



Provided by the author(s) and University College Dublin Library in accordance with publisher policies., Please cite the published version when available.

Title	When regular is not easy: Cracking the code of Irish orthography
Authors(s)	Stenson, Nancy; Hickey, Tina
Publication date	2016-07-26
Publication information	Writing Systems Research, 8 (2): 187-217
Publisher	Taylor & Francis
Item record/more information	http://hdl.handle.net/10197/9049
Publisher's statement	This is an electronic version of an article published in Writing Systems Research, 8 (2), pp. 187-217. Writing Systems Research is available online at: www.tandfonline.com/doi/abs/10.1080/17586801.2016.1177481
Publisher's version (DOI)	10.1080/17586801.2016.1177481

Downloaded 2019-05-20T11:08:35Z

The UCD community has made this article openly available. Please share how this access benefits you. Your story matters! (@ucd_oa)



Some rights reserved. For more information, please see the item record link above.



Note this submitted version may diverge from the published final version. Readers are particularly recommended to consult the published article for the appendix and tables

To Cite

Stenson, N. and Hickey, T.M. (2016) When regular is not easy: Cracking the code of Irish orthography. *Writing Systems Research*, 8 (2):187-217.
<http://www.tandfonline.com/eprint/jurwUDQM7iKCzRDzK6zB/full>

When regular is not easy: Cracking the code of Irish orthography

Nancy Stenson and Tina Hickey, University College Dublin

This work was supported by a Marie Curie Incoming International Fellowship (FP7-PEOPLE-2011-IIF), project number 302123 from the European Union.

Abstract

Irish is well-known to be a threatened minority language, which has a number of under-researched features. This article presents an analysis of Irish orthography, based on the most frequent words in a corpus of children's literature in Irish. We identify both basic orthographic rules and a few phonological rules that systematically alter pronunciations from those expected based on the orthographic norms. Comparison of Irish spelling patterns with those in a similar corpus for English confirms a widespread belief that the orthography of Irish is more regular than that of English, the L1 of most beginning readers of Irish. However, this analysis refutes the commonly accepted corollary assumption that explicit decoding instruction in Irish is unnecessary for learners already literate in English, based on further examination of other features differentiating the two languages. We argue that despite its greater regularity, Irish spelling is sufficiently complex and distinct from English to challenge learners and require explicit instruction.

Introduction

Although regularity of orthographic patterning is an important factor in the ease with which beginning readers acquire literacy, it is not the only factor, as much research on a range of alphabetic languages has shown (Caravolas, Kessler, Hulme and Snowling, 2005; Carrillo and Alegria 2014; Frost 2012; Perfetti 2000; Seymour 2007; Ziegler and Goswami 2005). Additional

challenges arise when emergent readers in their first language (henceforth L1) are also at the very early stages of learning and acquiring literacy in a second language (L2). The Irish education system offers such a case, since the vast majority of children begin to learn Irish as a subject from school entry about age 4, and embark on formal acquisition of literacy in their mother-tongue English only a short time before they begin to learn to read in Irish, their L2. Here we consider the challenges of Irish orthography for L2 learners and their teachers, presenting an analysis of the spelling system of an under-researched language with an extremely long history of literacy.

A body of research extending back at least 30 years has investigated the relationship between literacy acquisition in different languages and the nature of the orthographic system in those languages. Seymour, Aro and Erskine (2003), comparing children learning 13 European orthographies (several Germanic and Romance languages plus Greek and Finnish), found that reading development is almost twice as slow in English as in the others, most of which are mastered within the first year of reading instruction. They present a continuum of orthographic depth based on their findings, in which English occupies the extreme deep (or opaque) end of the continuum and Finnish the shallow (transparent) end, closely followed by Greek, Italian, Spanish, German, Norwegian and Icelandic, with French, Portuguese, Danish, Dutch and Swedish occupying intermediate positions. Subsequent research has confirmed the relative difficulty of mastering English literacy compared with these and other languages, including Welsh (Spencer and Hanley 2003), Serbo-Croatian (Caravolas, Volín and Hulme 2005), Turkish (Durgunoglu 2006), Japanese (hiragana), Spanish (Carillo and Alegria 2014), Albanian (Ellis et al., 2004), and Hungarian (Ziegler et al., 2010). Others have discussed emergent literacy in languages with different scripts, e.g., Ellis, et al. (2004) for Japanese, Katz, Frost and Bentin

(1987) for Hebrew, and Perfetti and Zhang (1991, 1995) for Chinese. These studies of orthographic depth, it should be noted, examine the acquisition of literacy by children learning to read their first language. Fewer studies consider the role of orthographic differences in second language acquisition, the situation that concerns us here (examples include Geva, Wade-Woolley and Shany (1997), Hamada and Koda (2008) and Ijalba and Obler (2015); Nassaji (2014) reviews the literature and issues in L2 literacy). In light of the evidence available on L2 literacy, and as will be discussed further below, it cannot be assumed that acquisition of L2 literacy will proceed in the same way or with equal ease, not matter how transparent the orthography being learnt.

The orthographic depth continuum has been widely referenced, often without definition, but when its basis is specified, it is usually in terms of spelling consistency, as in the following definition from Frost, Katz and Bentin (1987:244): “*In a shallow orthography... the phonemes of a spoken word are represented by the graphemes in a direct and unequivocal manner. In contrast, in a deep orthography the relation of spelling to sound is more opaque...*” However, other (often interconnected) aspects of orthographic depth have also been identified, including syllable structure (Seymour, 2007), the ratio of phonemes in the language to letters available to represent them (Caravolas, Volín and Hulme, 2005), grapheme complexity (Bear, Templeton, Helman and Baren, 2004; Caravolas, Kessler, Hulme and Snowling, 2005), the phonological and morphological structure of the language (Durgunoglu, 2006; Perfetti 2000), and grain size, the analytic level(s) to which the orthography is sensitive (Ziegler and Goswami, 2005, 2006).

No research has yet applied the criteria used in other studies (e.g., Borgwaldt, Hellwig and de Groot 2005; Seymour et al, 2003; Ziegler et al, 2010) to Irish. Ó hAiniféin (2008) quoted the following comment by Lyddy on Celtic orthographies:

“Welsh, Gaelic and Irish have relatively transparent alphabetic orthographies that have been subject to regular review and standardisation in recent decades. Notwithstanding differences across dialects, compared with English they have fewer inconsistencies, with relatively predictable print sound mappings (Lyddy, 2005:1).” Cited by Ó hAiniféin (2008:25)

Elsewhere, Lyddy, Ó Loinsigh and Parsons (2005:91) referred to Irish orthography as ‘*relatively predictable*.’ⁱ This accords with a general, albeit incorrect, perception (as we argue below) that Irish orthography is easier than that of English. Stenson and Hickey (2014a) and Hickey and Stenson (2016) presented findings from interviews with teachers and language specialists illustrating this viewpoint and its effects on teacher preparation and classroom behaviour, and argued that there is a critical need for more attention to explicit teaching of decoding skills based partly on a preliminary analysis of Irish spelling.ⁱⁱ The interviews further indicate that the educational system tends to operate as if this (largely covert) assumption were true, with the result that reading instruction, particularly the relationships between sounds and spellings, is often neglected. The lack of systematic teaching of decoding is evident both in reports of classroom teaching from primary teachers and from an examination of the most commonly used materials for teaching Irish in schools, and is reflected in rather poor learning outcomes overall with respect to Irish reading skills (Gilleece, Shiel, Clarke and Millar, 2012; Harris, Forde, Archer, Nic Fhearaile and O’Gorman, 2006; Hislop, 2013).

In this paper we expand the analysis in Hickey and Stenson (2011) and explore the interaction between regularity and other aspects of the orthographic system that contribute to opacity in Irish orthography and the attendant difficulties that learners of Irish face in processing the written language. We will argue that orthographic regularity, at least as defined in terms of consistency of grapheme-phoneme correspondences, **cannot** be equated with transparency. We

begin with necessary background on the Irish educational context, and briefly outline current outcomes in reading and general language achievement.

The teaching and learning of Irish reading

The Irish educational setting

Irish is taught to various populations in a number of different contexts. As an obligatory school subject in the Republic of Ireland, it is taught from primary school entry at age 4, and is also compulsory through secondary level in all schools. Primary schools teaching Irish can be grouped into three categories. In the areas known as *Gaeltacht* (officially designated Irish-speaking communities, mainly on the western seaboard) a sizeable proportion of the population (usually half or more) consists of L1 speakers of Irish, although the numbers of L2 speakers continues to grow due to in-migration and shift. Another minority of schools throughout the country, known as *Gaelscoileanna*, are Irish-medium immersion schools in which Irish is the medium of instruction but most pupils speak English as an L1 (*Gaelscoileanna* are also found in Northern Ireland). In 95% of Irish schools, however, English is the L1 of the majority of pupils and the medium of instruction except during the Irish lesson, which constitutes just one of 12 subjects taught at the primary level.

There are also growing numbers of adult learners both in Ireland and throughout the diaspora, in university and community education settings as well as through independent study (cf. Ó Conchubhair, 2008). Although some of the discussion below may have relevance to the other educational settings and learner populations, the focus of attention in this paper is on the great majority of schools where Irish is taught as a subject and is not the medium of instruction;

all future mention of Irish classrooms, teachers and pupils, as well as the outcomes and issues to be discussed below, should be read as referring to these.

Reading in L1 and L2 – Irish outcomes

Our previous examinations of teacher interviews (Stenson and Hickey, 2014a, Hickey and Stenson, 2016) showed significant differences between the ways reading is taught in English and in Irish in Irish primary schools. For example, while most English-medium schools offer phonics instruction in English, teachers reported little or no attention to phonics in teaching Irish. It is our contention that this can be attributed to a strong underlying assumption among educationalists and curriculum planners that reading is a single transferable skill, and that the phonics principle, once learned in the native language, will transfer to the L2 automatically and produce accurate decoding of that language. Thus, this assumption rests on the twin pillars of belief in the sufficiency of (spontaneous) positive transfer of reading skills from English to Irish, and on the conviction that the transparency of the Irish spelling system should make it 'easy' to learn to read Irish even with little teaching of Irish-specific decoding. We argue that this underlying assumption is not based on examination of the evidence, but that educational planning in Ireland *operates as if* this assumption were true, and that this can be seen in the failure to prepare teachers to teach decoding skills in Irish, which is also linked with other assumptions about the need to focus on oral skills in Irish primary classrooms and conflicting priorities in teacher education. The main evidence for this assumption is discussed here in relation to current practices and outcomes in teaching Irish reading and teachers' perceptions: both teachers and teacher educators indicate that little preparation is provided for Irish-specific reading instruction. Moreover, teachers repeatedly expressed a lack of confidence in how to proceed, and most were

unaware of the instructional materials using a phonics approach to Irish that exist for this purpose. In this article we will present linguistic evidence that shows the urgent need for educationalists to review the faulty assumptions underlying the teaching of reading in Irish.

