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Firthian phonology: Prospect and retrospect

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Contents

Introduction	1
JOHN LOCAL & BILL WELLS	
J. R. Firth: Life, Work and Legacy	15
LEENDERT PLUG	
'From a Grammatical Angle': Congruence in Eileen Whitley's Phonology of English	49
ADRIAN P. SIMPSON	
'Saying Different Things': E. M. Whitley's Early Phonology of Irish	91
JOHN KELLY	
Types of R Prosodic Piece in a Firthian Phonology of English, and Their Vowel and Consonant Systems	125
R. K. SPRIGG	
The Short-Quantity Piece in English Lexical Items, and Its Vowel Systems	157
R. K. SPRIGG	
The Phonetics of Agreement and Disagreement	189
RICHARD OGDEN	
J. R. Firth and the London School: A Historical and Theoretical Approach to Firthian Prosodic Phonology	221
ELENA BATTANER	

Types of R Prosodic Piece in a Firthian Phonology of English, and Their Vowel and Consonant Systems*

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1 Introduction

It was at a meeting of the Philological Society of London, in 1947, that Firth launched 'a theory of the phonological structure of the word in the piece or sentence' (Firth 1948: 121), later known as 'prosodic analysis' or 'the prosodic approach', in which the emphasis is on the phonetics and phonology of synthesis rather than analysis. Consequently, it results in a 'chunky' technique for the phonological description of languages, as opposed to an analysis based on minimal distinctions that results in such a unit as the phoneme. The 'chunks' may be as small as two successive sounds or as large as phrases, clauses, and sentences; they may also be junction pieces, in which phonetic features are associated syntagmatically in such a way that they link the final part of one unit, whether syllable, word, clause, or sentence, with the initial part of the following unit. For the features abstracted from pieces Firth introduced the terms 'prosodies' and 'prosodic'; unlike 'phonematic units', which resemble the phonemes of preceding theory in being limited to single sounds, they extend over more than one sound (or segment):

For the purpose of distinguishing prosodic systems from phonematic systems, words will be my principal isolates. ... Indeed I propose to apply some of the

* A summary of this article under the same title was presented at the first Firthian Phonology Colloquium, held at the University of York in April 1984. Correspondence: sprigran@btinternet.com.

principles of word structure to what I term *pieces* or combinations of words. ... For my part I would restrict the application of the term [phoneme] to certain features only of consonants and vowels systematically stated *ad hoc* for each language. ... We may speak of a five-vowel or seven-vowel phonematic system, or of the phonematic system of the concord prefixes of a Bantu language, or of the monosyllable in English.

(Firth 1948: 122)

Firth's attitude towards closed systems, both prosodic and phonematic, whereby a term in a system takes its functional value from the remaining terms in the system, with which it is in contrast (not so much, that is, from what it is but from what it is not but could have been), seems to owe something to the mathematical philosopher Whitehead, whose *Adventures of ideas* had appeared in 1933 (cf. also Sprigg 1975, especially pp. 667–668):

Terms or factors are not merely *seen* in relation to one another. They actively take one another into relation, or mutually 'prehend' one another as Whitehead would say. ... It [i.e. a term in a system] even prehends negatively everything that was not said but might have been said. This 'inter-related prehensiveness' must be taken as a fundamental principle even in phonetics and formal grammar.

(Firth 1937: 110–111)

Two years after *Adventures of ideas* there appears Firth's first application of what Palmer refers to as 'polysystemic analysis' — 'Phonological features of some Indian languages' (Firth 1935a):

The first clear indication of what was later known as the polysystemic approach, the refusal to identify terms in one system with terms in another, is found in Firth 1935 where for the nasals in Marathi he noted a two-term alternance initially, a three-term alternance finally, but, though phonetically there were eight different sounds, one 'unique' homorganic nasal before medial consonants; he comments 'I should not wish to identify all these *n* sounds as linguistically and functionally the same unit'.

(Palmer 1970: x–xi)

Firth's article 'The use and distribution of certain English sounds', published in that same year, 1935, just falls short of setting up a series of different systems for the vowels and consonants of English, each appropriate to a different type of piece, as proposed for nasals in the three different types of piece in Marathi referred to above. In it Firth illustrates the different ranges of phonetic 'substitution counters' that can occur in the specimen contexts *b-d*, *s-ks*, *p-l*, *h-d*, and 'finally after *d* and *m* for certain diphthongs: *diə*, *deə*, *doə*, *duə*; *miə*, *meə*, *moə*, *muə*'; 'by comparison a total series of twenty-one terms may be established' (Firth 1935b: 36-37).

Gimson (1962: 86-93) states 20 of these 21 terms as vowel phonemes of RP English as follows:

/ɪ e æ ɒ ʊ ʌ ə/	e.g. <i>hid, head, had, hod, hood, bud, (sitt)er</i>
/i: u: ɑ: ɔ: ɜ:/	e.g. <i>heed, fool, hard, fall, heard</i>
/eɪ aɪ ɔɪ/	e.g. <i>fail, hide, foil</i>
/əʊ aʊ/	e.g. <i>foal, fowl</i>
/ɪə ɛə ʊə/	e.g. <i>beard, bared, poor</i>

As an example of the twenty-first term of Firth's total series referred to above, *ɔə*, *hoard* would serve. Gimson, however, does not distinguish a phoneme /ɔə/ from /ɔ:/, exemplified above by *fall*; but I do distinguish [ɔə] phonologically from [ɔ:] in my own speech, and therefore wish to include it in my analysis. Indeed [ɔə], and the other 'centring diphthong' phonological units of English, [ɪə], [eə] and [ʊə], are a convenient point of departure for me in introducing the *r* (prosodic) piece and the first of its (phonematic) vowel systems.¹

¹ Cf. also Firth (1948: 131-132):

The distribution of the neutral vowel in English from this point of view would make an interesting study. The prosodic nature of ə is further illustrated by the necessity of considering it in connection with other prosodies such as the so-called "intrusive" *r*, the "linking" *r*, the glottal stop, aitch, and even *w* and *y*. The occurrence of Southern English diphthongs in junctions is a good illustration of the value of prosodic treatment, e.g. ... the so-called "centring" diphthongs, *ɪə(r)*, *eə(r)*, *ɔə(r)*, *ʊə(r)*.

2 The junction piece and its three-term prosodic system:

r, v, c

If the lexical item *dear*, one of Firth's set of four examples of 'certain diphthongs' referred to above, is examined in different phonetic contexts, it will, at least in my usage, be found to alternate in phonetic form between [dɪəɹ] and [dɪə]: [dɪəɹ] in e.g. '*Dear Enemy*', *dearest*;² [dɪə] in e.g. *oh dear!*, *my dear sir*, *dear one*, *dearly*. This alternation can usefully be considered in terms of difference in junction; clearly at least two types of junction piece would be needed, one to which it is [dɪəɹ] that is appropriate, and one to which it is [dɪə]. Lexical items such as Firth's *diə*, *dɛə*, *dʊə* and *duə* above, which contain the four centring diphthongs [ɪə], [ɛə], [ʊə] and [uə], have the same alternation under the same junction conditions, and can be put into the same junction class, which I have termed 'r', after the letter by which this kind of junction piece is regularly symbolised in orthography; they are appropriate to the r-junction piece, and can therefore be classified as r-junction-piece, or r, lexical items. The same is true of lexical items containing the pure vowel [ə:], such as *her*, *fir*, and *purr*; and it is very nearly true of those containing the pure vowel [ɑ:], as in *star* (but not *Shah*). The four diphthongal vowels and the two pure vowels occur in stressable syllables; the vowel [ə], which is confined to unstressable syllables, also commonly occurs in the r piece, with the result that a lexical item containing it can also be classified as a r lexical item; e.g. (*sitt*)*er*, *father*, *father(ing)*, *inferior*, *familiar* (but not *India*).³

Lexical items such as *play* also alternate in phonetic form, between [plɛ:] and [plɛ·]: [plɛ:] in e.g. *play!*, *play up!*; [plɛ·] in e.g. *playing*, *plays*. These can be put into a second junction-piece class, which can conveniently be termed 'v', after the syllabic vowel that is final in this class of lexical item; they are v-junction-piece, or v, lexical items.

