Partially-Stressed Syllables and "Unstable" /ɪ/ in English*

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0 Abstract

This paper examines those syllables of the RP variety of English which are not "properly" stressed yet have a full vowel, *i.e.* a vowel other than schwa, as in *finite, pathos, pocket, illicit.* I claim that they usually carry a lexically specified "partial-stress" which prevents them from reducing, but is not strong enough to attract major stress on itself (*cf. *finíte*).

The discussion concentrates on preconsonantal vowels. We examine the consequences of assuming a very powerful rule of Preconsonantal Reduction whereby all unstressed syllables are reduced to schwa. Unstressed /ʊ/ is examined: except for one particular environment, it could simply be called a full vowel today. A more serious problem emerges with syllables like *harvest,* which show free variation between /ɪ/ and /ə/: I call this surface behaviour "unstable" /ɪ/. These syllables have underlying unstressed /ɪ/, and RP has a dialect-specific late rule of Optional /ɪ/-Stressing, which prevents them from reduction.

The treatment is fairly conservative, with rule-ordering. Relevant data are collected from Wells (1990), arranged according to the criteria set out in the paper.

1 The status of partially-stressed syllables

1.1 "Full" and "reduced" nuclei

There are syllables in English which are not properly stressed (in the rhythmic sense of the word), but nevertheless have a full vowel, *i.e.* a vowel other than schwa. The nuclei of such syllables will be shown with a grave accent: *finìte, pathòs, exploìtation, pockèt, ìllicit.* I call these syllables partially-stressed and claim, following authors like Kingdon (1958), Fudge (1984) or Giegerich (1992), that partially-stressed syllables are a subset of stressed syllables and not a subset of unstressed ones. The criterion that distinguishes partially-stressed from unstressed syllables is the "full" nature of

their vowel, *i.e.* the absence of reduction.[1] As Wells puts it (1990:778):
"Among unstressed syllables it is useful to distinguish between those that
nevertheless contain a **strong** vowel and those that have a **weak** vowel..."

The terms "full" (or strong) *vs.* "reduced" (or weak) in reference to
syllabic nuclei have two different yet conspiring meanings:[2]

(a) full (*vs.* reduced) feature specification: in this use "full" means that
the phonetic features of the vowel are present in their "full" number,
i.e. the vowel is fully specified as to [high] or [front] or [tense], *etc.*
The feature specification of a reduced vowel (or more exactly, a
reduced nucleus, since there may be a syllabic sonorant rather than
a vowel proper) is "reduced" to a minimum of features: in terms of
linear phonology, it is [+syllabic], but all its other features are minus;
in nonlinear terms, it is not associated with any feature below that
of "V".

(b) full (*vs.* reduced) range of oppositions: this use refers to the full
paradigmatic possibility of vowel choice (excepting /ə/, of course)
in the given place. "In unstressed syllables most vowel-contrasts are
absent [... while] syllables with lower ('secondary') stress may con-
tain the full range of vowel phonemes" (Giegerich 1992:67; similarly
Poldauf 1984:16).

The "conspiracy" of the two uses is obvious: if a vowel is specified
for many features, then it will be in opposition with many other fully spec-
ified vowels which, by necessity, will differ from it in some of their feature
specifications. If it is specified for [+syllabic] only, then it will not be in
opposition with any vowel, since those are [+syllabic] too; it will just be a
general unspecified vowel. "We are therefore, strictly speaking, non entitled
to call schwa a phoneme of English: schwa occurs where all vowel contrasts
(except the one with /ɪ/) are suspended" (Giegerich 1992:69). We could
not agree more, except for the parenthetic remark concerning /ɪ/ — now is
there, or is there not, a contrast in unstressed syllables between /ə/ and /ɪ/
(or other vowels, for that matter)? It is my aim to examine the relationship
between /ə/, /ɪ/, and other reduced nuclei.

I use "full/reduced" in their segmental meaning as in (a) above, but
the other meaning is understood as well. Some authors use another pair
of terms: "strong/weak", echoing the traditional distinction of function
words in their "strong form" (*i.e.* their stressed syllable having a full vowel)
and "weak form" (*i.e.* all their syllables having reduced nuclei or being
lost). Unfortunately, "strong/weak" may cause confusion when compared
to the terminology of Metrical Phonology, where the label "weak" does not
necessarily cover a reduced syllable; I shall avoid the strong/weak pair as

general descriptions of syllable types, but occasionally use it for particular vowels when necessary.

The term "reduction" is traditionally applied to a process rather than a state. Examples are alternations where a vowel appears at times in its full value and at other times in a reduced form, mostly as schwa or nothing, as in Russian declensional stress-shift, *e.g. storoná* /ə/ $\sim$ *stóronu* /o/ 'side NOM$\sim$ACC', or in Greek gradation (Ablaut), *e.g. derk-omai* $\sim$ *e-drak-on* 'to look PRES$\sim$AOR'. Reduction is thus a noncyclic rule whereby a fully specified underlying vowel loses most (or all) its features due to the absence of stress in a particular alternant of the morpheme.

Reduction in English basically applies in preconsonantal position. I give the rule in (1):

(1) **Vowel Reduction**

$$V \quad \rightarrow \quad \text{ə} \quad \Big/ \left[\dfrac{\quad\quad}{-\text{str}} \right] \text{C}$$

In word final position reduction only operates on low vowels (chiefly to /æ/ as in *dramátic* $\rightarrow$ *drám*/ə/). In *SPE* (Chomsky & Halle 1968), Reduction applies to lax vowels only, *i.e.* [−tense], as their framework needs laxing rules to prepare a vowel for reduction.

In the "process" interpretation of reduction the underlying vowel can always be retrieved from a "full" alternant of the same morpheme. For example, the underlying /æ/ of *magícian* (surface /ə/) can be retrieved from *mágic* /æ/). The term "gradation" may be used for these cases.[3]

There are, however, many English syllables where the reduced vowel does not alternate with anything, *e.g. salad, Britain, potato, surprise.* (Note that, as the spelling suggests, these had different full vowels in earlier phases of their history or the source language from which they were borrowed, but in contemporary English this is no longer recoverable and thus the phonology has no access to these "original" vowels.) It is logical to call these nonalternating syllables reduced too, since they exhibit the same features and behaviour as the reduced alternants of gradational syllables, but in this case reduction can hardly be a process of feature-loss since the underlying vowel cannot be specified: these syllables are reduced *ab ovo*. In practical descriptions and language-teaching it is customary to pretend that even in reduced-ab-ovo syllables the vowel suggested by the spelling is the underlying one, so *e.g. salad* [?]/sælæd/ $\rightarrow$ /sæləd/; *Britain* [?]/-teɪn/ $\rightarrow$ /-tən/. The phonologist, however, must reject the arbitrariness of these solutions, since they would violate Kiparsky's Alternation Condition (1982 : 127); all we can say is that these syllables have a "lexical schwa", and

not an underlying full vowel which "becomes reduced". In nonalternating
weak syllables reduction is not a process but a state.

Let us compare three types of syllable from our point of view:

(2)		nonreduced (partially-strd)	reduced by rule	reduced *ab ovo*
		act+iv+ity	magic+ian	banana
	UR	/æ/	/æ/	/V/
	Reduction	*blocked*	/ə/	n.a.
	SR	/æ/	/ə/	/ə/

By "lexical schwa" I do not really mean a /ə/ in the underlying
representation of *salad, etc.*: this would give the wrong impression that /ə/
is a contrastive phoneme. It is much better to resort to underspecification
and say that the term "lexical schwa" refers to a vowel that has no fea-
tures beyond "V". Thus *salad* /sælVd/, *surprise* /sVrpraɪz/ (*cf.* Durand
1990:113). The "process" and the "state" type of reduction can then be
harmonized by saying that an underlying full vowel needs (at least partial)
stress to actually take on its features: in want of stress it remains "V".

