by other letters, and are not introduced until Level 4.
    a. Multigraphs (11 digraphs and 1 trigraph) have been used where there is no current single graph corresponding to a phoneme:
        i. 4 consonant multigraphs (digraphs): sh ch th ng.
        ii. 8 vowel multigraphs:
            1. 7 digraphs: ar er or ow oo ou oy.
            2. 1 trigraph: air.
    b. It is considered that these multigraphs might possibly be written with the two letters joined together until Level 3, e.g., the letters s, c, t might be joined to the letter h in sh, ch, th. This is likely to provide strong metacognitive assistance, allowing immediate recognition that a multigraph is present.

    c.   The three consonants commonly occurring in current English-text vowel digraphs ('*vowel friends*':r w y) are each used in at least one Flexispel digraph (ar air, ow, oy) in order to build familiarity with these consonants being involved in English vowels.

    d.   When a single phoneme represented by a letter occurs next to a digraph containing that letter e.g., s-sh, g-ng, double letters are used, eg misshap airring danggul.

    e.   It is recognised that the commonly occurring schwar (neutral vowel) sound is not listed as a separate phoneme in the Fleksispel. The writer contemplated using uu to represent this sound, but settled instead on writing it as u at Level 1, and introducing common final syllable morphemes such as 'er en ed el es' in Level 2. It was considered that while it should have a separate graph, the proportion of English speaking adults and teachers who are unaware of this commonest vowel sound is very high and confusion over neutral vowels might complicate the introduction of a transitional orthography such as Fleksispel.

    f.   It is recognised that 'th' represents two phonemes (voiced and voiceless <u>th</u>, e.g., <u>th</u>in <u>th</u>e), but a decision was made to use just one 'th' graph, given that English-text children do not experience confusion between these phonemes. A graph 'zsh' was also considered for the middle phoneme in trea<u>s</u>ure, but it was felt that this phoneme occurs so infrequently that including it would cause unnecessary complication.

    g.   One inconsistent pattern which is still present is when one letter-vowels are followed by an r sound. It is considered that an optional hyphen could be used to show the vowel structure, e.g., fo-rest, fo-run, fe-rry vs ferry (furry).

5. It is intended that given and family names would be spelled in their current form, but that Fleksispel might be included as a support to reading these words, perhaps written in brackets or grey font near the current spelling, and that writing of people's names using Fleksispel by people not knowing the current spelling, might be an allowable practice (i.e., forgivable, not placing the writer in a position where ridicule might occur).

6. It is likely beginning reading books and texts would having the Fleksispel word in black type and the Standard English Spelling in pale grey larger background type, or have the Standard English Spelling in light grey type below the word.

    a.   Reading books and texts would be written in 4 parallel forms, reflecting matching to each of Levels 1 to 4, with children progressing to the next level, when a criterion of fluency with their current level is reached.

    b.   With the advantages of current and future computer software, producing books in multiple fonts, or being able to convert text from Standard English Spelling to one of the four levels of Fleksispel is likely to be very manageable.

    c.   It is considered that an extensive array of computer, board and card games similar to those used in reading resources I have developed (Galletly, 1999c, 2000c, 2001c) would be valuable in supporting children to enjoyably develop awareness and expertise with the different patterns of English orthography.

7. It is intended that spelling variations are accepted, where these reflect variations in pronunciation and/or close similarity of phoneme usage e.g. heyu/heeu, diffurunt/diffrunt.

The characteristics of the six different levels of Fleksispel are as follows:

<u>Level 1</u>

Letters representing 40 common phonemes of English (See Figure 3A.1)

1. English has 40 common sounds which are each written in just one form in Fleksispel:

    a.   Some are written with one letter, e.g. p, t.

    b.   Some are written with two or three letters, e.g., sh er air).

