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THE PEDAGOGICAL IMPLICATIONS OF VARIABILITY IN TRANSCRIPTION: THE CASE OF [i] AND [u]

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ABSTRACT

The problem of variability in transcription is raised in this paper through the analysis of the two sounds [i] and [u] in English, which appear in pronunciation dictionaries. The distribution for these sounds is not clear, the dictionaries often give different transcriptions and the literature does not help us with rules concerning the apparition of these sounds.

This paper shows that from the study of the distribution of [i] and [u] and of the variants that are given in the two reference pronunciation dictionaries (the Cambridge English Pronunciation Dictionary, 17th ed. and the Longman Pronunciation Dictionary, 3rd ed.) rules can be drawn. We show that as Wells mentions in LPD3 (2008, p. 892), there are “implications for syllabification [...] and for rhythm”. Morphology is also dealt with since the question of prefixes for example is a determining factor in the pronunciation of initial unstressed syllables. This study sheds light on many obscure details and contributes to the field of teaching English pronunciation because rules are given that enable the teacher and the student to understand the distribution of [i] and [u] and the different variants associated with them.

Keywords: transcription, unstressed high vowels, syllabification, rhythm, variability.

Introduction

When teaching transcription or pronunciation to learners of English, teachers sometimes have to answer difficult questions and may look to pronunciation dictionaries for answers. The aim of this paper is to describe the distribution of [i] and [u], both tense and short vowels as opposed to tense long /i:/ and /u:/ and to lax short /ɪ/ and /ʊ/. This is a difficult subject for students because they never know when these sounds should be pronounced and used in transcription. Our study was based on different transcriptions of these two sounds in two reference pronunciation dictionaries: Jones (2006), edited by Roach and colleagues, which will be referred to as CEPD17 (Cambridge English Pronunciation Dictionary, 17th edition) and Wells (2008) which will be referred to as LPD3 (Longman Pronunciation Dictionary, 3rd edition).

This paper presents the theoretical background to the problem and analyses the different positions in which [i] and [u] appear in dictionary transcriptions. It then discusses the pedagogical issues raised and scope for future research.

In 1962, Gimson mentioned that “/ɪ/ is increasingly replaced in the speech of younger generations by a short variety of /i:/” (p. 105). Wells (1982) was the first to discuss the ‘happy vowel’. He observes that “there is an increasing tendency throughout the English-speaking world to use a closer quality [i(:)], and for speakers to feel intuitively that *happy* belongs with FLEECE rather than with KIT.” (p. 294). In an article entitled “*Happy Land Reconnoitred*”, Windsor Lewis (1990) also mentions the tensing of final /ɪ/. ‘Happy-tensing’ is now a well-known phenomenon and several acoustic studies confirmed the tensing of final /ɪ/ in certain dialects of British English including the standard variety of English (Fabricius, 2002; Harrington, 2006; Lee, 2009). However, tensing applies not only in final position. It also affects /ʊ/, as mentioned in the two pronunciation dictionaries and in Roach (2000).

What the authors agree about is that [i] and [u] are found in weak syllables only. Roach (2000, p. 84) explains that

2 vowels are commonly found in weak syllables, one close front (in the general region of /i:/ and /ɪ/) and the other close back rounded (in the general region of /u:/ and /ʊ/. In strong syllables it is comparatively easy to distinguish /i:/ from /ɪ/ and /u:/ from /ʊ/, but in weak syllables the difference is not so clear.

The second point of agreement is that [i] and [u] are not phonemes, but phones: Roach (2000, p. 84) says that in certain contexts, “there is really no possibility [...] of a phonemic contrast between /i:/ and /ɪ/ or between /u:/ and /ʊ/”. In other words, when the phonemic contrast cannot be maintained, the symbols [i] and [u] are used (CEPD17, p. xiv). In his text

box entitled “Neutralization”, Wells explains that [i] and [u] are used to represent the neutralization of the opposition between /i:/ and /ɪ/ and /u:/ and /ʊ/ respectively: “One type of neutralization is symbolized explicitly in LPD3 by the use of the symbols i and u” (LPD3, p. 539). Although these are phones and we are therefore in the field of phonetics and not phonology, slashes and not brackets shall be used here for simplicity, in keeping with Roach (the editor of CEPD17) and Wells (in LPD3).