It must be said that the reliance on alternants, logical as it is, leaves
the underlying representation at the mercy of morphology, since whether
there happens to be an alternant or not is often a matter of historical acci-
dent or lexical arbitrariness. *Hérod* alternates with *Heród-ias* /həˈrəʊdiæs/
(with /əʊ/ by CiV Tensing through /ɒ/), but *salad* has no such alternant
(**saladian?* or **saladic?*), therefore we may represent *Herod* as /herɒd/,
but *salad* must remain /sælVd/. A certain amount of alternant-hunting
may be necessary to recover "lost" vowels.

1.2   The traditional triangular reduction system

In the English descriptive tradition gradation was first recognized for mono-
syllabic function-words, which undergo reduction in stressless syntactic po-
sitions. Jones writes:

> "By gradation is meant the existence in many common English
> words of two or more pronunciations, a strong form and one or
> more weak forms. Weak forms occur only in unstressed posi-
> tions; strong forms are used chiefly when the word is stressed,
> but they also occur in unstressed [=partially-stressed] positions."
> (1956:126)

This gave the classificatory basis for calling those vowels "weak" that reg-
ularly appear in "weak forms": /ə ɪ ʊ/ (besides syllabic sonorants or no

nucleus). These three have been traditionally recognized as the "weak" vowels of English. The same phenomena characterize all unstressed syllables, including those in longer words of the major word classes. An early authority, I. C. Ward, says:

> "The vowel /ə/ [...] replaces almost all other vowels or diphthongs in unstressed positions; /i(ː)/ and /ɪ/, however, are exceptions to this: /i(ː)/ is generally replaced by /ɪ/ in unstressed positions, and /ɪ/ remains the same, *e.g. 'reˈname* /iː/ but *reˈmain* /ɪ/, *finish* /ɪ–ɪ/. [...] The semi-weak forms of /u(ː)/ and /oʊ/ are generally /ʊ/ (thus *do*) and /o/, *e.g. obey, November, protest, phonetics*" (1939 : 107).[4]

Historically, the three major areas of the vowel space (high front, high back, and low) each had its local reduction result. Thus /iː e eɪ/ reduced to /ɪ/, *e.g. prepare, pocket, manage;* /uː juː oʊ/ reduced to /ʊ/, *e.g. **July**, ed**u**cate, November;* and other vowels to /ə/, *e.g. salad, potato, status.* The situation was different before /r/, where centralization and an ensuing reduction to schwa happened almost everywhere (see Table III). As Ward points out, this system allowed for "semi-reduction" since not all features of the nonlow vowels were stripped: the features [high, front] remained in *pocket*, and [high, back] (and redundantly [round]) remained in *July*. Kingdon says:

> "of the twelve pure vowels in English one (ə) is always weak and can therefore occur only in unstressed syllables, and two (i, u) may be either weak or strong, according to whether they occur in unstressed or stressed syllables respectively. The remaining nine [...] are always strong, and syllables in which they occur will therefore tend generally to take some sort of stress. Of the nine diphthongs two (iə, uə) may be either weak or strong, [...] the remaining seven are always strong." (1958 : 5)

Gimson mentions /ə ɪ ʊ/ as "particularly associated with unaccented situations" (1989 : 226) (*i.e.* anywhere and in any type of word). Roach says that besides schwa "two other vowels are commonly found in weak syllables, one close front and the other close back rounded" (1983 : 65), which he symbolizes as /i u/ in final or prevocalic positions, and /ɪ ʊ/ elsewhere (equating the latter with the phonemes /ɪ ʊ/).

This triangular system is upheld by Wells, who allows five vowels in (truly) unstressed syllables, namely /ə i u ɪ ʊ/:

> "**2** A stressed syllable [...] must always contain a strong vowel. This may be any vowel or diphthong except /ə i u/. All the syllables in the following words, whether stressed or unstressed, are **strong**-vowelled: *red, hope, bedtime, undone, acorn, butane.*

3 The vowels /ə i u/ are always weak. So, too, is /ɪ/ in many cases, as well as /ʊ/ in BrE and /oʊ/ in AmE. The underlined syllables in the following words are **weak**-vowelled: <u>a</u>llow, happ<u>y</u> /i/, sit<u>u</u>ation /u/, carel<u>e</u>ssn<u>e</u>ss, [...] stim<u>u</u>l<u>u</u>s /-jʊləs/. [...]
4 The distinction between weak /ɪ/ and /ə/ has the power of distinguishing words in RP: *Lenin* ~ *Lennon*, *rabbit* ~ *abbot*.
5 Even in RP [...] many words may be heard with either pronunciation [/ɪ/ or /ə/]." (1990:778)

One can say that the triangular system of "semi-reduction" has practically collapsed in RP. Its weakest point is "weak /ʊ/", which is discussed in **1.4.**

The ambiguous nature of /ɪ/ must still be recognized, though unstable /ɪ/ is gradually disappearing too. "Especially [...] younger RP speakers, as well as all speakers in casual speech, seem to prefer /ə/ in many cases where conservative RP speakers, or more formal speech, would favour /ɪ/" (Giegerich 1992:68). I label /ɪ/ as unstable if it freely alternates with /ə/ (see **2.4**).

Jones and some other authors also mention the "weak diphthongs" /ĭə ŭə/ in places like *glorious, happier, area, realistic; influence, valuer, puerility.* These are referred to as "rising" or "crescendo" diphthongs (as opposed to the usual English diphthong type, which is "falling" or "diminuendo"), because the syllabicity peak is on the second element, the schwa. We may bypass these, however, as they are always the result of the contraction of two adjacent nuclei (called "compression" by Wells (1990:152), of which the first is /i(ː) u(ː)/, which undergoes smoothing and desyllabification, *i.e.* it turns into a glide /j w/.

This paper examines what problems we face if we claim that the only reduced vowel (and reduction product) in English is schwa.[5] Any syllable having schwa as its vowel is reduced and, *a fortiori,* zero-stressed. Some other vowels which are candidates for "weakness" are examined below. Reduction is either lexical, when a word has underlying schwa, or a phonological process, when a full vowel has a reduced alternant.

1.3   Schwa and its derivatives

Whether reduction is a lexical property or a process, its result is necessarily schwa, which may in certain environments optionally further reduce to a syllabic sonorant or complete syllable loss. English /ə/ is stable in most of its environments, *e.g.* **ago, matter, exclamation,** unlike in French, where its appearance is mostly governed by rhythmic factors. There is no apocope in present-day English (Knowles 1987:106), *i.e.* initial and final /ə/ is not normally elided. The schwa of RP is, however, subject to two major optional

rules: Syllabic Consonant Formation and Sonorant Desyllabification, as well as a minor optional rule: Syncope. I call the results of these rules schwa-derivatives.

Syllabic sonorants, *e.g. button, table, prism,* do not constitute a separate class of weak nuclei. They are derivable from schwa plus sonorant by an optional rule when the schwa is post-consonantal: **Syllabic Consonant Formation** (see (3)). This rule cannot be handled very well in SPE-type linear phonology because it makes the process look complicated: two segments resulting in one — in an autosegmental framework the rule can be stated more simply as the delinking of the vowel and the reassociation of the syllabicity to the sonorant. Since our main concern is not comparing frameworks now, I give the rule as a replacement rule in (3).

(3) **Syllabic Sonorant Formation**

$$\text{ə} \begin{bmatrix} +\text{son} \\ -\text{syl} \end{bmatrix} \rightarrow \begin{bmatrix} +\text{son} \\ +\text{syl} \end{bmatrix} \Big/ \quad C \underline{\quad} \qquad \text{optionally}$$

$$\quad 1 \quad\quad 2 \qquad\qquad\quad 3$$

There exists a hierarchy between the sonorants as to which can act as left-hand environment for the syllabicness of which sonorant. For example, they cannot both be nasals (*lemon* /-mən/, not */-mn̩/); the sequence /nl̩/ is well formed, but */ln̩/ is not. For a thorough treatment of this problem see Ács & Törkenczy (1989). We may add to their findings that the rhyme complexity of the preceding stressed syllable is a catalyst for Syllabic Consonant Formation. This is shown in Table I by the slightly differing behaviour of *divination* and *ordination:* in the latter, Syllabic Consonant Formation is possible because the preceding syllable *ord-* has a complex rhyme, whereas *div-* does not. Similarly in *hēdonist* and *botanist,* though both occur with both realizations, the more frequent forms are /hiːdn̩ɪst/ but /bɒtənɪst/.