² [ɹ], which appears in the International Phonetic Alphabet as the symbol for 'dental, alveolar, or post-alveolar approximant', I regard as symbolising a non-syllabic central vowel; cf. Pike (1943: 145): 'all vocoids are *non-syllabic vocoids* while functioning as non-syllabics (e.g. [y] in "young"; [w] in "woo"; [r] in "rich")'; cf. also Sweet (1877; see Henderson 1971: 115): 'if r is weakened we get a peculiar vowel sound, which partakes of r itself and of the mixed vowel æh [i.e. IPA ə], the tip being raised while the rest of the tongue is in the position for the low or mid mixed vowels', and Sweet (1908; see Henderson 1971: 111): 'the English r is vowel-like in sound, being quite free from buzz'.

³ Firth (1935b: 37) isolates [ə] from the other vowel units too: 'it may also be noted that ə can only occur in unstressed syllables, so that we only have a twenty-term potentiality in stressed syllables'.

A third class of lexical item needs to be distinguished as c-junction-piece (from their final consonant), in order to account syntagmatically for such contextual differences in phonetic form as [s], [z] and [ɪz] for the plural suffix; e.g. *cats* [kæts], *dogs* [dɒgz], *fishes* ['fɪʃɪz], *buzzes* ['bʌzɪz]; and [t], [d] and [ɪd] for the past-tense suffix; e.g. *raced* [ɪɛ'st], *raised* [ɪɛ:zd], *rated* ['ɪɛ'tɪd], *raided* ['ɪɛ:dɪd]. (For these two suffixes the r and v piece agree in having [z] and [d], respectively; e.g. *dears*, *endeared* for the r piece, and *plays*, *played* for the v piece.) Such lexical items as *cat*, *dog*, *fish*, *race*, *raise*, *buzz*, *rate*, and *raid* can all be grouped in a general c-junction class, within which a further junction sub-classes need to be distinguished, six of which can be illustrated from the above eight examples.

2.1 The stressable type of r piece

Having provided phonetic criteria for distinguishing the r prosodic piece from such other types of piece as the v and the c piece, the next task is to pursue the type of analysis that Firth referred to as 'substitution-counter', and was later to call 'phonematic analysis', in order to determine the number of phonological vowel units (V units) and phonological consonant units (C units), grouped as terms in systems, appropriate to the stressable kind of r piece.

As the least controversial point of departure I take the four centring diphthongs of my own usage, [ɪə], [ɛə], [ɔə] and [ʊə];⁴ they differ prosodically from all but three of the remaining 17 'substitution counters' of Firth (1935b) in being identified with types of r piece. Indeed they provide a phonetic criterion of the r piece that, in certain circumstances (i.e. the consonant-type junction described in Sections 2.1.1.2 and 2.1.2 below) is more effective than the principal criterion, the voiced non-syllabic central vowel [ɹ], commonly known as 'linking r'. Of the remaining three similar 'substitution counters', [ə:], [ɑ:] and [ɔ:], I wish to add to the four diphthongs the first of these, [ə:], as being identical in junction behaviour with them, and therefore as enjoying equal status with them as a criterion of the r piece, while the second, [ɑ:], can be accepted for this function subject to minor qualifications. These form the six characteristic types of

⁴ I emphasise the diphthongal nature of these four in my own usage because I am aware of pure-vowel alternatives to two of them in use since the early 1960's: [ɪ:] and [ɛ:] where I use [ɪə], and [ɛə], respectively. The pure-vowel alternative [ɔ:] to my [ɔə], however, belongs to a different generation from these.

vowel of stressable syllables in the junction; [ə], on the other hand, is dealt with as the characteristic vowel of unstressable syllables, in Section 2.2 below.

2.1.1 Junction between words (interverbal junction)

2.1.1.1 Vowel type

In interverbal junction the four diphthongs and the two pure vowels [ə:] and [ɑ:], when in the final syllable of the word, are linked to the initial syllable of the following word by a voiced non-syllabic central vowel [ɹ] if that following word begins with a syllabic vowel, unless the two words are isolated from each other by a pause. This type of interverbal junction is, therefore, termed the vowel type:

[-ɪəɪ -ɛəɪ -ɔəɪ -ʊəɪ -ɜ:ɪ -ɹ:ɪ (-ɔ:ɪ)] [V-]

e.g. *Shear it!, Tear it!, Pour it!, Moor it!, Spur it on!, Bar it!, (War Office), here it is, there he is, fur and feather, far and wide*

The lexical items shown here as occurring in the r piece, *shear, tear, pour, moor, spur, and bar, and here, fur, and far*, can be classified, from their association with the r piece, as r-piece lexical items; and so can all other lexical items whose behaviour in interverbal junction is the same as that of these nine. Once this identification with r junction has been made, all such lexical items can themselves be treated as each a criterion of the r piece, not as a phonetic criterion but as a lexical criterion, and as indicating an instance of the r piece in a spoken or written text.

In the pause sub-category of interverbal junction of this type, the vowel type, on the other hand, the junction piece comprises a sequence of two syllabic vowels, and can be represented as follows, with [,] symbolising a pause:

[-ɪə, -ɛə, -ɔə, -ʊə, -ɜ:, -ɑ:, (-ɔ:,)] [V-]

e.g. *here, it's yours; far, and yet not too far*

2.1.1.2 Consonant type

In junction with a word beginning with a consonant or a non-syllabic vowel, the consonant type of r-piece junction, the syllable-final vowel is also word-final, and is immediately followed by the initial consonant or non-syllabic vowel of the following

word, whether or not a pause intervenes. In the consonant type of interverbal r-piece junction, therefore, including its pause sub-category, there is no [ɹ] to act as a major criterion; and the centring diphthongs [ɪə], [eə], [ɔə] and [ʊə] and the pure vowel [ə] are each the phonetic criterion of the r piece; and so, for the most part, is [ɑ:]. Again a distinction can be made between a non-pause and a pause sub-category:

[-ɪə -eə -ɔə -ʊə -ə: -ɑ:ɹ (-ɔ:)] [C- j- w- ɹ- h-]

e.g. *shear them, tear them, pour them, moor them, spur them on, bar them, War House, here you are, here we go, here he is, bar your way, bar one's way, bar his way*⁵

[-ɪə, -eə, -ɔə, -ʊə, -ə:, -ɑ:, (-ɔ:,)] [C- j- w- ɹ- h-]

e.g. *Here, take it!*

These four diphthongal vowels imply [ɹ] in the appropriate junction context, the vowel type of r piece; so does the pure vowel [ə:]; and so, generally, does [ɑ:]. This implication is recognised by symbol, an asterisk, in the *English Pronouncing Dictionary*: e.g. 'ʃɪə*', 'bɑ:*', 'pɔ:*' [pɔə*]; in English orthography the symbol is, of course, lexical-item-final r, which is commonly also word-final.

It should be noted, however, that, while the pure vowel [ɑ:] is a criterion of r in the vowel type of r junction piece, in which it supports the more effective criterion [ɹ], e.g. *far and wide* [-ɑ:ɹ ə-] (as opposed to e.g. *Shah of Persia* [-ɑ: ə-], an example of the v junction piece briefly distinguished above), it is not entirely efficient in the pause and the consonant type of junction. This is because the phonetic exponency of r in these two types of piece overlaps that of v; firstly, in the pause type of junction, and secondly, in the consonant type of junction:

⁵ The lexical items *them* and *his* have alternative phonetic forms according to type of junction: [ðəm] and [əm] (with a further phonetic form [ðem]), and [hɪz] and [ɪz]. The examples with *them* given here are pronounced [ʃɪə ðəm], [spɔ: ðəm] etc., in the consonant type of junction, but [ʃɪə əm], [spɔ: əm] etc., with [-ɹ], in the corresponding vowel type of junction at fast tempo; cf. also [bɑ: hɪz] vs. [bɑ:ɹ ɪz].

