

English Spelling and dyslexia: articles, papers and books.

The Guardian. 21 December 1999.

[English teases the brain and twists the tongue.](#)

Tim Radford, Science Editor,

Scientists have shown that a language creates its own geography within the human brain in a discovery which could have promising implications for dyslexia research.

Uta Frith of University College, London, reveals in Nature Neuroscience today that differences in the structure of languages lead to different strategies for pronouncing words, which may explain why dyslexia is a common problem in English-reading nations, but relatively unknown in Italy. Italian is simple and beautiful to sing, not just because of the alternation of consonants and vowels but because the rules for pronunciation and stress are consistent.

English, on the other hand is notorious for its inconsistencies - words such as cough, bough, dough and tough are classic examples - and George Bernard Shaw remarked bitterly that a word like "ghoti" could just as easily be pronounced as "fish": gh as in tough, o as in women, and ti as in nation. Brain scans taken while Italian and English-speaking volunteers looked at and read out words in their own language showed subtle differences in activity in precise locations in the brain.

Prof Frith found that when asked to read words and pronounceable non-words, English speakers took longer to begin reading each word, and were even slower when they had to apply a pronunciation to a made-up word. The fact that the native Italian speakers were quicker on the draw was consistent with the idea that Italians could rely on a sure set of rules for translating letters into sounds, whereas the English-speaking volunteers had to work out what the meaning might be before they could settle on a pronunciation.

Prof Frith believes, because of such differences, Italians use the left superior temporal region to read both words and experimental "nonwords", English speakers use the same hemisphere but slightly different areas. The difference may be to do with how the language is learned, she said. "Children learning to read and write in English do take a long time. I was involved in some earlier work comparing German-speaking and English-speaking children and the difference is very marked in the speed with which they can acquire their code for their language.

"The second phenomenon has to do with dyslexia: this is quite a noticeable phenomenon in English-speaking countries but it is hardly thought of as a handicap in Italy."

Daily Telegraph. 16 March 2001.

[Simpler spellings 'would make life easier for dyslexics'.](#)

Roger Highfield Science Editor.

A STUDY of dyslexic adults has shown that simplifying English spellings could be one way to help sufferers.

It also confirmed that the cause of the reading difficulty was a brain disorder. Experiments show for the first time that the neurological cause of dyslexia is the same in sufferers across Europe. But the disorder appears to be twice as common in England as in Italy because English has a more complex writing system, or orthography, than Italian, which is more phonetic.

French, English and Italian adult dyslexics all did equally poorly in tests that involved short-term memory, whereas Italian dyslexics did better in reading tests.

The head of the team, Prof Eraldo Paulesu, of the University of Milan Bicocca and the Institute San Raffale, said: "There is an argument for reforming complex orthographies to improve literacy problems in these languages. English dyslexics would have an easier life if their writing system was more regular, with more unique correspondences between sounds and print."

The Associated Press. WASHINGTON. 15 March 2001.

[Study: English a Factor in Dyslexia](#), By PAUL RECER.,

When English-speaking children with dyslexia begin to read, they face the awesome task of learning more than 1,100 ways that letters in the written language are used to symbolize the 40 sounds in the spoken language.

This may explain why there are twice as many identified dyslexics in English-speaking cultures as in countries with less complex languages, according to a study appearing Friday in the journal Science.

The study by an international team compared the brain scan images and reading skills of dyslexic university students in Italy, France and England.

The researchers found virtually no difference in the neurological signature for dyslexia, but there was an immense difference in how well the students learned to read their native languages.

"It is much easier for dyslexics to learn to read in languages where there is a one-to-one relationship between a letters and the sounds," said Chris D. Frith, a researcher

at the University College London and a co-author of the study. "In English, there are more than a thousand ways to spell the sounds."

In Italian, dyslexic students have a far easier time. The 33 sounds in Italian are spelled with only 25 letters or letter combinations.

The researchers noted that identified dyslexics are rare in Italy because the language helps learning readers to quickly overcome problems caused by the disorder. To find dyslexics among Italian university students, the researcher had to conduct special tests to identify those with the neurological signature for the disorder.