Consider the data in Table I with unstressed medial vowels followed by a sonorant. The data show that the target for **Sonorant Desyllabification** (given in (4)) is a light syllable in the "descending" location, that is, a syllable flanked by a stressed syllable to the left and an unstressed one to the right, with only one consonant following the vowel in focus, *e.g. fám(i)ly, cám(e)ra, féd(e)ralizátion.* If the following syllable is stressed (even partially), the focus syllable is not in "descending" but in intertonic location, and Sonorant Desyllabification is not permitted. Thus the adjective *sép(a)rate,* where *-ar-* is descending, may be /pər/ or /pr̩/ or, with syllable loss, /pr/. The verb to *séparàte,* on the other hand, is only /pər/ because its last syllable is stressed and thus *-par-* is intertonic. A disyllabic form */ˈspreɪt/ is not recorded.

The possibility of desyllabification in *family, bakery, hetero* furnishes interesting evidence as to the status of their last vowel. On the surface the last vowel appears as full (and often long and tense), but Sonorant Desyllabification shows that the last syllable is underlyingly weak. The surface fullness of these vowels (even if due to a [+stress] feature) must be secondary or late. And indeed, final *-i, -o, -u* is underlyingly lax and is only tensed by a rule of Late Tensing (so *SPE*). Hence the difference between *catering* (*-ing* is partially-stressed!) ↔ *bak(e)ry,* or *cháperòne* /ˈʃæpərəʊn/ ↔ *hét(e)rò* /ˈhet(ə)rəʊ/; the latter has alternants with syllabic consonant formation /tr̩/, and Sonorant Desyllabification /tr/, but *chaperone* does not. This is because the partial-stress on the last syllable of *chaperone* is lexically given, while that on *hetero* is assigned by phonological rule (Late Restressing). The Sonorant Desyllabification rule shows that the location we call "descending" comprises in its right-hand environment syllables that are Late Restressed (owing to their vowel being nonlow and non-preconsonantal). Thus Rule (4) would have to be ordered accordingly. *Buffalo,* on the other hand, seems to have a proper lexical partial-stress on its last syllable, just like *chaperone;* hence */bʌfləʊ/.

Desyllabification only occurs to the right of the first major-stress of the word, at least in the style of speech we may consider "not fast". Normally there is a consonant before the (original) schwa, but Wells (1990) gives *realize* as having an alternant /ˈriːˡaɪz/, so we do not have to include that in the left-hand environment in (4).

(4) **Sonorant Desyllabification**

$$\begin{bmatrix} +\text{son} \\ +\text{syl} \end{bmatrix} \quad \rightarrow \quad [-\text{syl}] \quad \Big/ \quad \begin{matrix} \sigma \\ [+\text{str}] \end{matrix} \, - \, \begin{bmatrix} -\text{str} \\ \text{V} \end{bmatrix} \qquad \text{optionally}$$

We cannot go into further details of syllabic sonorants, but these alternations do not affect the unstressed status of the syllable. For our purposes syllabic sonorants as well as Sonorant Desyllabification can be treated as derivatives of schwa. Unless otherwise stated, we will subsume these derivatives when we speak of schwa.

Syncope must also be mentioned briefly: this is the loss of a schwa (and consequently the syllable) when not before a sonorant, *i.e.* without intermediate Syllabic Formation, as in *vegetable, Madison,* or non-RP *Saturday* /-td-/. It is not very frequent in "careful" speech, so we may treat it as lexical alternation. In faster speech of course it becomes a major rule (see Brown 1977).

1.4 Weak /ʊ/

The vowel /ʊ/ in non-major-stressed syllables is rarely given as a first alternative in Wells (1990). As a non-alternating vowel it only appears before a consonant.[6]

Consider the data in Table II. Weak /ʊ/, when not followed by a consonant, is in free variation with /u(ː)/ (as in *arduous, intuition, value*); when followed by a consonant, it has mostly been replaced by /ə/ (as in *today, fortune*), or is again in free variation with /u(ː)/ (as in *superior*) and/or /ə/ (*argument*). In almost all cases the other alternant, namely /ə/ or /(j)u(ː)/, appears as the main variant. There is only one particular environment where Wells has /ʊ/ as the main variant: in preconsonantal position when the syllable is light and in "descending" location (between a stressed and a zero-stressed syllable), as in *stimulus*. Here /ʊ/ survives, especially when preceded by a surface /j/, but even here it is in free variation with /ə/.[7]

Let us say that whenever /ʊ/ appears, it is to be analysed as partially-stressed, and that there is no weak /ʊ/ or /u(ː)/ in present-day RP. I subscribe to the view that "in unstressed syllables only schwa and /ɪ/ are possible" (Giegerich 1992:69; similarly in LDCE 1978). Thus the middle syllable of *educate* does not reduce; *July* has a syllable with optional reduction, *etc.*

The problem with this analysis is that words like *stimulus,* when pronounced with /ʊ/, would display a major-stressed–partially-stressed–unstressed string; that is, they would have a partially-stressed syllable (the /ʊ/) in a descending location, an arrangement that is quite uncharacteristic of English. A constraint referred to in the literature as Montana Filter expresses the fact "that the configuration σ́ σ̀ σ̆ is disfavoured" (Selkirk 1984:103). Generally, the descending location is a classic target for reduction (and even syllable loss, see **1.3**) — so why does /ʊ/ survive in this particular location? Now, either we relax the Montana Filter in an *ad hoc* manner for syllables with /(j)ʊ/, or we say that in this environment /ʊ/, like /ə/ elsewhere, is a reduced vowel. Both solutions are bad; if forced to choose, I would opt for the first, and suspend the Montana Filter for descending syllables with /(j)ʊ/, to be able to call such syllables partially-stressed. But the problem merits further attention.

It must be mentioned, furthermore, that Yod-Dropping also points to the penultimate vowel (whether pronounced /ʊ/ or /ə/) in *stimulus*-type words being weak. In *soluble, consulate,* the obligatory /j/ can only be explained by the stresslessness of the syllable, since under any degree of stress Yod-Dropping after /l s z/ is optionally permitted in RP (and

obligatory in AmE). Thus *consúme* is /juː/ ∼ /uː/, but *consulate* only /jʊ/ (or /jə/).

1.5   Alternations: stable and unstable vowels

Reduced syllables, as a category, are characterized by a much higher degree of free variation (*i.e.* unconditioned alternation) than nonreduced syllables. Full vowels display free variation relatively rarely, and the alternation counterpart is mostly *ad hoc:* cases like ***either*** /aɪ/ ∼ /iː/, *trans-* /ɑː/ ∼ /æ/ are phonologically uninteresting since they must be lexically specified. They are really cases of synonymy: there are two English words, /aɪðə/ and /iːðə/, and they happen to have the same meaning (and spelling). There is no way in which the phonology could handle this. Admittedly, there are certain "patterns of free variation",[8] where the counterpart of the alternation is predictable, and only the trigger is arbitrary (for example, unmotivated Vowel Shift in the freely alternating tense *vs.* lax forms of *vitamin, patriot, ego, etc.*); but this does not save the phenomenon from being an unpredictable lexical feature.