If /i/ and /u/ neutralize these oppositions, the question arises of why there are two pronunciations for *ecumenism* (/ɪ'kju:mənɪzəm/ and /i:'kju:mənɪzəm/). Wells provides a clue: “[...] some speakers use ɪ, some i:, some use something intermediate or indeterminate, and some fluctuate between the two possibilities. Modern pronunciation dictionaries use the symbol i, which reflects this” (LPD3, p. 539). Therefore, when the two symbols /i:/ and /ɪ/ are given, it probably means that there is no fluctuation and we hear either /i:/ or /ɪ/ and not something in between. However, this is not entirely clear.

This problem with the transcription of *ecumenism* is recurrent. Not only do entries for many words have the two variants /ɪ/ and /i:/, there is also a noticeable difference between the two dictionaries, where transcriptions vary a good deal for /i/ and /u/. For this reason, I have decided to try and find some order in this, hoping to be able to establish some rules or to at least identify constants which would help us to understand more precisely when /i/ and /u/ should be used in transcription. Although Roach and Wells do mention these symbols in the introductions of the two dictionaries, they do not give rules enabling the student or the teacher of phonetics to know exactly when /i/ and /u/ should be transcribed, and therefore when an intermediate or indeterminate vowel in between /ɪ/ and /i:/ and /ʊ/ and /u:/ should be pronounced. The literature is rather poor on this subject and apart from the acoustic studies mentioned above, no study to our knowledge deals with the exact distribution of /i/ and /u/.

Different environments

Using the CD ROMs from the two pronunciation dictionaries, I did a search according to the different environments in which /i/ and /u/ are said to appear. They are supposed to appear in the same environments and /u/ in certain other contexts: “u is found not only in i environments, but also in certain others, for example, in one pronunciation of *stimulate* 'stɪmjulət'” (Wells, LPD3, p. 539).

Final position

For /i/, all the authors agree on the ‘happy-tensing’ as in *valley* /'væli/ or *happy* /'hæpi/. Roach (CEPD17 §2.9, p. xiv) also mentions that:

word-final /u:/ and /i:/ are possible both with stress (*grandee, bamboo*) and without stress (*Hindi, argue*) although in the unstressed case it is often not possible to draw a clear line between /i:/ and /i/, or between /u:/ and /u/.

Contrary to ‘happY-tensing’, this constitutes a shortening of the final vowel.

A search through the database confirms that for /u/, all the words ending with -ue, -ew, -u, or unstressed -oo are pronounced /u:/: *Andrew, avenue, cuckoo, curfew, guru, Hebrew, issue, impromptu, jujitsu, Lulu, menu, nephew, rescue, residue, sinew, statue, tissue, venue, virtue, Zulu*. Although Wells says that /u/ appears in the same environments as /i/, the final position does not seem to conform to this. Final /u/ seems to appear only in unstressed grammatical words where we find the two variants /u/ and /ə/: *you, into, to...*

As for /i/, a consensus exists on ‘happY-tensing’ *i.e.* at the end of words. However, this does not always occur when word-final/i/ is unstressed, eg. *Hindi*, for which CEPD17 and LPD3 give the two variants /i/ and /i:/. This word seems to be the only one apart from words spelt with final non stressed -ee (exceptions therefore)¹. For these final non stressed -ee words, the two dictionaries do not give the two variants; the endings are pronounced either /i/ or /i:/. The choice seems to depend on rhythm, on the accentual pattern of the word:

- /i:/ is found when the word is stressed on the antepenultimate syllable (stress pattern /100/)²: *‘pedigree, cor’roboree, ‘jubilee, ‘apogee.*
- /i/ is found when the stress is on the penultimate syllable of the word (stress pattern /10/): *‘coffee, ‘toffee, com’mittee, ‘levee, ‘yankee.*

Windsor Lewis (blog) mentions rhythmic contrast as a possible influence.

To conclude concerning final unstressed position, for the region of i the neutralized vowel /i/ is assigned except in words ending with unstressed -ee showing a /100/ stress pattern. For u, tense long /u:/ is heard in lexical words, the neutralized vowel /u/ is only assigned to grammatical words.