Experts have estimated that between 5 percent and 15 percent of Americans have some degree of dyslexia.

Dyslexia involves a brain structure that makes it difficult for a learning reader to connect verbal sounds with the letters or symbols that "spell" that sound. Such connections are essential to learn to read.

In the study, researchers found that English, French and Italian dyslexics did equally poorly in tests based on the short-term memory of verbal sounds, a key measure for the disorder. Yet the Italians were far better at reading their native language than were the English and French students.

The students were then put through a series of reading exams using positron emission tomography to measure and image blood flow in specific parts of the brain, an indication of neurological activity. All of the students had the same deficits in the left temporal lobe of the brain while performing reading tasks.

"Although Italian dyslexics read more accurately than French or English dyslexics, they showed the same degree of impairment" in the brain image, the study found.

This suggests, the researchers said, that it is the language difference alone that makes it more difficult for English-speaking dyslexics to learn how to read.

"The complexity of the English and French written languages stems from historical events that have introduced spellings from other languages, while, in comparison, Italian has remained quite pure," said Eraldo Paulesu of the University of Milan Bicocca, the lead author of the study.

In English, many words share the same letter combinations, but involve different sounds when spoken. For example: *mint* and *pint*; *cough* and *bough*, and *clove* and *love*. In French, the complexity stems from different letter combinations that "spell" the same or similar sound, such as "au temps" (at the time) and "autant" (as much, or so much).

Frith said that Spanish, Finnish and Czech are "dyslexia friendly" languages because they lack the sound-spelling complexity of English and French. Japanese, he said, is

also easier for children learning to read because of its consistency of sounds and symbols.

"One study found an Australian boy in Japan who was dyslexic in English, but not in Japanese," said Frith. "That is the sort of thing that you would expect" if language was a significant factor in the severity of the reading disorder.

Dr. Thomas Zeffiro, co-director of the Center for the Study of Learning at Georgetown University, said the study by the European researchers was "an exciting result" for researchers studying dyslexia.

But Zeffiro said the study, with only 72 subjects in three countries, was too small to draw final conclusions about how common dyslexia is among the peoples of the world.

He said that brain imaging studies with small numbers are notorious for sampling errors - statistical flukes that distort conclusions.

"For these results to be generalized (for all humans) you would need four or five times more subjects," said Zeffiro. "This lays the groundwork to make it worthwhile to do a much larger study."

ABC NEWS. 15 March 2001.

[Dyslexia More Difficult in English, French](#) by Willow Lawson. [excerpts]

...Dyslexia more evident in countries with complex writing systems.

The United States has twice as many dyslexics as Italy. A new study says complicated English spelling is to blame.

A new study of the brain disorder that causes difficulty in reading and writing shows that simple languages, like Italian, are easier for dyslexics to decode than English and French. That's because Italian words are spelled the way they are pronounced, unlike many words in English and French.

Need for Language Change?

Eraldo Paulesu, a professor at the University of Milan Bicocca who directed the study, says there is an argument for making spelling more uniform in complex languages.

"Languages with complex [writing] are difficult for both dyslexics and non-dyslexics to read," he says.

The impact of orthographic consistency on dyslexia: A German-English comparison.

Landel, K., Wimmer, H. and Frith, U.

[Cognition, 63, 315-334. \(1997\)](#)

On a task challenging phonological processing skills (spoonerisms) both English and German dyslexics were significantly impaired compared to their age and reading age controls. However, there were extremely large differences in reading performance when English and German dyslexic children were compared. The evidence for systematic differences in reading performance due to differences in orthographic consistency was similar for normal and for dyslexic children, with English showing marked adverse effect on acquisition of reading skills.

Dyslexia in Different Languages. Cross-linguistic Comparisons,

edited by Nata Goulandris, PhD., University College London.

[2003 Whurr Publishers, London & Philadelphia.](#)

Chapter 1. Introduction: developmental dyslexia, language and orthographies.