Reduced or entirely unstressed nuclei, on the other hand, are in many cases subject to regular and predictable free variation, *e.g.* ***happy*** /ɪ/ ∼ /iː/, ***button*** /ən/ ∼ /n̩/, and often to non-predictable but quasi-regular free variation, *e.g.* ***harvest*** /ə/ ∼ /ɪ/. It would be unwise to resort to the same solution as with full vowels and say that there are two English words, /hɑːvəst/ and /hɑːvɪst/, which happen to mean the same; since these forms are related by stress rather than being a lexical accident at the word level. Unstressed /ɪ/ alternates with /ə/, while /aɪ/ does not alternate with /iː/. (Note that taxonomic phonology was unable to distinguish between these two kinds and treated both as "phonemic variation", so Gimson 1989 : 259.) I propose to say that *harvest* has a single underlying form, /ˈhɑːvɪst/, which can have two stressings (zero for /vəst/ and partial for /vɪst/); while *either* has two phonemic make-ups, /aɪðə/ and /iːðə/.

An interesting terminology — if obviously limited by the practical nature of a dictionary—is introduced by CoBuild 1987 (pronunciation consultant David Brazil). He speaks of "protected and unprotected" vowels:

> "Any vowel marked in heavy type and underlined is a protected vowel. This means that there is very little variation in the way in which a speaker pronounces it, whether or not it actually gets a stress in the information unit in which it occurs. In /sɪti[1]/ (*city*), the protected vowel /ɪ/ is invariable within the chosen accent, but the unprotected vowel /i[1]/ can vary between /ɪ/ and /iː/ in the usage of a single speaker" (1987 : xii).

In (5) I list the nuclei and alternations found in English partially-stressed and unstressed syllables. Our classificatory principle is their relationship to schwa.

    (5) **List of nuclei and alternations**

        A) *Schwa not involved*
            — nonalternating full vowel other than /ɪ/ (*femále* /eɪ/)
            — nonalternating /ɪ/ (*pockèt* /ɪ/)
            — full vowel ∼ /ɪ/ (*alphabèt* /ə/ ∼ /ɪ/)
        B) *Schwa and something else involved* ("unstable" nuclei)
            — schwa ∼ full vowel (*November* /ə/ ∼ /əʊ/)
            — schwa ∼ /ɪ/ (*harvest* /ə/ ∼ /ɪ/)
            — schwa ∼ /ɪ/ ∼ full vowel (*September* /ə/ ∼ /ɪ/ ∼ /e/)
        C) *Only schwa (and derivatives) involved* (reduced nuclei)
            — nonalternating schwa (*paddock* /ə/)
            — schwa plus sonorant ∼ syll. sonorant (*lesson* /ən/ ∼ /n̩/)
            — syllabic sonorant ∼ nonsyllabic sonorant (*cycling* /-kl̩ɪŋ/
               ∼ /-klɪŋ/)
            — schwa ∼ nothing (*family* /-məli/ ∼ /-mli/)

If schwa alternates with a full vowel, as in *November, harvest, September,* the alternation is really one of stress: the syllable has partially-stressed and unstressed alternants. When the full vowel is used, the syllable is partially-stressed, when the reduced nucleus appears, it is unstressed. I call such an alternation between partially-stressed and unstressed "optional destressing". A problem arises here with regard to the ambiguous vowel /ɪ/ (for /ʊ/ see **1.4**): are alternations between a full vowel and /ɪ/ (*alphabet*) to be regarded as cases of optional destressing or not? We return to this question in **2.6**.

2   The problem of /ɪ/

2.1 Phonetic identity of stressed and unstressed /ɪ/

The vowel /ɪ/ behaves as an ambiguous case between full and reduced vowels. It appears in syllables that are obviously stressed (*big, diplomat*) but also in syllables that occupy locations typical of unstressed syllables, *e.g. continental, happy, before.* The phoneticians do not register any difference in quality between its stressed and unstressed occurrences in preconsonantal position (beyond what is trivial for all such cases, like loudness, length, *etc.*), and use the same transcription symbol /ɪ/ whether it is stressed or not. In non-preconsonantal position /ɪ/ alternates with /iː/ or /j/, but those are

usually considered "different sounds" even by the descriptive tradition, not automatic phonetic alternants of /ɪ/. The problem is discussed at some length below.

2.2   /ɪ/ as stable and unstable

Two fundamentally different solutions can be drawn up to accommodate /ɪ/ in the system of English.

2.2.1   The weak solution

One solution is to say that in syllables containing /ɪ/ the full-reduced distinction is neutralized, and therefore any non-major-stressed syllable with /ɪ/ has to be regarded as unstressed: *pocket, walking, Cambridge, before, alphabet* (the latter two when pronounced with /ɪ/) are all unstressed. Major stressed syllables containing /ɪ/ would of course still be distinguishable by their (real) stress and possible pitch prominence, as in *diplomat, bigger, peripheral.* But there would be no partially-stressed syllables with /ɪ/ (see the "?" in (6)) since they would be indistinguishable from unstressed syllables, as this distinction is based on vowel quality (*i.e.* "fullness" or "strength"). In this view, while other vowels (barring schwa, of course) can be major-stressed or partially-stressed, /ɪ/ can only be major-stressed or unstressed. Compare the possibilities in the following table, where "Vfu" means any full vowel except /ɪ/:

(6)

	Major stressed	Partially stressed	Un- stressed
ə	—	—	**a**go
ɪ	b**i**g	?	pock**e**t
Vfu	**a**ct	**a**ctivity	—

This solution is adopted by G. Walsh, the pronunciation editor of the first edition of the *Longman Dictionary of Contemporary English* (LDCE 1978):

> "Even in very long words only one secondary stress is usually shown:
>
>   *comprehensibility* /ˌkɒmprɪhensəˈbɪləti/,
>   *incompatibility* /ˌɪnkəmpætəˈbɪləti/.
>
> The third syllables of those words do have a little more stress than the other unmarked ones, but it is not necessary to show this because they contain "strong" vowels, which always have a certain amount of stress. But sometimes two secondary stresses are shown, as in

> *contraindication* /ˌkɒntrəˌɪndɪˈkeɪʃ(ə)n/.
> This is because /ɪ/ may be "strong" or "weak". (/ə/ is always
> weak. All the other vowels are always strong.)"
> (LDCE 1978:xviii).

This view, which I call the "weak solution", implies that the default value
of /ɪ/ is "weak": if there is no major-stress then a syllable containing /ɪ/ is
unstressed. If /ɪ/ has any degree of stress, that must be major (and therefore
a stress mark must be placed before it as in *contraindication*). In Walsh's
practical (yet theoretically "clean" and defensible) notation, this intertwines
with evidence for stress gained from consonants, notably aspiration (which
appears in the onset of stressed syllables). Compare the transcription of the
following entries in LDCE (I have added the phonetic values of the medial
stops):

(7) *cess**p**it*   /ˈsesˌpɪt/   [pʰ]
    *cess**p**ool*   /ˈses-puːl/   [pʰ]
    *des**p**ot*   /ˈdespɒt, -ət/ [p]
    *dis**t**inct*   /dɪˈstɪŋkt/   [t]

I would say that both *cesspit* and *cesspool* have partially-stressed second
syllables. In LDCE *-pool* needs no indication of this since /uː/ is "always
strong", *i.e.* the syllable is (at least partially) stressed, consequently the /p/
must be aspirated. But any /ɪ/ would be weak by default, so the syllable
must get a secondary-stress mark to show that the /p/ is aspirated. Note
that the /p/ of *-pool* is aspirated too, but this follows, in Walsh's system,
from its being followed by a "strong" (=partially-stressed) vowel. Since the
syllable needs no stress mark, there would be no automatic indication of
syllable division (*i.e.* whether the /s/ belongs to the first syllable or the
second), which is relevant for aspiration. This is why Walsh uses a hyphen
to indicate syllable division in the word *cesspool*. The second syllable in
despot is subject to optional reduction (it has a partially-stressed and a
zero-stressed free variant). The full alternant is of course partially-stressed,
which could be accompanied by aspiration of the onset-/p/, but here the /s/
precedes it in the syllable. (This is shown by not using a dividing hyphen:
LDCE tacitly implies the Maximal Onset Principle in its transcription). In
distínct the first /ɪ/ would be weak, while the second is obviously strong,
with the unaspirated nature of the /t/ shown by the place of the stress
mark.

