

# A Thistle, or how to tell a reduced vowel★

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*What to others a trifle appears  
Fills me full of smiles or tears;  
For double the vision my Eyes do see,  
And a double vision is always with me.  
With my inward eye, 'tis an old Man grey,  
With my outward, a Thistle across my way.<sup>2</sup>*

In the phonology of English vowel quality and stress are intimately related. A large set of vowels may occur in stressed syllables. Applying the conventional terminology, these will be referred to as (phonologically) *full* vowels. A much smaller set occurs in unstressed syllables, these are the *reduced* vowels. We accept (1) as an axiom.

- (1) a. a vowel occurring in a stressed syllable is full  
b. a vowel occurring in an unstressed syllable is reduced

The problem is that there are cases when we cannot tell whether a certain syllable is stressed or unstressed unless we refer to the vowel of that syllable, which leads to an unacceptable circularity. For example, the last vowel of the adjective *separate* ['sepəreɪt] is reduced and its last syllable unstressed, the last vowel of the verb *separate* ['sepəreɪt] is full and its last syllable stressed. The first syllable of both of these words is undoubtedly stressed, but of the last syllable of the verb it is not immediately obvious whether it contains a full vowel because it is stressed, or the other way around.

To make things worse, one cannot always tell of a vowel whether it is full or reduced simply by looking at its quality. Some vowels occur exclusively in stressed syllables, some exclusively in unstressed syllables, but there is a third set of ambiguous vowels, which occur in both stressed and in unstressed syllables. Whether these are vowels in the intersection of the two sets (full and reduced), that is, whether the same vowel exhibits dual behaviour, or whether phonologically there are two of each of these vowels, a full one and a reduced one, which happen to be pronounced — or, rather, transcribed — identically, is not clear, but, as we will show, this is irrelevant. The difficulty such a vowel presents is, however, clear. Take the word *robot* ['roʊbɒt]. Its second syllable is stressed, since it contains a full vowel and such a syllable must be stressed by axiom (1). If we now consider *rabbit* ['ræbɪt], we are left

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\*The authors consider themselves lucky and privileged to have been students and to now be colleagues of Ágnes Péter whose *presence* (in more than one sense of the word) in and beyond English studies has always been an inspiration to them.

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<sup>2</sup>William Blake, Poems from Letters [To Thomas Butts]: With Happiness stretch'd across the hills (22 November 1802), 25–30.

in uncertainty about its second syllable, since, as we are going to see, [ɪ] is one of those vowels that occur both as full and as reduced. Hence even our circular method of determining whether this syllable is stressed or not is lost.

In this paper we will show that in some cases at least we can tell whether a vowel is full or reduced — and consequently, according to our starting axiom (1), whether the syllable is stressed or unstressed — even when it contains one of the ambiguous vowels. Although opinions vary, we here take any syllable that contains a full vowel to be stressed. Some of these stressed syllables are not stressed from a rhythmic point of view (like the last syllable of *robot* or that of the verb *separate*), their stress is “tertiary” some would claim,<sup>1</sup> but from our point of view these are not any different from the initial, primary stressed syllables of these words. When we want to distinguish these stressed syllables from the rhythmically stressed syllables in a word we will refer to the latter as “major stresses”.

## 1 Full vowels

According to the axiom presented in (1), if a vowel occurs in a stressed syllable it must be classified as a full vowel. We know that a content word contains at least one stressed syllable. Therefore any vowel that occurs in a monosyllabic content word — whose only syllable is necessarily stressed — is a full vowel. These vowels are the following in Standard British English (SBE):<sup>2</sup>

- (2) a. ɪ e æ ʌ ɒ ʊ  
b. iː ɜː ɑː ɔː uː (jʊː) ɪə eɪ eə aɪ aʊ ɔɪ oʊ ʊə (jʊə)

The two parenthesized vowels deserve some comment. These two vowels look like the combination of the consonant [j] and the vowel [uː] or [ʊə]. Language historians are well aware that [jʊː] (and its pre-[r] version, [jʊə]) derive historically from the diphthong [ɪʊ], which developed into the rising diphthong [juː] in most accents, including SBE and GA, which was then reanalysed as a consonant+vowel sequence and lost its first, nonsyllabic element, the yod, when preceded by certain consonants (Kenyon 1950: 215ff, Wells 1982: 206ff). As we are going to see below, the behaviour of these two consonant–vowel sequences provides some justification for treating them as unitary segments even in a descriptive analysis of present-day English.