We argue that teachers need preparation for a more systematic approach to teaching Irish decoding skills – the explicit connection of Irish sounds with particular spelling patterns — for a number of reasons. First, several decades of reading research show that the greater a beginning reader’s phonological awareness, the better that learner’s reading fluency will be (Adams, 1990; Ehri, 2007, Ellis, 1997; Stuart, Masterson and Dixon, 1999). Phonics instruction has long been known to help with development of such awareness and therefore with reading fluency and comprehension (Chall, 1983; Pikulski and Chard, 2005).

It is important also to recognize that beginning readers of a second language face additional challenges. Bernhardt (2003) argued that L2 reading is necessarily a different process from L1 reading. Other studies have shown that the smaller vocabularies and lower fluency of L2 learners can short-circuit their reading efforts. Ijalba and Obler (2015) found L1 effects in L2 reading, even when the L2 orthography is relatively transparent. In the case of Irish, which most pupils encounter only in the classroom for a few hours a week during the school year, even the three year head start on oral Irish before reading is introduced can leave them at a significant disadvantage, especially since their English literacy is only partially developed when they begin reading Irish. Studies such as Hickey (1991) show pupils’ reading speed to be much slower in Irish than in English even after several years, a situation that can feed what has been called the Matthew Effect (Stanovich, 1986), whereby good readers reach a threshold from which they can move ahead quickly, while weak readers fall farther behind, becoming frustrated and eventually giving up.

Third, the assumption, reflected in the *Revised Irish Curriculum* (1999) guidelines, that literacy skills already learned in English will transfer to Irish is, as we have argued previously and will elaborate below, not entirely justified, because similarities in the Irish and English orthographies are relatively superficial. While the two languages share the Roman alphabetic system and roughly similar values of the consonant letters, giving Anglophone learners of Irish an edge over learners of languages like Russian, Arabic, or Japanese, the same symbols often have quite different phonological values (to be detailed below), thus presenting the possibility that negative transfer –not positive—may be the stronger influence on Irish L2 readers (cf. Odlin, 1989). As Bialystok (2007:45) points out, although general cognitive skills related to reading can transfer from L1 to L2, “others, such as decoding, are more language-dependent and need to be relearned with each new writing system.” Despite using a subset of the same letters as English, the Irish system is, as we will show below, quite different, and would benefit from being taught explicitly in conjunction with the significant phonological differences between the two languages.

Analysis of Irish spelling

Hickey and Stenson (2011) showed that spelling of the most frequent 100 words in a corpus of Irish children’s books (excluding textbooks) is fairly regular, and therefore decodable to a large extent. We compared the findings for Irish with the similar English corpus described by Stuart, Dixon, Masterson and Gray (2003), finding 71% regularity in Irish as opposed to 54% in the English corpus. Here we report on an expansion of that study to a larger segment of the corpus, examining the notion of regularity more closely and considering other features of spelling that may affect readability of a text for Anglophone learners of Irish.

Corpus of Irish Children's books

A corpus of Irish children's books (*Corpas na Leabhar Gaeilge do Pháistí*, henceforth CLGP) assembled by the second author (Hickey, n.d.) comprises Irish books aimed at preschoolers and children in primary school (up to about age 14); this includes fiction and non-fiction, but excludes textbooks for teaching other subjects in Irish-medium schools. As far as possible, texts were corrected to bring them into line with the final book (electronic texts were frequently not the final version of the text published). Where books included a glossary of terms (a recent, but fairly rare occurrence), the Irish words were retained in the text but the English gloss was excluded. Any text aimed at adults (e.g. the cover 'blurb') and publishing details (printer, page numbers, etc.) was excluded. Series from Northern Ireland (publisher *Áisaonad*) were included and the recent reading scheme, *Séideán Sí*, developed by *An Gúm* for Irish-medium schools was also added up to the level available. Some of the Irish books are translations of English or other language originals while others are published only in Irish, but it must be borne in mind that this is a minority language with a relatively small publishing base. The total CLGP includes books to be read aloud to young children, early readers and stories, as well as longer 'chapter' books aimed at mid-teenage readers. In all, this corpus comprises 761,779 word tokens, and 27,816 word types.

Methods

Here, we report on findings for the 1000 most frequent words of the CLGP analysing phonological correspondences to spellings for each of the three major Irish dialects (organized by province: Munster, Connacht, Ulster).ⁱⁱⁱ For each word on the list, phonetic transcriptions were recorded for as many words (excluding names) as can be found in dialect studies that

provide phonetic information. Native speakers, dialect scholars, and online dictionaries with recorded pronunciations were consulted to check uncertain transcriptions and to fill in words and morphological forms appearing in the corpus but absent from published sources.

Apart from names, relatively few words were absent from the monographs consulted, although some are not found in all dialects. The literature contained dialect specific forms (e.g. <conas> ‘how’, found only in Munster, or <céard> ‘what,’ limited primarily to Connacht). We removed any words that were unattested in all of our sources, along with proper names, and filled in with the next words on the list to bring the total back to 1000. Phonetically different transcriptions were considered equivalent across dialects if they consistently serve the same phonemic function (e.g., alveo-palatal affricates in Ulster Irish are equivalent to slender dentals in other dialects, and the phonetically long low front vowel of Connacht and Ulster is equivalent to the central vowel found in most Munster transcriptions).

Each of the pronunciations attested in each dialect was analysed by letter-sound, grapheme-phoneme, and rule-based regularities. Regularity was thus established on several levels as elaborated below. Word length was calculated in terms of syllable structure and letter-phoneme ratios per word, and sources of mismatch were identified.

What counts as regular in Irish?

As no models exist for establishing what counts as regular in Irish, we had to develop our own criteria. Dialect variation must also be taken into account, since learners of Irish outside the *Gaeltacht* (i.e., most learners) may encounter multiple dialects from the beginning of their language study. Indeed, the target dialect in English-speaking areas may not align completely with any single *Gaeltacht* variety, but may be a composite of pronunciations, depending on

where and how teachers learned their own Irish. Since Irish is a second language for most teachers, English influence may play a role.

In comparing dialects, we abstract away from intra-dialect variations attributable to fast speech phenomena, elisions, assimilations to phonological context, and idiosyncrasies of particular scholars' transcription practices. Variations of vowel length and consonant quality were ignored where they do not serve a grammatical function (such as marking case or number), domains where Ó Cuív (1944/1988) notes a tendency to individual variation; similar variation is apparent in the transcriptions for other dialects as well, without altering the phonemic status of the forms.^{iv} Likewise, occasional variations in voicing, and elisions of unstressed vowels are ignored unless known to be systematic, as the full pronunciation represented in spelling is always possible, even if not realized in every context.

We considered dialect-internal regularities before comparing dialects. We define a regular spelling as one for which a phonetic value of that spelling occurs as the dominant pattern in the dialect under consideration, in a majority of the most frequent words from the corpus; pronunciations that deviate from this norm are considered irregular. If multiple pronunciations are attested in a dialect (whether due to intra-provincial or individual variation), the spelling is counted as regular provided one of the attested pronunciations fits the pattern. A spelling is considered regular for the language as a whole if it has been identified as regular in at least half the dialects for which a phonetic form appears in the sources consulted. This leads to a rather conservative view of regularity compared with the many published linguistic analyses of Irish (e.g., Ó Siadhail, 1989, Ó Siadhail and Wigger 1975, de Bhaldraithe 1975, R. Hickey 2011, 2014 and the dialect studies cited in note ii). Although many minority pronunciations are linguistically regular by the application of fairly abstract phonological rules described in these

and other works, it would not be reasonable to expect L2 speakers without linguistic training (including most primary teachers) to control these, and certainly not schoolchildren just beginning to learn the language. Therefore, only the most concrete and widespread phonological patterns are considered to be regularities, as discussed further below. Once command of these very general patterns is acquired, it is assumed that more detailed analysis will enable learners to see the more abstract patterns that underlie some of these apparent violations. But too much abstract detail at the early literacy level with which we are concerned here would be counterproductive. For those interested, details of the possible orthographic realisations of each phoneme are provided in Appendix A.

As a further benchmark of regularity, we examined the pronunciations provided for the *Lárchanúint* [literally Central Dialect, but perhaps more appropriately Core Pronunciation], as found in the *Foclóir Póca* [Pocket Dictionary] (1986 [2001]), where regularity in recommended pronunciations exceeds 93%. These pronunciations were proposed in the 1980s as a model for teaching Irish as an L2, both for consistency and to reflect the fact that most teachers are not native speakers of Irish and may have pronunciations that do not consistently represent any single Gaeltacht dialect (see Ó Baoill 1986, 1990). Although the *Lárchanúint* has not, to our knowledge, been formally adopted as a teaching norm by the Department of Education, it is likely that many L2 pronunciations approximate it, as the *Foclóir Póca* is the most accessible source of pronunciation guidelines for Irish and a widely used resource for learners (including teachers) of Irish. However, *Lárchanúint* pronunciations shown in *Foclóir Póca* also include a number of recommendations not found in any native Gaeltacht dialect (e.g., /ob'r'ə/ for <oibre> ‘work (gen.),’ /ənos/ for <anois> ‘now’), which increase its regularity but are unlikely to be

learned even in L2 settings. Given that the *Lárchanúint* has not been officially adopted as the norm for L2 instruction in Irish, we will not discuss it further here.