2. There are 18 vowel sounds:

    a.   Five one-letter vowel sounds: a e i o u (as in at et it ot ut).

    b.   Five vowel names: ae ee ie oe oe.

    c.   Eight vowel pairs:

        i.   Standard English two-letter vowels are of two types:

            1.   Vowel + vowel e.g., oo, ue.

            2.   Vowel + *vowel friend* (r w y) e.g., ar, ow, oy.

        ii.   In Fleksispel we do this too:

<li value="1">Vowel friends: ar/car er /her or/for oy/boy   ow/bow
Vowel pairs: oo/foot ou/you air /air

    d. Some special words such as people's names (and other proper nouns) are written with Standard English, (their own special spelling patterns).

Level 2

1. The 'e' letter in vowel name sounds (ae ee ie. oe ue) may be written at the end of the word (came) in one syllable words and final syllables.
2. Final z sound is written as s
3. Y is a special vowel friend and can be a vowel all by itself, saying ie at the end of one syllable words, and ee at the end of multisyllabic words.
4. U doesn't like being at the end of words. His friend 'e' helps him out:
   - e. When the sound is just u by itself, we can write 'er'.
   - f. When u has another sound we can write e then the sound
       - i. Past tense endings can be written as 'ed'.
       - ii. Plurals can be written as 'es'.
       - iii. Some 'un' endings can be written as 'en'.
       - iv. Some 'ul' endings can be written as 'el'.
5. Two tricky words that aren't written how we say them are 'a' and 'the'.

Level 3

1. There are three main types of Standard English words:
   - a. Regular words which can be sounded out easily e.g. cup, flag, splint.
   - b. Pattern words where once you know the letter patterns you can read the words, e.g. igh, all, ar. An instructional possibility would be to teach 10 rimes, initially teaching a common word containing the rime as a sight word ('tricky word').

all ball	o go	oy boy	e he	igh right
ow now	ee see	ar car	ay day	y my

   - c. Tricky words, where the spelling tries to trick us, so it is easiest to learn them as whole-words:

     was one two eight school come gone some do

     done school mother Monday you what who little

     (Fleksispel would be a continuing option for these words.)

Level 4 (Optional spelling changes)

1. Morphemes (Little words than mean something) can be kept constant, e.g. electric(k), electricity(s), electrician(sh); mean, meant (ment).
2. Some consonant letters can be doubled.
3. K has a good friend c which keeps it company after a e i o u.
4. C is a copycat letter. Sometimes it copies K (before a, u, o) and sometimes it copies S (after i, e, y).
5. X is a copycat letter, copying ks. It is used at the end of some words finishing with the [ks] sounds.
6. G is half a copycat. It has its own sound and it copies j (before i,e,y). It's only half a copycat so it doesn't say its j sound every time it is before i,e,y e.g. gyrate, get, give, just most of the time e.g. cage, gentle, giant, gin, gym.
7. Y likes the end of words and i likes the middle. Oy and ae at the end of words use oy and ay, while in the middle of words, they use oi and ai.
8. There are lots of tricky words which use one of the 40 common spelling graphs inappropriately e.g. to, do.

Level 5:

1. Optional spelling of common letter patterns
   - a. Fleksispel graphs or Standard English spelling may be used for the following orthographic patterns:
       - i. Vowel digraphs: ai, ee, ea, ie, oa, oi, ow, ew, ue, aw, ough, oo, ou.
       - ii. Use of a for neutral vowels starting words e.g. abuv, ago, agen.
       - iii. Other orthographic patterns: qu, le, igh, ce, ge, etc.
2. Fleksispels recommended for incorporation into formal spelling:
   - a. When not involved as part of the vowel name sound, e.g. kite, silent final e permitted to be omitted, e.g. hors, chans, hous, charj,
   - b. Homophonic r vowels to be replaced by one form:

      i. er, ir, ur permitted to be spelled as er

      ii. Final er, ur, or, ar (usually pronounced as neutral vowel) permitted to be spelled as er e.g. auther, majer,

c. Homophones permitted to be spelled using regular spelling e.g. por (for pour, por, paw, pore), tou (for to, too, two) given that most English words have multiple meanings without being spelt differently e.g. draw a conclusion, draw a picture, draw a cheque.