## 2 Reduced vowels

Let us now look at vowels that do not occur in monosyllabic content words, that is, vowels that may never be stressed.

The prototypical unstressed vowel of English is [ə]: this vowel occurs only in unstressed syllables.<sup>3</sup> The same holds of syllabic consonants, these are always interchangeable with a

<sup>1</sup>Here we deliberately skirt the issue whether “tertiary” stress is really same as the other rhythmic word stress(es) or has to be recognised as a separate degree of stress — whatever the answer is, it is not essentially pertinent to our topic.

<sup>2</sup>Our statements about “English” are about SBE and occasionally General American (GA), the transcription symbols and possible pronunciations are those found in Wells (1990), except that we use [oʊ] instead of [əʊ] not only in GA, but also in SBE transcriptions.

<sup>3</sup>At least in SBE and a number of other English accents, but not in, for example, New Zealand English, where the second vowel of *rabbit* and *abbot* do not contrast (Wells 1982:

[ə]+consonant sequence and only occur in some unstressed syllables (e.g., the last syllable of *written* ['rɪt<sup>ə</sup>n] % ['rɪtən] or *bottle* ['bɒt<sup>ə</sup>] % ['bɒtəl]).<sup>1</sup>

There are two additional vowels used mainly in the British transcribing tradition: [ɪ] and [ʊ], which are found exclusively in unstressed syllables. The first marks the neutralization of [i:] and [ɪ] (e.g., *penny* ['penɪ], *copious* ['kɒpiəs]), the latter that of [u:] and [ʊ] (e.g., *stimulate* ['stɪmjuleɪt]) as Wells explains (1990: xxvif). Kenyon & Knott report of a similar tendency in General American of prevocalic [ɪ]: it “tends toward [ɪ]” (1944: xxxviii), and of “initial unaccented ‘long u’”: it “is [jʊ] or [ju] according to style (*unite* [jʊ'nait, ju'nait])” (1944: xliii).<sup>2</sup> So the vowels<sup>3</sup> that are unambiguously reduced are:

(3) ə i ʊ

So far the two sets are complementary, they have no common element. There are, however, vowels that do occur in monosyllabic content words, yet we have reason to assume that some of their other occurrences are in unstressed syllables. We turn to these now.

### 3 The third set: vowels that are both full and reduced

If stress falls on the third or later syllable of a word (from its beginning), another stress must occur on an earlier syllable (e.g., *Alabama*, *academic*). In even longer words other stresses must occur on earlier syllables (e.g., *inconsequentiality*). There is a constraint — named Early Stress Requirement by Nádasdy (2006:191) — which does not allow that any English word begin with two unstressed syllables. That is, since its third syllable is stressed, one of the first two syllables in a word like *Alabama* also has to bear stress. In such words, where the third syllable is stressed, it is practically always the first syllable that is assigned stress (*Alabama*), even when this goes against the preservation of the stress placement of their morphological base: *academy* → *academic*.<sup>4</sup> Any vowel found in such a syllable is full by axiom (1).

Uncertainty about the stressedness of a syllable arises in positions where both stressed and unstressed syllables are found. For example, if the second syllable of a word is stressed, the first may or may not be stressed: *contain* [kən'teɪn] vs. *torment* [tɔ:'ment]. If the first and third syllable of a word is stressed, the second one is again variable: *kangaroo* [ˌkæŋgə'ru:] vs. *addressee* [ˌædres'i:]. The same problem is encountered in the second or third syllable after a first stressed one: *parrot* ['pærət] vs. *robot* ['rɒʊbɒt], *separate*<sub>adj</sub> ['sepərət] vs. *separate*<sub>verb</sub> ['sepəreɪt], or *animal* ['ænəmə] vs. *orgasm* ['ɔ:gæzəm] vs. *demarcate* ['di:mɑ:kert]. In (4) we give these patterns schematically, using X for a major-stressed, x for

606), and the stressed vowel in *kit* sounds very much like them, i.e., [ə].