Walsh's approach to strong and weak syllables is a typical example
of the "weak solution". He strictly calls the /ɪ/ weak unless it has major-
stress.

2.2.2 The strong solution

The other approach, which I call the "strong solution", would be to say that /ɪ/ — like any vowel that is not schwa — is not ambiguous but strong, one of the ordinary full vowels of English. This of course entails that if it appears in a syllable, that syllable must be regarded as (at least partially) stressed, since otherwise the reduction rule would have been triggered. In this solution *pocket, walking, Cambridge, before, alphabet* (the last two when pronounced with /ɪ/) are all partially-stressed; *before* is a case of optional destressing (to schwa), while *alphabet* is a case of lexical free variation between two full vowels /ɪ/ ∼ /e/ like *either* between /aɪ/ ∼ /iː/. Only schwa and its derivatives would be allowed as nuclei of unstressed syllables. Absence of stress equals reduction, and certainly schwa is "more reduced" than any other vowel, including /ɪ/ (see **1.1**). This solution would work for General American, where, as Giegerich observes, "the /ə/–/ɪ/ contrast before consonants is all but obliterated: any occurrence of /ɪ/ in this context is highly sporadic and speaker-specific" (1992 : 68). However, in RP — though there, too, schwa is gaining ground at the expense of /ɪ/ in preconsonantal position — things have not gone that far yet.

The "strong solution" is more constrained and thus more interesting than the weak solution. It also helps to keep the reduction rule "clean". However, one might object that it ignores the fact that in very many words /ɪ/ acts as a reduction product: *éxcellent* /e/ — *excél* /ɪ/ (besides /e/, /ə/), *álphabet* /e/ ∼ /ɪ/, *etc.* Classing every /ɪ/ as full (and thus stressed) would miss this mechanism and would reintroduce the arbitrary "phonemic" surface alternations in the taxonomic treatment of cases like *átom — atómic.* On the other hand, the full vowel of which /ɪ/ can be called the reduction product is almost exclusively /e/ — a very idiosyncratic type of reduction, to be sure.

Let us further examine the behaviour of non-major-stressed /ɪ/. If /ɪ/ shows alternation with /ə/, I call it "unstable", if it does not, I call it "stable", even if it happens to alternate with some full vowel (as in *alphabet*).

2.3 Stable /ɪ/

Consider the examples in (8), in which Wells (1990) gives no alternative for /ɪ/ (at least within RP).[9] I only indicate major stress now (both primary and secondary with an acute accent), so as not to preclude later argument.

(8) **Stable /ɪ/ (always preconsonantal)**

a.	bíg	b.	íntercépt	c.	inférior	d.	illícit
	bígger		ínabílity		exténd		pócket
	fulfíl		sýntagmátic		dictátion		básis
	díplomat		díplomátic		wálking		núdist
	perípheral		consíderátion		Dánish		tónic

Types (8a) and (8b) are straightforward: they are major-stressed and contain the full vowel /ɪ/, and indeed have no reason for alternating with anything.

In (8c) and (8d) all highlighted syllables are less-than-major stressed, either because they are posttonic, or, if pretonic, because of their inability to take part in Rhythmic Stress-shift (**ínferior quálity*). This still leaves it open whether they are partially-stressed or unstressed. Since, however, they show no instability (*i.e.* no alternation with schwa), I regard them as permanently partially-stressed; if they were unstressed, they would be able to reduce to schwa. To refer back to (6): I prefer to put *pocket, etc.* in the middle box rather than the right-hand one. Thus we must write *pockèt, inférior, èvént, wálkìng, núdìst, etc.* The last syllable of *álphabet,* which may have /e/ or /ɪ/, is partially-stressed in both its variants, since its /ɪ/ does not further alternate with /ə/.

2.3.1 Protective codas

Note the difference between (8c) and (8d); to clarify that I present the data in (9):

(9) **Stable /ɪ/ compared to other nuclei**

	/ɪ/		other Vfu		/ə/
c.	ìnférior	c′.	àntérior	c″.	—
	èxténd		èxtánt		
	dìctátion		spèctátor		
	wálkìng		óblòng		
	Dánìsh		góulàsh		
d.	ìllícit	d′.	òbése	d″.	alígn
	póckèt		bátòn		ábbot
	básìs		páthòs		cénsus
	núdìst		bómbàst		próvost
	tónìc		hémlòck		páddock

The material in (9) compares the syllables of (8c) and (8d), all containing permanently partially-stressed (=stable) /ɪ/, with similar syllables containing a full vowel (′) and schwa (″).

Group (9c) has its exact full-vowelled counterpart in (9c′), but no reduced counterpart (9c″), that is, here /ɪ/ occurs in positions where reduction is blocked: the factor responsible for the nonreduction is the quality of the consonants in the coda (supported perhaps by the initial position of the vowel, which seems to discourage reduction in English).

Certain consonants or consonant clusters block the reduction of a preceding vowel to schwa: these may be called "strongly protective codas", such as /mp/, which does not tolerate schwa before it (thus generally */əmp/). There is a larger group of codas (containing the former) which only block the reduction of /ɪ/ to schwa: these may be called "weakly protective codas", such as /k/, which does tolerate schwa before it (witness *paddock* /-ək/), but which protects unstressed /ɪ/ from ever reducing to schwa, as in *tonic* /-ɪk/ but not /-ək/. From the point of view of our present investigation the two groups can be treated as one large group: protective codas. Late in the derivation, when major-stress assignment has already taken place, they assign an automatic [+stress] feature to the vowel, thereby protecting it from reduction.

I list protective codas in (10). They have exceptions, especially because extreme frequency of a word or morpheme favours reduction even before a protective coda, as in *subscríbe* /ə/, *extraórdinary* /ɪkˈstrɔːdɲri/, whereas infrequent words remain unreduced even before a nonprotective coda, as in *pathos*.) Not listed are those consonants or clusters that do not occur word-finally (such as /nf/), because they all belong to the group of (weakly) protective codas. Weakly protective codas are shown in brackets.

(10) **Protective Codas**

Noncoronal	(k,) ɡ	(f,) v	mp	lp, lb	ft	sp
			mf	lk		
			nk, ng			
Coronal		ð		(ls)		
Palatal	ʧ, ʤ	ʃ, ʒ	nʧ	lʧ, lʤ		

They are the noncoronal obstruents /p b k ɡ f v/, the postalveolars /ʃ ʒ ʧ ʤ/, and the noncoronal clusters /ks kt mp ng [=ŋ]/ (*cf.* Gimson 1989 : 251ff.).

In group (9c) the impossibility of reduction is motivated by the coda. I call this "motivated nonreduction", of which group (c), and of course (c′) also, are examples. The focus syllables in these words (*inferior, etc.*) are

not marked for stress underlyingly, but receive a [+str] feature from the protective coda during the derivation.

2.3.2 Word-initial vowels

Even one generation ago, the change of schwa to /ɪ/ was blocked in word-initial position, thus *immense* had no alternant with schwa, and thus would have had to be classed as stable /ɪ/. Today, however, schwa is gaining ground here, too. LDCE has schwa as a second option, accepted within RP, for most words given with initial non-major-stressed /ɪ/ followed by a nonprotective coda, *e.g. immense, event, estate.* It is worth noting that if an initial /ɪ/ is immediately preceded by a word-final consonant, as in *that event,* even conservative speakers would use /ə/. This is an interesting point, since it provides further evidence that the alternations of weak nuclei with each other are not simply to be treated as problems of lexical phoneme composition but largely as post-lexical rules.

