The First Lecture in: Phonetics and Phonology for second year students in the English Language Department/College of Education for Women /Tikrit University

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1.0 Phonetics

Phonetics is the science and general study of the characteristics of speech and speech sounds focusing on the description of speech sounds according to their production, transference and distinctive features. The speech sounds are considered the essential unit. Phonetics provides methods for speech sounds description, classification and transcription. Kumar and Sreehari further declare that *phonetics* is derived from the Greek word *phone* that means sound or voice and refers to the systematic study of speech sounds of any language and their articulation, audition and perception .Linguistic sounds are articulated by pushing air from the lungs out through the mouth, sometimes by way of the nasal cavity. The movement of the air can then be modified by the anatomy of the mouth and throat to produce different sounds.As a system of describing and recording the sounds of language objectively, phonetics provides an important approach of opening our ears to aspects of language which we tempted to recognize by reference to their written rather than their actual spoken forms. There are three branches of phonetics; the researcher will refer to them in the following.

1.1 Articulatory Phonetics

Articulatory Phonetics "is the study of the way speech sounds are made (articulated) by the vocal organs"(Crystal, 2008).He adds that the work in phonetics can be divided into two broad kinds :(a) general studies of the production, acoustics or cognition of speech. (b) Studies of

the phonetic characteristics of specific languages which show that there is additional criterion required for studying how the sounds of a language are used within the system of pronunciation. This functional approach to Phonetics is a part of phonology.Robins indicates that from the point of view of the study of language and as a part of general linguistics, there are good reasons for prime attention being paid to articulatory phonetics. Anatomically the main parts of the body that are in charge of the production and distinction of speech sounds, the organs of speech, can be reachable easily by visual observation, either directly or by means of different sets or systems such as laryngoscopes and X-ray photography. Most of them can be described to the extent that deals with the role that they play in the process of speaking by the use of fair terms of comprehension to the non-specialist to make the speaker have an ability to control his speaking.

Furthermore, all of us have some kinaesthesis of the processes of speaking,

That means the internal process which enables the speakers to be aware of the movement and positions of their vocal organs during their speech. People feel tension or movement of their muscles, joints as well as tendons. They use their knowledge to monitor their process of speaking unconsciously. With time, this kinaesthesis can be developed by interest, practice and training .The ability to recognize and discriminate different speech sounds will be increased in articulation. Bauman-Waengler states that articulatory phonetics deals with how various speech sounds are generated. The description and classification of these speech sounds will be in terms of parameters of their actual articulation. One major kind of classification is derived from the specific structures which are used for articulating the different speech sounds. The articulators (anatomical structures) that generate speech

sounds are: the lips, alveolar ridge, lower jaw (mandible), teeth, hard palate, and velum; therefore, a classification of speech sounds is made depending on these articulators. Initial /m/ in 'moon' is produced when the two lips are closed completely.

/m/ will be classified as a bilabial sound. Speech sounds are also divided into vowels and consonants that are general groups according to another categorization related to this kind of phonetics. We will explain that later. In this sense, Odden confirms that the speech sounds will be analyzed according to the arrangement of articulators which are required to articulate a particular speech sound. He interprets that

By appropriate positioning of articulators, the shape of the vocal tract can be changed, and consequently the sound which emerges from the vocal tract can be changed (much as different sized bottles produce different tones when you blow across the top). For the purpose of studying the production of speech, the most important articulators are the lips, teeth, tongue, palate, velum, pharynx and larynx.