In the analysis presented here, a word was scored as regular if it was judged to be regular in the majority of the three dialects in which it attested in our sources. Caution must, however, be exercised in interpreting the numbers reported, as these cannot with certainty be taken as indicating how consistent speakers' vocabulary would be in any single dialect. In determining regularity for each dialect, we have taken a step-by-step approach following Stuart et al. (2003). We begin with the most clear-cut cases of direct one to one phoneme-letter correspondences, followed by more complex correspondences, considering English analogues where possible to establish an intuitive notion of regularity that allows comparison across the two languages. We begin here, after an overview of Irish phonology, by examining basic orthographic rules of Irish for both single letters and digraphs, and then consider phonological rules that systematically alter pronunciations from what the orthographic rules alone would lead one to expect. Inclusion of such rules increases the regularity still further. Precedent for including such rules (e.g., the silent final *e* that signals a lengthened or diphthongised vowel) can be found in standard analyses of English spelling (e.g., Cook, 2004; Crystal, 2012; Venezky 1970). In the final section, we will consider some reasons why, despite the high level of regularity found in the corpus, Irish spelling cannot be dismissed as easy to learn or unnecessary to teach. Appendices A and B provide a summary of the orthographic representations of Irish phonemes and grapheme-phoneme rules for decoding written forms, including the frequencies with which each spelling appears in the data.

Phonological overview

Before proceeding to discussion of the orthographic patterns, a brief introduction to the phonology of Irish may be helpful. The number of phonemes in Irish varies across regional varieties and particular analyses; for example, Ó Sé (2000) identifies 45 phonemes in Corca Dhuibhne Irish, whereas Ó Raghallaigh (2013) gives 48 for the same dialect and 60 for Gaoth Dobhair. Consonants are found at labial, dental/alveolar, palatal and velar points of articulation; stops and most fricatives contrast for voicing (there is no voiced sibilant). There are no phonemic affricates, although some are found phonetically in certain regions. The central fact differentiating the Irish sound system from that of English is that each consonant symbol represents two phonemically distinct Irish sounds, differing in most cases by secondary articulation.^v The consonants traditionally known as *slender* have a palatal quality; those known as *broad* are usually velarised or plain. In what follows, this distinction will be referred to as *consonant quality*, following standard descriptive usage. Following standard Irish transcription practice, the palatal quality of slender consonants is identified by a following ' , while broad consonants are unmarked. A difference in consonant quality may be the only thing distinguishing two lexical items; minimal pairs illustrating the distinction include /bo t <bó> 'cow' vs. /b'o:/ <beo> 'alive', or /su:l'/ <súil> 'eye' vs. /s'u:l'/ <siúil> 'walk'; in medial position, /balə/ <ball> 'wall' contrasts with /bal'ə/ <baile> 'home, village'^{vi}.' In word-final position, contrasts of quality can serve morphological functions, distinguishing for example number and case, as in /ba:d/ <bád> 'boat' - /ba:d'/ <báid> 'boats' or 'boat (genitive)'. The challenge that this dual series of consonants poses for Irish spelling and decoding will be seen below. Another consonant domain in which dialects differ phonologically from each other and from English is that some retain certain historical tense sonorant consonants (liquids and nasals), which may differ phonemically

from their non-tense counterparts, although this distinction is in the process of disappearing and is completely gone in some dialects, e.g., in the southern province of Munster.^{vii} An example of the contrast from West Connacht is /bil'ə/ <buile> 'rage' - /biL'ə/ <buille> 'a blow', where the upper case is used in Irish phonetic transcriptions to identify uniformly any tense consonant regardless of articulatory details, a practice we will follow here, with phonetic explanations provided as needed. In this case /L'/ is a palatal lateral [ʎ].

Vowel length is phonemic, as the following pairs indicate: /t'e/ <te> 'hot' - /t'e:/ <té> 'person'; /do/ <do> 'for' - /do:/ <dó> 'burning'; /s'in'/ <sin> 'that' - /s'i:n'/ <sín> 'stretch'; /ka/ <cath> 'battle' - /ka:/ <cá> 'where'; /kulə/ <culaith> 'suit' - /ku:lə/ <cúlaigh> 'back up.' In addition to these 10 vowels, most dialects have one or more reduced vowels, found in unstressed syllables, and additional vowels have evolved in some regional varieties. All reduced vowels will in this article be represented as schwa. Phonetic details of the vowel phonemes vary considerably across dialects, but these do not alter the phonemic contrasts in most cases, and will not be dealt with further here. Details of the phonetic manifestations of Irish phonemes can be found in numerous phonological studies (e.g., Ó Siadhail and Wigger 1975, Ó Siadhail 1989, Ó Baoill 1987, Ní Chasaide 1999, Ó Raghallaigh 2013, R. Hickey 2011, 2014) and specific dialect monographs such as de Bhaldraithe (1975) and Ó Sé (2000), among many others. O'Rahilly (1932) and Mac Eoin (1993) provide historical perspectives on phonological developments.

Most words are stressed on the initial syllable, with unstressed short vowels reduced to schwa. Additionally, in Munster dialects, stress shifts regularly to a second-- or third-- syllable containing a long vowel or final <ach>, when the initial vowel is short (cf. Ó Sé, 2000, R. Hickey 2011 for details). We treat all these patterns as regular pronunciations, which will be learned according to the dialect being taught. In Ulster, unstressed vowels are reduced less

consistently than in other dialects, and are counted as regular whether pronounced with their orthographic value or as schwa. Likewise, unstressed long vowels may be shortened in closed syllables in Ulster dialects; both long and short pronunciations are counted as regular. Two kinds of stress pattern in the corpus count as irregular. In the first case, stress falls on a non-initial syllable, and is not due to the Munster shift, or is generalized to dialects outside Munster. Examples in (1) are from the corpus of children's books (CGLP), and all of these have second-syllable stress:

(1)	<isteach>	/əs't'ax/	'inward'
	<amháin>	/əva:n'/	'one'
	<tráthnóna>	/tra n̪u:nə/	'afternoon, evening'
	<amárach>	/əma:rəx/	'tomorrow'

The second class of stress exceptions is especially common in the 100 most frequent words of the corpus: the group of high-frequency monosyllabic function words with inherently unstressed reduced vowels, including <an> 'the', <i> 'in', <do> 'to, for,' etc. Since learners encountering new words in text cannot be expected to know which unfamiliar monosyllables have stressed vowels and which do not, the unstressed vowels must be learned individually. As discussed in Hickey and Stenson (2011), however, even these irregularities of word stress are patterned to a large extent, and can therefore be taught.

Orthographic Rules

The following 18 letters of the Roman alphabet are used in writing Irish:

(2) <a, b, c, d, e, f, g, h, i, l, m, n, o, p, r, s, t, u>

Long vowel phonemes are usually represented by an acute accent (known as *síneadh fada* or just *fada*) over the vowel. Thus, /o/ and /oː/ are typically distinguished as <o>, <ó>, respectively. Adding the five symbols <á>, <é>, <í>, <ó>, and <ú> to the inventory above gives a total of 23 letters, used to represent around 50 phonemes or more, as noted above. To handle this fairly dramatic mismatch between number of symbols and number of phonemes, an elaborate system of complex graphemes has evolved, using digraphs and trigraphs to distinguish similar but distinct phonemes without their own single symbol and to reflect the phonetic relations among phonemes and the contexts in which they appear.^{viii} Additional vowel digraphs have resulted from historical changes to the language and now overlap with the long vowels marked by diacritics, as described below.

The orthographic rules in this section specify the grapheme–phoneme correspondences that hold across most words in all dialects, ignoring phonetic details of dialect variation. With the major proviso to be discussed in the next section, letters have essentially their International Phonetic Alphabet (IPA) values. Additional Irish-specific spelling rules alter the standard IPA values of the letter symbols.

Consonant quality

The most pervasive rule of Irish spelling is *caol le caol, leathan le leathan* [slender with slender, broad with broad]. This has a wide-ranging influence that affects the entire spelling system. The rule, which refers to written symbols, specifies that adjacent vowel and consonant letters must agree in quality; slender (palatalised) consonant phonemes with orthographic front vowels (slender by definition) and broad (velarised) consonants with back vowels. Thus, vowel graphemes serve a dual function, indicating both quality of adjacent consonants and vowel

phonemes. When the pronounced vowel and consonant match in quality (e.g., <bád> /ba d/ ‘boat’, <tirim> /t’ir’əm/ ‘dry’), the vowel symbol represents simultaneously both the pronounced vowel and the quality of surrounding consonants; nothing additional is needed. But when they do not match, an additional orthographic vowel is added to separate a slender consonant from a phonetic back vowel or a broad consonant from a front vowel. The contrast is illustrated in Example 3.

(3)	Broad		Slender			
	<bád>	/ba:d/	‘boat’	<báid>	/ba:d’/	‘boats’
	<buí>	/bi:/	‘yellow’	<bí>	/b’i:/	‘be’

This rule explains the vowels in bold above, the <u> in <buí> and the <i> in <báid>, which are not pronounced independently, but which form a phonological unit with the adjacent consonant to signal its quality, which in these cases is not discernible from the pronounced vowel. The vowel digraphs to be discussed next serve a similar function of signalling consonant quality in the contemporary language, although their historical origins vary.

Long vowel digraphs: <ao>, <ae>, <eo>

Derived historically from diphthongs among other sources, certain sequences of vowel letters consistently represent long vowels identical to those represented elsewhere by the usual symbols plus síneadh fada. The sequence <ao> is pronounced as /e:/ in Munster and as /i:/ in Connacht and Ulster, <ae> represents /e/, and <eo> represents /o:/. The quality of the vowel letters as defined above also identifies the quality of the surrounding consonants, such that, <eo>, for example, will always be preceded by a slender consonant, in contrast to <ó>. All three of these

digraphs may also appear initially before slender consonants, in which case an added <i> signals the slender articulation; word-finally <aoi> normally replaces <ao>; see Table 1.

INSERT TABLE 1 ABOUT HERE

The letter <e>

It is a quirk of modern Irish spelling that the graphemes <e> and <é> appear alone only in final position, as in <te > /t'e/ 'hot' or <mé> /m'e:/ 'I, me.' Except where the digraphs described above are used, the phonemes /e/ and /e:/ when followed by a consonant are written as <ei>, <éi>, <ea> or <éa>, depending on the quality of the following consonant (see Example 4).

(4)	<i><beag></i>	/b'eg/	'small'	<i><deis></i>	/d'es'/	'opportunity, right hand'
	<i><déag></i>	/d'e g/	'teen'	<i><Déise></i>	/d'e:s'ə/	Placename

The pronunciation of <beag> is actually exceptional. In practice, as shown in example 5, the phoneme /e/ is rarely found before a broad consonant as is the case here; instead the sequence <ea> usually represents a phonemically short low vowel between a slender and a broad consonant (ranging phonetically between [a] and [æ] depending on dialect).