2.3.3 Unmotivated nonreduction

Group (9d), on the other hand, has /ɪ/ in positions where both full nuclei (9d′) and reduced nuclei (9d″) occur. Nothing seems to motivate the distinction between (9d–d′) on the one hand and (9d″) on the other. Since reduction would be possible in (9d–d′), yet does not take place, we must speak of "unmotivated nonreduction". I say that *illícit, etc.* are like *obese, etc.* and not like *align, etc.* The highlighted syllables of (9d–d′) are nonreduced because their vowel is somehow marked to resist reduction. The way to achieve this is to specify them underlyingly for partial stress.

      I claim, then, that all vowels that might reduce — because they do not bear major stress, and are not followed by a protective coda — but fail to do so, as in *outrage, pathos, obese, illicit,* are lexically marked for partial stress.

2.4 Unstable /ɪ/

By "unstable" /ɪ/ I mean a non-major-stressed /ɪ/ which has a free variant realization with schwa (or its derivatives), *e.g. harvest* /ɪ/ ∼ /ə/, *kitchen* /ɪ/ ∼ /ə/ ∼ /n̩/. Now, it is a general property of non-major-stressed /ɪ/ that before a consonant it is "laxable" (to schwa), whereas in other positions it is "tensable", *i.e.* it alternates with /i(ː)/ or /j/, both articulated with the tongue in a fronter and higher position than /ɪ/. I present this in (11), where "Vfu" stands for any full vowel other than /ɪ/ (as above) and "Vre" stands for any reduced vowel:

(11) **Non-major-stressed, freely alternating /ɪ/**

Unstable /ɪ/	Tensable /ɪ/		
a. __C	b. __#	c. __Vfu	d. __Vre
/ɪ/ ∼ /ə/	/ɪ/ ∼ /iː/	/ɪ/ ∼ /iː/	/ɪ/ ∼ /j/
befóre	háppy	theátrical	prévious
háppily	mélody	váriátion	háppier
bárgain	táxi	expériéntial	mánia
(mad)-ness[10]	-ity	infúriàte	lénient
(odd)-ity	apóstrophe	pérmeàte	collégiate
imménse	the	rádiò	cárdiológical

Recall that non-alternating /ɪ/ (*pocket, tonic*) is regarded as stable /ɪ/, which is (at least partially) stressed.

The four cases in (11) are in complementary distribution, depending on the right-hand environment: consonant, word boundary, full vowel, reduced vowel. These — on the surface at least — may be regarded as allophones of one single element: /ɪ/. However, in non-preconsonantal positions ((11b–d)) the realizations overlap with other segments (namely /iː/, /j/), and are probably better derived from /iː/ than from /ɪ/. This will be briefly discussed in **2.5.** Our central concern, however, is (11a), which is a curious case of free variation, apparently within the reduced or unstressed category. Referring back to (6), the question is this: are the two pronunciations of *harvest* both within the "Unstressed" column (analogous to *ago, pocket*) or is there a stress difference between them (analogous to *àctivity ↔ ago*)?

In (11a) /ɪ/ freely alternates with schwa: this only happens in preconsonantal position, since schwa is only permitted preconsonantally. LDCE 1978 captures this alternation by using a composite symbol (/$_ə^I$/); CoBuild uses superscript numbers "to indicate the range of likely variation" (1987:xii), thus /ɪ^1/ for the (11a) type. Wells (1990), like EPD, prefers to list the alternants separately — this is misleading from a phonological point of view because it suggests "phoneme" alternations like, say, in *either*, but it gives the author a possibility to rank the alternants, which is important in a pronunciation dictionary.

Remember that alternations of the (11a) type are only possible if the /ɪ/ is not protected by anything: all "protective" factors would assign late stress to it, since this is exactly how they exercise their protective power. Such protective factors include heavy codas (*ìnferior, verdìct, àctivity*), lexically prescribed (*i.e.* unmotivated) partial-stress (*illícit, póckèt, óutràge*), and possibly also initial and final position for "high" vowels (*irónic, rábbì*). When, however, no such protective factors apply, the underlying /ɪ/, like

all vowels, becomes a target for reduction to schwa. Consider *respíratory* /ɪ/ ~ *réspiràtor* /ə/, where the /ɪ/ reduces to /ə/ when the syllable becomes unstressed. Everything seems to follow the general rules: *pockèt* is like *outràge, respirator* is like *manage.*

The examples in (11a), however, may or may not reduce without apparent reason, *e.g. hárvest* /ɪ/ ~ /ə/). I call these nuclei "unstable /ɪ/". One could say here reduction is not obligatory, but this would be hard to motivate, and would weaken the simplicity and strength of the Reduction rule (1). It seems better to say that it is the stresslessness which is optional: all non-major-stressed unprotected /ɪ/'s either reduce as any unstressed vowel (*harvest* /ɪ/ → [ə]), or, after stress-assignment rules have operated, allow for the optional stressing of /ɪ/, which of course bleeds Reduction (*hárvest* /ɪ/ → *hárvèst* [ɪ]). I call this rule Optional /ɪ/-Stressing, as given in (12).

(12) **Optional /ɪ/-Stressing (Unstable /ɪ/ before consonants)**

    ɪ   →   [+str]   / __C   optionally and late

This rule must apply after major stress assignment since otherwise it would attract the main stress of *immense* on to the first syllable by making it stressed (and thus main-stressable). On the other hand, it must apply before Reduction, to save these /ɪ/'s from being turned into schwa. To take an example: when *validation* is realized with /ɪ/, its surface appearance is analogous to *exploitation,* whose middle syllable is protected from reduction (probably because /ɔɪ/ is not a real diphthong in English but a VC sequence, and /jt/ counts as a heavy coda); with *validation* this protection is Optional /ɪ/-Stressing. When *validation* is realized with schwa, its surface appearance is analogous to *explanation,* whose middle syllable has no protection and thus undergoes reduction.

(13)

unstressed reduced V		**partially-str full V**		**reason for nonreduction**
éxplanátion	/ə/	—		—
—		éxplòitátion	/ɔɪ/	*coda protection?*
—		súffixátion	/ɪ/	*coda protection*
válidátion	/ə/	válìdátion	/ɪ/	*optional /ɪ/-stressing*

The standard view is that /ɪ/ and /ə/ contrast in unstressed syllables (Giegerich 1992:69), and minimal pairs such as *Lenin* ~ *Lennon, torches* ~ *tortures, Sophie* ~ *sofa* are adduced to support this. None of these is conclusive, however. *Lenin,* has a stable /ɪ/ and can therefore be regarded

as underlyingly partially-stressed, whereas *Lennon* does not; the two words are thus not a proper minimal pair.[11] In *tortures* the underlying /r/ must be recognized even in a non-rhotic dialect like RP (because it satisfies the Alternation Condition, *cf. torturing*), and thus the difference is ascribable to the presence of the /r/ which centralizes (if you like, reduces) the preceding vowel, as it does in Pre-R Breaking (*beer*). Generally speaking, an /r/ has a centralizing and therefore reducing effect on a preceding vowel: when the /r/ is in the rhyme of an unstressed syllable, the reduction to schwa is obligatory (historically through "Pre-R Broadening", which centralized vowels in this position), *e.g. information, confirmation, dissertation, expurgation;* when the /r/ is in the onset of the next syllable (or ambisyllabic), the reduction is still generally obligatory but has, for syllables with /ɪ/, an optional partially-stressed result /ɪ/ produced by rule (12), *e.g. aspiration.*[12] This is analogous to the mechanism that saves vowels like *ca rrot* from undergoing R-influence. Compare *aspiration* (1. /ə/, 2. /ɪ/) with *application,* where Wells (1990) gives the reverse: /ɪ/ as the main and /ə/ as the subsidiary variant. (See data in Table III.)