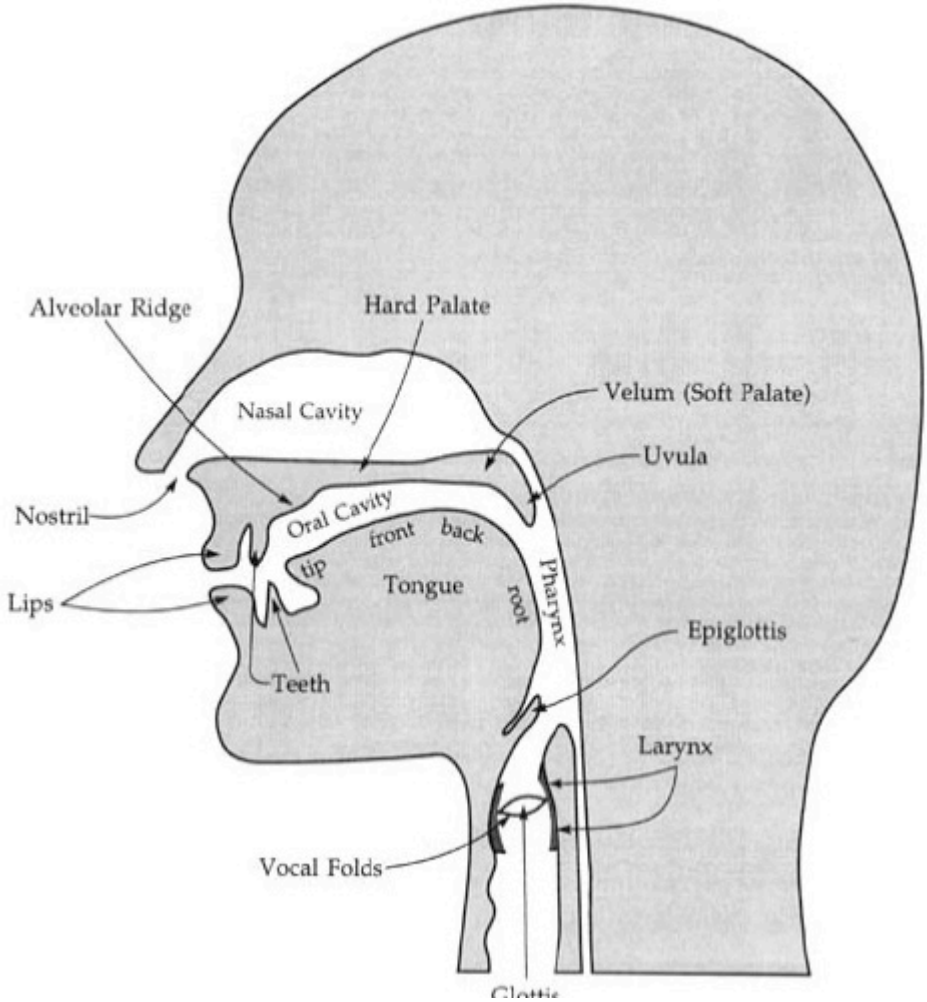


Figure (1): The vocal organs anatomy

Note that figure (1) illustrates the anatomical parameters which are most important for the production of speech studies.

The interference of the airflow plays a very important role in the speech sounds articulation. This is system is the respiratory system. The speech sounds production begins with the lungs which push the air to come out of the mouth. Air is forced out of the lungs through the vocal folds, that represent a valve which goes through a repeated cycle of blocking and

allowing air to pass from the lungs to the vocal tract. A waveform is made by this repeated movement of air. Airflow through glottis is illustrated by the following figure that shows this movement in the production of voiced sounds.

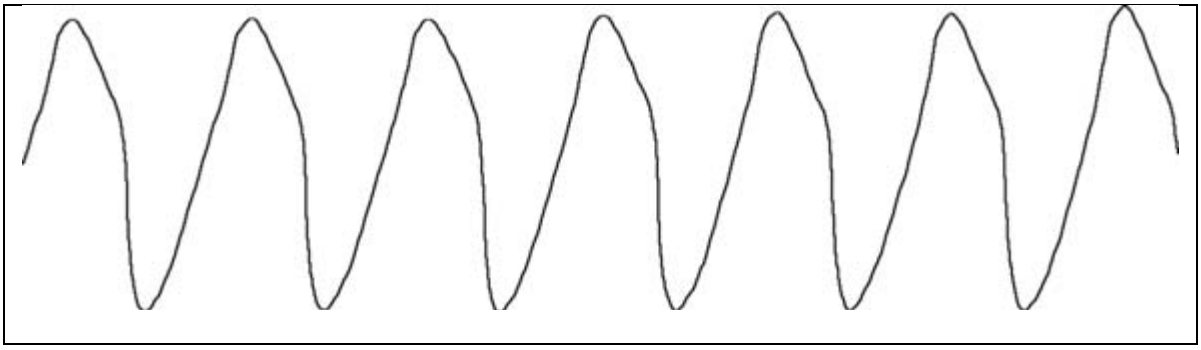


Figure (2): Airflow through glottis

Delahunty and Garvey explain that to produce speech sounds, air

has to flow from the lungs through the vocal tract, that includes the vocal folds (popularly called the vocal cords, though they are more like thick elastic bands than strings), the nose or nasal cavity, and the mouth or oral cavity (See Figure 1). The vocal folds vibrate for some sounds but not for others. Air flows through the nose for certain sounds. But the major creator of speech sounds is the mouth.