<sup>1</sup>Like Wells (1990) we use a superscript <sup>ə</sup> before the consonant to indicate its syllabicity.

<sup>2</sup>Note, however, that Kenyon & Knott use [i] and [u] (without the length mark) for the stressed vowels of *flēece* and *goose*, respectively, and they ignore this variation in unstressed syllables in the dictionary itself.

<sup>3</sup>In a more precise formulation we should say that the unambiguously reduced *nuclei* are [ə i ʊ] and syllabic [n m l r]. For the sake of simplicity we shall disregard syllabic consonants and continue to refer to nuclei as vowels.

<sup>4</sup>There are very few exceptions to this regularity. *Divòrcée* is one, but even here the widespread pattern *divorcée* is also possible.

an unstressed syllable, and F for a full-vowelled syllable which is not stressed by some stress rule (these are the putative tertiary stressed syllables).

- (4) a. x X contain  
F X torment  
b. X x X kangaroo  
X F X addressee  
c. X x parrot  
X F robot  
d. X x x separate<sub>adj</sub>, animal  
X x F separate<sub>verb</sub>  
X F x orgasm  
X F F demarcate

In such syllables we have to decide if the syllable is stressed on the basis of the quality of the vowel it contains. If this vowel is not one that is full or reduced without doubt, that is, if it is a member of the third set, a problem of indeterminacy arises. Nevertheless, as shall see, we still have recourse to the considerations presented below. In what follows we shall refer to the various *segmental* environments that can reveal the full/reduced character of the vowels of the third set [jʊ, ju:, ɪ, oʊ] in the positions listed in (4) as “indicator environments” (labelled +IND) and the various segmental environments that cannot show their full/reduced identity as “non-indicator environments” (labelled -IND). Note that +IND/-IND environments are not fully uniform for each of the vowels we discuss.

### 3.1 [jʊ]

The categorization of [jʊ] is not as simple as that of the vowels discussed so far: first, it may occur in stressed syllables (e.g., *put*, *look*) and it cannot occur word finally, which is a common property of the short full vowels, listed in (2a).

However, there are two things that distinguish [jʊ] from other full vowels: (i) it is relatively rare in stressed syllables and when it does occur there, it typically occurs after a nonpalatal consonant, while (ii) in unstressed syllables it is almost always preceded by a palatal consonant (that is, [tʃ dʒ ʃ ʒ j]), as, e.g., in *petulant*, *fabulous*). The two distributions are not fully complementary though. In unstressed syllables palatality is absent if there is an obstruent+liquid cluster before [jʊ] (e.g., *influence*, *instrument*, *menstruate*, *superfluous*). Note, however, that in some cases what seems an unstressed syllable may be claimed to be stressed. In the above examples, for instance, there is nothing to stop us from saying that the middle syllable of *instrument* is stressed, hence the [jʊ] in it is a full vowel, which accordingly lacks the palatal onglide. The same analytic trick is not available for the other examples (*influence*, *menstruate*, *superfluous*), because here the [jʊ] stands before a vowel, and — as we have already noted — a short full vowel only occurs before a consonant.

In stressed syllables we have found four exceptions of [jʊ] that is preceded by a palatal consonant: *shook*, *should*, *shush*, and *sugar*, all of them with [ʃ].<sup>1</sup> Assuming that these words are truly exceptional, one is tempted to take [jʊ] in “palatal C + jʊ” sequences in otherwise

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<sup>1</sup>Again, this is true of SBE, a southern British English accent, which has both [ʌ] and [jʊ]. In northern British English accents words like *shut* also have [jʊ]. Also note that [r] is sometimes categorized as palatal. Only four morphemes contain the sequence [rʊ] in a stressed syllable: *brook*, *Burundi*, *crook*, and *rook*.

unstressed syllables to be reduced, not only before vowels, but also before consonants (e.g., *congratulate* [kən'grætʃʊleɪt], *patchouli* ['pætʃʊli], *conjugal* ['kɒndʒʊgəl]), since if it were considered a full vowel, it would constitute a special, arguably impossible set: a full vowel that does not regularly occur in stressed syllables (which contradicts our definition of full vowels). So:

- (5) a. C<sub>pal</sub> ʊ = reduced (*petulant, fabulous*), (unless marked as exceptional, *sugar*)  
 b. ʊ + V = reduced (*influence, menstruate*)  
 c. ʊ elsewhere = full (*put, look*)

Let us use [jʊ] as a shorthand for this reduced vowel: an [ʊ] preceded by a palatal consonant, (5a). We may then say that [ʊ] is a full vowel,<sup>1</sup> but [jʊ] is a reduced one. It should by now be clear that of the three reduced vowels listed in (3) the last one is actually [ju], that is, an [u] preceded by a palatal consonant.