2.4.1   The posttonic–intertonic location

As an example for type (11a), Table III lists words with posttonic–intertonic syllables before the ending *-átion,* as in *inclinátion.* Their location is post-tonic, since they are rhythmically part of the foot constructed upon the preceding major-stressed syllable. They are in a typically weak metrical lo-cation (a "trough"), being flanked by two major-stresses; they are a target for the reduction to schwa. Note that the phrasal example in the preceding section, *that event,* also has the highlighted syllable in intertonic position. At the same time, this is not a Syllabic Sonorant Desyllabification site, for the location is not "descending" (because the next syllable is stressed). Therefore nonsyllabic "C" is not given as a column in this table.

2.5   Non-preconsonantal (tensable) /ɪ/

2.5.1   /ɪ/ finally or before a full vowel

In (11b) and in (11c) /ɪ/ alternates with /iː/. In these cases the /ɪ/ is word-final (11b) or is followed by a full (*i.e.* stressed) vowel (11c). I abbreviate this environment as "final/pre-full". The alternation is labelled "*happy*-tensing" by Wells (1982 : 257), and "Stem-final Tensing" by Halle & Mohanan (1985 : 59). Final /ɪ/ is odd in the system of English vowels, since in final position vowels tend to be either long (if stressed) or reduced (if unstressed).

I have claimed that an /ɪ/ that does not alternate with schwa must be stressed; and certainly final /ɪ/ does not alternate with schwa. Actually, *sofa* ↔ *Sophie* looks like a minimal pair. Now, if we consider final /ɪ/ stressed then we abandon the final-length rule; but if it is unstressed, then it ought to become schwa, at least optionally.

Final/pre-full /ɪ/ is in free variation with /iː/. Let us suppose that underlying /ɪ/ may optionally become /iː/ here. Note that the Reduction rule as given in (1) does not apply.

(14) **Final/pre-full /ɪ/-tensing**

$$\begin{matrix} \text{ɪ} \\ [-\text{str}] \end{matrix} \quad \rightarrow \quad \text{iː} \quad \Big/ \quad \_\!\_ \left\{ \begin{matrix} \# \\ \left[\begin{matrix} +\text{str} \\ \text{V} \end{matrix} \right] \end{matrix} \right\} \qquad \text{optionally}$$

This brings *happy* in line with *menu, Hebrew, window, potato,* and is analogous to the Tensing Rule in *SPE* (52), which in 1968 would have been inappropriate for British RP as far as *vary, country* are concerned, but present-day RP is developing (or has developed?) in the direction of tensing final /ɪ/'s. To represent this alternation, most modern handbooks use the symbol /i/, thus Roach 1983, LDCE 1987, CoBuild 1987, Kreidler 1989, Wells 1990. Some claim that there is a separate phonetic entity [i] in these environments, but there is no need in phonology to recognize it. The /iː/ in such cases, being unstressed, is automatically shortened phonetically (especially so in prevocalic position). Its shortness follows from the general realization rules of English (partially-stressed vowels are shortened, witness the /juː/ in *value, education, duét* or the /əʊ/ in *window, poetic*), and does not need to be taken care of at this level.

Wells points out that "the opposition between /iː/ and /ɪ/ is in effect suspended [*i.e.* neutralized] in weak [*i.e.* unstressed] syllables" (1982 : 166). This means that we could analyse surface /ɪ/ in the given contexts as deriving from underlying /iː/, in which case rule (14) would be reversed as (15), *i.e.* underlying /hæpiː/ would optionally be realizable as [hæpɪ].

(15) **Final/pre-full /ɪ/-laxing I**

$$\text{iː} \quad \rightarrow \quad \text{ɪ} \quad \Big/ \quad \_\!\_ \left\{ \begin{matrix} \# \\ \left[\begin{matrix} +\text{str} \\ \text{V} \end{matrix} \right] \end{matrix} \right\} \qquad \text{optionally}$$

At first sight the rule looks convincing, and would free us from having to suppose contrast (*i.e.* /ɪ/ ↔ /ə/) within the set of reduced vowels, rather than considering them each other's allophones or at worst free variants: but it has the flaw of over-generating: it will (optionally) change the final /iː/

of pedigree into /ɪ/, which is not possible. Therefore we must insist that the final vowel of *happy, Sophie* is actually unstressed, and rewrite (15) accordingly as (16), adding the reference to /iː/'s unstressedness:

(16) **Final/pre-full /ɪ/-laxing II**

$$\begin{matrix} \text{iː} \\ [-\text{str}] \end{matrix} \quad \rightarrow \quad \text{ɪ} \quad / \quad \underline{} \left\{ \begin{matrix} \# \\ \left[\begin{matrix} +\text{str} \\ \text{V} \end{matrix} \right] \end{matrix} \right\} \quad \text{optionally}$$

Before a full vowel, as in *rádiátion, rádiò,* this /iː/ may optionally undergo what Wells (1982) calls Smoothing, *i.e.* lowering and laxing of /iː/ to /ɪ/, which is exactly what (16) now says: *happy* /i(ː)/ ~ /ɪ/, *radio* /i(ː)/ ~ /ɪ/.

2.5.2　/ɪ/ before a reduced vowel

In (11d) /ɪ/ alternates with /j/ in the environment of a following reduced vowel. In such cases its [+syllabic] feature may change to [−syllabic], or—to put it in terms of non-linear phonology—the Nucleus node may be deleted and the "melody" of the /ɪ/ attached to the next nucleus as an on-glide. This is the constellation that Jones (1956) refers to as "rising diphthongs", *i.e.* vocalic strings constituting one nucleus whose second element is the syllabic rather than the first. We may unofficially call this the "half-syllabic *i*", since it easily switches from vowel to glide, toggling, as it were, between the plus and minus values of syllabicity. In some words — after a short vowel plus /n/ or /l/ — the desyllabification has become historically established and dictionaries only give /j/, *e.g. Italian, stallion, Spaniard, onion* (all exclusively /j/ in Wells 1990).

When the stressing of the vowel following the unstable /ɪ/ changes from unstressed (type (11d)) to stressed (type (11c)), as in *rádiant — rádiátion,* the unstable /ɪ/ is affected: a /j/ realization is no longer possible (*cf.* Glide Vocalization in *SPE* 208), and rule (16) becomes active. This suggests that even before a reduced vowel the underlying segment is /iː/, whose height is in full agreement with that of /j/, and only the [syllabic] feature changes:

(17) **Pre-reduced /ɪ/-gliding**

$$\text{iː} \quad \rightarrow \quad \left[\begin{matrix} -\text{syl} \\ -\text{long} \end{matrix} \right] \quad / \quad \underline{} \left[\begin{matrix} -\text{str} \\ \text{V} \end{matrix} \right]$$

To conclude: non-preconsonantal "unstable" /ɪ/ (*happy, radiation, radiant*) is a realization of underlying unstressed /iː/, shortened and laxed

("smoothed") optionally in certain styles (*e.g.* conservative RP); as such, it is a full vowel like those in *men**u*** and *potat**o**,* and as such, stressed. It is not a reduced vowel like the /ɪ/ in *barg**ai**n.*

2.6 /ɪ/ as a reduction result?

One problem remains to be mentioned. In certain words a full vowel (usually /e/) of a partially-stressed syllable optionally alternates with /ɪ/ (as in *álphabet* /e/ ∼ /ɪ/), making /ɪ/ look like a possible result of optional reduction. But we defined "stability" as inability to alternate with schwa or the other elements listed in **2.4** and *alphabet* does not alternate with any of those.[13] Our framework suggests that the /e/ ∼ /ɪ/ alternation of syllables like *alphabet* or *embezzle* is an instance of full ∼ full alternation. It is certainly hard to explain, given the overall stability of full vowels, why /ɪ/ should so readily alternate with another full vowel. To take up the terminology of the CoBuild 1987 dictionary: alternations normally happen when a vowel is "unprotected" (*scil.* from reduction), *i.e.* alternations are normally reductions. CoBuild's list of unprotected vowels and their reduction results (1987 : xii) contains nine pairs of full vowel alternating with schwa, four pairs of full vowel alternating with /ɪ/, and one pair of /uː/ ∼ /ʊ/ alternation. This suggests that full vowels do not alternate with each other, only with /ə/, /ɪ/ and /ʊ/,[14] consequently these three vowels act as reduction results (*cf.* the triangular system discussed in **1.2**).