The level of transparency (how reliably a letter maps onto a speech sound) measured on a continuum with 'transparent' or 'shallow' at one end and 'opaque' or 'deep' at the other, has been shown to determine how easily children learn to read. In a transparent orthography the mappings between a grapheme (the letter or letters used to represent a speech sound) and phonemes (speech sounds) are reliable and children can use this information to sound out unfamiliar words. In 'opaque' orthographies there are numerous mappings between letters and sounds (consider the spelling of the long *o* /əʊ/ in the words 'hole', 'road', 'low', 'so', 'though' and 'toe') and phoneme-grapheme correspondence rules are much less reliable. The degree of consistency of sound-letter mappings may also vary according to word position. In highly consistent orthographies, a grapheme is pronounced the same when it occurs in any position in a word. Transparent languages are much more consistent than opaque languages.

Existing cross-linguistic research (e.g. Wimmer, 1993) indicates that for alphabetic languages the most important linguistic characteristic for ensuring success in learning to read is the consistency of the orthography, defined as the extent to which learners can rely on phoneme-grapheme mappings to help them identify unfamiliar words. Transparent orthographies, those that represent the phonological or sound features of the language, such as Italian, Spanish and Greek, present few problems for young readers and most children can read the majority of written words after only one year of schooling (Seymour, 1998). Opaque and inconsistent orthographies, on

the other hand, such as English (and to a lesser extent French, Polish and Danish), which give precedence to the morphemic level of language over the phonological level (Albrow, 1972), are far more difficult to master and reading difficulties are more prevalent. Moreover, whereas measures of reading accuracy are a useful diagnostic tool in English, they are of limited value when assessing poor readers of transparent languages who are often as accurate as good readers. In highly transparent orthographies, many studies report that only reading rate differentiates poor and good readers (see Wimmer, 1993, 1996; Chapter 4). In moderately transparent orthographies, reading error differences are also in evidence (see Chapter 5 - but note that Chapter 2 also reports accuracy deficits in German-speaking dyslexics).

... orthographies that incorporate numerous irregular words, such as English, confuse the learner and render the task of extracting rule-based regularities more difficult and prolonged. ...

The influence of instructional methods on the cross-linguistic manifestations of dyslexia must not be overlooked. The majority of languages with shallow, transparent and consistent orthographies are taught using highly structured phonics methods that explicitly teach letter-sound mappings and consonant-vowel (CV) syllables that can be combined into familiar words. Considering the reliability of the mappings, this teaching method is extremely effective because learners receive positive feedback throughout the learning process.

This book sets out to explore these issues by presenting current research into dyslexia in non-English languages, including: alphabetic languages such as Afrikaans, French, German, Greek, Hebrew, Norwegian, Swedish and Polish; semi-syllabic and semi-alphabetic scripts, such as Kannada, Tamil, Hiragana and Katakana; and logographic scripts, such as Chinese and Kanji. Its objective is to explore a variety of languages and to identify both the typical reading and spelling difficulties characteristic of each language, considering its unique linguistic properties, and the common core or universal deficits that can be considered to be the defining characteristics of developmental dyslexia regardless of language. Each chapter begins with a description of the linguistic features of the language in question, how that language differs from English and what problems beginners may face acquiring literacy. We begin by examining the more transparent languages and proceed through the less regular to the opaque orthographies. Logographic scripts are considered at the end of the volume.

International Book of Dyslexia: A Cross-Language Comparison and Practice Guide.

Edited by Ian Smythe, John Everatt and Robin Salter.

[2004 John Wiley & Sons, Ltd.](#)

INTRODUCTION TO PART I.

A second topic discussed by many authors was the transparency of the language. Transparency refers to the relationship between the written symbol of the script and its associated sound in speech. Some languages have a more regular script (i.e., a high correspondence between written symbols and speech sounds), alternatively referred to as a transparent/shallow orthography (see, for example, Chapters 18 and 13 on Spanish and Italian). Other languages have a much more inconsistent (irregular) correspondence between symbols and sounds, and are often referred to as non-transparent or deep orthographies, of which English is the most quoted example.