### 3.2 [ju:] too

The presence of the preceding [j] may be used as evidence for the categorization of the vowel [ju:], too. Although [u:] and [ju:] are well-established members of the set of full vowels, the latter vowel — appearing as [u:] after palatal consonants — may also be found in unstressed syllables. It was mentioned above that the onglide of the vowel [ju:] is lost in certain contexts. Crucially, this phenomenon (yod-dropping) takes place after a smaller set of consonants in unstressed than in stressed syllables. For example, while most SBE and GA speakers will not have a yod in *Luke* [lu:k] or *lewd* [lu:d], they will have it in *value* ['vælju:], or GA speakers generally drop the yod in *tube* [tu:b] or *new* [nu:], they will retain it in *pustule* ['pʌstju:l] or *continue* [kən'tɪnju:].<sup>2</sup> Thus, in certain contexts at least (the +IND ones), the presence or absence of a yod indicates the full vs. reduced status of the vowel after it. This makes [ju:] a reduced vowel in these environments in words like *value*, *pustule*, and *continue*. There are, however, other +IND words in which [ju:] behaves as a full vowel since yod-dropping does apply in GA: e.g., *avenue* ['ævənu:], *mildew* ['mɪldu:], *costume* ['kɔ:stʊ:m], etc. Furthermore, when not major stressed, in -IND environments (e.g., after non-coronals) [ju:] is indeterminate: it may be analysed a full vowel or a reduced one since yod-dropping does not apply irrespective of stress, e.g., *argue* ['ɑ:gju:] (cf. *leguminous* [lɪ'gju:mɪnəs]), *perfume* ['pɜ:fju:m] (cf. *fuse* [fju:z]), *emu* ['i:mju:] (cf. *music* ['mjuzɪk]), etc. Thus, [ju:] is a vowel whose categorisation is context dependent, and lexically determined in +IND environments:

- (6) a. non-major stressed [ju:] +IND in certain words reduced (*issue, value* (SBE and GA), *continue, pustule* (GA))  
 b. non-major stressed [ju:] +IND in certain words full (*avenue, mildew* (GA))  
 c. non-major stressed [ju:] -IND indeterminate (*argue, emu*)  
 d. major stressed [ju:] full (*mute*)

<sup>1</sup>unless prevocalic (5b)

<sup>2</sup>The yod may coalesce with the preceding coronal obstruent, yielding a palatal consonant, [tʃ] in *pustule* ['pʌstʃu:l], for example. In such cases we take it that the yod is *not* dropped. Note that in some cases the uncoalesced pronunciation is not available (any more), e.g. SBE *issue* ['ɪʃu:] % ['ɪsju:], *virtue* ['vɜ:tʃu:] % ?['vɜ:tju:], *cashew* ['kæʃu:] \*['kæsju:]; GA *issue* ['ɪʃu:] \*['ɪsju:], *virtue* ['vɜ:tʃu:] % \*['vɜ:tju:], *cashew* ['kæʃu:] \*['kæsju:]

It is unpredictable which words belong to (6a) vs. (6b) and it is not clear which one is the default case, so we simply assume that both these cases have to be marked lexically.<sup>1</sup>

With this reasoning one is forced to say that the [ʊ] in the second syllable of *ámbush* is a full vowel, since the reduced vowel would have a yod before it, which has no reason to drop in this context. On the other hand, we find [ʊ] as a reduced vowel even without a preceding palatal consonant in the prevocalic weak forms of *to* and *do*. Being word-final, this [ʊ] cannot be a full vowel: it must be reduced since short full vowels do not occur in word-final position. For the same reason, the leftmost vowel of *suicidal*, which according to Wells (2008) may be pronounced as [sju:'saɪd<sup>ə</sup>] or (less frequently) as [su:'saɪd<sup>ə</sup>], has a reduced vowel in the former pronunciation, but a full vowel in the latter. Incidentally, this last example helps us highlight an element of circularity in the above analysis: another way of saying the same thing would be to claim that in the first pronunciation of *suicidal*, the initial syllable is unstressed [sju:'saɪd<sup>ə</sup>], but in the second, it is stressed [,su:'saɪd<sup>ə</sup>]. In the first case we know it is unstressed because there is a reduced vowel in it, in the second we know it is stressed because there is a full vowel in it.