1.2 Acoustic and Auditory Phonetics

Acoustic phonetics is concerned with the physical properties of speech as sound waves in the air transmitted between mouth and ear. It is concerned with measuring and analyzing the physical properties of the

sound waves we produce when we speak. Both approaches are indispensable to an understanding of speech. Fasold and Connor-Linton considers what happens inside the mouth and how the speech sounds are produced, the only part of the process. We have to understand how the articulators turn air movements into sound, what happens to sound after it passes through the lips, how it moves through the air, and how it affects on the ears and brain(sometimes the microphones , recorders, and computers)of the listeners so as to understand how people use sound to communicate.

Auditory phonetics is the study of speech sounds from the point of view of the listener, concerned with the way the ears and brain process and perceive the speech. It is the branch of phonetics that is concerned with the perceptual response to speech sounds, sponsored by ear, auditory nerve and brain. It is not studied well since there are difficulties faced as soon as one tries to identify and measure psychological and neurological responses to speech sounds. There are well anatomical and physiological studies of the ear[3] as techniques for measurement of hearing, but a little pure research is comparatively done into the attributes of speech-sound sensation, observed as a phonetic system, and the relationship between such phonetic analyses and phonological studies remains obscure. The subject is closely related to studies of auditory perception within psycholinguistics.

Second Lecture:

2.Phonology

Phonology is a branch of linguistics, which deals with the ways in which speech sounds form systems, and patterns of languages. Phonology is concerned with the growth, the analysis and description of the phonemes of a language. It studies the speech sounds of one particular language with respect to their production, transmission and reception. Balasubramanian states, “The selection and organization of speech sounds in a particular language constitute the phonology of that language**”**. It is the study of the organization of the speech sounds units into syllables and other larger units . It is used in two ways: as the mental representation of linguistic knowledge, and as the description of this knowledge. So it refers either to the representation of the sounds and patterns of sound in a speakers mental grammar, or to the study of the sound patterns in a language or in human language generally. Phonological knowledge supports a speaker to articulate sounds which form meaningful utterances, to identify a foreign accent to build up words, to add the suitable phonetic segments to form plurals and past tenses, to produce aspirated and unaspirated voiceless stops in the suitable context, to know what is or what is not a sound in one's language, and to know that different phonetic strings may represent the same morpheme. Its aim is to explain the patterns of distinctive sound found in a language, and to make as general statements as possible about the

nature of sound systems in the languages of the world. It studies the range and function of sounds in specific languages as well as the rules that can be written to show the kinds of phonetic relationships which relate and contrast words and other linguistic units. Crystal confirms that phonology, in linguistic theories is understood in two ways(a)as a level of linguistic organization, contrasted with the levels of phonetics,(b)as a component of a generative grammar(the phonological component),contrasted with different other components such as syntactic or semantic in early generative grammar. This second lecture shows that phonology seems to be more abstract. It does not deal with the physical nature of speech sounds directly (although that is completely relevant).It deals with rules of the unconscious to a large extent for sound patterning which are found in the mind/brain of a person who speaks a particular language. It can be argued that a phonologist is a kind of grammarian, and the area of grammar that it is concerned with is the sound pattern of a language. The rules studied by phonologists come in various kinds. First, phonetic study reviews that sounds oftentimes vary with their context in complex ways; and phonologists hypothesize rules to characterize this variation. Second, the sequencing and distribution of speech sounds follows patterns also describable with rules. That means it is not arbitrary. Third, phonology is interacted with other components of the grammar, particularly morphology and syntax, and there are rules that characterize

the way in which sound patterning reflects information that arises within these components.