 [-ɑ:] [V-]

 e.g. r *far, and not so far*
 v *the Shah, and his predecessors*

[-ɑ:] [C- j- w- ɹ- h-]

 e.g. r *'Far from the madding crowd's ignoble strife'*
 v *the Shah decided/yielded/went/re-opened/held*

Fortunately for the effectiveness of [ɑ:] as a criterion of r the number of v-piece partial homophones, e.g. the lexical items *Shah, bra, blah, fa(h), la(h)*, is very small, none of them being drawn from the verb, adverb, adjective, or particle grammatical categories, with the result that pause-type and consonant-type instances of a junction piece containing [ɑ:] are very much more likely to be examples of the r piece than the v piece; and [ɑ:], consequently, only just falls short of being, with [ə:], a criterion of the r piece.

2.1.2 Junction within words (intraverbal junction)

Lexical items containing these six r-piece vowels also show the same alternative vowel-type and consonant-type (but not pause-type) junction features in intraverbal junction, and offer the same phonetic criteria, as seen in the following combinations of verb and verbal suffix (for [wɔ:(ɹ)-], as in *warring, warred*, see the w syllable-nucleus piece, in Section 2.1.5.2 below):

 [-ɪɹ- -ɛɹ- -ɔɹ- -ʊɹ- -ə:ɹ- -ɑ:ɹ-] [-V-]

 e.g. *shearer, tearing, pouring, mooring, spurring, barring*

[-ɪə- -ɛə- -ɔə- -ʊə- -ə:- -ɑ:-] [-C-]

 e.g. *shears, bared, poured, moored, spurred, barred*

The r piece's alternative exponents can be exemplified from adjective and noun lexical items too in such words as *queerish, hairy, gory, poorer, furry, starry* (cf. *queer, hair, gore, poor, fur, star*) vs. *queers, hairs, pores, poorness, furs, stars*.

2.1.3 Phonological vowel (V) systems

The type of r piece analysed in this section has been shown to have a sixfold phonological distinction in vowel as far as the lexical-item-final component of the junction is concerned; so it might appear that a six-term (phonematic) V system could be set up, for which the five vowel letters of the roman alphabet, I, E, O, U, and A, could conveniently be used, with one more added, Y perhaps being the most suitable. Four of these terms, I, E, O, and U, would have diphthongs, the centring diphthongs [ɪə], [ɛə], [ɔə] and [ʊə] as their phonetic exponents, while the remaining two, A and Y, would each have a pure vowel as its exponent, [ɑ:] and [ə:] respectively (but [ɔ:] as the phonetic exponent of A in the w syllable-nucleus piece, e.g. *war, warring, warlike*, in Section 2.5.1.2 below):

I	E	O	U	A	Y
[ɪə]	[ɛə]	[ɔə]	[ʊə]	[ɑ:]	[ə:]
<i>shear</i>	<i>tear</i>	<i>pour</i>	<i>moor</i>	<i>bar</i>	<i>spur</i>

While such a six-term V system as this would be warranted by the relations of these six types of vowel sound with following sounds in the junction, it would ignore their relations with preceding sounds within the syllable, both consonants and non-syllabic vowels. The syntagmatic relations of these six vowels with preceding sounds are not all comparable; and further prosodic types of piece need to be distinguished and stated for the syllable initial, which comprises the syllabic vowel and whatever consonants and non-syllabic vowels, especially [j] and [w], precede it within the syllable.

2.1.4 Syllable-initial system (five-term): y, w, r, l, z

Among these syllable-initial syntagmatic relationships the following four are especially prominent. Firstly, both the voiceless non-syllabic front spread vowel [j-] and sequences in which a non-syllabic front spread vowel, voiced or voiceless, combines with a preceding consonant or consonants, [Cj-], [Cj-] or [sCj-], combine with only one of the six vowels distinguished in the previous section: the diphthong [-ʊə-], or, to introduce a more detailed phonetic transcription at this point, [-ʊə-]; e.g. *Huron, pure, durable, skewer*. The voiced non-syllabic front spread vowel [j-], on the other hand, when initial in a lexical item, combines with five of those six types of vowel sound, e.g. *year, Yare*

(Norfolk), *yore*, *your/ewer/Ure*, *Yare* (Isle of Wight), and has therefore been treated differently, as a component of the z piece (see Section 2.1.4.5 below; cf. also the y syllable-nucleus piece in Section 2.1.5.1).

Secondly, the non-syllabic back rounded vowel, voiced or voiceless, combines with only two preceding consonant sounds, alveolar fricative and velar plosive, both being voiceless: [sw-], [kw̥-] or [skw-]; not with labiality: *[pw̥-], *[bw-], *[fw-]. Furthermore, [kw̥] at least, and the syllable-initial voiceless non-syllabic back rounded vowel [w̥-], combine not with the open back non-rounded vowel [ɑ], as in e.g. *scar*, *Parton*, *Harewood*, but with the half-open back rounded vowel [ɔ:]: e.g. *Quarr*, *Wharton* (cf. also [w-], in *war*, *warring*, *warfare*, in Section 2.1.5.2 below).

Thirdly, the voiced and voiceless non-syllabic central vowels [ɹ] and [ɹ̥] combine with the feature plosion in a preceding consonant, and with the feature friction, though voiceless and labiodental only, but do not combine with nasality, or laterality, or alveolar friction, unlike [j] in [mj-], [nj-], [lj-] and [sj-], and [w] in [sw-].

Fourthly, laterality, voiced or voiceless, combines with labiality and velarity as features of preceding plosives, but not with alveolarity: *[t̥l-] and *[dl-].

It is to express these relationships of mutual expectancy that a syllable-initial system with the following five terms has been distinguished: y, w, r, l and z.

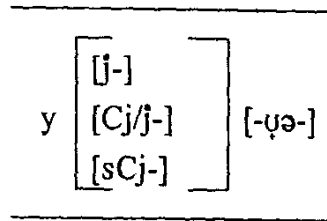
2.1.4.1 y

One of the r-piece syllabic vowels, [ʏə], differs from the remainder in that it can combine with a syllable-initial sequence of consonant, or consonants, and a non-syllabic front spread vowel, [Cj-], [C̥j-] or [sCj-], whence a type of piece, the y piece, can usefully be distinguished.⁶

The beginning of the diphthong is slightly more fronted and slightly less rounded in the y piece than in the w, r or l piece, or the z piece except for such lexical items as *your*, *ewer* or *Ure* [jʏə] (see Section 2.1.5.1 below). The non-syllabic vowel is voiced when combined with a voiced plosive or an assibilated plosive, and voiceless and breathed when combined with a non-assibilated voiceless and breathed plosive (on this syntagmatic basis two further prosodic systems, aspirated vs. non-aspirated and

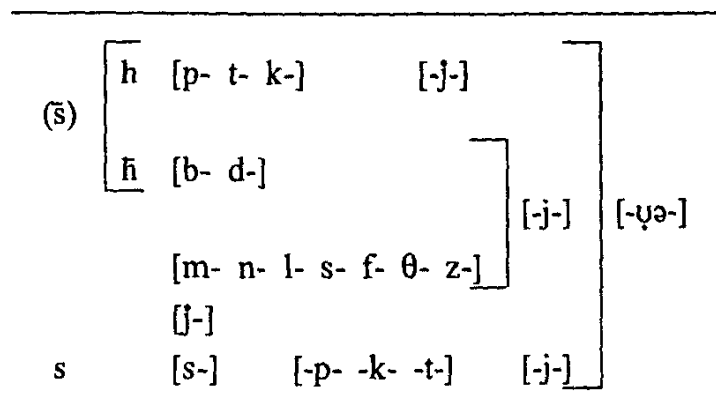
⁶ A y syllable-initial piece can also be distinguished for those v-junction-piece lexical items which contain the vowel [u], e.g. *pew*, *Pugh*, *spew*, *new*, *lieu*, *few*.

assibilated vs. non-assibilated, need to be set up);⁷ it is also voiced when combined with a nasal, a lateral, or a fricative:



The syllable-initial voiceless non-syllabic front spread vowel [j-] and the voiced or voiceless non-syllabic front spread vowel when combined with a preceding consonant or consonants, [Cj-], [Cj-] or [sCj-], are each a criterion of the y term. But the syllable-initial voiced non-syllabic front spread vowel [j-], as in *your*, *ewer*, and *Ure*, is not a criterion of the y term because it combines equally readily with the vowels [ɪə], [eə], [ɔə] and [ɑ:], as in *year*, *Yare* (Norfolk), *yore*, *Yarmouth*, and *has*, therefore, been assigned to the z term of this five-term system (see Section 2.1.4.5, and also Section 2.1.5.1 below).

