



THE STUDY OF THE DISTINCTIVE FEATURES OF SOUNDS IN ENGLISH: A TOOL BASED APPROACH

M.Somathasan¹ and V.Thiruvalluvan²

¹Assistant Lecturer in English, Advanced Technological Institute, Trincomalee, Sri Lanka.

²Professor and Director of CAS in Linguistics, Annamali University, Tamilnadu, India.

ABSTRACT

The purpose of this paper is to test the knowledge in distinctive or phonetic features or properties of English phonemes found in the first year students of Higher National Diploma in English (two and half year course) at Advanced Technological Institute at Trincomalee, Sri Lanka; and further make them become familiar in the distinctive features of the sounds in English as *Introduction to Phonology* is one of the subjects in their course. Phonetic features are very helpful to identify and compare the sounds of English. Further, these features are essential for phonological analysis. It is not sure to expect all the students in the class to excel the ability to find out the phonetic features of the sounds correctly, because they are not familiar with phonology as it is not introduced in school curriculum; and the students who follow the course of HND in English, meet the subject first time in the class. Thus, most of them are struggling in identifying these features except one or two naturally intelligent ones. Having considered this concept in mind, we have developed a simple student-friendly learning supporting tool named as *Distinctive Feature Finder (DFE)* based on feature matrix in order to help these students be successful in their subject and the course, as well.

KEY WORDS: phonetic features, English sounds, Phonology, curriculum, learning tool

INTRODUCTION:

Phonology is the study of the sound system of a language. Thus, English phonology is the study of the 44 sounds in English, i.e. 24 consonants and 20 vowels out of which 12 are pure vowels and 8 are diphthongs. All these sounds are also known as *phonemes*. A phoneme can be thought of as a “bundle” or set of “phonetic distinctive features” – Bloomfield (1933). In turn, each distinctive feature can be thought of as a basic building block of the phoneme and this feature or trait that distinguishes one phoneme



from another. For instance, in English, /p/ can be phonemically distinguished from /b/ by the single feature called *voicing*: /b/ is voiced and /p/ is not. In English, changing a /p/ for a /b/ in a minimal pair is distinctive; for example, pin /pɪn/ vs. bin /bɪn/, it changes the meaning. The difference between *pin* and *bin* is “signaled” by the fact that the initial sound of the first word is /p/ and the initial sound of the second word is /b/. Thus, a student learning English subconsciously uses the basis of voicing to distinguish the sounds, /p/ which is voiceless and /b/, voiced. While considering the phoneme /p/, not only the fact that it is voiceless, but can it also be thought of as resulting from some other traits. Therefore, the student subconsciously learns to contrast all the phonemes in a number of ways. /p/ is a consonant as opposed to a vowel; it is oral and not nasal; it is a stop and not a fricative, and so on. Therefore, /p/ is the

sum of all its features. It is clear that aspiration is not a distinctive feature in English. For instance, the contrast in aspiration (allophonic variation) between [p] and [p^h] does not bring the meaning-change. Hence, it should be noted that the distinctive features distinguish between different phonemes, not allophones of the same phoneme.

DISTINCTIVE FEATURES:

As stated above, a distinctive feature or property can be thought of as a basic building block of a phoneme and it is helpful to distinguish one phoneme from another. Each feature can have one of two values, plus (+) and minus (-), so for each speech sound, the segment either has the property [+] or lacks the property [-]. There are two major works on distinctive feature approach. One is by Roman Jakobson and Morris Halle (1956) and the other is by Noam Chomsky and Morris Halle (1968). The Jakobson and Halle approach was primarily on the acoustic features of sounds (which could be detected on a spectrogram) like *grave vs. acute* whereas Chomsky and Halle paid attention on the phonetic realizations of the underlying features, i.e. articulatory features of sounds like *voicing*. Some other linguists worked on the auditory features of the sounds, as well. Though different linguists use different lists of features like acoustic and/or auditory, the most commonly used lists are based on articulatory features of sound such as *tense*. For this paper, we have followed Chomsky and Halle (1968) and concentrated on some generally accepted articulatory distinctive features of vowels and consonants in English.