Medial position

Whereas ‘happY-tensing’ is an acknowledged phenomenon in modern English, the tensing of non-final unstressed vowels has not attracted the attention of theoretical practitioners. Following the same method as for final vowels, I searched the two dictionaries for /i/ and /u/ in medial position.

1 Exceptions because -ee is an accented ending so words ending with -ee are normally stressed on the final syllable.

2 1 represents primary stress and 0 zero stress (2 represents secondary stress).

Compounds & prevocalic position

At the end of part of a compound word /i/ is used, as in *bodyguard* /'bɒdɪgɑ:d/ for instance. This is logical since the first part of the compound undergoes 'happY-tensing'. This is not the case for /u/, as it does not appear in final position in lexical words. In an unstressed prevocalic position, /i/ and /u/ are also always assigned, for example: *piano* /pi'ænəʊ/, *geography* /dʒi'ɒgrəfi/, *influenza* /,ɪnflu'enzə/, *graduation* /,grædju'eɪʃn/. This leads to the problem of -ion type endings, since in these endings, the first vowel is in an unstressed prevocalic position.

-ion type endings

Roach (2000, p.85) explains that "the suffixes spelt 'iate', 'ious' when they have two syllables, eg. *appreciate*, *hilarious*" will be pronounced with /iərt/ and /iəs/. Wells (2008) also gives the examples of *graduation* /,grædju'eɪʃn/ and *glorious* /'glɔ:riəs/. These are words with -ion type endings³. Roach refers to the number of syllables, which seems to be a very important aspect; -ion type endings are considered as monosyllabic endings in most pedagogical books. When students are taught that -ion type endings are stress-imposing endings, they learn that the stress in such words bears on the syllable preceding the ending, and the stress pattern is /10/. This means that the ending counts as only one syllable. However, Roach attributes two syllables to -ious, to take one example.

Therefore, a useful analysis could be made of the transcriptions of -ion type endings in the two dictionaries. If the sounds /i/ or /u/ occur, it means they are disyllabic endings and the rules thus have to be revised. In CEPD17, /i/ and /u/ are found, for example, in *scorpion* /'skɔ:piən/ or *beauteous* /'bjʊ:tiəs/, *acrimonious* /,ækrɪ'məʊniəs/, *cardiac* /'kɑ:diæk/, *cordial* /'kɔ:diəl/, *habitual* /hə'bitʃuəl/, etc... (CEPD17). These examples show that -ion type endings are disyllabic endings, /i/ and /u/ counting as one syllable. The stress pattern should be /100/ and the first vowel of the ending is transcribed /i/ or /u/ since it is placed before another vowel (prevocalic position). However, we need to distinguish between the phonological and the phonetic level. Although -ion type endings are disyllabic on a phonological level, they are not always disyllabic phonetically. The words above are transcribed in LPD3 with the symbol [ɹ], indicating a possible compression: *acrimonious* /,ækrɪ'məʊniəs/, *habitual* /hə'bitʃuəl/ for example. This means that *acrimonious* is pronounced [,ækrɪ'məʊniəs] and is transcribed /,ækrɪ'məʊniəs/, *habitual* is pronounced [hə'bitʃwəl]

3 These words include endings in {i,e,u}V(C) (where V represents a vowel and C a consonant), such as -ia, -iac, -ial, -ian, -iate, -iel, -ient, -io, -iod, -ion, -ious, -ium, -ius, -eal, -ean, -eon, -eous, -ual, -uar, -uate, -uence, -uous, etc...

and transcribed /hə'brɪfju əl/. The phenomenon of synaeresis takes place: two adjacent unstressed vowels are pronounced as one (cf. Fournier, 2010, p. 186). In the case of –ion type endings, the first vowel of the ending (/i/ or /u/) is transformed into the corresponding semi-vowel (/j/ or /w/).