(5)	<i><bean></i>	/b'an/	'woman'
	<i><fear></i>	/f'ar/	'man'
	<i><ceapaim></i>	/k'apəm'/	'I think'

The digraph <ea> may also appear initially, or even alone, as in the pronoun <ea> /a/ 'it.' For this reason, we treat the sequence as a vowel digraph along with the other spellings of

/e/, /e t/, rather than as a vowel <a> plus a <Ce> digraph signalling consonant quality (to be discussed further below).

The spelling rules applied

Before moving to the phonological rules that make spellings more opaque, we will examine in greater detail those words in the corpus that can be read from these spelling rules alone.

Letter–sound mappings

In the clearest and most direct instances of regularity, one letter corresponds to a single phoneme. Examples from the CGLP are given in (6).

(6)	<agam>	/agəm/	‘by me’
	<fad>	/fad/	‘distance’
	<mise>	/m’is’ə/	‘me (emphatic)’
	<trí>	/t’r’i’:/	‘three’
	<óg>	/o:g/	‘young’
	<tirim>	/t’ir’əm’/	‘dry’
	<níl>	/n’i:l’/	‘is not’
	<cur>	/kur/	‘putting’
	<sásta>	/sa:stə/	‘satisfied’

In all, 158 of the 1000 most frequent words are regular by simple letter-sound correspondence in this way. Most are monosyllables, but there are a few longer words as well, which requires brief consideration of Irish stress patterns. Normally, stress is word-initial and unstressed short vowels are reduced to schwa (phonetic details vary with the surrounding consonant quality). In our analysis of regularity by orthographic rules, we treat non-initial

unstressed (reduced) vowels in polysyllabic words as regular. With this assumption, among the most frequent 1000 types from this corpus, the 158 words displaying letter-sound regularities constitute just under 16% of the total, well below the 25% regularity of the top 1000 in the English comparison corpus.^{ix} Far more frequent in Irish, however, are regular spellings that require complex graphemes including the diacritic uses described above for signalling consonant quality and others to be discussed in the next section. Following Stuart et al (2003), the full set of regular spellings, including both simple and complex graphemes, will be referred to as grapheme–phoneme mappings.

Phoneme-grapheme mappings

Regular phoneme-grapheme correspondences include those containing digraphs, i.e., sequences of two (or more) letters representing a single sound. Although digraphs are familiar in English (<ch>, <th>, <sh>, <ie>, <ea>, etc.), Irish words display many more, a factor likely to contribute to learners' difficulties in mastering Irish reading. In addition to the vowel digraphs described above, rules giving the values of other complex graphemes are detailed in this section.

Mutations

Perhaps the most accessible digraphs for learners (in the sense that they are both most visibly salient and most often explicitly taught) are those that result from the spelling rules governing Irish initial mutations. Triggered by a wide range of grammatical and lexical contexts, Irish initial consonants undergo systematic changes, represented in spelling by complex graphemes simultaneously showing the citation form of the consonant and its post-mutation pronunciation. These are illustrated in Table 2. Lenition, the commonest mutation, is marked by placing an <h>

after the affected consonant, signalling an original articulatory weakening of the original consonant, and deletion of <f>; subsequent sound changes have complicated some of these pronunciations, as Table 2 shows. Both broad and slender consonants are affected by the mutations, but are not represented separately in the table. Historically, lenition also applied postvocally within words, so these spellings are also found in the contemporary language word-internally and finally.

INSERT TABLE 2 ABOUT HERE

The second major mutation, appears orthographically only in initial position, and involves voicing of a voiceless consonant and nasalisation of a voiced one, marked in spelling by placing the symbol for the new pronunciation before that of the citation form. A related spelling, found in slightly different contexts from the usual eclipsis mutation (sometimes called ‘nasalisation’), replaces an /s/ or /s'/ by /t(‘)/, as in <srón>/<an tsrón> ‘(the) nose’. Of 244 words with an initial mutation in the 1000 analysed, only 34 appear in eclipsed form, and 4 with prefixed /t/.

Caol le caol revisited

A second source of digraphs results from the application of the *caol le caol, leathan le leathan* rule and the related use of vowel digraphs in certain consonantal environments, described above. This results in spellings of the sort seen in Table 3, arguably the least accessible aspect of Irish spelling. The digraphs established for the long vowels (e.g., <ao>, <ae>, <eo>) are not included here, as they are considered orthographic vowel units as described above; the sequences in this section, which do not reflect concomitant vowel lengthening, are treated for analytic purposes as forming digraphs with the consonants they mark; they do not affect the pronounced vowel

beyond whatever phonetic transition effects may result from the consonant articulation itself. Digraphs are presented in bold in Table 3.

INSERT TABLE 3 ABOUT HERE

We acknowledge that a number of potential alternative approaches could have been adopted, as an anonymous referee has pointed out, for capturing the orthographic use of vowels to identify consonant quality. In fact, while we analyse sequences like <id> and <bu> as phonological units representing consonant quality, we do not assume that such an analysis is necessarily the best pedagogical approach, or the most psychologically salient for L2 learners. In teaching learners to decode Irish words, we adopt a pragmatic position regarding early focus on areas that offer learners the best return for their effort. Thus, it makes more pedagogical sense to take the written vowel sequences as a starting point and compute their phonological values, mapping <ai, eoi, ui, eai>, etc, to single vowel pronunciations, with the consonant quality computed separately from the surrounding vowel graphemes. This approach is reflected in the rules for decoding presented in Appendix B.

Double sonorants

Most sonorant consonants can be doubled in Irish spelling. Historically, these doubled consonant digraphs represented consonant phonemes distinct from those represented by single graphemes (longer, tenser, sometimes with different point of articulation), but the distinctions are disappearing in most dialects. In our analysis, double consonant spellings are treated as regular, regardless of whether they represent distinct sounds in a particular dialect. The presence of such consonants, however, often has an effect on the preceding stressed vowel, to be discussed in the next section. In example 7, the consonant pronunciation may or may not differ from the single

letter spelling, but the preceding vowel is unaffected by doubling. Transcriptions reflect Munster pronunciations, where single and double consonants are phonemically identical.

(7)	<rinne>	/r'in'ə/	'did'
	<linn>	/l'in'/	'with us'
	<iarraidh>	/iərə/	'attempt'
	<tamall>	/taməl/	'a while'

Diphthongs

Finally, the diphthongs /iə/ and /uə/ are regularly spelled <ia> and <ua>, respectively, as shown in example (8).

(8)	<bia>	/b'ia/	'food'	<nua>	/nuə/	'new'
	<siar>	/s'iaɾ/	'westward'	<slua>	/sluə/	'crowd'
	<bliana>	/b'l'iaɲə/	'year'	<chuala>	/xuələ/	'heard'
	<iad>	/iəd/	'them'	<suas>	/suəs/	'upward'
	<riamh>	/riəv/	'ever'	<luath>	/luə/	'early'

Other diphthongs are more complex, being derived from sequences of a vowel and lenited consonant, as shown in example 9.

(9)	< labhair >	/laur'/	'speak'
	< damhsa >	/dausə /	'dance'
	< radharc >	/rairk/	'view'
	< staighre >	/stair'ə/	'stair'

These are considerably more variable, both across and within dialects, but are counted as regular when they form diphthongs as in (9). If we include these regular correspondences between digraphs and phonemes as constituting regular spellings (as Stuart et al. 2003 do for English), total grapheme-phoneme regularity rises to 65%, substantially above the 59% in the English children's corpus.

Decoding Rules

Regularity increases still more dramatically when we consider regular patterns of Irish phonology and dialect variation. For another 186 words, pronunciation deviates from the expected value of particular graphemes taken in isolation, but that pronunciation is entirely predictable from the operation of context-sensitive rules mapping spellings to sounds. Some of these are synchronic phonological rules that apply widely across dialects; others reflect diachronic processes that have differentiated dialects over time, but the patterns are sufficiently consistent and widespread that it makes little sense to treat them as irregular in the dialects where they occur, as their systematicity enhances learnability (see Kessler 2009 for discussion of young readers' sensitivity to context-sensitive sound-spelling patterns in English.) Since our goal is not to describe the phonological system of Irish (amply done elsewhere), but to present patterns of regularity for purposes of decoding written Irish, the two types of process need not be distinguished here. The rules identified below are consistent with, but less abstract than rules proposed in linguistic grammars of Irish, such as Ó Siadhail (1989), Ó Siadhail and Wigger (1975). Because the rules presented here are intended to inform training in, and the provision of materials for, Irish literacy education at the primary level, we adhere more closely to the orthographic forms rather than proposing abstract underlying representations that might cover a

more complex variety of dialect variation and subregularities, and do not therefore include a number of minor rules identified by, e.g., Ó Siadhail (1989).

Two rules apply widely and consistently within and across dialects: vowel lengthening before sonorants, and epenthesis, each of which is discussed below.

Vowel lengthening before sonorants

In all dialects certain vowels unmarked by a *síneadh fada* [length mark] are regularly lengthened or diphthongised before double sonorants and single <m> in closed syllables. Lengthening also applies to single sonorants before another consonant, but not word-finally. As usual, details vary by dialect, but the pattern is consistent, at least in Munster and Connacht. Lengthening is less consistent in Ulster, where double sonorants are more often retained instead as tensed consonants, distinct from their single grapheme counterparts (Table 4).

INSERT TABLE 4 ABOUT HERE

Epenthesis

In certain final (and some medial) consonant clusters consisting of a sonorant and another non-dental sonorant or voiced obstruent, a schwa is inserted in pronunciation after short vowels, although no vowel is present in spelling, as shown in (10).

(10)	<orm>	/orəm/	‘on me’
	<ainm>	/an’əm’/	‘name’
	<dearg>	/d’arəg/	‘red’
	<airgead>	/ar’əg’əd/	‘money, silver’
	<madra>	/madərə/	‘dog’

Less regularly, the rule applies before voiceless consonants, as in <dorcha> ‘dark.’ Not many such words appear in the corpus, but numerous others are likely to be encountered fairly early by learners, so this is a rule worth knowing and teaching.