In the following table I have plotted the initial consonants of the y syllable-initial piece in relation to [j] and [j-]; this has made it necessary to group them within the framework provided by the further prosodic systems s- \bar{s} and h- \bar{h} (h and \bar{h} imply \bar{s} , which I have, therefore, bracketed):



The above phonetic combinations of consonant, non-syllabic vowel, and syllabic vowel can now be cast in the form of phonological formulae to illustrate the various

⁷ It is necessary to distinguish certain consonants, [p], [t] and [k], not only as voiceless but also as breathed, because voiceable consonants are also voiceless, but not breathed, in whispered speech: [p̥], [t̥] and [k̥]. In whispered speech the latter have not breath (cavity friction), but arytenoid (local) friction; cf. Pike (1943: 140-142) and Sprigg (1978: 5-7).

phonological consonant (C) systems; no vowel system can be stated for y-piece lexical items, because only one vowel sound is possible: [ʊə]. This diphthongal vowel is adequately symbolised by yC in combination with r.⁸ The following examples are of vowel type (similar examples of consonant type include *purely, endured, manured, sewers, lured, skewers*):

(s̄)hyC ₃ r	<i>purest, maturity, cure</i>
(s̄)fiyC ₃ r	<i>bureau, enduring</i>
yC ₈ r	<i>demure, manure, lure, sewerage, fury,</i> <i>thurible, Zürich, Huron, heuristic</i>
syC ₃ r	<i>spurious, skewer, estuary</i>

2.1.4.2 w

In r-junction-piece lexical items the range of possible initial consonants that can combine with a non-syllabic rounded back vowel, voiced or voiceless [-w-] or [-w̥-] according to the type of voicing piece in which it occurs, is much less than the 13 attested [Cj/f-] combinations for the y piece in the previous section; but the range of vowels with which [Cw/w̥-] can be associated, on the other hand, is much greater, not a mere one but three, with the further addition of [ɔ:] doing duty for [ɑ:] and [ə:], though only in combination with [w̥-], in *whirr*. There are no instances of [Cw/w̥-], [sCw-], or [w̥-] combining with the sixth vowel, the diphthong [-uə-], hence there are no such lexical items as *[kw̥uə], *[sw̥uə] or *[w̥uə]. This gap in distribution as compared with the z piece (see Section 2.1.4.5 below), e.g. *poor, moor, sure, houri, spoor*, might however be fortuitous in the r piece, because [Cw-] does occur in such phonetically similar c-junction-piece examples as *swoon* and *swoop*; in which case there would be no need to deny to the w piece the full range of six vowel terms, I, E, A, O, U, and Y, stated for the r junction piece in general in Section 2.1.3 above. In the following table, though, I have included only those vowel and consonant sounds which are attested:

⁸ The symbols y in combination with either v or c, symbolising the other two terms of the three-term junction system, r, v, and c, suffices to symbolise the vowel [ʊə]; e.g. *you, queue, dew, thew(s), Hugh, spew* for yv, and *use, tune, duke, mule, huge, spume* for yc. The y system does not apply to short-vowel lexical items with [-iC], [-ɛC], [-æC], [-ɒC], [-ʌC] or [-uC], hence there are no such lexical items as *[jus], *[tjun], *[jup] and *[spjuŋ]; [juŋ], as in *Jungfrau*, is best assigned to a separate system for loan-words.

w	<div style="border: 1px solid black; padding: 2px; display: inline-block;">[w̥-]</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">[Cw̥/w-]</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">[sCw-]</div>	[-ɪə- -ɛə- -ɔə- -ə:- -ɔ:-]
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In the w syllable-initial piece the phonetic exponents of one of the terms of the vowel system, A, are markedly different from those appropriate to it in the more wide-ranging z syllable-initial piece (except for those types of z piece which are also examples of the w term of the w- \bar{w} syllable-nucleus system, e.g. *war*, *warring*, *warfare* (see Section 2.1.5.2 below): for w backness, half-openness and rounding [ɔ:], e.g. *Quarr*, *Wharton*;⁹ but for z backness, openness and non-rounding [ɑ:], e.g. *car*, *scar*, *Harewood*, *Parton* (as in *car of the sun*, *car-owner*, *scarring* for vowel type, and *car-driver*, *cars*, *Scarface* for consonant type). Apart from the [ɔ:]-[ɑ:] alternation there is no marked difference between the features of each vowel unit of the w piece as compared with those of the z piece; in the following comparison I have left a blank for U in the w row to indicate that I am willing to consider the absence of *[swuə] and *[kwuə] or *[skwuə] to be not systemic but merely fortuitous:

	I	E	O	U	Y	A
w	[ɪə:]	[ɛə:]	[ɔə:]		[ə:]	[ɔ:]
z	[ɪə:]	[ɛə:]	[ɔə:]	[uə:]	[ə:]	[ɔ:]-[ɑ:]

The more general, and formulaic, table given above to illustrate the w piece is, however, somewhat misleading, because it does not reveal the very considerable difference in range of syllable-initial consonants between the w piece and the preceding type of syllable-initial piece, the y piece, and, even more so, the z piece (see Section 2.1.4.5 below); the initial consonants of the w piece are limited to the following:

⁹ I welcome the *-arr* in the spelling of *Quarr*, and of *-ar* in *Wharton*, as orthographic support for my analysis that should not be spurned; cf. Firth (1957b: 15): 'Indeed the consideration of graphic exponents is a companion study to phonological and phonetic analysis, unfortunately not always harmonious, but often of provocative interest'.

(š)	h	[k-]	[-w̥-]	[-ɪə- -ɛə- -ɔə- -ə:- -ɔ:-]
		[s-]	[-w-]	
		[w̥-]		
	s	[s-]	[-k-] [-w-]	

e.g. (š)hwV_{sr} *queer, Traquair, quorum, Quarr*
 wC₂V_{sr} *swear, where, swore, whirr*
 swr *square*

Lexical items of the c-junction piece type such as *quirk*, *swirl*, and *squirt* suggest that the absence of lexical items to exemplify the phonematic unit Y apart from *whirr* may well be fortuitous; similarly, *swear* and *square* support the possibility of *[swɪə(ɪ)] and *[skwɪə(ɪ)]; and *quart* and *sward* support the possibility of *[swɔ:(ɪ)] and *[skwɔ:(ɪ)]. The loan-word *quorum* is given as 'quɔ̄r'um' in the *Concise Oxford Dictionary of Current Usage*, [kwɔ̄ɹəm], but my pronunciation is [kwɔ:(ɪ)m], as in the *English Pronouncing Dictionary*. For s-piece lexical items, only [-k-] and [-ɛə] are attested; so no C and V systems can be stated; and [-k-] and [-ɛə] are adequately symbolised by swr, unless such forms as *[skwɪə(ɪ)], *[skwɔə(ɪ)], *[skwə:(ɪ)] and *[skwɔ:(ɪ)] are accepted as part of the phonetic and phonological potentiality of English.

The examples of the w piece given above, *queer*, *swore*, *square*, etc., are all vowel-type examples; consonant-type examples would include *sworn*, the past-participle form corresponding to the vowel-type past-tense example *swore*. It is noteworthy that in its case the phonetic exponency of O is not [ɔə:] but [ɔ:], overlapping the exponency of A; [ɔən] is not attested in the past-participle form of w-piece verbs (cf. also the z-piece verb forms *torn*, *born*, *borne* and *shorn*, in Section 2.1.4.5 below).

It will no doubt have been noted that I have included initial [w̥-] in the phonetic exponency of the w term but not its corresponding voiced sound [w-]; this is because I am treating [w̥-], like [j-] in the previous section, as a combination of non-syllabic vowel, back and rounded or front and spread, with the non-syllabic voiceless breathed vowel [h-], the two non-syllabic vowels being articulated not in sequence but simultaneously. Apart from these two single voiceless sounds the function of both the w and the y piece is syntagmatic: to link the two types of non-syllabic vowel to a

permitted preceding consonant or sequence of two consonants. There was no difficulty in dissociating the voiced non-syllabic vowel [j], when in initial position, from the y term of the syllable-initial system because, as was demonstrated above, [j-], unlike [j-], and also [Cj/j-] and [sCj-], was not restricted to combining with the following diphthong [-ʊə-] but combined freely with all the remaining syllabic vowels of the r junction piece except, as it happens, [ə:(ɹ)]: there is at present no such lexical item as [jə:(ɹ)].