In some words like *action* /'æksɪn/, *courageous* /kə'reɪdʒəs/, *precious* /'preʃəs/, *crucial* /'kru:ʃəl/, *Belgium* /'beldʒəm/, and words with two variants like *acacia* /ə'keɪʃə/-/ə'keɪsɪə/, *amnesia* /əm'ni:ziə/-/əm'ni:zə/, *consortium* /kən'sɔ:tiəm/-/kən'sɔ:ʃəm/, a second step takes place. This step is exemplified in the first variant above for the words which have two variants. The second step consists in an assimilation and more precisely a palatalisation. For example, /s/ + /j/ becomes /ʃ/ as in *acacia* /ə'keɪʃə/, *action* /'æksɪn/, *precious* /'preʃəs/ or /z/ + /j/ becomes /ʒ/, as in *amnesia* /əm'ni:zə/, *courageous* /kə'reɪdʒəs/ or *Belgium* /'beldʒəm/. In such cases, the –ion type ending is pronounced as one syllable, and is therefore monosyllabic. However, this is due to the assimilation which is a consequence of syllable compression, i.e. phonetic phenomena. A syllable compression is the total reduction of a syllable. It occurs alongside palatalisations, as in the cases mentioned here, but also in words like *history* or *evening* which are pronounced with two syllables /'hɪstri/ /'i:vniŋ/. This is why the phonetic and the phonological levels have to be distinguished. It is interesting to note that some words only have one variant, the compressed pronunciation. They may be very common words and it may be a question of frequency, but these are only hypotheses.

Adding a suffix

Adding a suffix to a word ending with /i/ or /u:/ is another problematical issue, especially in the region of u. When a suffix beginning with a vowel is added to /i/, then /i/ is in medial prevocalic position, so there is no change: *happier* /'hæpiə/, *easiest* /'i:ziəst/, *carrying* /'kæriŋ/. However, when u is in final position, we find tense long /u:/ and not tense short /u/. Logically, with the adding of a vowel-initial suffix, /u:/ is in a prevocalic position, and should therefore be transformed into neutralized /u/ (shortening of the tense long vowel). This is not always the case:

- when a short ending is added, /u:/ remains: *mildewy* /'mɪldju:i/, *sinewy* /'sɪnju:i/, *interviewer* /'ɪntəvju:ə/, *issuer* /'ɪʃu:ə/.
- and when a longer ending is added, such as -ary, -ance or -able, then neutralized /u/ appears: *statuary* /'stætjuəri/, *issuance* /'ɪʃjuəns/, *issuable* /'ɪʃjuəbl/.

This does not seem to be linked to the number of syllables, because -able is considered monosyllabic, as is -ance. However, they are longer than

-y or -er, which are phonetically composed of one vowel only, and this may be the reason why they trigger a shortening of /u:/ into /u/.

If a suffix beginning with a consonant is added, Windsor Lewis explains that “unlike the suffixes -less, -ness, etc., the ending -ly when added to happy-type words in GB only permits their final -y to be schwa /ə/ or the SIT vowel /ɪ/” (blog). Consequently, if a consonant-initial suffix is added, lax /ʊ/ should occur as it is no longer final or prevocalic. As far as u is concerned, in the two dictionaries only one word exhibits this: *argument*. Logically, CEPD17 gives /ʊ/ or /ə/, but LPD3 gives /u/ or /ə/. This is one of the “certain other contexts” like *stimulate* mentioned by Wells (LPD 3, p. 539) which will be discussed in the next section of this paper. For examples with final tense /i/, the results are very confusing. Different transcriptions are found with the different endings:

LPD: /i/ + -hood⁴, -ment⁵, -ness⁶, -wise⁷

/ɪ/-/ə/ + -ful⁸, -less⁹, -ly¹⁰

EPD: /i/ + -hood, -less, -wise

/ɪ/ + -ful, -ness, -ment

/ɪ/-/ə/ + -ly, -ful (*beautiful* and *bountiful*)

Therefore, the two dictionaries only agree on the transcriptions with -ly (/ɪ/) and -hood (/i/). This confirms Windsor Lewis’s statement about -ly, but not about the other endings.