      The number of words in which some vowel alternates with /ɪ/ is not small, but practically limited to /e/ and /aɪ/. The alternation /aɪ/ ∼ /ɪ/ can be treated as an instance of "idle" Vowel Shift (*i.e. vitamin* /aɪ/ ∼ /ɪ/ like *patriot* /eɪ/ ∼ /æ/). As for /e/ ∼ /ɪ/, I would rather say that certain words exhibit full ∼ full phoneme alternations than make our definition of partial-stress circular, since how could we then know which /ɪ/-syllables are partially-stressed and which are unstressed?

2.7 Conclusion

We have defined what we regard as "unstable" /ɪ/ — a preconsonantal /ɪ/ that freely alternates with /ə/ (and its derivatives), as in *harvest, kitchen* (**2.4**). Such syllables have underlying /ɪ/, not marked lexically for stress: as unstressed syllables they normally reduce to /ə/, while their /ɪ/ alternant is produced by a late rule, idiosyncratic for RP, which I call "Optional /ɪ/-Stressing". This rule must work just before Reduction, bleeding it of inputs with unstressed /ɪ/.

Non-preconsonantal /ɪ/, on the other hand, is probably not an underlying /ɪ/ but the surface shortening and laxing of unstressed underlying /iː/, as in *happy, radiant* (**2.5**). Reduction does not apply to such /iː/'s since they are not preconsonantal or nonhigh.

"Stable" /ɪ/ does not alternate with /ə/, as in *pocket, illicit, verdict* (**2.3**). It must be preconsonantal; it is identical in behaviour to other full, *i.e.* nonreduced nuclei, either protected by a coda as in *compàct,* or marked lexically for partial stress as in *outràge.*

Table I: Syllabic consonant formation and sonorant desyllabification

●: main or only variant
○: less frequent

	ɪC	əC	C̦	C
Intertonic				
divi**n**ation	●	○		
ordi**n**ation	●	○	○	
muti**l**ation	●	○	○	
cance**ll**ation	○	●	○	
insta**ll**ation		●		
bot**an**ist		●	○	
gene**r**ality		●		
chape**r**one		●		
cat**er**ing		●		
sep**ar**ate (v)		●		
oblit**er**ate		●		
cate**g**orize		●		
buf**f**alo		○	●	
hed**on**ist		○	●	
Descending				
par**all**el		●	○	○
cam**er**a		●	○	○
bak**er**y		●	○	○
het**er**o		●	○	○
illit**er**ate		○	●	○
sep**ar**ate (adj)		○	●	○
gen**er**al		○	●	○
fam**il**y	○	○	○	●

Table II: Candidates for weak /ʊ/

/u/ symbolizes "the neutralization of /uː–ʊ/"
●: main or only variant
○: less frequent
≈: non-RP

	ə	(j)ʊ	(j)u	(j)uː
to**d**ay	●			
fort**u**nate	●			
sat**u**ration	●	○		
inaug**u**ration	●		○	
fort**u**ne	●			○
stim**u**lus	○	●		
reg**u**lar	○	●		
Port**u**gal	○	●		
dep**u**ty	○	●		
cons**u**late	○	●		
em**u**lation	○		●	
arg**u**ment	○		●	
stim**u**late	○		●	
occ**u**py	○		●	
ed**u**cation	≈		●	
val**ue**			●	
s**u**perior			●	
ard**u**ous			●	
unite			●	○
J**u**ly	○		●	○
mod**u**le				●
aven**ue**				●

Table III: Intertonic syllables before -/C*ation*

Vfu: any full vowel (except /ɪ/), incl. Wells's
    /i/ and /u/ (phonemically /iː/ and /uː/)
  ●: main or only variant
  ○: less frequent

	Vfu	ɪ	ə	C̩
__CV				
Before /r/				
saturation	○		●	
inauguration	○		●	
aspiration		○	●	
operation			●	
veneration			●	
preparation			●	
decoration			●	
expectoration			●	
Before other sonorant				
emulation	●		○	
inclination		●	○	
depilation		●	○	
intonation	○		●	
consummation	○		●	
cancellation		○	●	○
concatenation		○	●	○
installation			●	
consolation			●	
Before obstruent				
dilatation	●		○	
education	●			
instigation		●	○	
constipation		●	○	
fornication		●	○	
elevation		●	○	
deprivation		●	○	
derivation		●	○	
deprecation		○	●	
depredation		○	●	
interrogation			●	
aggravation			●	

Table III [continued]

	Vfu	ɪ	ə	S̩
__CC (light, unprotective)				
contestation	●			
execration		●	○	
denigration*		●	○	
registration		●	○	
celebration		○	●	
__CC (heavy, protective)				
Before /rC/				
usurpation	●			
incarnation	●			
exhortation	●			
perturbation	●		○	
confirmation			●	
reservation			●	
information			●	
Before other protective coda				
incantation	●			
expectation	●			
eructation**	●			
inundation	●		○	
obfuscation	●		○	
adaptation	●		○	
infiltration		●		○
consultation	○			●

  * also /diːnaɪ-/
** also /erʌ-, erə-/

NOTES

* This paper is a revised version of two chapters of the author's PhD dissertation, *Unstressed and Partially-Stressed Syllables in English Words*, Budapest, 1993.

[1] The full *vs.* reduced distinction is the major distinction between the nucleus types of English (and not, as the classics thought, the monophthong *vs.* diphthong or the short *vs.* long distinction).

[2] Gimson uses "reduction" in a different sense, to describe Pre-Fortis Shortening/Clipping. For our "reduction" he uses "obscuration" (1989 : 318), which is otherwise not a recognized category in his framework (nor does it appear in his *Index*).

[3] "Gradation" is rarely encountered in the British descriptive literature. Roach uses it in a narrower sense: "The process of change in phoneme realisations produced by changing the speed and casualness of speech is sometimes called gradation" (1983 : 108).

[4] The reduction result /oʊ/ → [o] is mentioned by Jones, too (1956 : 249). The vowel /oʊ/, however, has developed into /əʊ/ by now and thus the reduction result is not distinguishable from other schwas.

[5] Traditionally taken to be so in all languages; though Kaye *et al.* (1985) claim that it is a somewhat higher central vowel, [ɨ].

[6] Halle & Mohanan speak of "the vowel [uw]" and "its unstressed reduced reflex" (1985 : 89). Since their examples are words like *argue, tenuous, value*, the term "reduced" cannot refer to a schwa-like product (as in our terminology) but rather to shortness due to stresslessness.

[7] *Today* is only given as /ə/ in LPD, LDCE, or OALD, and only EPD 1988 gives /ʊ/ (as a less frequent alternative), though /ə/ in *educate* is still labelled as non-RP.

[8] These are somewhat like quasi-regular patterns of irregular past tense formation: *sing : sang : : drink : drank, etc.*

[9] I continue to use Wells's LPD as source of data, both for main *vs.* less frequent forms and for RP *vs.* non-RP labelling.

[10] "In singing, a strong-vowelled form /nes/ is customary" (LPD).

[11] Durand (1990 : 113) also says that the English /ə/–/ɪ/ alternation is not an instance of /ə/–full vowel alternation.

[12] The spelling always has *i* in these cases.

[13] /-bət/ is given in LPD as an educated but non-RP form.

[14] Alternation with zero is also listed in CoBuild, but we consider that a variety of schwa (except for real Syncope, see **1.3**).

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CoBuild see Sinclair.

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EPD see Gimson 1988.

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LDCE see Procter 1978, 1987.

LPD see Wells 1990.

OALD see Hornby 1985.

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