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"Graphonemic Indicators" of Vowel Pronunciation: suggestions for research and teaching

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1. "GRAPHONEMIC INDICATORS"

Observe the following list of symbols: <r>, <w>, <e>, <ng>, <lt>, <rt>. Any time I present this list to my students and ask them to tell me what they are, I receive the same answers. They are letters —my students say—, or allographs at the most. Some are bold enough to suggest that these symbols represent sounds of a language, even when in such a language as English, the symbol <r> and <e> in writing often lack correspondence with any phoneme, and so, in non-rhotic versions of English, the <r> in *card* has no clear or immediate correspondence with any phoneme, neither does the often called silent <e> in *sense* or *come* (Sgall, 1987: 8, 11). If faced with the same question, I believe native speakers and readers of English would provide the same answers.

Still, the letters of the list have not been selected at random but very carefully, and have been grouped together because they constitute, within the English writing system, what I call *graphonemic indicators*, that is, letters which may perform the function of indicating how other letters, especially vowel-letters, have to be pronounced. When these letters have no pronunciation themselves, like the second <e> in *sense* or one of the two <t>'s in *written*, I call them *pure* graphonemic indicators.

Going back to the list, the concurrence in writing of a letter <r> immediately after a letter <i> indicates something about the pronunciation of

(1) In this paper, C and V stand for *any* single consonant or any single vowel. To indicate any combination of different consonants or vowels we will use CC, VV or CCC depending on how many items conform the cluster. The symbol C^2 stands for a double consonant such as <t> in *letter*. A parenthesis means that the elements included within it might or might not appear, and so C(CC) implies *one or more than one consonants*. The symbol // means *end of word*. The composition analysis of a word like *stretching* would be CCC+V+CCC+V+CC+//.

the latter. The letter <i> is pronounced /ɪ/ in *gild* but /ɜ:/ in *gird*; and there is a permanent and univocal relation between the context [1] <r> + C and the pronunciation /ɜ:/ of <i>. Many examples could be easily provided, like *flirt*, *first*, *smirk*, *quirk*, *squirm*, etc. Another of the letters of in the list, the letter <w> at the onset of a syllable, followed by the combination <or> is also an indicator of pronunciation /ɜ:/, as in *word*, *work*, *worse*, *worth*, etc. The combination <lt> after <o> indicates pronunciation /oʊ/ as in *molten*, *colt*, *voltage* or *jolt*. The combination <ng> after <a> may indicate pronunciation /eɪ/ as in *danger*, *ranger* or *strange*. A combination <r> + C after <a> may indicate pronunciation /ɑ:/ of <a> as in *art*, *tart* or *cart*. In sum, all the elements of the list with which I opened this paper are graphonemic indicators.

2. AMBIGUITY AND OVERLAPPING

The distribution of English phonemes among Latin graphemes in the case of vowels is not homogeneous in American English, the letter <o> may perform up to eight functions, and six of them correspond to monophthongs:

now	/naʊ/	word	/wɜ:rd/
socks	/sɑ:ks/	horde	/hɔ:rd/
month	/mʌnθ/	go	/goʊ/
doctor	/ˈdɑ:ktər/	prove	/pru:v/

One single letter-vowel, <o>, stands for more than 50% of English monophthongs. This extreme versatility implies a no less extreme ambiguity; the grapheme <o> contains potentially so much information that its occurrence by itself is very little informative in a practical sense. Another very versatile and ambiguous letter is <a> which with its seven functions [2], six of them monophthongs, covers nearly a 50% of English monophthongs: /eɪ, æ, ɑ:, ɔ:, e, ɪ, ə/ as in *name*, *cat*, *art*, *bald*, *many*, *village*, *ago*. To the problem of functional ambiguity we must add the one of functional overlapping: the same phoneme may be spelled in some cases with <a> and in some others with <o> [3].

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(2) According to Carney (1994), the letter <a> has eleven functions. He considers diphthongs /eɪ/ (cake) and /ei/ (patient) as two different phonemes, and also incorporates a zero realization (*distance*).

(3) In this paper we will deal exclusively with Standard American pronunciation.

socks	/sɑ:ks/	wads	/wɑ:dz/
doctor	/ˈdɑ:ktər/	mortar	/ˈmɔ:rtər/
horde	/hɔ:rd/	ward	/wɔ:rd/

These are, in a nutshell, the main causes of complexity in the writing system as far as vowels are concerned: the complexity of the phonological system itself, the simplicity of the Latin alphabet, and a heterogeneous functional distribution which leads to ambiguity and overlapping [4].

3. THE CONTEXT-DESIGN METHOD AND COGNITION

Still, the English writing system has a high degree of integrity and coherence, though its complexity is certainly exasperating. The disambiguation of vowel-letters, the way I see it, is based on a *context-design* method. The context tells us the way we must pronounce/interpret a given vocalic grapheme.