Other patterns are somewhat less universal, but are sufficiently widespread and consistent to be considered as teachable regularities by teachers who speak the relevant dialects. These include nasal raising, final consonant deletion, delenition of certain final consonants, and a shift of /n/ to /r/ following a consonant.

Nasal Raising

In Connacht and Munster (and more rarely Ulster) a regular pattern of raising vowels in the vicinity of (historical) nasals is attested. An orthographic mid vowel (<e>, <é>, <o>, or <ó>) is pronounced as high: /i()/, /u(:)/. The outcome, in terms of mapping spellings to sounds is that vowels written as mid are pronounced as high. The rule applies most consistently in Connacht, but is quite widespread in Munster too, where it is frequently accompanied by diphthongisation before a consonant. Examples from the corpus include the following: ^x

(11)	a.	<liom(sa)>	/l'umsə/	‘with me’
		<nó>	/nu:/	‘or’
		<tráthnóna>	/tra:nu:nə/	‘afternoon’
	b.	<déanta>	/d'i:ntə/	‘done’
		<greim>	/g'r'i:m'/	‘bite’

Final consonant deletion

A number of final (historically lenited) consonants, especially <th> /h/, are often unpronounced or reduced to a glide in final syllables (only slender consonants in unstressed syllables in the case of the labials <bh>/<mh>) or before words beginning with a consonant, but are retained in spelling because the consonant is audible before a vowel and in careful speech. This rule is most widespread in Connacht and Ulster, but also applies in Munster, especially to <th> and <mh> (see below for another Munster-specific rule). Occasionally within words, deletion of /h/ is replaced by metathesis of the /h/ (usually written <th> with the following consonant, so that the /h/ is heard following the consonant, as in <tráthnóna> : /tra n̪ho:nə/. These, too, are treated as regular here, as they often alternate with forms showing deletion.

INSERT TABLE 5 ABOUT HERE

Deletion

In Munster Irish, when the final consonant is slender <dh> or <gh>, it is not deleted but rather delenited and pronounced as /g'/, as in <chuaigh>, pronounced /xuə/ in Connacht, /xui/ in Ulster, but /xuəg'/ in Munster. Similarly <réidh> is /re:/ in Connacht, /re:i/ in Ulster, but /reg'/ in Munster.

Denasalisation

In Connacht and Ulster, <n> (broad or slender) is pronounced /r/ following another consonant in syllable onsets (and sometimes medially), as in <mná> 'women' (/mna:/ in Munster, /mra:/ in Connacht/Ulster) or <imní> (/i:m'r'i:/ in C/U, i:m'n'i:/ in M).. Although examples are rare in the 1000 word subcorpus, the pattern is quite consistent throughout the language and is found in other common words likely to be encountered early in SLA.

Inclusion of spellings subject to these rules in the class of regularities brings the total to nearly 84% regularity among the most frequent 1000 words. On the most generous possible interpretation of regularity in English, which includes as regular words displaying context sensitive patterns such as pronunciation of <igh> as /ai/, phonologically ambiguous words like <wind>, and consistent phonological processes like intervocalic voicing of /s/ and palatalisation of /k/ and /g/ before front vowels, the regularity in the most frequent 1000 words of English is still only 52%.

Beyond Regularity

While Irish compares favourably to English as regards regularity, we can see from this analysis that as the regularity increases, so does the number and complexity of rules needed to decode the pronunciation, increasing the burden for learners. This, coupled with contrasts between Irish and English complex graphemes, can help explain the difficulties that learners face despite the high regularity of the spelling rules. A number of potentially challenging orthographic features of Irish can be seen in the data, suggesting that there is more to understanding orthographic depth than simple regularity of sound-symbol patterns.

As the research cited in the introduction has shown, more is involved in reading than sensitivity to regularity and consistency. Space does not permit a thorough discussion of all the factors that have been identified as affecting readability; we will focus here on Irish-specific features linked to the rule patterns just described. Among the orthographic features that differentiate Irish from English are word length, the number and values of digraphs, syllable structure, and the ratio of graphemes to phonemes within words.

Word length and type

Only eight words in the most frequent 100 of the English corpus are classed as content words (nouns and adjectives); similarly the Irish corpus contains 9 nouns and adjectives in the first 100. Stuart et al. (2003) treat as function words both auxiliary verbs and “verbs with general meaning,” including forms of <go>, <come>, <look>, <see>, <get>, <put>, <say>, <help> and <want>, in addition to the auxiliaries, <be>, <have>, <do> and modals, an exclusion which seems somewhat artificial in the Irish context, where the auxiliary versus main verb distinction is less robust and where occurrences even of <bí> ‘be’ are rarely used in auxiliary function in the corpus fragment (evident from the paucity of verbal nouns in the list). If the verbs above are excluded from the inventory of function words, then the ratio of function words to content words is higher in Irish.

According to Stuart et al. (2003), 91 of the 100 most frequent words in their English corpus are monosyllables, and only nine are disyllables. Among the most frequent 100 words of the Irish corpus there are 18 disyllables. More importantly, as word length increases in Irish, so does the discrepancy between visual length and phonemic length. This discrepancy is a function of the graphemic complexity of Irish described by the orthographic rules presented in previous sections. The implications of this are significant, as shown below.

In terms of syllable structure, also identified as a factor in reading ease, the most frequent 100 words of the English corpus show seven syllable types: V, VC, VCC, CV, CVC, CCVC, CVCC. The Irish corpus has five types in the first 100 words: V, VC, CV, CVC, and CVCC. The Irish distribution is flatter than that of English, with fewer pronounced consonant clusters and fewer closed syllables (27 in Irish, 61 in English). But the complexity of the Irish syllable structure increases considerably when we expand to the most frequent 1000 words of the

corpus, with seven new syllable types appearing (VCC, CCV, CCVC, CCVCC, CCCV, CCCVC, CCCVCC) and a much higher percentage of closed syllables, 628 of the next 900 words (1490 syllables), or over 40%. Moreover several forms vary across dialects between closed and open syllables, both of which learners are likely to encounter in their schooling. Finally, the next 900 words include 424 disyllables and 33 trisyllables. In comparison, the next 900 words of English add only 288 disyllables (but also 34 three-syllable and two four-syllable words). This means that 2/3 of the English top 1000 words are monosyllabic, while just over half of the Irish words are, giving Irish readers longer words with more complex syllable structures to decipher in the early stages of literacy. Additionally, Irish has more unpronounced letters than English, which can be potential hurdles for learners, even if they are silent by regular rule or by virtue of forming digraphs.

Digraphs

Both Irish and English rely on graphemes consisting of more than one letter to convey their complex phoneme systems with the limited number of symbols available. Although, as noted above, the Irish digraphs are fairly regular in their values compared to those of English, there are many more of them, especially when the extra vowels to mark consonant quality are taken into account, as they may appear with virtually any consonant. If we exclude the CV digraphs marking consonant quality, the languages do not differ greatly in number of digraphs found in the first 100 words, but the values of the graphemes are completely different in the two languages, as shown in Table 6.

INSERT TABLE 6 ABOUT HERE

Apart from the three consonant digraphs in boldface in the upper left and one vowel digraph in the centre column, there is no overlap in the forms of English and Irish digraphs appearing in the most frequent 100 words of either corpus. Moreover, although these digraphs are found in both languages, their phonetic values are quite different. Both <th> and <sh> are pronounced as /h/ in Irish and <ai> is regularly /a/, whereas in English it is usually /e ɪ/. Similarly, although the Irish spelling <l> appears superficially similar phonetically to that of English (i.e., just like that of <l>), this is deceptive. Not only do some dialects differentiate at least some cases of <l> and <ll> phonetically, it must be remembered that each consonant symbol, including this digraph, represents two Irish phonemes, broad and slender, which are identified by adjacent vowels, so even <ll> is not phonemically identical in Irish and English, although the contrasts may be learned rather late.

Adding CV digraphs for all the possible spellings of broad consonants next to a front vowel and slender consonants next to a back vowel dramatically increases the complexity of the Irish spellings, as shown by the rightmost column of Table 6 (which shows only those found in the most frequent 100 words). Expanding our examination to the most frequent 1000 words hugely increases the number of digraphs (and trigraphs), and even the 1000 word inventory does not exhaust the possibilities for the language as a whole. The number of graphemes to be taught can be reduced if the diacritic vowels identified above are taught as units with the pronounced vowels, as we recommend for decoding instruction (see Appendix B for this treatment), but it is still extremely complex and alien to English speakers beginning the study of Irish.

Letter phoneme ratios

As a result of the greater number of digraphs used in Irish spelling compared to English, the density of digraphs within a word is substantially greater in Irish. Many words may contain one or more mutation digraphs in addition to multiple signals of consonant quality, whether through added vowels, vowel digraphs, or both, to say nothing of diphthongs or double sonorants in any combination. A word like <buachail> ‘boy’ contains all four kinds of digraph.

As an additional measure of complexity, we calculated the ratio of letters to phonemes in the most frequent 1000 words of the Irish children’s corpus and compared them to those in the English corpus. The results are shown in Figure 1.

INSERT Figure 1 ABOUT HERE

A total of 284 words in the most frequent 1000 words of the Irish corpus have a one-to-one letter-phoneme ratio. These include both words identified as regular by letter-sound correspondences, and words counted as irregular (most by virtue of stress or unpredictable vowel pronunciations). The longest five such words contain six letters and phonemes: <agamsa> ‘by me’, <splanc> ‘spark’, <trasna> ‘across’, <ábalta> ‘able’, and <sagart> ‘priest.’ Seven more have a 5:5 ratio (<solas> ‘light,’ <doras> ‘door,’ <ocras> ‘hunger,’ <minic> ‘often’ <móran> ‘much,’ <bosca> ‘box,’ <titim> ‘falling’); the vast majority, however, are 1-4 letter words. This is roughly comparable to the ratio in the English corpus. The number of words with an even ratio of letters to phonemes in Irish decreases dramatically after the first 100 words, however.

Altogether, over 70 % of the 1000 most frequent Irish words are spelled with digraphs, often more than one per word. As the number of words increases beyond the most frequent 100, we see a startling difference emerge in the data from English and Irish. The vast majority of words in the English corpus have only one more letter than phoneme (usually due to the silent

<e> in words like <make>, <come>), and none have more than four extra letters. In contrast, 61 Irish words contain as many as four digraphs, and several have five or six.