It is reasonable to treat initial [w] in the same way as its fellow non-syllabic vowel [j], even though the syntagmatic difference between [j-] and [j-], [Cj/j-] and [sCj-] is not repeated in the case of [w-] as against [w̥-], [Cw/w̥-] and [sCw-]: these combine with the remaining vowels (except [-ʊə-]) equally; e.g. *whirr*, *where*, *swore*, *swear*, *queer*, *Quarr*, *square* for a w syllable-initial piece, and *weir*, *were*, *wear*, *wore*, *war* with syllable-initial [w]. Accordingly, both [w-] and [j-] are assigned to the z syllable-initial piece, and their syntagmatic relations with following vowels are dealt with in Section 2.1.4.5 below (and, further, through the two syllable-nucleus systems y- \bar{y} and w- \bar{w} ; see Section 2.1.5 below).

2.1.4.3 r

Unlike the w piece, from which initial labiality is excluded, *[p̥w̥-], *[bw̥-], *[fw̥-], the non-syllabic central vowel, voiced or voiceless, can combine with all three places of articulation, labial, alveolar (or, rather, post-alveolar), and velar when further combined with plosion, and also with voiceless labio-dental friction: [p̥ɹ-], [bɹ-], [k̥ɹ-], [gɹ-], [fɹ-], [t̥ɹ-], [dɹ-]; but, unlike the y piece, not with nasality or laterality, nor, in r-junction-piece lexical items, with friction combined with other places of articulation. When combined with post-alveolarity, in [t̥ɹ-], [dɹ-], the [ɹ] component is fricative, and therefore consonantal, and the tongue tip is somewhat retroflexed throughout the cluster to accord with the post-alveolar place of articulation:

h	[p- t- k-]	[-ɹ-]	[-ɪə- -ɛə- -ɔə- -ʊə- -əɪ-]
h̄	[b- d- g-]	[-ɹ-]	
	[f-]		

e.g.	hrC ₃ V ₅ r	<i>prayer, prurient, Truro, crore</i>
	h̄rC ₃ V ₅ r	<i>brer, Brereton, drawer, Drury, Grier,</i> <i>Grierson</i>
	rVr	<i>Frere</i>

In the last of these examples voiceless labio-dental friction is unique in *Frere*, and can therefore be adequately symbolised by the letter r; but if, as seems possible, other types of fricative initial were assumed to be compatible, in sequences such as [θɹ-] and [ʃɹ-], which occur in v-junction and c-junction types of lexical item, e.g. *three*, *shrew* for v junction and *throat*, *shriek* for c junction, then the phonological formula would need to be expanded to rC₃Vr, to accommodate *[θɹɪə] and *[ʃɹʊə], for example, or whatever other such forms the future might have in store for the vocabulary of English. Similarly, if the remaining four types of vowel were taken to be part of the expectancy of this type of piece, that formula would have to be expanded to rV₅r to allow for **frare*, **frore*, **froor*, and **frer*, **frir*, or **frur*. Indeed, if the full six vowels of the r junction piece were assumed to be not inappropriate, the formula for this type of piece would have to be amended to (h/h̄)rC₃V₆r.

It is a shortage of examples that makes it difficult to know whether expansions such as these would be legitimate or fantastic. So scarce are examples of the r piece that it might, on the contrary, seem that [Cɹ-] is with difficulty compatible with the r junction piece: most of the examples that do occur are place names or personal names, loan words, or curiosities; e.g. *Brereton*, *Grier*, *Frere*, *Truro*, *dreary*, *prurient*, *prayer*, *drawer*, *prairie*, *crore*, *brer*.¹⁰ In v-junction-piece and c-junction-piece lexical items, on the other hand, from which piece-final [ɹ] is conspicuously absent, this kind of initial

¹⁰ *Ware* shares the phonetic form [wɔə] with *wore* in the usage of the Leicestershire hunting-field — or at least it did when I was a boy; but the former is probably best treated not as an independent lexical item but as a stylistic (situational) variant of the lexical item *ware* [wɛə(ɪ)] (cf. also *beware*) in which the lip-rounding feature of the initial has spread into the vowel, replacing lip-spreading to some extent, and taking backness with it instead of frontness (cf. also *war*, *Quarre*); it seems to be confined, grammatically, to the imperative.

sequence is common: e.g. *tree, tray, dray, true, drew, straw, draw, pray, brew, crow, grey, free, three, throw, shrew* for v junction, and *treat, dream, train, drain, troop, droop, stroll, drone, trawl, preach, brain, croon, freak, throat, shrewd* for c junction.

Piece-initial and junction-piece [ɹ], on the other hand, occur together freely, in the z syllable-initial piece; e.g. *rear* ('hindermost part', 'raise', 'bring up'), *rare, roar, Ruhr, rural*; in this respect, association with a wide range of vowels, the central non-syllabic vowel (with varying degrees of lip-rounding and lip-spreading to match the syllabic vowel) conforms to the pattern set by its fellow non-syllabic vowels, the front spread [j-] and the back rounded [w-] (see Section 2.1.4.5 below), though differing from them in their relations with certain of the syllabic vowels, which have given rise to the syllable-nucleus systems, y- \bar{y} and w- \bar{w} ; see Section 2.1.5 below.

2.1.4.4 l

Lexical items in which an initial consonant combines with a lateral, [Cl/]- or [sCl-] resemble the w syllable-initial piece, described in 2.1.4.2 above, in having a gap in compatible initial consonants; but, in this case, it is not the incompatibility of labials and labio-dentals that is responsible for the gap but alveolarity: *[t_l-] and *[dl-] are impossible combinations. The acceptable initial consonants for this type of piece are (note that [θl-] is a possible l-piece combination in addition to [fl-] and [sl-], in Welsh place-names such as *Llangollen, Llanelly, and Llandudno*):

(s)	h	[p- k-]	[-]-] [-l-]	[-lə- -eə- -ɔə- -uə- -ə:- -ɑ:-]
	h̄	[b- g-]			
		[f- s-]			
s	[s-]	[-p- -k-]			
e.g.	(s)hIC ₂ V ₆ r	<i>clear, declare, implore, pleurisy, plural</i>			
	(s)h̄IC ₂ V ₆ r	<i>bleary, glare, Blore, deplorable, blur, Blarney</i>			
	IC ₂ V ₆ r	<i>flare, floor, slur</i>			
	sIC ₂ V ₆ r	<i>sclerosis, explore</i>			

All four of the types of syllable-initial piece described so far, y, w, r, and l, can have plosion and friction as features of the initial consonant; and all of them can also include velarity; but only three of them can include labiality as a possible feature; and

only two of them can include alveolarity and plosion (though the absence of this combination of features from the w piece may be fortuitous), while only one of them, the y piece, can include nasality and laterality as possible features, together with dentality (and, on account of *Zürich*, friction and voice [z]). All these features, though, are represented in the z syllable-initial piece, [(s)CV-], with the addition of features exclusive to the z piece such as affrication, [tʃh-] and [dʒ-], labio-dental and dental friction combined with voice, [v-] and [ð-], friction combined with palato-alveolarity and voicelessness, [ʃ-], and piece-initial non-syllabic vowel articulations, [j-], [w-], [ɹ-] and [h-] — all nine of which can be regarded as criteria of the z term. In fact the only sounds that do not occur initially in the z syllable-initial piece are [j] and [w] (the voiced palato-alveolar fricative, [ʒ], occurs only in intraverbal position, e.g. *measure*, *leisure*, or in word-final position, e.g. *barrage* (balloon), *ménage*). For comparison at a glance all these syllable-initial-piece relationships can be plotted as follows:

y	[p b t d k g m n l f s θ z]	[j]
w	[k s]	[w]
r	[p b t d k g f]	
l	[p b k g f s]	
z	[p b t d k g m n l f s θ z]	[h tʃ dʒ v ʃ ð j w ɹ]

2.1.4.5 z

This fifth type of syllable-initial piece, to which I have allotted the symbol z, has, therefore, easily the widest range of sounds, both consonant and non-syllabic vowel, [j-], [w-], [ɹ-] and [h-], and syllabic vowel. The range of syllabic vowels not only includes the six listed in 2.1.3 above, but also two alternatives, one for the y syllable-nucleus piece and one for the w syllable-nucleus piece, and a further vowel restricted to only half a dozen lexical items. I have displayed them below in the form of a table. The example lexical items in the table are all of vowel type; similar consonant-type examples include *charwoman*, *poor-box*, *jeers*, *beer-money*, *surety*, *whore-house*, *spurred*, *spheres*.