1.	*writer*	... <i> + C + V ...	→ /aɪ/
2.	*written*	... <i> + C^2 + V ...	→ /ɪ/
3.	*bird*	... <i> + <r> + C ...	→ /ɜ:/
4.	*pixel*	... <i> + <x> + V ...	→ /ɪ/

A context design consisting of a single consonant, followed by vowel, implies the pronunciation /aɪ/ of the letter <i> (example 1), unless the single consonant is <x>, in which case pronunciation is /ɪ/ (example 4). A double consonant within a word in English does not usually imply gemination in the spoken chain but constitutes a pure graphonemic indicator which in the case of *written* rules pronunciation /ɪ/ of <i>. The contexts which follow the vowel-letter <i> in examples 1-4 constitute very well known designs intended to perform a graphonemic indexical function.

When engaged in the so called sub-lexical route of word decoding [5] (Field, 2004: 94), which happens any time the reader bumps into an

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(4) Historical reasons for the opaqueness of English spelling can be found in Jespersen (1962: 1-3) and Coulmas (2003: 183-8).

(5) According to the dual route theory, a reader engaged in the lexical route recognizes the word as a whole, and jumps directly to lexical meaning without analysis of grapheme-phoneme correspondence (GPC) rules. The sub-lexical route, frequently used when the meaning is not the ultimate target, because it is unknown or because it does not exist, implies the consideration of GPC rules.

unknown word, the process of reading Spanish differs from that of reading English. For the Spanish reader, interpreting the vowel-letters of the Spanish word *punterola* would imply (1) the recognition of graphemes <a>, <e>, etc. and (2) the attribution of their correspondent functions: /a/, /e/. For the English reader, interpreting the letter <a> in *falter* —via sub-lexical route— would imply (1) the recognition of grapheme <a>, (2) the consideration of contextual <lt> and other possible designs, and (3) the selection of value /ɔ:/ from the seven possibilities implicit in <a>. The distinctive steps (2) and (3) in the case of English reading involve an analysis of contextual relevance. Both native and non-native speakers and readers of English, at least those who have been sufficiently exposed to writing, may consciously *choose* to perform such step when necessary. To prove this would be as easy as to require from such a reader to read aloud the non-existing word *smalter* as if it was English. The safest bet is that they would, in the main, read it as /'smɔ:ltər/, following the analogy suggested by words with identical context designs such as *falter*, *Walter*, *psalter*, *alter*, *Baltic*, *salt*, etc. (6).

Reading a common word like *falter* does not actually require from any skilled reader any compositional analysis of context-designs. Here, the reader is more likely to take not the sub-lexical but the lexical route which leads to the recognition of the word as a whole, and therefore jump immediately to pronunciation or meaning. Nevertheless, our work as teachers of English should not be restrained by the goal of strictly reproducing in our students the exact cognitive processes natives perform in speaking or reading. In part because those processes are still under thorough research and, to a certain extent, still unknown. And, secondly, because our goal is, eventually, to teach them to speak and read generally and efficiently, but not in any particular way. For that reason, the cognitive dimension of spelling, which has been already studied by several authors (7), is useful and welcome, but of relative importance to us, and not at all indispensable for the description of the English writing system and the development of teaching methods and specific exercises.

The English writing system as it stands today probably reflects more accurately the minds of their many and distant designers than that of its

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(6) According to Glushko's Theory of Analogy (Glushko, 1979), the analysis of context would be based, not on isolated combinations, but on the comparison of similar words. As we will see later, the specific way in which natives tend to deal with reading should not necessarily direct our teaching.

(7) Authors like those in U. Frith (1980).

users, and the spelling of the word *falter* seems to be designed so that its pronunciation could be easily prescribed by means of compositional analysis. Certainly, the direct and unmediated recognition of the phonic structure via lexical route is much faster than the sub-lexical analytical approach. But the point is that analysis would equally lead, through a longer path, to the same pronunciation. This longer path towards phonemic interpretation is the only resort for beginners whose vocabulary is too small to allow them to draw any analogies. Therefore, beginners should be taught that *falter* is pronounced /ˈfɔːltər/, but *also* be taught that any <lt> after <a>, under certain conditions [8], implies the pronunciation /ɔː/ of the vowel-letter.

If phonetics and pronunciation have often been neglected in most handbooks of English, the possibility of offering graphemic instructions that might lead from spelling to sound does not seem to have ever crossed the mind of handbook writers. As a result, many of our students of English in Spain have their minds full of visual representations of English words which they can easily recognize and reproduce in written texts but only barely and defectively in spoken texts.