d. Multisyllabic spelling rules to be regularised

      i. Single vowel sounds (a/happun) to be followed by two consonants, e.g. mettul, different.

      ii. Vowel name sounds (a/David) to be followed by single consonants e.g. legul, virus.

      iii. Neutral vowels permitted to be spelled as 'u'. e.g. Simun, Diffu, Davud

e. W spelling patterns to be reformed, e.g.

      i. Regular vowels used e.g. wunder, wot, worter, werld, worn,

      ii. Wr permitted to be spelled as r, eg rong, rite.

      iii. Wh permitted to be spelled as pronounced, either as h Hoo/Who, or w, e.g., wot

f. Vowels spelled in multiple ways permitted to be spelled in one form:

      i. ae as in caem and came permitted for ai as in main, aigh as in straight, ei as in rein, eig as in reign, eigh as in eight,

      ii. ee as in bee or bene permitted for ea as in speak, ie as in piece,

      iii. ie as in tied or tide permitted for igh as in high, eigh as in height, ie as in tied, ui as in guide,

      iv. oe as in soep and sope permitted for oa as in soap, ow as in grow, ough as in although,

      v. ue as in cuet and cute permitted for ew as in few, ue as in due, ough as in through,

      vi. ow as in cow permitted for ou as in found, ough as in bough.

      vii. ou as in soup permitted for oo as in food, ew as in grew, ough as in through, ui as in cruise, oe as in shoe

      viii. oo as in foot, permitted for oul as in could, should, would

      ix. ar as in far permitted for a as in fast, a as in father

      x. or as in for permitted for augh as in naughty, au as in sauce, aw as in lawn, al as in chalk,

      xi. (See above) Neutral vowels permitted to be spelled as 'u'. e.g. Simun, Difu, Davud

      xii. (See above) Regular vowels used after w e.g. wunder, wot, warter, werld, worn,

      xiii. (See above) Homophonic r vowels to be replaced by one form

          1. er, ir, ur permitted to be spelled as er

          2. Final er, ur, or, ar (usually pronounced as neutral vowel) permitted to be spelled as er e.g. auther, majer,

      xiv. (See above) When not involved as part of the vowel name sound, e.g. kite, silent final e permitted to be omitted, e.g. hors, chans, hous, charj,

g. Ch permitted to be spelled as pronounced, both as k as in skool, and sh as in shef.

h. Sh to replace ti, si, ci in the final syllable of multisyllabic words and 'u' to replace the neutral vowel following the sh sound, e.g. grashus, pashunt, speshul.

i. Final syllables le, el, ial, al pronounced 'ul' to be spelled as 'ul', e.g. legul, panel,

j. Ough with eight different vowel sounds used in a total of less than 25 common words, permitted to be spelled as pronounced, e.g. tuf, doe, thort, throu, bow, cof, thurru, hikup

k. C and ck permitted to be spelled as pronounced as in kat, clok, clikking, and final e after c permitted to be removed if not part of vowel name sound, e.g. chans, choys (but mise or mies, not mis)

l. G pronounced j permitted to be spelled as j and final e after g permitted to be removed if not part of vowel name sound, e.g. charj, gorj (but caej or caje, not caj)

m. Silent letters which are not morphemically significant permitted to be omitted, e.g. lissen, anser, noe/know, noeme/gnome

Level 6:

Standard English Spelling (unless Level 5 is adopted as Standard English)

Sample texts using Fleksispel

The following tables and figures include examples of use of Fleksispel. They include:

1. Figure 3A.1: A sample of continuous text using Fleksispel Level 1.
2. Figure 3A.2: Common words of English using Fleksispel Levels 1 and 2.
3. Table 3A.1: Parallel forms of text using Fleksispel Levels 1, 2, 3, and 4-5.