In the table below I have separated [tʃ-] and [dʒ-] from [p-], [t-] and [k-] and [b-], [d-] and [g-] because, unlike these latter, they are doubly incompatible with assibilation: firstly, [tʃh-] and [dʒ-] share with the plosives [ph-], [kh-], [b-], [g-] etc. the incompatibility of aspiration and of voice with assibilation, whereby e.g. *[sph-],

*[stʃh-], *[sb-] and *[sdʒ-] are impossible combinations; but, secondly, they are syntagmatically distinct from plosives in that the affrication feature is in itself incompatible with assibilation: *[stʃ-] and *[sdʒ-] are impossible, but [sp-], [st-] and [sk-] occur, e.g. *spear, stare, score* in the table below. In other words, the expectancy of affrication as regards a preceding consonant within the lexical item differs from that of plosion.

I have also given alternative vowel sounds in the table: [-ʊə-/-ʊə-] and [-ɑ:-/-ɔ:-]. The alternatives are complementarily distributed by type of piece, the former being dealt with, in Section 2.1.5.1 below, through the y-ȳ syllable-nucleus piece, e.g. *ewer/your/Ure* vs. *poor*; and the latter, in Section 2.1.5.2, through the w-ȳ syllable-nucleus piece, e.g. *war* vs. *car*.

(s̄)	h	[tʃ-] [p- t- k-]	[-h-]
	h̄	[dʒ-] [b- d- g-]	
s̄		[m- n- l- j- w- ɹ- h- f- s- ʃ- θ- v- z- ð-]	
s	[s-]	[-p- -t- -k- -m- -n- -l-] [-f-]	

[-ɪə- -eə- -ɔə- -ə:-
-ʊə-/-ʊə- -ɑ:-/-ɔ:- (-ɔ:-)]

e.g.	(s̄)hzV _{6r}	<i>cheer, chair, chore, char, chirr</i>
	(s̄)hzC ₃ V _{6r}	<i>peer, tearing, core, tar, cur</i>
	(s̄)h̄zV _{6r}	<i>jeer, jury, jar</i>
	(s̄)h̄zC ₃ V _{6r}	<i>beer, daring, gory, dour, bar, bur(r)</i>
	s̄zC ₁₄ V _{6r}	<i>meer, nearer, lore, ewer, wearer, rarity, whoring, far, sir, sure, therology, veering, zero, there</i>
	szC ₆ V _{6r}	<i>spear, stare, score, spoor, smear, snare, slur, star</i>
	szr	<i>Sphere</i>

To the vowel-type examples given above could be added the past-tense forms *tore*, *bore*, *wore*, and, as an alternative to *sheared* in certain uses, *shore*, to which there are corresponding consonant-type past-participle forms *torn*, *born*, *borne*, *worn*, and *shorn*. While dealing with the w piece, in Section 2.1.4.2 above, I drew attention to the alternative exponency of O as [ɔ:] in the appropriate grammatical context, i.e. in the past-participle form *sworn*, rather than the [ɔə] of the past-tense form *swore*; the same alternation applies to the z-piece past-tense and past-participle forms *tore*, *bore*, *bore*, *wore*, and *shore* as opposed to *torn*, *born*, *borne*, *worn*, and *shorn*. Further, the final [-ɔ:n] of these three r-junction consonant-type past-participle forms contrasts phonetically with the final [-ɔən] of the c-junction *mourn* (verb, present tense) and the *Bourne*-lexical item of *Bournemouth* (noun), but is non-comparable phonologically because of lexical and grammatical differences — two lexical items (stem and suffix) vs. one lexical item, verb vs. noun.

In addition to *war* and *Warre*, which are examples of the z syllable-initial piece from its w syllable-nucleus sub-category (see Section 2.1.5.2 below), there are two z-piece lexical items in [-ɔ:(ɪ)], both of them nouns, that do not belong to that sub-category: *tor* and *Thor*. These two exceptions are perhaps best accounted for by means of a separate sub-category for loan-words: for the former Wyld refers to Old Welsh *torr*, Welsh *tor*, 'a boss'; and for the latter the *Concise Oxford Dictionary of Current English* refers to Old Norse *Thórr*.

The only other such z-piece forms in [-ɔ:(ɪ)] from outside the w syllable-nucleus sub-category are the two conjunctions *nor* and *for* and the preposition *for*, [fɔ:(ɪ)] or [fə(ɪ)], to which might be added, from outside the z initial piece, the conjunction *or*, with a syllabic vowel initially. These four lexical items form a small class of their own, in complementary distribution, grammatically, with the numerous examples of the z piece in [-ɔə(ɪ)]; e.g. *Nore*, *fore*, *four*, *pour*, *store*, *core*, *bore*, *deplorable*, *explore*, *more*, *snore*, *lore*, *sore*, *wore* (and the syllabic-vowel-initial noun *ore*), which are nouns, verbs, adjectives, and adverbs. Though these four r-junction forms in [-ɔ:] or [-ɔ:(ɪ)] occur frequently in speech, they are only a handful in number; consequently, word-final [ɔ:] comes near to being a criterion of the v junction piece; e.g. *thaw*, *taw*, *awe*, *gnaw*, *jaw*, *law*, *maw*, *saw*.

2.1.5 Syllable-nucleus systems (z-piece lexical items only)

In order to account for two pairs of alternative vowels in the z syllable-initial piece in association with preceding types of sound two further prosodic systems need to be set up: $y-\bar{y}$ and $w-\bar{w}$. I have given the name 'syllable nucleus' to these two systems because the type of piece that they are concerned with relates features of certain syllabic vowels, the nuclei of the syllable, to appropriate preceding sounds.

2.1.5.1 $y-\bar{y}$

In the table in Section 2.1.4.5 above, showing the various combinations of sounds that form the z syllable-initial piece, alternatives have been given for one of the diphthongs: [-ʊə-] and [-uə-]. The first of these alternatives combines only with the non-syllabic front spread vowel [j-], and the latter with all the remaining consonants of the z piece and with the central non-syllabic vowel [ɪ-], with variable lip-rounding; so two types of piece can be formularised as follows:

	y	[j-]	[-ʊə-]
	\bar{y}	[C- ɪ-]	[-uə-]
e.g. vowel type	y	<i>your, ewer, Ure</i>	
	\bar{y}	<i>poor, jury, moor, surer, rural</i>	
consonant type	y	<i>yours, ewers, Ure's</i>	
	\bar{y}	<i>poorly, adjured, moors, surety</i>	

The non-syllabic front spread vowel [j] is not, of course, limited to combining with [-ʊə-]; it combines with all the vowels of r-junction-piece lexical items except [-ə:], e.g. *year, Yare* (Norfolk), *yore, Yare* (Isle of Wight), *Yarmouth* (probably it is merely fortuitous that **yir*, **yer*, or **yur* is absent from English); but these other four vowels do not appear to me to alternate in feature in association with [j-] as opposed to [ɪ-] or [C-].

The y syllable-nucleus piece overlaps the y syllable-initial piece, described in Section 2.1.4.1 above, in two respects: [j] and [ʊə]; but it differs from it through the association of [j-] with the vowels [ɪə], [ɛə], [ɔə] and [ɑ:], which is enough to justify placing [jʊə] within the z syllable-initial piece as a prosodic sub-type.