The phonologies of many languages always present a level of complexity that makes them an important intellectual challenge for the phonologist who attempts to understand them. It can take many years of careful research to explain the sound pattern of a language completely. The wonderful thing is that the same pattern is learned quite quickly by humans when they are exposed to it in childhood; at the intuitive level. There are two branches of phonology: ***segmental*** phonology that analyses speech into separate segments such as consonants and vowels. ***Suprasegmental*** phonology which analyses features that extends over more than one segment such as stress and intonation. There is another distinction made between ***diachronic*** phonology that studies patterns of sound change in the history of language and ***synchronic*** phonology which studies sound patterns regardless of the process of historical change. ***Experimental*** phonology purpose is to merge research in experimental phonetics, experimental psychology and phonological theory to provide a hypothesis- based investigation of phonological phenomena. The history of phonology has adopted the development of ideas that are related to the phoneme, as originally raised in Prague school and Bloomfieldian phonological theory, and the alternative views suggested later, especially

in ***generative*** phonology and ***prosodic*** phonology. Both of them reject the concept of the phoneme. ***Prosodic*** phonology suggests the notions of phonemic unit and prosody. Various levels of representation are recognized and an independent phonemic level has been rejected in early ***generative*** phonology.

The Third Lecture:

Simple and Complex Sounds

The movement of a tuning fork is very simple that is back and forth, so that the wave of the sound it produces is very simple. The sound which is made in this way is a pure tone of a single frequency (like 440 Hz).But the vibrations of the vocal tract and the sounds it creates are more complex. Speech sounds are made according to the source-filter theory of speech production. When air passes out of the windpipe(trachea) and over the vocal folds, the folds start to vibrate. They flap open and closed at a frequency between around 100 times per second for a large adult male and 300times per second for a child. But on the top of this basic flapping movement, there are many various sub ripples in the moving vocal folds.They do not flap up and down firmly, but wave in complex patterns. Each of these little waves contribute its own pattern to the sound making "overtones," or harmonics, the main pith of the speaker's voice as well. The basic rates of vibration, the fundamental frequency, identify the pitch, but the overtones create the various qualities of different sounds. Whereas the vocal folds vibrate, the air inside the vocal tract begins to vibrate in the same complicated way, then the air in the vocal tract filters the harmonic structure of the sound made at the vocal folds. Certain waves(certain harmonics)are amplified that depend on the shape of air column inside the vocal tract, and other waves are diluted. Different air particles tend to vibrate at different frequencies. Harmonics that are "in

tune" with the characteristic frequencies of a particular vocal tract shape will be amplified, while those which are not in tune will be reduced. The filter is controlled by moving the tongue and lips to various positions by the speaker. He amplifies some harmonics and withholding others. The most strongly amplified frequencies are called formants.In the acoustic analysis of speech sounds it has been found that in addition to the glottal pitch of voiced sounds (and it has been calculated that about eighty per cent of the speech sounds of connected utterance in English are voiced), perceptible phonetic differences are the result of sound waves generated at different areas or 'bands' of frequency. In vowels and certain continuant sounds the features that distinguish one from another are caused by a combination of a small number of separate bands of frequencies(formants) of which two are the most important, ranging from around 200 cycles per second to around 750 cycles per second and from around 700 cycles per second to around 3,000 cycles per second respectively.The sound waves move through the air at the rate of around 340 meters per second, until they clash with a membrane tuned to receive them, such as the eardrum. They move down the air in the ear canal until they reach the eardrum that begins to vibrate. The patterns of vibration are transferred from the eardrum through the bones of the middle ear to the inner ear. This additional stage of transfer, through the middle ear, helps to amplify very soft sounds, and tone down very loud sounds. The process of hearing occurs actually in the inner ear (cochlea). Because the cochlear membrane varies in shape along its length, it thick at one end and thin at

the other, different places along the membrane respond to different frequencies of vibration. The thick end vibrates in tune to low-pitched sounds, the thin end in tune to high to mid-range sounds. In response to a given pattern of vibration, sending signals to the brain about the frequencies present in the received wave. The brain reunifies the frequency information it recognizes into the sounds of language.

Several theories of hearing have been submitted since the subject was first systematically investigated in the mid-19th century. *Resonance* or *place theory* is the classical theory of pitch perception, deriving from the work of German scientist. Individual fibers in the cochlea were thought to reecho to a particular frequency and if the frequency changes, the place of vibration along the basilar membrane will change too. The basilar membrane vibrates along most of its length. *Temporal* or *frequency theory* is proposed by William Rutherford in 1886.The frequency of a wave was thought to be transferred by the number of pulses per second in a nerve fibre. The cochlea is working as a type of telephone transmitter, directly passing on frequency information to the auditory nerve. After the discovery of no nerve fibre can release at more than 1,000Hz.That most releases happen at much lower rates. As human beings can respond to speech frequencies ranging up to 20,000 Hz, a purely temporal theory is insufficient.