### 3.3 [ɪ]

The status of preconsonantal [ɪ] also presents difficulties. We know that besides being a full vowel (e.g., *hit*, *kiss*), [ɪ] must also be a reduced vowel, since it occurs word finally and prevocalically (at least as an alternative pronunciation of [i] in the relevant words), where the short full vowels never occur: e.g., *funny* ['fʌnɪ] (also ['fʌni]), *maniac* ['meɪniæk] (also ['meɪniæk]). However, both classifications are in principle possible *before a consonant* unless the syllable is unambiguously major-stressed (e.g., monosyllabic *hit*).

We have seen that in the case of [ʊ] and [u:] the presence or absence of palatality before the vowel may hint at its status (it is a +IND environment). There are other segmental indicators: phenomena like syncope and flapping are also capable of distinguishing full and reduced vowels since neither can apply before a stressed syllable. The possibility of omitting the middle vowel in *memory* (['meməri] % ['memri]) and the adjective *separate* (['sepərət] % ['sepɹət]), but not in *memorize* (['meməraɪz], \*['memraɪz]) and the verb *separate* (['sepəreɪt], \*['sepɹeɪt]), or the possibility of flapping the [t] in GA *gravity* ['grævəri], but not in *gravitate* (['grævɪteɪt], \*['grævɪreɪt]), shows that both syncope and flapping occur before an unstressed syllable only. The option of posttonic [jʊ] optionally alternating with [ju:] is also sensitive to the status of the following vowel: the tense vowel may occur if the following syllable contains a full vowel (e.g., *stimulate* [-mjʊleɪt] or [-mju:leɪt]), but not if it contains a reduced vowel (e.g., *stimulus* [-mjʊləs], but \*[-mju:ləs]).

The variation in *amulet* ['æmjʊlət], ['æmjʊlɪt], ['æmjʊ:let], but \*['æmjʊ:lət, -lɪt], suggests that the [ɪ] in this word is a reduced vowel, since it patterns with [ə] and not with [e]. This also suggests that, even in the absence of other segmental indicators, the fact itself that a given syllable with [ɪ] has an optional alternative pronunciation with [ə] shows that that the [ɪ] there is a reduced vowel not a full one, e.g., *denim* ['denɪm] or ['denəm], *mischievous* ['mɪstʃɪf] or ['mɪstʃəf], *imagine* [ɪ'mædʒɪn] or [ɪ'mædʒən]. There are some words in which an [ɪ] occurs in a +IND context and must be classified as full, witness *botulism* ['bɒtju:lɪzəm] where [ju:] is possible before a syllable with [ɪ] (compare *botulin* ['bɒtjʊlɪn], \*['bɒtju:lɪn] where it is not).

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<sup>1</sup>Furthermore, we assume — perhaps without justification, for the sake of symmetry — that if a vowel behaves as full in one accent, it will also be full in another, unless we have evidence that it does not.

Apparently, it is not the suffix *-ism* that inherently contains a full [ɪ]. Although syncope is not given by Wells as a possibility in any word containing this suffix — which follows if the [ɪ] is full —, flapping of the [t] is indicated in *absolutism*, *elitism*, *quietism*<sup>1</sup> — suggesting that the [ɪ] in these is reduced, but not in *autism*, *egotism*, *magnetism*, *nepotism*, *rheumatism* — indicating a full [ɪ].