2.1.5.2 *w-w̄*

The latter member of the remaining pair of complementarily distributed alternatives given in the table in Section 2.1.4.5 above, [-ɑ:-/-ɔ:-], is to be associated with a preceding syllable-initial non-syllabic back rounded vowel, [w-], whence [wɔ:], [wɔ:ɪŋ] and [wɔ:-] exemplify a w syllable-nucleus piece; the former member of that pair, on the other hand, is relatable to all the consonants of the z syllable-initial piece as well as to the front spread non-syllabic vowel:

w	[w-]	[-ɔ:]
w̄	[C- j-]	[-ɑ:]
e.g. vowel type	w	<i>war, warring, Warre</i>
	w̄	<i>car, charring, mar, lar, far-away, Yare (Isle of Wight)</i>
consonant type	w	<i>warship, Warres</i>
	w̄	<i>car-park, charwoman, marred, far-seeing, Yarmouth</i>

The syllable-initial back rounded non-syllabic vowel [w] also combines with the remaining vowels of the r junction piece apart from [-ʊə] and, in my usage, [-ə:], e.g. *weir, wear, were, wares, wore, ware*;¹¹ but these two gaps may be fortuitous, especially since the phonetically similar lexical items *woo, wound, and whirr* occur; and some speakers pronounce *were* with [-ə:]. Apart from the [ɑ:-][ɔ:] alternation there is no marked difference between the features of each vowel when combined with [w-] and when combined with [C-] or [j-]. The w syllable-nucleus piece has both its non-syllabic vowel and its syllabic vowel in common with the w syllable-initial piece, [(s)Cw/w̄-], described in Section 2.1.4.2 above; e.g. *war, warfare* as contrasted with *Quarr* and the first lexical item of *Wharton*.

2.1.6 Syllable-initial syllabic vowel [V-]

The five types of syllable initial considered in Section 2.1.4 above have the initial position in the piece occupied either by a consonant or by a non-syllabic vowel; but it is also possible for a syllabic vowel to occupy that position:

¹¹ For an oddly similar relationship in Tibetan see Sprigg (1968).

I	E	O	U	A	Y
<i>ear</i>	<i>ere, air</i>	<i>ore, oar</i>	<i>Urdu</i>	<i>are, r</i>	<i>err</i>

2.2 The non-stressable type of r-piece [ə]

Firth, in his 'Use and distribution of certain English sounds', drew attention to the contextual distribution of [ə] as follows: 'it may be noted that ə can only occur in unstressed syllables, so that we only have a twenty-term potentiality in stressed syllables' (Firth 1935b: 37). Some instances of [ə] in word-final position do not directly concern me because they are contained in examples of the v-junction piece such as [-ə ə-]; e.g. *India and Burma, criteria of the r piece*, whence *India* and (*criteri*)*a* can both be classified as v-piece lexical items (cf. also, for a stressable v-piece lexical item, *Shah*, as in *Shah of Persia*, in Section 2.1.1.2 above); but examples of [-ə] in the r junction piece such as [-əɪə-] are numerous.

As when dealing with stressable syllables (see Section 2.1 above) it is convenient to treat the unstressable syllables within the same framework: firstly, interverbal junction; secondly, intraverbal junction.

2.2.1 Interverbal junction

Phonetic differences make it useful to distinguish vowel-type, pause-type, and consonant-type junction, as in Section 2.1.1 above.

2.2.1.1 Vowel type

Within vowel type junction the main phonetic distinction is between [-əɪ], and [-aɪ] and [-ɑɪ]. It needs two lexical and two phonetic contexts to account for it. Firstly, we have one lexical item or two, with a consonant preceding:

[-Cəɪ] [V-]

e.g. *father and mother, conductor and passenger*

Secondly, we have one lexical item or two, with a non-open vowel preceding:

[əu:əɪ -i:əɪ -e:əɪ -u:əɪ -ɔ:əɪ -ɔɪəɪ] [V-]

e.g. *'The Sower and the Seed', overseer of ..., player or spectator, persuer and persued, destroyer of Carthage, destroyer (one lexical item), coir*

Thirdly, we have two lexical items, with an open vowel preceding:

[-aɪ:əɪ (-aʊ:əɪ)] [V-]

e.g. *buyer and seller, higher and higher, (endower, plougher)*

Fourthly, we have one lexical item, with an open vowel preceding:

[-a:aɪ -ɑ:aɪ] [V-]

e.g. *hire and fire, fire and sword, the Tower of London, 'the power and the glory'*¹²

I usually distinguish two-lexical-item forms such as *buyer* and *higher* by a sequence of diphthong and short vowel [aɪ:ə] from one-lexical-item forms such as *hire* and *fire*, for which I use a sequence of long pure vowel and harmonising short vowel [a:a]. Somewhat similarly, I distinguish *destroyer*, one who destroys, as a two-lexical-item form, from *destroyer*, a type of warship, but by length of diphthong: [ɔɪ:ə(ɪ)] vs. [ɔɪə(ɪ)]; the latter rhymes with the one-lexical-item form *coir* (Malayalam *kayar*), not with *coyer*. No such problem arises with [ɑ:a] because there are no contrasting two-lexical-item forms (except, perhaps, for *endower* and *plougher*, given in the *English Pronouncing Dictionary*, which I suppose I should pronounce with [aʊ:ə] and have therefore included above, but in brackets).

¹² Gimson (1962: 134) refers to 'confusion between [ɑ:] < [aʊə] and /ɑ:/, resulting in such homophones as *shower* and *Shah* and *tower* and *tar*'; quite apart from the [-ɪ] that distinguishes *shower* from *Shah* in vowel-type junction, *shower* and *tower* not only have greater length of vowel than *Shah* and *tar* in my usage, but also strike me as disyllabic ('Every occurrence of an initiator time bulge ... followed by renewed speed of the initiator movement is a trough or border between two syllables', Pike 1943: 116).

2.2.1.2 *Pause type*

Pause-type junction shares with vowel-type junction the four categories described above, but with a more open central vowel in the first three, among other differences:

[-Cə,] [V-]

e.g. *'Our Father, which ...', in particular, I ...*

[-əʊ:ə, -i:ə, -ɛ:ə, -u:ə, -ɔ:ɪə, -ɔɪə,] [V-]

e.g. *'having no guide, overseer, or ruler'*

[-aɪ:ə, (-aʊ:ə,)] [V-]

e.g. *higher!*

[-a:a, -ɑ:ɑ,] [V-]

e.g. *fire!*

2.2.1.3 *Consonant type*

The exponents of r in consonant-type junction can be symbolised as follows, within the same four categories as for the vowel type:

[-Cə] [C- j- w- ɹ- h-]

e.g. *father confessor, Father William, Mother Hubbard*

[-əʊ:ə -i:ə -ɛ:ə -u:ə -ɔ:ɪə -ɔɪə] [C- j- w- ɹ- h-]

e.g. *'a sower went forth', coir matting (one lexical item)*

[-aɪ:ə (-aʊ:ə)] [C- j- w- ɹ- h-]

e.g. *higher than Kinchinjunga*

[-a:a -ɑ:ɑ] [C- j- w- ɹ- h-]

e.g. *fire below decks, all power corrupts*

2.2.2 Intraverbal junction

The pause type, with the vowel [ɐ] peculiar to it, is not appropriate to intraverbal junction; the other three vowel sounds, [-ə], [-a] and [-ɑ], occur in intraverbal junction under much the same conditions as in interverbal junction (see Section 2.2.1 above): firstly, with a consonant, non-syllabic vowel, non-open syllabic vowel preceding, and secondly, with an open syllabic vowel preceding, either front [a] or back [ɑ]. The phonetic exponents of r in the first type can be symbolised as follows, distinguishing between the vowel type and the consonant type:

[-əɪ-] [-V-]

e.g. *father-in-law, neighbouring, colliery, brewery, temporary*

[-ə-] [-C- -j- -w- -ɪ- -h-]

e.g. *fatherhood, neighbourly, brewers, buyers*

In the context of a preceding open syllabic vowel the corresponding vowel-type and consonant-type exponents of r are:

[-aɪ- -ɑɪ-] [-V-]

e.g. *fire-alarm, hiring, fiery; overpowering, towering*

[-a- -ɑ-] [-C- -j- -w- -ɪ- -h-]

e.g. *fireworks, hireling, powerful, towered*

Such lexical items as *father, neighbour, -ier* and *-yer* (as in *collier, lawyer*), *-(e)r* (as in *overseer, player, buyer*), *-er* (as in *higher, lower, redder*), *tempor-* (as in *temporary, temporise*), *coir, fire, hire, power*, and *tower* can all be classified as r(-junction-piece) lexical items, any instance of which in an utterance or a written text indicates an instance of the r junction piece.