CONSONANTAL FEATURES:

There are 24 consonant phonemes in English. Consonants are the sounds made by a closure or narrowing in the vocal tract so that the airflow is either completely blocked, or so restricted that audible friction is produced. Consonants are conveniently described by three criteria: place of articulation, manner of articulation, and the mode of vibration of the vocal folds, i.e. *voicing*. Thus, the consonant /p/ is labelled as *voiceless bilabial stop*. The distinctive features of consonants taken for this paper are described as follows:

VOICING:

It is an articulatory feature because it involves the movement of the vocal cords in the production of a sound. Voicing while considered as a single feature, can be thought of in two values: *voiced*, i.e. the presence of this feature and *voiceless*, the absence of it. The presence of this feature is signified by plus (+) and its absence, by minus (-). Therefore, /b/ is [+voiced] and /p/ is [-voiced]. Further, we could have called this feature "voiceless" and specified /b/ as [-voiceless] and /p/ as [+voiceless].

CONTINUANTS:

A sound is said to be [-continuant] if it involves a full closure in the oral cavity of the vocal tract. Thus, stops such as /p/, /t/, and /k/; and affricates like /tʃ/ and /dʒ/ are [-continuant]. Further, nasals like /m/, /n/, and /ŋ/ also involve a complete oral closure and are, thus, [-continuant]. Fricatives, liquids (/l/ and /r/), glides (/j/, and /w/), and laryngeal (/h/) do not have a complete oral closure and are classified as [+continuant].

NASALITY:

The presence or absence of nasality can similarly be designated as [+nasal] or [-nasal]. Thus, /n/ is [+nasal] and /k/ or /g/, being [-nasal]. It is, here, noted that a [-nasal] sound is equivalent to an oral sound like /k/ and /g/.

OBSTRUENTS:

Obstruents are the sounds which are produced in the oral and pharyngeal cavities that are articulated with enough constriction to cause a buildup of pressure. They include stops (/p/, /b/, /t/, /d/, /k/, and /g/), fricatives (/f/, /v/, /θ/, /ð/, /s/, /z/, /ʃ/, and /ʒ/), and affricates (/tʃ/ and /dʒ/).

SONORANTS:

Sonorants are frictionless continuants. All other sounds except obstruents are called sonorants. They are intermediate between obstruents and vowel sounds. Sonorants include the nasals (/m/, /n/, and /ŋ/), liquids (/l/ and /r/), glides (/j/, and /w/), and laryngeal (/h/) sounds. The sonority hierarchy of these sounds is given below:

Glides	Liquids	Nasals	Obstruents
[+sonorant]			[-sonorant]

VOWEL FEATURES:

The vibration of the lung air caused by the vibration of the vocal folds creates the vowel sounds. The main mechanism of vowel production is vibrating vocal folds; thus, vowels are *voiced* in English. Although vowels can be divided into oral vowels and nasalized vowels; in English, vowels are almost always *oral*. A vowel is labelled by three factors which are tongue height (high, mid, and low), tongue advancement (front, central, and back), and lip position (rounded or unrounded). Thus, the vowel /i:/ is labelled as a *high front unrounded vowel*.

HEIGHT:

Depending on the height of the tongue, English vowels can be classified into high (/i:/, /ɪ/, /u:/, /ʊ/, /iə/, /ʊə/), mid (/e/, /ə/, /ɜ:/, /ɔ:/, /eɪ/, /əʊ/, /ɔɪ/, /eə/), and low (/æ/, /ʌ/, /ɑ:/, /ɒ/, /aɪ/, /aʊ/). Thus, /i:/ is represented as [+high] and /æ/ as [-high]; otherwise /i:/ can be shown as [-low] and the vowel /æ/ as [+low].

FRONT, CENTRAL, BACK:

In the production of vowels in English, the advancement of tongue causes three way feature distinction. They are front (/i:/, /ɪ/, /e/, /æ/, /eɪ/, /iə/, /eə/), central (/ə/, /ɜ:/, /ʌ/, /əʊ/, /aɪ/, /aʊ/), and back (/u:/, /ʊ/, /ɒ/, /ɔ:/, /ɑ:/, /ɔɪ/, /ʊə/). To capture these three way distinction of the vowels, the features [back] and [front] are mostly needed; and the following table shows the distinctions clearly.

front	central	back
[-back]		[+back]
[+front]	[-front]	

ROUNDING:

Rounding is a term used to refer to the visual appearance of the lips, i.e. lip position in the vowel production in English. There is at most a two-way phonological distinction of rounding, expressed as [+rounded] vs. [-rounded]. For instance, the phoneme /i:/ is [-rounded] and the phoneme /u:/, [+rounded]. The other unrounded vowels are /ɪ/, /e/, /æ/, /ə/, /ɜ:/, /ʌ/, /ɑ:/, /eɪ/, /əʊ/, /aɪ/, /aʊ/, /iə/, and /eə/ whereas the rounded vowels are /ʊ/, /ɒ/, /ɔ:/, /ɔɪ/, and /ʊə/.