Here we have an illustration of what may be the single greatest contribution to the challenge of Irish spelling for English-speaking learners. The following sentences are constructed entirely from the most frequent 500 words in the corpus of children's literature. Each includes several cases of digraphs used to signal adjacent consonant quality, consonant mutations, regular long vowel digraphs like <ao>, final consonants deleted (or strengthened) by phonological rule, and doubled consonants, as well as truly irregular silent consonants, such as the <d> in <codladh> and regular elisions in sandhi positions. While acknowledging that many of the apparently silent letters, those which do not have an obvious phonetic realisation in these examples, do follow predictable patterns, our argument is that most young readers of Irish, whose dominant literacy is in English are more likely to benefit from being taught these patterns rather than being left to deduce them, as is presently the case in many classrooms.

(12) Thosaigh an buachaill ag smaoinreamh uirthi.

/hɔsənbuəxəʎ 'əsmi n'u:or'ə/

'The boy started to think about her/it.'

Irish: 36 letters, 20 phonemes, English: 28:22)

(13) An bhfuil Caoimhín ina chodladh ar feadh an tráthnóna?

/əvil'ki v'i n'ənəxolær'f'antra nɔ Nə/

'Is Kevin sleeping all afternoon?'

Irish: 45 letters, 28 phonemes, English 25:22

(Phonemic transcriptions above reflect the Connacht dialect of Irish.)

Faced with such accumulations of multiple complexities in a sentence, young Irish learners, especially those still building their English literacy and still not fluent in Irish, can surely be forgiven for not finding this system transparent or amenable to the rules of English orthography that they have been learning.

Conclusion

Both English and Irish use orthographies based on the Latin alphabet to represent the spoken languages in print form. However, despite sharing a subset of the orthographic symbols used by English and despite the greater orthographic regularity of the most frequent words in the Irish children's corpus, this study confirms that there is only minimal overlap between the phonemes of English and those of Irish, and in the ways the phonological inventories of the two languages are represented with these shared symbols. It is therefore unreasonable to expect a learner to induce the unfamiliar patterns without assistance, as appears to be the case currently in most mainstream classrooms. Moreover, learners, especially the young learners in Irish schools, who have not yet completely mastered English reading, can be de-railed by the longer words they meet among the more frequent words of the Irish corpus and the higher frequency of complex graphemes. Because of the high level of regularity, however, the patterns can and should be taught, and a vital step towards such teaching is the preparation of such an analysis, leading to the development of material for pre-service training for teachers.

This approach is consonant with proposals in Nig Uidhir (2006) advocating a program for Irish of reading recovery based on the work of Clay (1993). Nig Uidhir presents a number of ideas for assisting struggling pupils in Northern Ireland immersion schools, which might equally be used for all pupils in the English-medium schools of the Republic, where exposure to Irish is

more limited, thus requiring greater teaching efficiency. Materials are available for the teaching of Irish spelling patterns much as they are taught in English, through courses such as *Fónaic na Gaeilge* [Irish Phonics] (BELB 2011), developed for use in the immersion schools of Northern Ireland. These materials are used occasionally in the Republic, both in some *Gaelscoileanna* and by individual teachers in English-medium schools, but this appears to be rare, and it is likely that at least some teachers in the Republic are deterred by the dialect difference and the use of Irish only in the explanatory materials.

The research reported in Hickey and Stenon (2016) indicates that decoding skills are taught irregularly at best, and that the teacher education curriculum gives little, if any, preparation for teaching Irish literacy. Most of the teachers and specialists interviewed for the studies reported in that research seemed to be unaware of the existence of phonics-based materials and insecure about their own understanding of the system. Given the evidence that literacy correlates with L2 skills more generally, it is essential that Irish reading instruction be restored from its currently marginal position in the curriculum to a more central role in the development of L2 language skills. For this to happen, materials, time, and human resources are needed to provide preservice and in-service teachers with the necessary understanding of the Irish orthographic system to maximise the efficiency with which reading is taught.

ACKNOWLEDGEMENTS

This research was funded by a Marie Curie Incoming International Fellowship to the School of Psychology, University College Dublin and by a Fulbright Fellowship to the first author. An earlier version of this article was presented to the annual meeting of the North American

Association for Celtic Language Teachers in Waterford, Ireland, June 2014. We are grateful to participants at that conference for feedback and discussion, and to two anonymous referees for their suggestions for improving the paper. We also thank the many teachers, language scholars and native speaker consultants who contributed to this and earlier studies.

REFERENCES

- Adams, M. (1990). *Beginning to read*. Cambridge, MA: MIT Press.
- Bear, D.R., Templeton, S., Helman, L., & Baren, T. (2004). Orthographic development and learning to read in different languages. In G. Garcia (Ed.), *English learners: Reaching the highest level of literacy*, (pp. 71-94). Barksdale, DE: International Reading Association.
- BELB (Belfast Education and Library Board). (2011). *Fónaic na Gaeilge*. [Irish Phonics]. Retrieved from <http://www.nicurriculum.org.uk/>.
- Bernhardt, E. (2003). Challenges to reading research from a multilingual world. *Reading Research Quarterly* 38, 112-117.
- Bialystok, E. (2007). Acquisition of literacy in bilingual children: a framework for research. *Language Learning* 57, Supplement. 1, 45-77.
- Borgwaldt, S. R. Hellwig, F. M. and de Groot A..B. (2005). Onset entropy matters—Letter-to-phoneme mapping in seven languages. *Reading and Writing* 18, 211=229.
- Breatnach, R. B. (1947). *The Irish of Ring, Co. Waterford*. Dublin: Dublin Institute for Advanced Studies.
- Caravolas, M. Volín, J and Hulme, C. (2005). Phoneme awareness is a key component of alphabetic literacy skills in consistent and inconsistent orthographies: Evidence from Czech and English children. *Journal of Experimental Child Psychology* 92,107-139.
- Caravolas, M., Kessler, B., Hulme, C., and Snowling, M. (2005). Effects of orthographic consistency, frequency and letter knowledge on children's vowel spelling development. *Journal of Experimental Child Psychology*. 92, 307-321.
- Carillo, M. and Alegría, J. (2014). The development of children's sensitivity to bigram frequencies when spelling in Spanish, a transparent writing system. *Reading and Writing* 27, 571-590.
- Chall, J. (1983). *Learning to read: The great debate*. (2nd ed.). New York, NY: McGraw Hill.
- Clay, M. (1993). *Reading Recovery: A guidebook for teachers in training*. Portsmouth, NH: Heinemann.
- Cook, V. (2004). *The English writing system*. London: Hodder Education.
- Crystal, D. (2012). *Spell it out: The singular story of English spelling*. London: Profile Books.
- de Bhaldraithe, T. (1953). *Gaeilge Chois Fhairrge: An deilbhíocht*. [The Irish of Cois Fhairrge: Morphology] *Baile Átha Cliath: Institiúid Ard-léinn*. Athchló.1977.
- de Bhaldraithe, T. (1975). *The Irish of Cois Fhairrge, Co. Galway*. Revised edition. Dublin: Dublin Institute for Advanced Studies.

- Durgunoglu, A. U. (2006). Learning to read in Turkish. *Developmental Science* 9,429-453.
- Ehri, L. (2007). Development of sight word readings: phases and findings. In M. Snowling, and C. Hulme (Eds.), *The Science of Reading* (pp. 135-154). Oxford: Blackwell.
- Ellis, N. (1997). Interactions in the development of reading and spelling: stages, strategies, and exchange of knowledge. In C.A. Perfetti, L. Rieben, and M. Fayol, (Eds.), *Learning to spell: Research, theory and practice across languages* (pp. 271-294) Mahwah, NJ: Erlbaum.
- Ellis, Nick C., Natsume, Miwa, Stavropoulou, Katerina, Hoxhallari, Lorenc, Van Daal, Victor H.P., Polyzoe, Nicoletta, Tsipa, Maria-Louisa, & Petalas, Michalis. (2004). The effects of orthographic depth on learning to read alphabetic, syllabic, and logographic scripts. *Reading Research Quarterly* 39, 438-468.
- Foclóir Póca [*English-Irish/Irish-English Dictionary*] 1986 [2001]. Baile Átha Cliath: An Gúm.
- Frost, R. (2012). Towards a universal model of reading. *Behavioral and Brain Sciences* 35, 263-329.
- Frost, R., Katz, L. & Bentin, S. (1987). Strategies for visual word recognition and orthographic depth: multi-lingual comparison. *Journal of Experimental Psychology: Human Perception and Performance* 13,104-115.
- Geva, E., Wade-Woolley, L., and Shany, M. (1997). Development of reading efficiency in first and second language. *Scientific Studies of Reading* 1:2, 119-144.
- Gilleece, L., Shiel, G., Clerkin, A. and Millar, D. (2012). *The 2010 National Assessments of English Reading and Mathematics in Irish-Medium Schools: Main Report*. Dublin: Educational Research Centre, St. Patrick's College, Drumcondra.
- Hamada, M. and Koda, K. (2008). Influence of first language orthographic experience on second language decoding and word-learning. *Language Learning* 58.1, 1-31.
- Harris, J., Forde, P., Archer, P., Nic Fhearaile, S, and O'Gorman, M. (2006). *Irish in primary schools: Long-term national trends in achievement*. Dublin: Stationery Office.
- Hickey, R. (2011). *The dialects of Irish: Study of a changing landscape*. Berlin: De Gruyter Mouton.
- Hickey, R. (2014). *The sound structure of Modern Irish*. Berlin: De Gruyter Mouton.
- Hickey, T.M. (1991). Leisure reading in a second language: An experiment with audio tapes. *Language, Culture and Curriculum* 4, 119-131.
- Hickey, T.M. (2007). Fluency in reading Irish as L1 or L2: Promoting high frequency word recognition in emergent readers. *International Journal of Bilingual Education and Bilingualism* 10, 471-493.
- Hickey, T.M. (n. d.) *Corpas Leabhar Gaeilge do Pháistí (CGLP)* [Corpus of Irish Books for Children]. Unpublished research corpus.
- Hickey, T.M. and Stenson, N. (2011). Irish orthography: what do teachers and learners need to know about it and why? *Language, Culture and Curriculum*. 24.1, 23-46.
- Hickey, T.M. and Stenson, N. (2016) 'The sociolinguistics of Irish language acquisition: The role of L2 reading' In: Raymond Hickey (eds). *Sociolinguistics in Ireland*. Basingstoke: Palgrave Macmillan, pp 269-298.
- Hislop, H. (2013). *Chief Inspector's report: Promoting the quality of learning*. Department of Education and skills, Retrieved from www.education.ie/en/Publications/Inspection-Reports-Publications/Evaluation-Reports-Guidelines.
- Ijalba, E. and Obler, L. (2015). First language grapheme-phoneme transparency effects in adult second-language learning, *Reading in a Foreign Language* 27.1, 47-70.