> Sum of thu reeserch kuming owt ov Uerup iz shoeing that chuldrun lerning simpul orthogrufees (Greek, Italyun, Spanish, Finish, Duch, Norweejun, etc) lern to reed 2.5 tiems farstu than chuldrun lerning tou reed Inglush. Orlsoe, vertuelee orl ov thair chuldrun hav veree hie reeding akuerasee levulz bie harfwae throu thair ferst yeeu at skoul. So thai doent hav chuldrun with reeding akurasee problemz (thoe sum ar stil u bit sloe at reeding).
>
> And wun ov thu things I fiend reelee frustraeting abowt it orl (bekooz I werk with soe meny hartbroekun kidz houz bigust problem mae be that they wer born in un Inglish speeking kuntree) iz that orl the chuldrun in thoes simpul langwijuz seem tou get top fonulogikul skilz veree kwiklee, - ow por kidz need orl thu fonulogikul skilz thai kan get to marstu Inglish beekuz it iz such u komplekz orthografee, but thai dont get graet fonulogikul skilz for a fue yeeuz (wuns thae ar reeding wel). Chuldrun reeding Greek, Spanish and Italyun don't need fonologikal skilz koz thair langwijuz ar soe easee to marstu, yet thae hav top sownd skilz, wiel ow kidz reelee need them and havunt got them. Itz not just ironik…its a reel paen.

Figure 3A.1. A sample of continuous text using Fleksispel Level 1

the	thu the	we	wee	could	cood	good	good
of	ov	there	thair	make	maek make	before	beefor bufor
and	and	can	can	than	than	go	goe
a	u a	an	an	first	ferst	man	man
to	tou	your	yor	been	been	our	ow
in	in	which	wich	its	its	write	rite riet
is	iz is	their	thair	who	hou	used	uesd used
you	you ue	said	sed	now	now	me	mee
that	that	if	if	people	peepul pepul	day	dae
it	it	will	wil	my	mie my	too	tou
he	hee	do	dou	made	maed made	any	enee
for	for	each	eech	over	ovu	same	saem same
was	woz wos	about	abowt	did	did	right	riet rite
on	on	how	how	down	down	look	look
are	ar	up	up	way	wae	think	thingk
as	az as	out	owt	only	oenlee	also	orlsoe
with	with	then	then	may	mae	around	urownd
his	hiz his	them	them	find	fiend	another	unuthu unuther
they	thae	she	shee	use	ues use	came	caem came
at	at	many	menee meny	water	wartu	three	three
be	bee	some	sum	little	litul	come	cum
this	this	so	soe	long	long	work	werk
from	from	these	theez theze these	very	veree	must	must
I	Ie	would	wood	after	arftu	part	part
have	hav	other	uthu uther	word	werd	because	beekuz beekooz
not	not	into	intou	called	corld	does	duz
or	or	has	haz has	just	just	even	eevun even
by	bie by	more	mor	new	nue	place	plaes plase
one	wun	two	tou	where	wair	old	oeld
had	had	her	her	most	moest	well	wel
but	but	like	liek like	know	noe	such	such
what	wot	him	him	get	get	here	heeu
all	orl	time	tiem time	through	throu	take	taek take
were	wer	see	see	back	bak	why	wie wy
when	wen	no	noe	much	much	things	things

Figure 3A.2. Common words of English using Fleksispel Levels 1 and 2

Table 3A.1. Sample texts written at multiple levels (Levels 1, 2, 3 and 4-5) of Fleksispel