Before a consonant

Medial position before a consonant in the middle of a word with no particular ending added was also analysed: /i/ never appears before a consonant, and /u/ never appears in CEPD17 but it does appear in LPD3. These are the “certain other contexts like *stimulate*” indicated by Wells (2008, p. 539). Therefore, I tried to define the contexts in which /u/ appears in LPD3, because at first sight it is very complex. Many different variants were found:

4 *Hardihood, likelihood, livelihood.*

5 Such words as: *accompaniment, embodiment, merriment.*

6 Up to 727 words in this category: *airiness, breathiness, cleanliness, happiness, sugariness, etc...*

7 Only one word: *contrariwise.*

8 *Beautiful, bountiful, dutiful, fanciful, merciful, pitiful, plentiful, unmerciful.*

9 *Merciless, penniless, pitiless.*

10 Up to 451 words such as *arbitrarily, momentarily, necessarily, etc...*

- /u/-/ə/ LPD3 (CEPD17: /ʊ/-/ə/): *stimulate* /'stɪmjuleɪt/ /'stɪmjələɪt/, *tuberculosis* /tju,bɜ:kju'ləʊsɪs/ /tju,bɜ:kjə'ləʊsɪs/, *accumulation* /ə,kju:mju'leɪʃn/ /ə,kju:mjə'leɪʃn/
- /ʊ/-/ə/ LPD3 & CEPD17: *contributive* /kən'trɪbjʊtɪv/ /kən'trɪbjətɪv/, *accuracy* /'ækjʊrəsi/ /'ækjərəsi/, *ridiculous* /rɪ'dɪkjʊləs/ /rɪ'dɪkjələs/
- /ʊ/ LPD3 (CEPD17: /ʊ/-/ə/): *acidulous* /ə'sɪdʒʊləs/, *tributary* /'trɪbjʊtəri¹¹/
- /u:/ LPD3 & CEPD17: *prosecutor* /'prɒsɪkjʊ:tə/, *absolutism* /'æbsəlu:tɪzəm/, *executable* /'eksɪkjʊ:təbl/
- /u/-/ʊ/ LPD3 (CEPD17: /ʊ/-/ə/): *postulate* (vb) /'pɒstjuleɪt/ /'pɒstʃuleɪt/

For CEPD17, things are quite clear. /u/ is never found in medial position, it is either /ʊ/-/ə/ or /u:/ and this also holds for the same words in LPD. Nonetheless, LPD3 seems to follow a much more precise logic. Series of words deriving from the same base were examined: words like *ac'cumulable* /ʊ/-/ə/, *ac'cumulate* /u/-/ə/, *ac'cumulative* /ʊ/-/ə/, *ac,cumu'lation* /u/-/ə/, *ac'cumulator* /u/-/ə/ or *a'cidula* /ʊ/-/ə/, *a'cidulate* /u/-/ə/, *a'cidulous* /ʊ/-/ə/. Words in -ate help us understand this logic : verbs in -ate are pronounced with the diphthong /eɪ/, whereas in nouns, -ate is reduced and pronounced /ət/ or /ɪt/. LPD3 proposes *'conjugate* (adj, noun) /ʊ/-/ə/, *'conjugate* (vb) /u/-/ə/, *ar'ticulate* (adj) /ʊ/-/ə/ and *ar'ticulate* (vb) /u/-/ə/. In verbs, u is pronounced with tense short /u/, but with lax /ʊ/ in nouns. This means that rhythm plays an important role: the pronunciation of u depends on the reduction of the following vowel. Other examples follow the same pattern: *tu'bercular*, *tu'berculin*, *tu'berculous* /ʊ/-/ə/ (u is followed by a reduced vowel), *tu,bercu'losis* /u/-/ə/ (the vowel o afterwards is not reduced); *'tumulus* /ʊ/-/ə/ (the vowel following unstressed u is reduced to schwa), *'tumuli* /u/-/ə/ (the vowel following unstressed u is a diphthong).

Therefore, when u is in medial position and followed by a stressed syllable or a diphthong, it is pronounced /u/ or /ə/ as in *'adulate* (vb) /'ædjuleɪt/, *,acu'puncture* /,ækju'pʌŋktʃə/, and when it is followed by a weak syllable, it is reduced to /ʊ/ or /ə/, as in *e'masculate* (adj) /ɪ'mæskjʊlət/, *'accuracy* /'ækjʊrəsi/, *a'cidulous* /ə'sɪdʒʊləs¹².