- Kessler, B. (2009). Statistical learning of conditional orthographic correspondences. *Writing Systems Research* 1, 19-34.
- Lyddy, F. (2005). Celtic biliteracy. *Literacy Today* 43, 1-2.
- Lyddy, F., O’Loinsigh, B., & Parsons, C. (2005) Reading processes in Irish-English bilinguals: Evidence from the Stroop Interference Effect. In E. Kennedy and T.M. Hickey (eds) *Learning to read and reading to learn*, Dublin: Reading Association of Ireland. pp90-100.
- Mac Eoin, G. (1993). Irish. In M. J. Ball with J. Fife (Eds.), *The Celtic Languages*, 1st edn, pp. 101–144. London: Routledge.
- Nassaji, H. (2014). The role and importance of lower-level processes in second language reading. *Language Teaching* 47.1, 1-37.
- Ní Chasaide, A. (1999). Irish. In *Handbook of the International Phonetic Association*, pp. 111–116. Cambridge: Cambridge University Press.
- Nig Uidhir, G. (2006). Early literacy achievement in Irish-medium schools and early interventions. PDF retrieved 19 November 2014 from <http://www.nicurriculum.org.uk/>.
- Ó Baoill, D. (1986). *Lárchanúint don Ghaeilge*. [A central dialect for Irish]. Baile Átha Cliath: Institiúid Teangeolaíochta Éireann.
- Ó Baoill, D. (1987). Phonological borrowing in Irish and problems of orthographical representation. In Gearóid Mac Eoin, Anders Ahlqvist, and Donncha Ó hAodha (Eds.), *Third International Conference on Minority Languages: Celtic papers*, pp. 89–103. Clevedon: Multilingual Matters.
- Ó Baoill, D. (Ed.) (1990). *Úsáid agus forbairt na lárchanúna*. [Use and development of the central dialect]. Baile Átha Cliath: Institiúid Teangeolaíochta Éireann/Bord na Gaeilge.
- Ó Baoill, D. (2010). Irish. In Martin J. Ball and Nicole Müller (Eds.), *The Celtic languages*, 2nd edition, pp. 163–229. London: Routledge.
- Ó Conchubhair, B. (2008). The global diaspora and the ‘new’ Irish. In Nic Pháidín, C. and Ó Cearnaigh, S. (Eds.), *A new view of the Irish language*. Dublin: Cois Life. Pp. 224-248.
- Ó Cuív, B. (1944/1983). *The Irish of West Muskerry, Co. Cork*. Dublin: Dublin Institute for Advanced Studies.
- Ó hAiniféin, D. (2008) An tumoideachas in Éirinn. Léacht an Chonartha. [Immersion education in Ireland. Invited Lecture to Conradh na Gaeilge] Available online from <http://www.gaelscoileanna.ie/en/immersion-education/all-island-agreed-policy-on-immersion-education/immersion-education-in-ireland/> Last retrieved 8 December 2014.
- Ó Murchú, M. (1977). Successes and failures in the modernization of Irish spelling. In Joshua Fishman (Ed.), *Advances in the creation and revision of writing systems*, pp. 267–289. The Hague: Mouton.
- Ó Raghallaigh, B. (2013). *Fuaimeanna na Gaeilge* [The sounds of Irish]. Baile Átha Cliath: Cois Life.
- Ó Sé, D. (2000). *Gaeilge Chorca Dhuibhne* [The Irish of Corca Dhuibhne]. Baile Átha Cliath: Institiúid Teangeolaíochta Éireann.
- Ó Siadhail, M. (1989). *Modern Irish: Grammatical structure and dialectal variation*. Cambridge: Cambridge University Press.
- Ó Siadhail, M. and Wigger, A. (1975). *Córas fuaimeanna na Gaeilge* [The sound system of Irish]. Baile Átha Cliath: Institiúid Ard-Léinn.
- Odlin, T. (1989). *Language transfer*. Cambridge: Cambridge University Press.

- O'Rahilly, T. F. (1932 [1972]). *Irish dialects past and present*. Dublin: Dublin Institute for Advanced Studies.
- Parsons, C. and Lyddy, F. (2009a.) *Learning to read in Irish and English: A comparison of Irish-medium, Gaeltacht, and English-medium schools in Ireland*. Final report to An Chomhairle um Oideachas Gaeltachta agus Gaelscolaíochta. [The Council on Gaeltacht Education and Irish Immersion schooling] Maynooth: Ollscoil na hÉireann.
- Parsons, C. and Lyddy, F. (2009b). Early reading strategies in Irish and English: Evidence from error types. *Reading in a Foreign Language*, 21, 22-36.
- Perfetti, C. (2000). The psycholinguistics of spelling and reading. In Perfetti, C. Rieven, L. and Fayol, M. *Learning to spell: Research, theory and practice across languages*. (21-38). Mahwah, NJ: Lawrence Erlbaum Associates.
- Perfetti, C. and Zhang, S. (1991). Phonological processes in reading Chinese words. *Journal of Experimental Psychology* 17, 633-643.
- Perfetti, C. and Zhang, S. (1995). Very early phonological activation in Chinese reading. *Journal of Experimental Psychology: Learning, Memory, and Cognition* 21.24-33.
- Pikulski, J. and Chard, D. (2003). Fluency: the bridge from decoding to reading comprehension. *The Reading Teacher* 58, 510-519.
- Quiggan, E. C. (1906). *A dialect of Donegal*. Cambridge: Cambridge University Press.
- Seymour, P.H. K. (2007). Early reading development in European orthographies In M. Snowling, and C. Hulme (Eds.), *The Science of Reading*, (pp. 296-315). Oxford: Blackwell.
- Seymour, P.H. K., Aro, M. & Erskine, J. M. (2003). Foundation literacy acquisition in European orthographies. *British Journal of Psychology* 94, 143-174.
- Sjoestedt-Jonval, M.-L. (1931). *Description d'un parler irlandais de Kerry* [Description of an Irish dialect of Kerry] Paris: Librairie Ernst Leroux.
- Sommerfelt, A. (1922). *The dialect of Torr, Co. Donegal*. Christiana: Jacob Dybwad.
- Spencer, L. H. & Hanley, J R. (2003). Effects of orthographic transparency on reading and phoneme awareness in children learning to read in Wales. *British Journal of Psychology* 94.1-28.
- Stanovich, K. (1986). Matthew Effects in reading: some consequences of individual variation. *Reading Research Quarterly* 21.4, 360-407
- Stenson, N. and Hickey, T. (2014a). In defense of decoding. *Journal of Celtic Language Learning* 18, 11-40.
- Stenson, N. and Hickey, T. (2014b). Optimising Irish literacy instruction: Building effective change. Paper presented at the 50th International Conference of the UK Literacy Association, Brighton, July 4, 2014.
- Stuart, M., Dixon, M., Masterson, J. and Gray, B. (2003). Children's early reading vocabulary: description and word frequency lists. *British Journal of Educational Psychology* 73.585-598.
- Stuart, M., Masterson, J, and Dixon, M. (1999). Learning to read words turns listeners into readers. In J. Oakhill, and R. Bear (Eds.) *Reading development and the teaching of reading* (pp. 109-130). Oxford: Blackwell,
- Venezky, R. (1970). *The structure of English orthography*. The Hague: Mouton.
- Wagner, H. (1979). *Gaeilge Theilinn* [The Irish of Teelin]. Baile Átha Cliath: Institiúid Ard-léinn.
- Wigger, A. (2004). *Caint Ros Muc* [The speech of Ros Muc]. Dublin: Dublin Institute for Advanced Studies.

- Ziegler, J., and Goswami, U. (2006). Becoming literate in different languages: similar problems, different solutions. *Developmental Science*, 9, 429-453.
- Ziegler, J.C., and Goswami, U. (2005). Reading acquisition, developmental dyslexia and skilled reading across languages: a psycholinguistic grain size theory. *Psychological Bulletin* 131, 3-29.
- Ziegler, J.C., Bertrand, D., Tóth, D., Csépe, V., Reis, A., and Faísca, L. (2010). Orthographic depth and its impact on universal predictors of reading: a cross-language investigation. *Psychological Science* 21, 551-559.

TABLE 1

Long vowel digraphs

Digraph	<ao>	<ae>	<eo>
Equivalent	<é> (Munster) or <í> (Connacht, Ulster)	<é>	<ó>
Context: C__C	<saor> /se:r/, /si:r/ 'free'	captaen /kapte:n/ 'captain'	<ceol> /k'o:l/ 'music'
C__C'	<saoire> /si:r'ə/ 'holiday'	<traein> /tre:n/ 'train'	<ceoil > /k'o:l/ 'music (genitive)'
#__	<aos> /e:s/, /i:s/ 'folk'	<aer> /e:r/ 'air'	<eolas> /o:ləs/ 'knowledge'
__#	<naoi> /ne:/, /ni:/ 'nine'	<tae> /te:/ 'tea'	<ceo> /k'o:/ 'fog'

TABLE 2

Initial mutations

	Voiceless stops	Voiced stops	Fricatives
Lenition	<p> → <ph> /f/	 → <bh>/v/, /w/ ^{xi}	<f> → <fh> (silent)
		<m> → <mh>/v/, /w/	
	<t> → <th> /h/	<d> → <dh> /ɣ/	<s> → <sh> /h/
	<c> → <ch> /x/	<g> → <gh> /ɣ/	
Eclipsis	<p> → <bp> /b/	 → <mb> /m/	<f> → <bhf> /v/, /w/
	<t> → <dt> /d/	<d> → <nd> /n/	<s> → <ts> /t/
	<c> → <gc> /g/	<g> → <ng> /ŋ/	

Note: The choice between /v/ and /w/ depends partly on dialect and partly on consonant quality. In the dialects north of the Shannon, the lenited broad consonant is phonetically closer to /w/ than to /v/ (historically, it was a bilabial fricative).