It is syncope that tells us that the invariable [ɪ] in words like *acreage* ['eɪkəriːdʒ] % ['eɪkɪdʒ], *maverick* ['mævərɪk] % ['mævɪk], *preterite* ['pretərɪt] % ['pretrɪt] must be reduced. Before a full vowel, that is, a stressed syllable, a sonorant may turn syllabic, but syncope may not occur, while before a reduced vowel syncope may be<sup>2</sup> a possibility (e.g., *specialization* [ˌspeʃɪəlaɪ'zeɪʃən] % [ˌspeʃɪ'zeɪʃən], but \*[ˌspeʃləɪ'zeɪʃən], *specialism* ['speʃɪɪzəm], but \*[ˌspeʃɪzəm]).

If we do not find any segmental context that would indicate the status of an [ɪ] in a syllable that is not doubtlessly stressed, then it is indeterminate,<sup>3</sup> e.g., *Eric* ['erɪk], \*[ˈerək], *message* ['mesɪdʒ], \*[ˈmesədʒ], *punish* ['pʌnɪʃ], \*[ˈpʌnəʃ], the initial syllable of *imagine* \*[ə'mædʒɪn] or [ə'mædʒən].

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|---|-------------------------------|
| (7) a. non-major stressed [ɪ] +IND in certain words | reduced ( <i>gravity</i> )    |
| b. non-major stressed [ɪ] +IND in certain words     | full ( <i>botulism</i> )      |
| c. non-major stressed [ɪ] -IND                      | indeterminate ( <i>Eric</i> ) |
| d. major stressed [ɪ]                               | full ( <i>hit</i> )           |

### 3.4 [oʊ]

The last candidate for the list of reduced vowels is [oʊ], but only if word final. This vowel shows a dual behaviour in word-final position: in GA flapping may occur before it in *motto* ['mɑːroʊ], but not in *veto* \*[ˈviːroʊ] (Chomsky & Halle 1968:190f). We have found 55 words in EPD<sup>4</sup> that end in non-major-stressed [-toʊ] preceded by a sonorant, that is, words in which flapping is expected to occur in GA. In 20 of these Wells (1990) does not indicate flapping (e.g., *canto*, *legato*, *risotto*, *veto*), in 24 he does (e.g., *auto*, *memento*, *motto*, *Toronto*), and one (*NATO*) is variable. Of the nonflapping words there is one that is suspect of being felt to be a compound (*mistletoe*), thus having rule-governed (major) stress on its last syllable (a content word), too. In the case of the others there seems to be absolutely no way of predicting whether flapping is possible or not. We assume that in the flapping words the [oʊ] is reduced, in the nonflapping words it is full. Syncope is marked by Wells (1990) as possible in the word *hetero*, as well as in the prefix *hetero-* (in the latter the final vowel may be either

<sup>1</sup>Intriguingly, Wells (1990, 2008) indicates flapping of the first, pretonic [t] of *potáto* [pəˈreɪroʊ]: perhaps flapping is possible before a full vowel *in this word* (only?)? In similar words, e.g. *patérnal*, *poténtial*, *mutátion*, flapping is not possible.

<sup>2</sup>Whether syncope occurs before a reduced vowel depends on other factors too, like the identity of the consonants surrounding the syncopated schwa. Even if these consonants are right, syncope may fail to occur. Syncope also depends on the frequency of the word. What we claim is that if it occurs, the vowel following is reduced.

<sup>3</sup>One may be tempted to take the impossibility of the optional [ɪ]~[ə] alternation a sign of the full-ness of these [ɪ]'s, but it turns out that this is untenable since flapping (a +IND environment) is possible before non-alternating [ɪ]-s too, e.g. *cottage* ['kɒrɪdʒ], \*[ˈ-ədʒ], *British* ['brɪtɪʃ], \*[ˈ-əʃ], which suggests that they are reduced in these words. Note also the possibility of syncope before syllables with an invariable [ɪ] discussed above.

<sup>4</sup>EPD is an on-line pronunciation dictionary available at <http://seas3.elte.hu/epd>.