Though four different vowel sounds, [ə], [ɐ], [a] and [ɑ], have been shown to occur in one or other type of unstressable r junction piece, there is no phonologically significant contrast between any of them; so no vowel system can be set up; and the prosodic symbol r sufficiently indicates them provided that the unstressability of this type of r piece is also symbolised. Which of the four vowels it is that is appropriate to

this type of r piece in any given instance is a function of the type of piece, the pause type for [ɐ], preceding open vowel [a] for [a] and [ɑ] for [ɑ] within a single lexical item, and [ə] for the three remaining types of piece, preceding consonant, preceding non-open vowel, and preceding [aɪ] (and perhaps [aʊ]) in a separate lexical item.

The alternation of [ə] with [ɐ], [a] and [ɑ] is limited to unstressable syllables; and all four vowels are in complementary distribution; but [ə]–[ɐ] also alternates, within the same lexical item, with the vowels of stressable syllables; and these are phonologically contrastive.

2.3 Alternation of the unstressable vowel with the stressable vowels

Generally the stressable vowels occur in the stress-bearing syllable of the word. The [ə] or [ɐ] vowel is then only one of two or more variants; and the stress of the words associated with each other through their common lexical item must be taken into account.

2.3.1 [ə(ɪ)] or [ɐ] in interverbal junction

The unstressable vowels [ə] and [ɐ] in word-final position alternate with one or other or both members of two sets of stressable vowels occurring in the same lexical item but within the word: firstly, a short-vowel set (apart from [juə]), and secondly, a long-vowel set, with which can be compared an unstressed-syllable vowel:

[-ɛɪ- -æɪ- -ɔɪ- -juəɪ-]

e.g. *Homeric, vulgarity, superiority, sulphuric*

[-ɪəɪ- -ɛəɪ- -ɔɪə- -juəɪ-/ -uəɪ-]

e.g. *managerial, vulgarian, professorial, sulphureous, censorious, injurious*

[-əɪ- -juɪ-]

e.g. *manageress, vulgarise, professorate, sulphurise, oratory, figurative*

A four-term vowel system is needed for these associated types of r junction piece; for these four terms the symbols E, A, O and U suggest themselves, with double,

or even treble, exponency for each term according to type of piece:

E	A	O	U
[ə ε ɪə]	[ə æ ɛə]	[ə ɒ ɔ:]	[ə (j)ʊə ju/ə]

The various exponents are each appropriate to the following types of piece:

interverbal	unstressable		[-ə]
intraverbal	stressed	short	[-ɛ- -æ- -ɒ- -juə]
		long	[-ɪə- -ɛə- -ɔ:- -(j)ʊə-]
	unstressed		[-ə- -ju/ə-]

The alternation of [-juə-] with [-ʊə-] for U in the intraverbal, stressed type of piece reflects a difference in syllable-initial consonant: [ʊə] is appropriate to the syllable-initial palato-alveolar consonants [dʒ], [ʒ] and [ʃ], e.g. *injurious*, *luxurious*, *insurance*; and [juə] to the rest.

All four vowel terms E, A, O and U share [ə] as the exponent appropriate to interverbal junction, and also to unstressed syllables in intraverbal junction except U, which regularly has [ju] in my usage; but all four terms are distinguished in stressed syllables in both the short-vowel and the long-vowel piece.

Lexically, the short-vowel piece is to be associated with the lexical items *-ic(al)* and *-ity*, while the long-vowel piece is to be associated with *-ial*, *-ian*, and *-ious* or *-eous*; phonetically, I believe that the prosodic conditions distinguished above are an attempt to achieve a balance: vowel shortness, [ɛ], [æ] and [ɒ], combined with a stressable vowel [ɪ] in [ɪk] and [ɪtɪ] vs. vowel length, [ɪə], [ɛə] and [ɔ:], combined with an unstressable vowel [ə] in [ɪəl], [ɪən] and [ɪəs].

The four-term V system E, A, O, U applies to lexical items in which the vowel is preceded by a consonant or a non-syllabic vowel (or the sequence [ɪɪ], as in *superior*); where, however, the unstressable vowel is preceded by a syllabic vowel, as [-a] is preceded by [-a:-] in, for example, *lyre*, the whole of the two-vowel sequence [-a:a] alternates with the single short vowel [ɪ] not only in the short-vowel piece, but in the long-vowel piece as well, and in stressed and unstressed syllables alike: e.g. *lyre*, *Tyre*, *admire*, *conspire*, *expire* vs. *lyric*, *Tyrian*, *admirable*, *conspiracy*, *expiration*.¹³

¹³ The sequence [ɪɪ], non-syllabic vowel and syllabic vowel, occurs because a sequence of the two non-syllabic vowels [ɪj] is not possible: e.g. *Syria* [-ɪɪə]; cf. *India* [-dʒə].

From their junction behaviour the lexical items *Homer*, *vulgar*, *superior*, *sulphur*, *-er* (of *manager*), *-or* (of *professor*, *censor*, *orator*), *figure*, *injure*, together with *lyre*, *Tyre*, *admire* and *-spir(e)* can all be classified as r-piece. Lexical items such as these, together with the short-vowel-piece suffixes *-ic* and *-ity* and the long-vowel-piece suffixes *-ial*, *-ian*, *-eous*, and *-ious* are drawn from the classical element in the English lexicon, Greek and Latin.

2.3.2 [ə] in intraverbal junction

In these types of piece containing *Homer*, *vulgar*, *lyre*, etc. the unstressable vowels [ə], [ɐ] and [a] can occur in word-final position, in interverbal junction: [-ə(ɪ)], [-ɐ,] and [-a(ɪ,)]; while the alternating short-vowel and long-vowel pieces occur within the word, in intraverbal junction. The same threefold alternating set, short-vowel, long-vowel and unstressable-vowel piece, can also occur entirely within intraverbal junction, in which case the unstressable vowel is limited to the form [ə]:

	Unstressable	Short	Long
	[-əɪ-]	[-ɛɪ- -æɪ- -ɔɪ- -juəɪ-]	[-ɪəɪ- -ɛəɪ- -ɔəɪ- -juəɪ-/-uəɪ-]
E	<i>numeration, mystery</i>	<i>numerical</i>	<i>mysterious</i>
A	<i>Barbary</i>	<i>barbaric, barbarity</i>	<i>barbarian</i>
O	<i>history</i>	<i>historic</i>	<i>historian</i>
U	<i>luxury, usury</i>		<i>luxurious, usurious</i>

I have included *luxury* and *usury* as my examples here for the sake of [ə], as in [-ʒə-] and [-ʃə-], consistently with the E, A, and O examples; but in pieces in which the syllable-initial feature is other than palato-alveolar, the unstressable-vowel piece has as its exponents [-juɪ-]; e.g. *mercury*, *penury* (as opposed to [-juəɪ-] in *mercuric*, *mercurial*, *penurious*; cf. also *sulphurise*, *figurative* in Section 2.3.1 above).

3 Conclusion

In this detailed analysis of one small sector of English phonology, the r pieces, I have taken account of the phonetic level throughout in as much detail as I found necessary; and I have tried to reconcile my findings at the phonological level with the requirements of the grammatical and lexical levels, bearing in mind one of the closing passages of Firth's 'A synopsis of linguistic theory, 1930-55':

... a theory of analysis dispersed at a series of levels must require synthesis at each level and congruence of levels. Such a theory requires what has been called the prosodic approach in phonology, since this is congruent with studies of the piece and of the longer text in collocation, of colligation, and finally with syntactical analysis. Grammar and lexicography are both keyed to the statement of the meaning of the restricted language under description by the controlled language of description ...

(Firth 1957b: 32)

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