

## **Considering Dynamic Non-Segmental Phonetics**

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### **Abstract**

This presentation aims to explore some possibility of non-segmental phonetics usually ignored in phonetics education.

In pedagogical phonetics, especially ESL/EFL oriented phonetics speech sounds tend to be classified in two criteria 1) 'pronunciation' which deals with segments and 2) 'prosody' or 'suprasegmentals', a criterion that deals with non-segmental elements such as stress and intonation. However, speech involves more dynamic processing. It is non-linear and multi-dimensional in spite of the linear sequence of symbols in phonetic/phonological transcriptions. No word is without pitch or voice quality apart from segmental characteristics whether it is spoken in isolation or cut out from continuous speech. This simply tells the dichotomy of pronunciation and prosody is merely a useful convention. There exists some room to consider dynamic non-segmental phonetics.

Examples of non-segmental phonetic investigation, some of the analyses conducted within the frame of Firthian Prosodic Analysis, especially of the relation between vowel variants and foot types, are examined and we see what kind of auditory phonetic training is required to understand impressionistic transcriptions which lie behind the non-segmental phonetics.

### 1. Advocating non-segmental phonetics for segments.

It is well known that speech is nonlinear and multidimensional in spite of its written representation as in phonetic/phonological transcription. However, linguistic analyses of vowel variations are conducted maximally by paying attention to surrounding segments. However, Local (1990) argues that rhythmic quantity characteristics have relevance with the quality of final open-syllable vowels in disyllabic words such as 'city' in urban Tyneside speech. He reports there are twelve 'recurrent qualities discernible within' the region in question (1990:24). The final open-syllable vowel is referred to as 'happY' vowel hereafter.

The investigation by Local (1990), to the best of my knowledge, may not be as consistent as other variationists such as Hughes and Trudgill (1996). Hughes and Trudgill (1996:43) for instance, write:

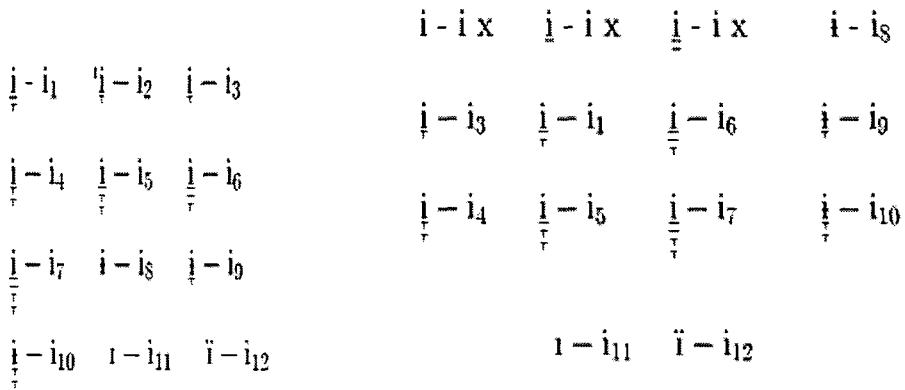
There is growing tendency for the final vowel in words like *city* and *pity* to have a vowel rather more like /i:/ than the traditional /ɪ/. Thus /sɪti:/ rather than the older /sɪtɪ/.

Wells (1982: 294) details happY vowel variations in RP from the viewpoints of social class differences.

If rhythmic quantity characteristics play an important role in vowel variations, there, in due course, exists some room to consider dynamic non-segmental phonetics.

### 2. Interpretation of Local (1990)

Local (1990) recognises twelve 'recurrent qualities discernible within' the region expected to be heard in happY vowels spoken by seven speakers on careful listening. These qualities or variants are schematised for clarification as shown in Figure 1 with slight modification of symbols. (Diacritics for 'open(er) variety' in the original was similar to the one for 'lips more spread.' It was replaced with the symbol admitted in the Handbook of the International Phonetic Association. )



&lt;Figure 1&gt;

&lt;Figure 2&gt;

Figure two is a rearranged figure of the Figure 1 in accordance with vowel quadrilateral. An X stands for zero occurrences. And  $i_2$  is not included. The figures are generated with the use of the TIPA font with pLaTeX2e system, which was originally developed for UNIX but now works on Windows 98 including the Japanese version.