TENSENESS:

Vowels can be divided into two categories: *tense* and *lax*, depending on the degree of tension of the tongue muscle and the degree of vocal tract constriction. Tense vowels are produced with a deliberate, accurate, and maximally distinct gesture that involves considerable muscular effort, and further with a slightly longer duration than lax vowels. Therefore, tense vowels are long vowels (/i:/, /u:/, /ɜ:/, /ɑ:/, /ɔ:/) and lax vowels like (/ɪ/, /ʊ/, /e/, /æ/, /ə/, /ʌ/, /ɔ/), show less tension and constriction, and are shorter in duration. Hence, the vowel /i:/ is [+tense] whereas the vowel /ɪ/ is [-tense]; or the vowel /i:/ is [-lax] and then /ɪ/, [+lax]. Further, all the diphthongs are tense vowels.

SYLLABIC:

Every syllable in a word may be said to have a nucleus which is its most sonorous segment, i.e. peak of sonority; and this segment is best illustrated by vowels, which have the greater carrying-power.

Segments forming the nucleus of a syllable are classified as [+syllabic], while the remaining segments in the syllables are [-syllabic]. This definition of [syllabic] is inevitable as nasals and laterals in some languages like English, Serbo-Croatian, etc, reflect the syllabic feature. For example, the last sounds of English words /n/ in *button* /bʌtn/ and /l/ in *bottle* /bɒtl/ lack the sonority of vowel, but nevertheless serve as syllable nuclei and are known as *syllabic consonants*; and counted as [+syllabic].

FEATURE MATRIX:

In phonology, a feature matrix lists sound segments along the horizontal axis, and features on the vertical axis. The cells of the matrix are then filled with pluses (+) or minuses (-) corresponding to whether a feature is available or not. This is a binary system of classification of the analysis of the distinctive features of phonemes and it is highly simple, ideal, and convenient. That is why, many linguists like Noam Chomsky, use the combination of binary distinctive features. Peter Ladefoged (1925–2006) also used the same system. According to Noam Chomsky and Halle (1968), sound contrasts are distinguished by features, especially they concentrated on the articulatory features of the sounds. Thus, a phoneme is replaced by a feature matrix, i.e. a group of features in a rectangular array of entities made up of rows and columns, and it is used as an aid in description or analysis of features of phonemes. The following is the feature matrix of English phonemes (vowels and consonants).

FEATURE MATRIX CHART

Pure Vowels:

All pure vowels are [+voiced], [+syllabic], [-consonantal], [+continuant], and [+sonorant] except for situations in which the phonetic environment may alter the usual way in which a vowel is produced.

Features	i:	ɪ	u:	ʊ	e	ə	ɜ:	æ	ʌ	ɑ:	ɒ	ɔ:
high	+	+	+	+	-	-	-	-	-	-	-	-
low	-	-	-	-	-	-	-	+	+	+	+	-
front	+	+	-	-	+	-	-	+	-	-	-	-
back	-	-	+	+	-	-	-	-	-	+	+	+
tense	+	-	+	-	-	-	+	-	-	+	-	+
rounded	-	-	+	+	-	-	-	-	-	-	+	+

Diphthongs:

All diphthongs are [+voiced], [+syllabic], [-consonantal], [+continuant], and [+sonorant].

Features	aɪ	eɪ	ɔɪ	ɪə	eə	ʊə	əʊ	aʊ
high	-	-	-	+	-	-	+	-
low	+	-	-	-	-	-	-	+
front	-	+	-	+	+	-	-	-
back	-	-	+	-	-	+	-	-
tense	+	+	+	+	+	+	+	+
rounded	-	-	+	-	-	+	-	-

Consonants:

All consonants are [-syllabic] except for /m/, /n/, /ŋ/, /l/, and /r/, which can act as syllabic consonants in some contexts.