4. RESEARCH, RESULTS AND TEACHING

We should like, then, to train our students in graphemics so that they become more sensitive to the presence of graphonemic indicators while they are still in need of learning many new words, most of which will surely come to them in the written format. Graphonemic indicators have been designed to help readers predict pronunciation, and that is a certain aid for ESL students.

In trying to teach and explain the predictive powers of spelling I suggest taking graphemes as the starting point. This is, I think, the best approach in teaching reading to ESL students [9]. Native authors writing for native readers have often dealt with the problem inverting the perspective and trying to find out the different spellings of each vowel-phoneme [10]. Unlike ESL students, native users of English find more compelling the problem of

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(8) The conditions here are that the letter <a> be in last or penultimate accented (with primary stress) syllable of a word.

(9) Coulmas (2003: 184) also argues in favor of this perspective when considering the goal of describing the English writing system. This was also the approach in Hill and Ure (1962) who wrote with ESL students in mind.

(10) T. Bozman (1989) is a good example of this approach.

spelling what they know how to pronounce than the problem of reading properly unknown words. Solving the second problem is most urgent to foreign students of English.

The study of context-designs and their relation with vowel-letters and phonemes soon encounters great difficulties. It is difficult to appropriately perceive the structure of the English Writing System, and to distinguish rules from exceptions. It is desirable to find a clear set of principles and an adequate terminology to guide both research and the presentation of results to students. I propose the approach summarized in figure 1 below.

Each vocalic grapheme should be studied both in stressed and unstressed syllables. In stressed syllables, vocalic graphemes should be studied in what I call early, neutral and late structures. Early structures are those in which the primary stress falls on the antepenultimate syllable or before. Neutral structures are those in which the primary stress falls on the penultimate syllable. And late structures are those stressed on the last syllable (including all English monosyllabic words) (11).

In each accentual structure we should find out the different functions that a given grapheme may perform. It is a well known fact that most vocalic letters in unstressed syllables in English will be pronounced with a reduced vowel, /ə, ɪ, ʊ/. Most graphemes in stressed syllable of early structures are pronounced with the traditionally called 'short version of the letter', according to the following orths: æ /<a>; e /<e>; ɪ /<i>; ɑ: /<o>; ʊ or ʌ/<u>. Determining context designs in late structures is relatively easy; but neutral structures in English are quite complex, and the number of exceptions is often discouraging.

Both for research and teaching, context designs could be classified as shown in the table. *Low-specification* context designs have to do with the number of consonants, regardless of their quality, and with pure graphonemic indicators, such as double consonants and silent <e>. The low-specification context design described as <e> + C^2 + V... indicates the pronunciation /e/ of <e>, as in *letter*. These contexts are very well known and often taught in handbooks of phonetics, but are by no means exception-free (12).

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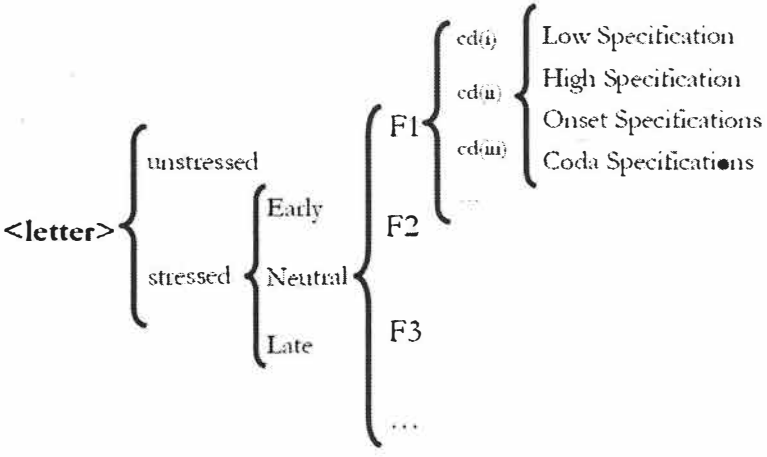
(11) Hill and Ure (1962) where wise enough to offer the pronunciation of letters and not the spellings of pronunciations, but then, they did not incorporate to their approach any stressed/weak distinction. Their long lists of words and cases tend to obstruct assimilation, and some very common features concerning vowel-letter interpretation remain obscured behind casuistic.

(12) Think of the word *pretty* /ˈprɪti/, for example.

Figure 1.



High-specification context designs have to do with specific consonants, like <r>, or <x> in some of the examples given above. High specifications often conflict with low specifications, and are much less known –the word *pixel*, for example, defies the validity of the low-specification context applicable to *writer*.