11 symbol ʊ indicates possible syllable compression.

12 It is to be noted that *argument* is an exception to this rule since u in this word is transcribed in LPD3 with /u/ and is followed by a weak syllable. This may be due to the morphology (adding of a suffix).

/u:/ in medial position?

The problem of /u:/ in medial position is still an enigma, for example /u:/ in words like *prosecutor* /'prɒsɪkjʊ:tə/, *prosecutorial* /,prɒsɪkjʊ:'tɔ:riəl/, *absolutism* /'æbsəlu:tɪzəm/, *executable* /'eksɪkjʊ:təbl/, *acoustician* /,ækʊ:'stɪʃn/. Our initial hypothesis was that this was due to derivation, because all these words derive from words with /u:/: *prosecute* /'prɒsɪkjʊ:t/, *absolute* /'æbsəlu:t/, *execute* /'eksɪkjʊ:t/, *acoustics* /ə'kʊ:stɪks/. However, a few similar words are pronounced with /ʊ/-/ə/: *executive* /ɪ'gzekjʊtɪv/ /ɪ'gzekjətɪv/, *distributor* /dɪ'strɪbjʊtə/ /dɪ'strɪbjətə/. The word *constitutive* sheds light on the issue, as it has two variants where rhythm is a determining factor: /kən'stɪtjʊtɪv/ with stress pattern /100/ and /'kɒnstɪtjʊ:tɪv/ when stress pattern /1000/. If /u:/ is preceded by an unstressed syllable, /u:/ seems to occur, as in /'kɒnstɪtjʊ:tɪv/ with a /1000/ stress pattern or *prosecutorial* /,prɒsɪkjʊ:'tɔ:riəl/. If a stressed syllable precedes, /ʊ/ or /ə/ are found, as in /kən'stɪtjʊtɪv/ with a /100/ stress pattern. The tense long pronunciation /u:/ seems to play a rhythmic role, easing the pronunciation if there are several unstressed syllables in a row.

Initial Syllables

Initial position is the most complex and this part of our study is still in progress. Even though no clear-cut systemic pattern can be distinguished at this stage of the investigation, a few conclusions can be drawn.

/i/ in initial syllables

As far as /i/ is concerned, Roach (2000, p. 85) talks about the prefixes re-, pre-, de-, when followed by a vowel, claiming that we can find /i/ “in a prefix such as those spelt ‘re’, ‘pre’, ‘de’ if it precedes a vowel and is unstressed, eg *react*, *preoccupied*, *deactivate*.” This is the medial prevocalic position. In CEPD17, when these prefixes are followed by a consonant, /ɪ/ is assigned. CEPD17 only gives the neutralized vowel /i/ in initial position in one word: *Ebonics*. However, we were unable to identify any shared features across the many variants given in CEPD17: most words can be pronounced with either /ɪ/ or /ə/.

In LPD, the prefixes be-, de-, pre- and re- are transcribed with /i/, as explained in the introduction of the dictionary: “Entries for words containing be-, de-, e-, pre-, re-, and se- (also rede-, unre- etc.) have been simplified. When unstressed, these prefixes are now shown with i. This reflects the fact that, like words ending in i, such as *happy*, they may be pronounced indifferently with ɪ or i:.” (LPD3, p.xiii). Therefore, /i/ is used in *decipher*, *begin*, *prefer*, *repair* for example, but also in words beginning with be- or de- where be- and de- do not seem to be prefixes, as in *December*, *begonia* or *benevolence* for

instance. As for the prefix *se-*, it is not transcribed /i/ in LPD3 but /ɪ/ or /ə/, nor are other prefixes such as *em-*, *en-* or *di-* (also pronounced /daɪ/). When there is no prefix, /i/ is only found in LPD3 in “*begonia* type” words (those words beginning with *be-* or *de-* but which are not prefixed). In these, there are many variants and derivation may be a key factor:

- /ɪ/ or /ə/ occur when there is no obvious derivation: *civility*, *velocity*, *vivacity*,
- /ɪ/, /e/ or /ə/ occur in *melodious*, probably because it is derived from *melody* with /e/,
- /ɪ/ or /i:/ occur in *velaric* or *venality* because they are derived from words with /i:/, respectively *velar* and *venal*.
- only /ɪ/ with no variant is given for *viscosity* for example, probably because closed syllables are typical laxing contexts.