ARABIC.

Literary Arabic is written in an alphabetical system with 28 basic letters. It is a system of consonants, and it is read and written from right to left. In literary Arabic there is a predictable sound-symbol correspondence between the letters and their sounds if the text is vowelized. However, there are certain irregularities ...

CHINESE.

(summary) There are many languages, but one script. Strokes form a character which represents a phoneme. There are over 40,000 characters but only 3000 are needed for literacy. Pinyin has Roman characters and dyslexic reversals show more than in the morphographic script.

DUTCH.

Dutch orthography appears to be rather transparent when compared to other languages.

GREEK.

... Greek, like English, is a morphophonemic script but is much more transparent than English in the representation of phonology. The English spelling system has variable and inconsistent grapheme-phoneme relationships due to many irregular spellings and it is considered a deep orthography, with higher level morphological constraints (Chomsky and Halle. 1968).

HEBREW.

Children learn to read in pointed Hebrew, which has almost perfect one-to-one grapheme-to-phoneme correspondence, hence decoding is mastered very rapidly.

... this diacritical system provides a complete and unambiguous representation of the vowels by means of tiny dots and dashes appearing mostly under letters.

... certain children have unique difficulties negotiating the transition from pointed to unpointed script.

HUNGARIAN.

The Hungarian language is a phonetic, transparent language of the Finno-Ugric group, of which Finnish is said to be the closest relative. However, vowels with acute, umlaut and tilde accents, combined consonants, agglutinated words (prepositions added to nouns making very long words) all cause difficulties.]

ITALIAN.

... each of the five vowels has only one orthographic rendition in Italian. Consonants have only one graphemic rendition and vice versa, except for a few stop consonants and affricates

A recent cross-linguistic comparison among different European orthographies (Seymour *et al.*, 2003), has confirmed that in languages with shallow orthographies, children become accurate and fluent both in reading simple words and non-words at the end of the first Grade, differently from children who must learn to read French, Danish and particularly English. The difference between a 'deep' orthography like English and a 'superficial' one like Italian has been also documented using a PET study by Paulesu *et al.* (2000).

POLISH.

In Polish an alphabetical script is used. Unlike English, Polish script is basically phonetic, however, there are a number of differences between speech and script.

BRAZILIAN PORTUGUESE.

The Portuguese script is a fairly transparent orthography with regular grapheme-phoneme correspondences and rules of pronunciation (Lemle, 1991) that account for most noncanonical correspondences.

RUSSIAN.

Authors undertaking studies in Russia (Andreopoulou and Bogiotopolou, 2000) and in Greece obtained confirmation of data that reading is an easier skill to acquire in countries with a phonetic principle of writing, and dyslexia is less common there. Reading is a more complex skill in countries with a traditional (historically formed) principle of education (English, French), where a break has occurred between changed spoken language and historical spelling.

SPANISH.

... the orthographic regularity of Spanish ...

SWEDISH.

The relatively shallow Swedish orthography ...

Dyslexia in context: Research, policy and practice.

Edited by Gavin Reid and Angela Fawcett

(book of the British Dyslexia Association International Conference, 2004.)

[Whurr. 2004.](#)

Chapter 3. Developing flexible mapping in an inflexible system?

Page 53.

"One of the main differences between reading development across languages is how soon the readers are confronted with the need to use more complex mapping options and grapheme/phoneme conversions. In turn, a wider range of cognitive skills will have to be engaged, making the learning process more difficult. This explains why learning how to read and spell results in lower word and non-word reading performance after the first year of instruction and practice in a deep orthography (English, followed by the English, Portuguese and French) than in a more simple and/or shallow one (Finnish, followed by Greek, Italian, Spanish, German) (Seymour et al., 2003). For example, at the end of grade one, in most European languages - with the exception of Danish - the children read words and non-words with an accuracy of 70% or above, whereas the children in the UK still identify only about 30% correctly."

Page 60.