For the sake of methodological rigor, we should be ready to discover high and low specifications both at the onset and at the coda of the syllable. For that reason we consider appropriate to distinguish between *onset specifications* and *coda specifications*. However, all onset specifications in English seem to be high specifications, concerning the consonantal graphemes <w> and <qu>, as well as their combinations in clusters where they stand as second element, as in <tw>, <sw>, <squ>, etc.

Whereas coda specifications are often *independent*, onset specifications always function in alliance with coda specifications and are, therefore, *dependent*. In the case of grapheme <u>, coda high-specification context + <r> + C indicates the pronunciation /ɜ:/ of the vowel, as in *church*, *murk*, *urn* or *burg*, independently of any further onset specifications. But the same coda specification as the context of the grapheme <o> depends on the concurrence of the typical onset specification —that is, <w>, <qu>, etc.— to render pronunciation /ɜ:/, as in ***word***, ***work***, etc., but not in *ford* or *cork*. The satisfaction of onset specifications by itself does not allow vocalic grapheme interpretation within the English writing system. The fact that a stressed syllable begins with <w> and is followed by <a> or <o> allows no final

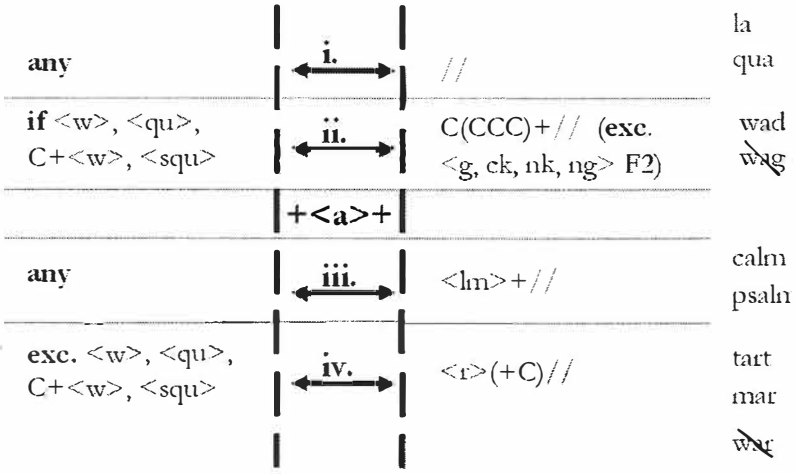
conclusion but triggers the need to consider coda specifications to determine interpretation.

High specifications could be further classified as *positive* or *negative*. Positive specifications imply the necessary concurrence of certain consonants. The necessity of <r> in leading from <a> to /ɑ:/ in *art* constitutes a positive specification; and so is the necessity of <w> at the onset and <r> at the coda for <a> to be pronounced as /ɔ:/, as in *war*.

Negative specifications imply the necessary absence of certain consonants, and so typical onset positive specification concerning <w> and <qu> will lead to pronunciation /ɑ:/ of <a> *only if* a coda negative specification is met, namely, the absence of <r>, <l> + C, <x>, <nk> or <ng>: *wad*, *swan*, and *quad*, go with /ɑ:/, but *war*, *wall*, *wax*, *swank* and *twang* do not.

As the reader of these pages has surely realized by now, the presentation of research results may easily lead to dry paragraphs which certainly would defy many a student's patience. It is important to present results in a user-friendly fashion. Figure 2 below offers a complete set of onset and coda specification contexts associated to the pronunciation /ɑ:/ of <a> in late structures. Onset specifications are on the left column and coda on the right; in the table *any* means no specifications; *if* means positive specification; and *exc.* means negative specification.

Figure 2.



Each pronunciation of each letter in each accentual structure could be presented in a similar way, and specific exercises should be designed to assist both the gradual exploration and the assimilation of the tables. Summary tables would be useful for the students; figure 3 offers a list of all the graphonemic indicators which are relevant to the interpretation of <a> in late structures. In order not to exceed the required length of the present contribution I must leave to interested readers the elaboration of specific exercises. A tentative sketch might be drawn from the following suggestions: all exercises should concentrate on the conscious detection of graphonemic indicators, and should promote the compositional analysis of contexts which surround the vowel-letter under focus. The task requires a gradual exploration assisted by frequent practice and recapitulations, and an amount of time and dedication which exceeds by far any considerations of the English writing system I have ever found in handbooks of English and English pronunciation.

Figure 3. THE LETTER <a> IN L-STRUCTURES

Graphonemic Indicators: High Specification

	F1/eɪ/	F2/æ/	F3/ɑː/	F4/ɔː/	F5/e/
Onset		<w> <qu>	<w> <qu>	<w> <qu>	
Coda	<the> <ste> <nge> <che> <gue>	<g> <k> <ng> <nk> <ck> <x> <dge> <lve> <nce> <que>	<lm> <r> <a>	<ll> <lk> <lt> <ld>	<re>

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