TABLE 3

Broad and slender digraphs

Palatalised C' before back vowel	Velarised C before front vowel
<siopa> /s'upə/ 'shop'	<muid> /mid'/ 'we, us'
<Seán> /s'a:n/ 'Seán' (man's name)'	<buí> /bi:/ 'yellow'
<ceo> /k'o:/ 'fog'	<croí> /kri:/ 'heart'
<i>Palatalised C' after back vowel</i>	<i>Velarised C after front vowel</i>
<fáil> /fa:l'/ 'to get'	<scéal> /s'k'e:l/ 'story'
<aire> /ar'ə/ 'care'	
<i>Palatalised C' between 2 back vowels</i>	<i>Velarised C between 2 front vowels</i>
<ciúin> /k'u:n'/ 'quiet'	<draíocht> /dri:xt/ 'magic'

TABLE 4

Sonorant lengthening

<i>Orthographic Vowel</i>	<i>Examples</i>	<i>Gloss</i>	<i>Pronunciation</i>
<a>	<ann>	‘in it’	/a:/ or /au/
	<crann>	‘tree’	
	<mall>	‘slow’	
	<gheall>	‘promised’	
	<carr>	‘car’	
	<fearr>	‘better’	
<i>	<tinn>	‘sick’	/i:/ or /ai/
	<cinnte>	‘certain’	
	<muintir>	‘people’	
<o>	<donn>	‘brown’	/o:/ or /au/
	<poll>	‘hole’	
	<bord>	‘table’	

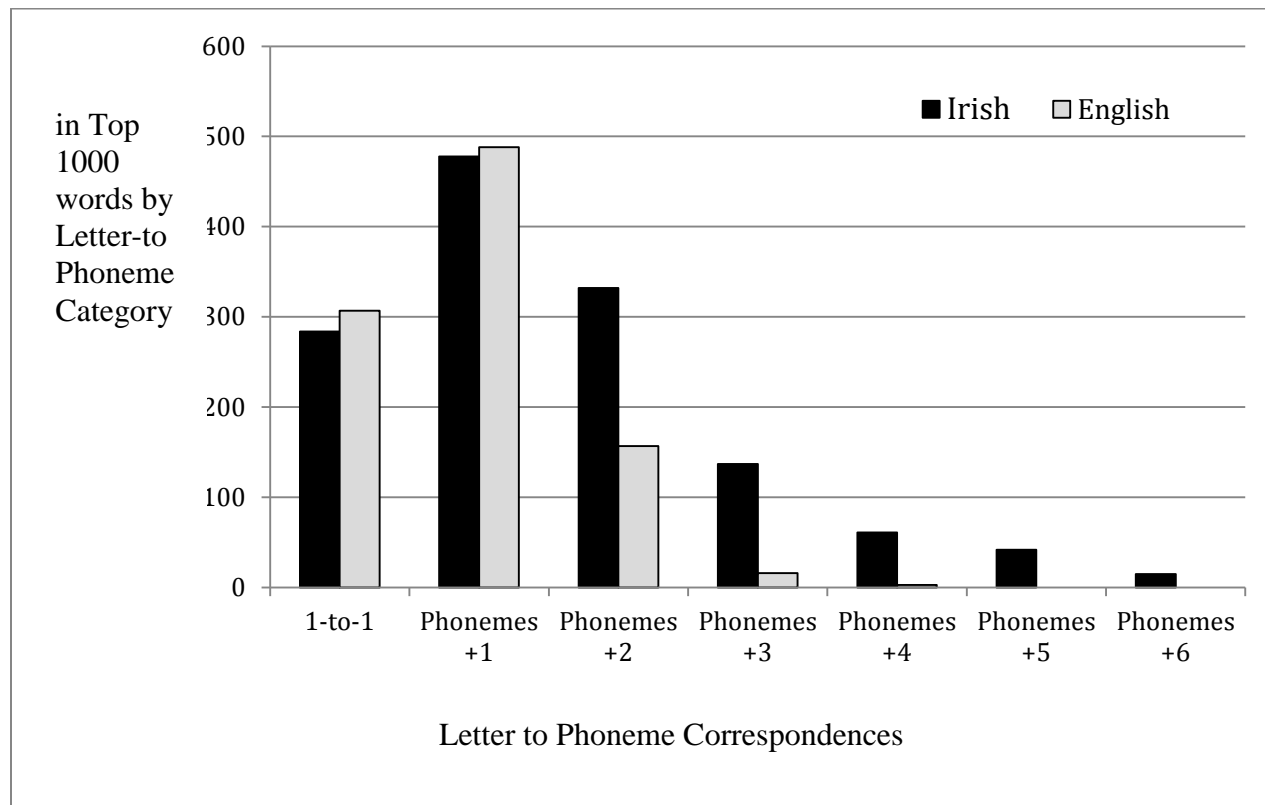
TABLE 5.

Final consonant deletion

<th>	<mh>	<bh>	<ch>	<gh>	<dh>
<maith>	<chomh>	<dubh>	<deich>	<dóigh>	<reidh>
<bheith>				<shuigh>	<feadh>
<chaith>				<istigh>	<dhiaidh>
<fáth>				<chuaigh>	
<luath>					

TABLE 6. Digraphs of Irish and English in most frequent words

<i>Consonants</i>		<i>Vowels</i>		<i>Diacritic vowel for consonant quality</i>
<i>English</i>	<i>Irish</i>	<i>English</i>	<i>Irish</i>	<i>Irish</i>
<ll> /l/ <willl>	<ll> /l/ <tmall>, /l'/or /l̃/ (acc. to dialect)<fill>	<ai> /e:/ <wait>	<ai> /a/ <maith.>	<ibh> /v'/ <dóibh>
<th>/θ/ or /ð/ <thin>, <the>	<th> /h/ <tháinig>	<ow> /au/ <now>	<ao> /i:/ or /e:/ <aon>	<se> /s'/ <seo>
<sh> /s'/ <she>	<sh> /h/ <shíl>	<oo> /u:/ <too>	<ae> /e:/ <lae>	<ir> /r'/ <dúirt>
<wh> /hw/ <when>	<bh> /v/ <bhaile> /v'/ <bhí>	<ee> /i:/ <see>	<eo> /o:/ <beo>	<bhf> /v/ <bhfuil>
<ck> /k/ <back>	<ch> /x/ <ach> /r /x'/ <chéile>	<ey> /e:/ <they>	<ei> /e/ <leis>	<in> /n'/ <tháinig>
<ff> /f/ <off>	<fh> silent <fháil>	<ay> /e:/ <away>	<éi> /e:/ <féin>	<no> /n/ <anois>
l	<gh> /ɣ/ <ghaoth>, /ɣ'/ <ghrian> <mh> /v/ or /v'/ <bhf> /v/ or /v'/ <nn> /n/, /n'/ or /N'/	<ou> /au/ <house>	<éa> /e:/ <scéal> <ua> /uə/ <aoi> /i:/ or /e:/	<or> /r/ <chu> /x/ <du> /d/ <le> /l'/ <it> /t'/ <na>/n/ <os> /s/ <be> /b'/ <igh> /ɣ'/



Note: 1-to-1 = same number of letters as phonemes; 'Phoneme+1' = one letter more than number of phonemes; 'Phoneme+2' = two letters more than phonemes, etc.

Figure 1. Letter to phoneme correspondences in Irish and English

ENDNOTES

- ⁱ This transparency reference was not included in the published version of Lyddy's (2005) article and subsequent work (e.g., Parsons and Lyddy, 2009a, b) has shifted to describing the system as "not transparent." Nevertheless, the view espoused in Ó hAiniféin's (2008) online lecture has been highly influential with teachers, as was borne out in interviews with teachers.
- ⁱⁱ These interviews include a number of statements like the following, from teachers, teacher educators and curriculum developers alike: "There are no unpronounced letters in Irish for the most part," "I think that in a way a lot of Irish is simpler [than English]," "Irish is actually so much easier than English because a sound is a sound; it doesn't change.' Difficult as such perceptions may be to justify on serious consideration of the orthographic system, the perceptions nonetheless exist, and must be taken into account in assessing the teaching implications of Irish spelling.
- ⁱⁱⁱ Print sources consulted include de Bhaldraithe (1953, 1975) and Wigger (2004) for Connacht; Ó Cuív (1944/1988), Ó Sé (2000), Sjoestedt-Jonval (1931), and Breathnach (1947) for Munster; Wagner (1979), Quiggan (1906), and Sommerfelt (1922) for Ulster.
- ^{iv} Lexical items showing consistent deviation from the pronunciation indicated by spellings, however, are identified as irregular.
- ^v Sometimes the difference is one of primary point of articulation, as in the articulation of <s> as broad [s] but slender [ʃ]. Further phonetic details of Irish phonemes can be found in the various linguistic studies of Irish cited above.
- ^{vi} In some dialects there is also a tenseness contrast in the laterals.
- ^{vii} Variation in the data and published monographs suggest that the system is still in the process of realignment. For simplicity this analysis treats all sonorants as regular regardless of tenseness, provided pronunciation matches spelling with respect to point and manner of articulation. In this we follow the Lárchanúint treatment of double consonants as identical to single ones, which is the usual Munster system. English speakers are used to double and single consonants with the same values, and given the variation, the phonetic details are not likely to be mastered before a fairly advanced level of exposure to a particular dialect's patterns of usage, a level well beyond that of primary school learners which is our focus here.
- ^{viii} Henceforth the term 'digraph' will be used as a cover term to include trigraphs and any more complex graphemes.
- ^{ix} Because Stuart et al. identify regularity only for the first 100 words, this comparison is necessarily approximate. In determining regularity of the remaining words we first followed the model of those 100, and where later words contained spellings not found in the first 100, we considered a spelling to be regular only where it was pronounced consistently in all or the vast majority of words where it occurred, e.g., <ee> as /i ʲ/, <oa> as /o: /, <ai> as /e: /, <igh> as /ai /.
- ^x One word where raising is not found is <leon> 'lion,' possibly because it is a relatively recent 'book word', not in widespread use in the vernacular language and perhaps more strongly associated with school. There are other dialect specific lexical exceptions: e.g., <i gcónaí> 'always' exhibits raising only in Connacht.