"Dyslexics who read languages with little complexities in split-syllable mapping and only a few multi-letter peculiarities such as Finnish, Italian and Hebrew should mainly be (very) slow readers. In contrast, languages such as English (and, possibly, French and Danish) with many multiple consonants and multi-letter inconsistencies should not only cause slow speed but also inaccuracy. Languages such as German and Dutch, with an intermediate level of syllabic and orthographic complexity, should be somewhere in between."

English words and their Spelling: A history of phonological conflicts.

Elaine Miles, the Dyslexia Unit, University of North Wales, Bangor.

[Whurr. 1 May 2005.](#)

[Most of the book is about the origins of English words, in the hope that it will help teachers to make spelling lessons more interesting. Here are excerpts from pp111-114.]

"However, a priority must be to consider the children learning to read, and therefore to try changes to some of the spellings which cause problems in their first years."

The possibility of spelling reform.

The more we adapt to the sounds of new languages, the less chance there is of overall spelling reform, or so it seems. English, as a language to learn, has advantages in its lack of inflections and gender indications, but the disadvantage of an enormous number of different spellings. We have only recently realized that British children are, as a result, slower to master the early stages of reading than any others in Europe. This is a serious disadvantage, especially when the English/American language is learned by such a large proportion of the population of the world.

Some tidying-up in spelling could certainly be done at all levels:

- Minor reforms such as those suggested in the nineteenth century (page 59) could be introduced, that is:
- - *-ough* words could be spelled phonetically, as they do not relate to any other words in the language. Trying to do the same with *-igh* words and some other *-gh* endings might cause a problem, because it would introduce more homonyms ('site'/'site', 'rite'/'rite') and there is no obvious good way to re-spell those that do not end in *-t*. (Re-spelling and also re-pronouncing 'neighbour' as 'nighbor', however, would at least make its meaning clearer, by demonstrating the link with 'nigh'.)
- - words ending in *-logue* (catalogue', 'dialogue', 'prologue', etc.) could be re-spelled *-log*. This is not just borrowing an American practice, as they would then be closer to their origin in Greek - the *-ue* was a French addition.
- All words ending in a vowel, instead of just some, could be pluralized with a simple *-s* ending. Then only words whose singular ends in *-oe* would have *-oes* endings in the plural. (There seems to be no problem in that except perhaps for pedantic Greek scholars who might be bothered because they know that the original Greek singular of *hero* was *heros*, with a long 'o'!)

- Since we already have a single symbol for /f/, we could drop 'ph'. There are often other features in words from Greek to preserve clues as to their origin, if that is wanted.
- We could omit the letters inserted during the vogue for Latinization at the time of the Renaissance, as in 'debt', 'doubt', 'receipt' and 'island', and any derivatives. As spelled, they are often unpronounceable, and the inserted letters are meaningless nowadays.

These are modest improvements, and do not raise any difficulties of destroying important links with words from the same root. There is a genuine problem in omitting the 'g' in 'sign', for example; it would destroy the connection with 'signature' and other words with the same derivation, and would create homonyms. There are already homophones (i.e. words spelled differently, and with different meanings, but sounding the same) from way back in the seventeenth century: 'alter'/'altar', 'ascent'/'assent', 'bare'/'bear', 'pare'/'pair'/'pear', 'dear'/'deer', 'hair'/'hare' and 'lesson'/'lessen'. We would create other difficulties if we produced more ambiguities by adding homonyms! This is already a problem in our huge English vocabulary.

However, a priority must be to consider the children learning to read, and therefore to try changes to some of the spellings which cause problems in their first years. We could easily write *skool*, *elefant* or *hous* (in the last case, our Old English ancestors wrote simply *hus* or *hors*, so there is a precedent). We also could drop the initial unpronounced 'w' in 'write', 'wrap', etc., and the unpronounced 'k' in 'knife' and 'knit'. Finally we could simplify some of the early numbers, such as *one*, *two* and *eight*, to *wun*, *too* and *ait*.

[Elaine Miles goes on to discuss modern influences from America and technology, including acronyms and text messaging.]