[oʊ] or [ə]), but it is not indicated in other [oʊ]-final words containing consonants that allow for syncope, like *buffalo*, *bungalow*, *Clitheroe*, *piccolo*, *pomelo*, or *tremolo*. Since syncope is optional in many other cases and frequency-dependent too, we cannot claim with certainty that the latter set contains the full [oʊ]. Our third indicator, the possibility of [ju:] in the previous syllable indicates that the final vowel of *modulo* is full, but we have not found any other example of this complex context. High vowel gliding is yet another phonological process that appears to be possible only before a reduced vowel: we may find glide [w] in a *graduate* [-dʒwɛt], but only syllabic [u] in *to graduate* [-dʒwɛɪt], glide [j] in *idiot* [ɪdʒət], but only syllabic [i] in *idiotic* [ɪdɪɔtɪk]. Word-final [oʊ] again exhibits both types of behaviour: *folio* and *intaglio* may end in [-jɔʊ], *radio* and *polio* may not, the [i] in them must remain syllabic.<sup>1</sup>

- |        |  |  |
|--------|--|--|
| (8) a. | non-major stressed oʊ# +IND in certain words | reduced ( <i>Otto</i> , <i>hetero</i> , <i>folio</i> ) |
| b.     | non-major stressed oʊ# +IND in certain words | full ( <i>veto</i> , <i>radio</i> )                    |
| c.     | non-major stressed oʊ# -IND                  | indeterminate ( <i>limbo</i> , <i>buffalo</i> )        |
| d.     | [oʊ] elsewhere                               | full ( <i>boat</i> , <i>alcove</i> )                   |

To conclude, the list of reduced vowels contains [ə i ju] and almost all instances of [jɔ]. The vowels [ju: ɪ oʊ] are ambiguous in their behaviour, in some words they function as reduced, in others as full. In some cases we can tell from the context or the possibility of certain alternations whether an ambiguous vowel is reduced or full, in other cases we cannot resolve the indeterminacy segmentally. All other vowels are always full (i.e., in any environment in which they can occur).

## 4 Stress shift

It has been mentioned that some words carry two (or more) stressed syllables. In some of these words the first of the two stresses is more prominent (e.g., *róbòt*, *séparàte<sub>verb</sub>*), in others the second (e.g., *sàrdíne*, *kàngaróo*, *Álabáma*, *àcadémic*). When the latter type of word is the first element of a phrase in which the second element bears the most prominent stress, their first stress becomes more prominent than the second (e.g., *sárdine sándwich*, *kángaroo mérchant*, *Álabama Ríver*, *àcademic yéar*). This process, called stress shift (also Rhythm Rule), is a means of avoiding stress clash.<sup>2</sup> Stress shift is optional, in what follows we examine the possibility of stress shift applying.

If the second syllable of a word is stressed, the first syllable may contain a reduced vowel (e.g., *maróon* [mə'ru:n]) or a full one (e.g., *sardíne* [sɑ:'di:n] or *direct* [daɪ'rekt]).<sup>3</sup> The difference between the reduced and full vowel at the beginning of these words has consequences in phrasal stress: stress shift only occurs in the latter, but not in the former case, e.g., *sárdine sándwich* ['sɑ:di:n 'sændwɪdʒ] and *dírect débit* ['daɪrekt 'deɪt] vs. \*['dærekt-] and *maróon swéater* \*['mæru:n 'swetə]. The explanation of this difference is the

<sup>1</sup>Some word-final [oʊ]'s reduce to [ə] in some accents of English (*fellow* ~ *fella*, *window*), but not others (*elbow* \*[-ə]). However, we doubt this split would be the same as the one discussed above.

<sup>2</sup>It is not obvious (a) just how close stressed syllables have to be “linearly” to constitute a stress clash and (b) to what extent “structure”, i.e., the word-affiliation of stressed/unstressed syllables matters (Hayes 1984, Selkirk 1984, Halle & Vergnaud 1984).

<sup>3</sup>The word *direct* has an equally common alternative pronunciation with a reduced first vowel: [dɪ-] or [də-].

nonstressability of reduced vowels: according to axiom (1), a reduced vowel cannot occur in a stressed syllable.

The possibility of stress shift is thus an indicator of full vowel status. Compare the first syllables of *princess* [prɪn'ses] and *sincere* [sɪn'siə]. Both contain the ambiguous [ɪ], and both words carry their main stress on their second syllable. But stress is shifted in *Princess Ánn*, but not in *sincére thánks* \*['sɪnsiə 'θæŋks]. In addition, *princess* may be pronounced ['prɪnses] in isolation, while *sincere* may be [sɪn'siə], too. We conclude that the [ɪ] of *princess* is a full vowel, that of *sincere* is reduced.