These variants are not realised as free variations. Local reports their distributions are different in two (Type A: short-long and Type B: equal-equal) of the three foot-types (Types A, B and C: long-short), excluding Type C since it carries word boundary foot internally, exemplified by Abercrombie (1965:26-34) and the structure of foot. Because each foot consists of a strong syllable and a weak syllable, the vowel in question is an exponent of a weak syllable.

Local (1990) reports that there are the following 'typical prepausal qualities' for the happy vowels (using superscript  $^y$  as a generalised representation for clear or 'front' resonance,  $^o$  for central resonance and  $^w$  for central-to-back or back resonance. Layout is slightly altered.)

Words with short-long quantities:

C V $^y$ CV	$i_1$	e.g. silly
CV $^o$ CV	$i_7$	city

CV <sup>w</sup> CV	i <sub>10 11 12</sub>	very
Words with equal-equal quantities:		
C V <sup>y</sup> CV	i <sub>3</sub>	e.g. tiny
CV <sup>o</sup> CV	i <sub>1</sub>	lumpy
CV <sup>w</sup> CV	i <sub>8</sub>	nervy

The results of Local (1990) may not be explained in terms of simple phonemic theory in that they do not pay attention to foot types and resonance types. Simple phonemic theory groups these variants into one phoneme /i/, which itself is problematic.

### 3. The difference between phonemic oriented phonetics and polysystemic (=non-segmental) oriented phonetics.

It is naively believed without critical judgement that a researcher can carry out phonetic observation without analysis. The fact is, on the contrary, as depicted by Nakagawa (1996: 92) that accidental phonemic 'gap' of one language in the fieldwork can only be filled in through careful examination of the phonemic inventory of the language even though the transcription was thought to have been detailed enough when initially conducted.

In the case of happy vowel in English, the functions of these variations are equally the same in phonemic analysis. And the treatments of the phonic variations of happy vowel are the same as that of stressed syllables. However this may lead to unnecessarily confusions when the sounds which is labelled as schwa 'ə' and 'ɪ' are taken into consideration.

#### 3-1. Case of vowel /ə/ ('schwa')

The schwa is recognised as one of the phonetic realisations, if I use the concept of Generative Phonology, of full vowels in unaccented syllables. As Gimson and Cruttenden (1994: 116) write, '/ɜ:/ usually occurs in accented syllables and /ə/ in unaccented syllables', this implies the two vowels are of the same phoneme. There are, however, several words

which contain /ɜ:/ 'in unaccented syllable' which 'is not reducible to /ə/, e.g. in 'commerce' /'kɒmɜ:s/ ... and foreword /'fɔ:wɜ:d/ and 'expert /'ekspɜ:t/ mentioned to me by Professor M. Taniguchi (personal communication). (Note that slants (/ /) are used to entail broad phonetic representations and the transcription of the word 'commerce' was amended) This simply tells that simple dichotomy between reduced vowel and full vowel does not fully explain the situation. We also have to bear in mind that 'its acoustic formants of /ə/ are ... likely to be similar to those for /ɜ:/ and /ʌ/ according to the situation' (Gimson and Cruttenden (1994: 117)). Then, we can schematise the situation in the following way.

/ɜ:/ as an accented full vowel	turn, stir, etc
/ɜ:/ as an unaccented full vowel	com <u>mer</u> ce, fore <u>wo</u> rd, etc
/ʌ/ as an accented full vowel	but, come, etc
/ə/ as an unaccented <u>reduced vowel in weak syllable</u> of citation form	sofa <u>a</u> bout, etc
/ə/ as an unaccented <u>full vowel in weak foot</u> of citation form	the (book), etc
/ə/ as an unaccented <u>reduced vowel in weak foot</u> of connected speech	(smart) but (casual), (See) you, etc

Because our auditory properties for vowels are sensitive to differences of differences of formant, we can say metaphorically that we listen to formants but not listen to tongue movements. Then, what Gimson and Cruttenden (1994:117) may suggest is that listening to merely vowels without considering non-segmental properties of the syllables may not provide sufficient results.:

### 3-2. Case of happY vowel and /ɪ/

As we saw, /ə/ can occur in various positions of unaccented syllables. The conditions of happY vowel and /ɪ/ are complexed as well. Hughes and Trudgill (1996:43) write, 'There is growing tendency for the final vowel in words like *city* and *pity* to have a vowel rather more

like /i:/ than the traditional /ɪ/. Thus /sɪti:/ rather than the older /sɪtɪ/.’ However, since acoustic quality of /i:/ in connected speech is different from that of citation form in that formant frequencies of citation form is ‘more peripheral than the vowels from connected speech’ (Deterding 1997), it is well estimated that acoustic quality of /i:/ in happy vowel position is different from stressed syllables even if we pay attention to the fact /i:/ may be realised as more or less a shorter /ɪ/. Thus we may formulate the relations between happy vowel and /ɪ/ in the following way.

/ɪ/ as an accented full vowel	sit, hid, hit, etc
/i/ as an unaccented vowel in a weak syllable	simplistic, etc
/ɪ/ as an unaccented vowel in a weak syllable	body, city, etc
/i:/ as an accented full vowel	heal, head, etc
/i:/ as an unaccented vowel in a weak syllable	body, city, etc
/ɪ/ as an unaccented vowel in a weak syllable	body, city, etc

### 3-3. Necessity of polysystemic approach

Since differences between vowels in weak (or unaccented) positions in CVCV structure, that is, disyllabic words, do not make contrast, it is very likely that the differences which may be important from other phonological systems may be ignored or may not be identified at all.

It may be rather a contradiction that acoustically identical or similar vocoids are regarded as different phonemes but the same phonemes can be realised as different vowels. In short a simple phonemic theory allows over-lapping of realisations.

If we consider a polysystemic approach, over-lapping of realisations might not be necessary to be taken into consideration.

	Two Syllabic Word		One Syllabic Word	One Syllabic Word
	Foot		Foot	Foot
Syllables	S	W	S (W)	(S) W
	bod	y	seed	the (book)
	comm	erce	turn	
	sof	a	come	
			see	
	i: i ɪ / ɜ: / ə		i: / ɜ: / ə	ə

As we saw in section two, if other non-segmental aspects such as resonance of preceding units are considered, distribution of the variants ( i: i ɪ / ɜ: / ə) become clear. As a consequence, a polysystemic approach is better adopted to avoid unnecessary confusion.

#### 4. Importance of training of auditory impressionistic listening and transcription

Because the auditory impressionistic observation cannot be carried out without analysis, we have to have a certain theory to be supported. More strictly speaking, any observation is preoccupied with some aims which themselves are pre-conceptualised. If we are subconsciously preoccupied by the concept of a simple phonemic theory, we cannot evaluate the results of Local (1990). We have two fold techniques available to evaluate the results: 1) acoustic experimentation with sound spectrograph and 2) auditory impressionistic analysis based on acute auditory impressionistic observation using the same or similar sampled data.

I think almost every phonetician trained in British school agrees with me in that machines do not transcribe speech but humans can. Sound spectrography is employed to provide scientific traceable findings. However, simply using sound spectrographic data do not give us any insightful results if not supported by massive experimental sources. Fujino (1998) reports that foot types and vowel variations are not correlated with limited sampled data from the newscast of the BBC World Service. There may be a difference of style or register

between Local (1990) and Fujino (1998) regardless of accent difference but it is largely due to limitations on samples by Fujino (1998). In order to show the results characteristically with experimental data, the amount of data are necessarily larger than that of auditory impressionistic analysis. For this reason, it is best desirable, at an initial stage of the research, for a researcher to employ auditory impressionistic observation. However, phonemic oriented or based observation may not prevail significantly different variations found in Local (1990).

Phonetic training covering pronunciation and prosodic aspects may be conducted in phonetic classes, especially ESL/EFL oriented phonetics in Japan aiming at oral communication. However, it seems that few realises the view that practical phonetic training is also critical when providing training for evaluation of other's research.

Thus, we need a general phonetic training utilising the cardinal vowel systems with great care that may free us from language specific factors. This type of training is also desirable when we think about peer evaluation of analysis by researchers of other schools or approaches.

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#### NOTE

To know how to use TIPA with pLaTeX2e system on Japanese version of Windows 98, please visit the relevant page of my webpage:

<http://www.geocities.co.jp/CollegeLife-Labo/9551/pLaTeXintro-jp.html>.