To conclude, there are no shared features for words beginning with *e-*, neither in CEPD17 nor in LPD3. All the combinations of variants were found for these words:

EPD: /ɪ,i:/ /ɪ,i,e/ /ɪ/ /i:/ /ɪ,i,ə/ /i:,e/ /ɪ,ə,e/ /ɪ,e/ /ɪ,ə,e,i:/

LPD: /i,ə/ /ɪ,ə/ /i/ /ɪ,i:/ /ɪ,i,ə/ /i,ə,i:/ /ɪ,ə,e/ /ɪ,ə,e,i:/

Words in *eff-* seem to be transcribed /i,ə,e/ in LPD3, except *effect* and derived words and *efficient*, *efficiency*. Words in *er-* seem to be pronounced /ɪ,ə/ (*erupt*, *eradicate*, *erase*, *erotic*, *erode*). These conclusions are far from satisfactory. The roles of morphology and of rhythm merit further investigation.

Initial /u/

It is difficult to draw conclusions for initial /u/. In CEPD17, /u/ is only found in one word: *cupidity*. In all other words /u:/ is used, except for a few words where the two variants /u:/-/ʊ/ are given: words in *tu-* (12 words *tubercular* and derived forms, *tumescant*, *tumidity*, *tumultuous*, *Tunisia*, *tutorial*), in *su-* (8 words: *Sudan*, *sudanic*, *superfluous*, *superior*, *superlative*, *supremacy*, *supreme*)¹³, words in *ru-* (3 words: *rubato*, *rubeola*, *rubidium*)¹⁴ and *bulimia*, *dubiety*, *museum*, *pubescence*. In LPD, there are more variants: most words are pronounced with /u/, although 5 words are pronounced with /u/ or /ə/ : *bulimia* and *tubercular* and derived forms and 6 words are pronounced with /u:/ or /u/ (*humane*, *municipality*, *museum*, *supreme*, *unite* and *unique*). The words in *lu-* (except proper nouns) and 5 other words

13 *sudarium* is pronounced with /u:/ only.

14 *rubella* is pronounced with /u:/ only.

are pronounced /u:/ with no variant: *lubricious, lubricity, lucidity, lunation, nutation, numismatic, putrescence, putridity, ufology*.

Conclusion

The distribution of the three pronunciation variants is very complicated. Full understanding of the behaviour of English high vowels is not possible without taking into account an impressive range of parameters: syllabification, rhythm, derivation, morphology. Much research remains to be done. Nevertheless, this study contributes to the description of present-day English pronunciation for pedagogical purposes. First, this study shows that -ion type endings are phonologically 2-syllable endings. Secondly, /i/ and /u/ are very different. They are both found in unstressed positions but they do not appear in the same environments at all, except for the prevocalic position. Therefore, if a phonetics teacher has to explain the environments in which these two neutralized vowels appear, they can explain that:

- /i/ appears word-finally ('happy-tensing') except in words in -ee with a stress pattern /100/;
- final tense /i/ followed by -hood remains the same vowel. In other cases, /ɪ/ is the best transcription;
- in the prefixes be-, re-, pre- and de-, /i/ also appears. In all other cases, students should transcribe /ɪ/ or /ə/.
- /u/ is found in final position only in grammatical words. Otherwise, /u:/ is pronounced.
- /u/ is also found word-medially when it replaces final /u:/ followed by a long ending.
- /u/ is also the right transcription when u is followed by a stressed syllable or a diphthong and not derived from a word in /u:/.
- /u/ is found in the initial syllable in most words.

Many questions remain unanswered. Initial position should be investigated further, as should prefixes. Cases where /u/ should be pronounced or transcribed in initial position still remain unclear. Nonetheless, pronunciation dictionaries are precious tools. The inclusion of these pronunciation variants in dictionaries has pedagogical interest because, instead of neutralizing the opposition between /i:/ and /ɪ/ and /u:/ and /ʊ/, they seem to introduce a new type of contrast. This issue deserves further scrutiny, and perception and acoustic studies might be useful to this end.

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