Stress shift fails to occur in phrases like *Octóber ráin* or *Titánic's bánd*, although the pretonic vowel is full in the first element of these phrases, too. The standard explanation is that, unlike that of *sárdine*, the first syllable of *Octóber* and *Titánic* is not stressed, but an unstressed syllable containing a full vowel — contrary to axiom (1) —, that is, it is tertiary stressed. Stress shift is only possible to a stressed syllable (and tertiary “stress” does not count as stress in this sense). This appears to constitute solid evidence for the necessity of tertiary stress: we have to distinguish melodically identical full vowels for being subject to stress shift (= “normal” stress) or not (= tertiary stress).

Note, however, that we are not comparing words of an equal syllabic structure here: *sardine* has no syllable following its stressed syllable, *October* does. In fact, while in isolation both the noun *Bahréin* and the adjective *Bahréini* have primary stress on their second syllable *-réi(n)-* and their first vowel is full, [bɑ:-], we observe stress shift in *Báhrein Ísland*, but not in *Bahréini Dínar*. We have not found any convincing example of either of the opposite cases: a bisyllabic word with a full vowel in its first and stress on its second syllable that does not exhibit stress shift or a trisyllabic word with the same structure and an additional unstressed final syllable that does.<sup>1</sup> Arguably, such cases do not exist. This is illustrated in (7).

(9)	F X	F X x
stress shifts	✓ <i>Báhrein Ísland</i>	? —
no stress shift	? —	✓ <i>Bahréini Dínar</i>

That is, a pretonic full vowel is the potential target of stress shift if the word contains no posttonic syllable (*sárdine sándwich*, *dírect débit*, *Báhrein Ísland*, *Príncess Ánn*), but not if there is a further syllable in the word (\**Óctober ráin*, \**Titánic's bánd*, \**Báhreini Dínar*, \**Príncesses Ánn and Víc*). If this is correct, then pretonic vowels do not have to be marked as secondary vs. tertiary stressed for being able to accept stress moved by stress shift since this is controlled by the presence or absence of a posttonic syllable. Therefore, there is no need to posit unstressed syllables containing a full vowel.

<sup>1</sup>Although Wells (1990) does not mark the possibility of stress shift in many bisyllabic words with stress on the ult and a full vowel in the first syllable (e.g., *cartóon*, *cartél*, *cashíer*, etc.), our native speaker informant, Mark Newson, reports that their stress is on their first syllable in *cártoon nétwork*, *cártel príce*, *cáshier's check* (also cf. Gimson 1989:291f). Jones says that in *Salvation Army* the stress pattern *Sálvation Ármý* seems quite as usual as *Salvátion Ármý* (1956:254), however, Wells (1990) does not indicate stress shift here, just as we predict. Gimson (1989:291) and Selkirk (1984:46) mention *Westmínster* vs. *Wéstminster Ábbey*, but Wells (1990) cites the isolated form as *Wéstminster* in the first place, giving *Westmínster* only as a less common alternant.

In words where a pretonic full vowel occurs in a syllable that does not immediately precede the tonic (F x X) the full vowel is typically in one of the first two syllables of the word and receives (secondary) stress because of the Early Stress Requirement (*àcadémic*, *anáchronístic*). Since these syllables are always subject to stress shift (*àcademic blúnder*, *anáchronistic ców*) and thus behave in one way,<sup>1</sup> the need for distinguishing tertiary stress does not arise in these positions either.

## 5 Conclusion

English vowels fall into two groups, full and reduced vowels, depending on whether they occur in a stressed or unstressed syllable, respectively. There is a third set of vowels, which occur in both stressed and unstressed syllables. Some syllables are major-stressed by rules, but many words contain further syllables whose vowel is full, that is, syllables that are stressed. When a syllable that is not stressed by a rule contains a vowel of the third set, we cannot tell whether that syllable is stressed or unstressed. In this paper we discussed some segmental phonological phenomena (flapping, syncope, high vowel gliding, the vowel of a preceding syllable, stress shift) which can still decide the question in one direction or the other. A Thistle, or an old Man grey, as it were.

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<sup>1</sup>Note that posttonic syllabic structure of these words is irrelevant: stress shift affects them even if there is a posttonic syllable, e.g., *àcadèmic yéar*.