Level 1	Level 2	Level 3	Levels 4 and 5
God saev ow graeshus kween. God saev ow noebul kween. God saev thu kween. Long to raen ovu us, Hapee and gloreeus God saev ow graeshus kween. God saev ow kween.	God save ow graeshus kween. Long liv ow noebel kween. God save ow kween. Long to rane over us, Hapy and gloreeus God save ow graeshus kween. God save ow kween.	God save ow graeshus kween. Long liv ow noebel kween. God save ow kween. Long to rane over us, Happy and gloreeus God save ow graeshus kween. God save ow kween.	God save ow graeshus queen. Long liv ow noeble queen. God save ow queen. Long to rane over us, Happy and gloreeus God save ow graeshus queen. God save ow queen.
Ostraelyuns orl let us rejoys For wee ar yung and free. We'v goeldun soyl and welth for toyl, Ow land iz gert by see Ow land abownds in naechu'z welth Ov buetee rich and rair On histreez paej at evree staej Advans Ostraeleeyu Fair	Australians orl let us rejoys For wee ar yung and free. We'v goelden soyl and welth for toyl, Ow land is gert by see Ow land abownds in naecher's welth Ov buety rich and rair On histry's paje at evry staje Advans Australia Fair	Australians all let us rejois For wee ar yung and free. We'v goelden soil and welth for toil, Ow land is gert by see. Ow land abownds in naecher's welth Ov buety rich and rair On histry's paje at evry staje Advans Australia Fair	Australians all let us rejois For wee ar young and free. We'v golden soil and wealth for toil, Ow land is gert by sea. Ow land abounds in naecher's wealth Ov buty rich and rair On histry's page at evry stage Advance Australia Fair
<u>Uwae in u maenju</u> Uwae in u maenju, Noe crib for a bed, Thu litul lord Jeezuz lae down hiz sweet hed. Thu stars in thu briet skie lookt down wair hee lae, Thu litel lord Jeezuz, usleep on thu hae. I luv you lord Jeezuz, look down from thu skie And stae bie mie bedsied, Til morning iz niet.	<u>Uwae in a maenjer</u> Uwae in a maenjer, Noe crib for a bed, The little lord Jeesus lae down his sweet hed. The stars in the brite sky looked down wair hee lae, The little lord Jeesus, usleep on the hae. I luv you lord Jeesus, look down from the sky And stae by my bedside, til morning is nite.	<u>Uway in a maenjer</u> Uway in a maenjer, Noe crib for a bed, The little lord Jeesus lay down his sweet hed. The stars in the brite sky looked down wair hee lay, The little lord Jeesus, usleep on the hay. I luv you lord Jeesus, look down from the sky And stay by my bedside, till morning is nite.	<u>Uway in a maenjer</u> Away in a maenger, No crib for a bed, The little lord Jesus lay down his sweet head. The stars in the bright sky looked down wair he lay, The little lord Jesus, asleep on the hay. I luv you lord Jesus, look down from the sky And stay by my bedside, till morning is night.
Wuns upon u tiem thair wer three litul bairs hou livd in thu fo-rust with thair muthu. Wun dae muthu bair sed tou her sunz, 'It's tiem for you tou bild yor own howsuz.' Soe of thae went. Thu ferst litul pig met u man with a loed of stror. 'Pleez cood I hav sum ov yor stror' he arskt pulietlee. 'Sertunlee you fien yung pig,' sed thu man, and hee gave thu litul pig az much stror az he wontud.	Wuns upon a time thair wer three little bairs hou lived in the fo-rust with thair muther. Wun dae muther bair sed tou her suns, 'It's time for you tou bild yor own howses.' Soe of thae went. The ferst little pig met a man with a lode of stror. 'Pleez cood I hav sum ov yor stror' he arsked pulietly. 'Sertunly you fine yung pig,' sed the man, and hee gave the little pig as much stror as he wonted.	Wuns upon a time thair wer three little bairs hou lived in the fo-rust with thair muther. Wun day muther bair sed to her suns, 'It's time for you to bild yor own howses.' Soe of thae went. The ferst little pig met a man with a lode of stror. 'Plees cood I hav some ov yor stror' he arsked pulietly. 'Certunly you fine yung pig,' sed the man, and hee gave the little pig as much stror as he wonted.	Wuns upon a time thair wer three little bairs hou lived in the forrest with thair muther. Wun day muther bair sed to her suns, 'It's time for you to bild yor own houses.' So off thae went. The ferst little pig met a man with a load of straw 'Please cood I hav some ov yor straw' he arsked politely. 'Certunly you fine yung pig,' sed the man, and he gave the little pig as much straw as he wonted.

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