Features	p	b	t	d	k	g	tʃ	dʒ	f	v	ə	ð	s	z	ʃ	ʒ	m	n	ŋ	l	r	j	w	h
syllabic	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
consonantal	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-	-	-
sonorant	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+
nasal	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-
voiced	-	+	-	+	-	+	-	+	-	+	-	+	-	+	-	+	+	+	+	+	+	+	+	-
continuant	-	-	-	-	-	-	-	-	+	+	+	+	+	+	+	+	-	-	-	+	+	+	+	+

METHODOLOGY:

The phonetic features or properties, known as distinctive features, are the basis of phonological systems. As mentioned above, these features are inevitable for phonological analysis. As far as the English phonology is concerned, the knowledge in distinctive features helps the students distinguish between consonants and vowels, and be familiar with the nature of sounds and their presence. The study proposed in this paper is to test the knowledge in distinctive features of English sounds among the first year students (45) of HND in English at Advanced Technological Institute in Trincomalee, Sri Lanka. To test their knowledge in the phonetic features, we develop a simple but very effective user-friendly tool named as *Distinctive Feature Finder (DFF)* by using the computer language, Visual Basic 6. In this tool, words with various length and the features of English phonemes are included. The features included in this tool are syllabic, consonantal, sonorant, nasal, voiced, continuant, high, low, front, back, tense, and rounded. When a student clicks the *Word* button in the tool, a word and its phonemic transcription will appear randomly from the word list already given. The value of all the features show the minus (-) at the initial stage. To make it plus (+), the student has to click the minus (-). Then, if he wants to make it minus (-), he has to again click the plus (+). Thus, the value (+ or -) acts as a toggle key operation. Then, the student has to look at each phoneme in the phonemic transcription of the word and find out the relevant features of it. It is the mechanism of this tool. For example, when the student gets the word, *book* (/bʊk/), it has three phonemes /b/, /ʊ/, and /k/. Now the student has to think of the features of the consonant phoneme /b/ like [- syllabic], [+ consonantal], [- sonorant], [- nasal], [+ voiced], and [- continuant]; then the features of the vowel /ʊ/ are [+ high], [- low], [- front], [+ back], [- tense], and [+ rounded]; and next the features of /k/, [- syllabic], [+ consonantal], [- sonorant], [- nasal], [- voiced], and [- continuant]. The students can check the features of phonemes by using the *Check* button in the tool whether they are right. For this task, each student was given three chances to find out the features of the given sound in the word. While analyzing the results, 12 students were blissful in their first attempt and 23 were successful in their second attempt, and 6 students used the third attempt. 4 students were struggling to find out the features, but 2 out of them were alright in the fourth and the rest 2 in fifth attempt. The following sample visual of the developed tool shows a student’s attempt in finding the features of the word, *researchers* (/rɪsɜ:tʃəz/).

Sample Visual of the Developed Tool



CONCLUSION:

The distinctive features or properties are needed to define the possible phonemes of human languages and phonological rules. In this study, 45 first year students of HND in English at Advanced Technological Institute, Trincomalee, Sri Lanka were taken to know their existing knowledge in the distinctive features of sounds in English through an effective testing tool known as Distinctive Feature Finder (DFF). The tool was developed by considering some of the articulatory distinctive features proposed by Chomsky and Halle (1968). Further, the computer language Visual Basic 6 was used to develop the tool. In testing, the students were given three chances to find out the features of the phonemes in the word. Then, the results showed that most of the students were successful in their first (12) and second (23) attempts to express their positive knowledge in phonetic features. 6 students proved their ability in the features in the third attempt and the others took the fourth (2) and fifth (2) to be successful in the testing process. Though the result was like this, all the students stated that the tool was so friendly, innovative, and effective. Further, they told that they were interested while working with the tool, and very eager to complete the task. Thus, we strongly feel that we have achieved our objective, i.e. helping the first year students of HND in English be familiar with the distinctive features of English phonemes, to great extent.

REFERENCES:

1. Ashby, P. (2005). *Speech Sounds*. 2nd ed. London and New York: Routledge.
2. Bloomfield, L. (1933). *Language*. Holt, New York.
3. Bruce M. Rowe, et al. (2016). *A Concise Introduction to Linguistics*. 4th ed. London and New York: Routledge.
4. Chomsky, N. and Halle, M. (1968). *The Sound Pattern of English*. MIT Press.
5. Gussenhoven, C and Jacobs, H. (2011). *Understanding Phonology*. 3rd ed. UK: Hodder Education.
6. Jakobson and Morris Halle (1956). *Fundamentals of Language*. The Hague: Mouton.
7. Ladefoged, Peter (1993). *A Course in Phonetics*. 3rd ed. New York: Harcourt Brace Jovanovich.
8. Ladefoged, Peter (2001). *Vowels and consonants. An introduction to the sounds of languages*. Oxford: Blackwell.
9. Shockey, Linda (2003). *Sound patterns of spoken English*. Oxford: Blackwell.



M.Somathasan

Assistant Lecturer in English, Advanced Technological Institute, Trincomalee, Sri Lanka.