Volley theory is suggested by E.G Wever in 1949, represents a

compromise solution between place and temporal theories. It suggests that below 5,000 Hz temporal patterning is important, with pitch perception being dependent on the synchronized action of several nerve fibers, release in volleys. Above 5,000 Hz, place analysis is well maintained.

Voiced and Voiceless Sounds

There is an articulatory process called voicing in which the vocal flaps are assigned in vibration by leaving column of air. The lungs push the air and the airflow faces a controlled resistance at the larynx. The resistance can be controlled by different positions and tensions in the vocal cords. The free flow of air is allowed to and from the lungs during the process of quiet breathing when the cords are relaxed and spread apart, but during swallowing the cords are drawn tightly together to prevent foreign material from entering the lungs. The most important feature of the vocal cords for speech is that they can be made to vibrate if the airflow between them is rapid enough and if they have the appropriate tension and closeness to each other. The vocal cords are brought close tightly and the airstream vibrates them in rapid succession during voicing .Rapid closing and opening of these vocal cords several times a second is made. Consequently, the sounds that can be produced without the vibration of the vocal cords are called unvoiced or voiceless sounds, while those produced with the vibration of the vocal cords are called voiced sounds. In English /g, b, d, dʒ, v, z, ʒ, ð, m, n, ŋ, l,j w, r/ consonants and all the vowels are voiced sounds. The voiceless are/k, p, t, tʃ, f, s, ʃ, θ, h/.

Frequency of the vocal cords vibration is associated with pitch level, low and high tones and voice amplitude. The usual frequency of which in human speech is from 80 to 400 cycles per second. The vocal cords of adult males are larger in size than females and children; therefore, their frequency of vibration is relatively lower than the frequency of vibration in females and children. So the pitch of adult males' voices is lower than that of them. Voicing has a critical function in speech production. It is a basic factor in the fundamental classification of speech sounds into two functional categories, the voiced and voiceless sounds. The dichotomy signifies grouping of sounds according to the degree of muscular tension. *"Fortis*" refers to voiceless sounds that are pronounced with greater muscular energy and breath ,whilst in *"lenis*" the muscular energy and breath are markedly reduced and mostly voiced sounds are *lenis*.

The Fourth Lecture:

Phonemic and Phonetic Transcription

There are several different kinds of symbols for one of two purposes basically: phonemic (phoneme) symbols or phonetic symbols. The most important point is that the number of phonemic symbols must be exactly the same as the number of phonemes existed in the language. However, some of our phoneme symbols consist of two characters; e.g., / t͡ʃ / is a phoneme symbol consists of two characters / t / and / ʃ /. There is a difference between phonemic symbols and phonetic symbols because the phonemic symbols do not have to indicate accurate phonetic quality, it is possible to choose among several possible symbols to represent a particular phoneme, but this has made a lot of confusion to students to learn how to use these different symbols. The complexity and expense of using private symbols create problems in typing and printing processes; e.g., /a/ is a practical and usual symbol whereas /æ/ is unusual. Some writers have emphasized on producing a set of phoneme symbols that need the minimum number of special or non-standard symbols while others have thought that the symbols must be as close as possible to the symbols that a phonetician will choose to give an accurate reference to the quality of a sound. There can be disagreements about the most important characteristics of a sound that a symbol has to indicate. The critical property of phonemic system is that a special symbol or special

combination of symbols may represent each significant speech sound of a language; therefore, this transcription system overcomes the shortcomings of the current English alphabet.

Thus, it becomes important to innovate two kinds of transcription: *phonemic* and *phonetic*.Fromkin defines Phonemic transcription "is the phonemic representation of speech sounds using phonetic symbols, ignoring phonetic details that are predictable by rule, usually given between slashes, e.g., /pan/ for 'pan' as opposed to the phonetic representation //p^hãn/ ; /p^hool/ ; /t^hen/".Phonemic transcription is one of the traditional exercises in pronunciation teaching by phonetic methods in which every speech must be identified as one of the phonemes and written with appropriate symbol. There are two different kinds of transcription exercises: transcription from dictation, the student must listen to a person or a tape-recording and write down what they hear; transcription from a written text, the student is given a passage of dialogue written in orthography and must use phonemic symbols to represent how she /he thinks it would be pronounced by a speaker of a particular accent. In a phonemic transcription only the phonemic symbols may be used; this has the advantage that it is comparatively quick and easy to learn to use it. The disadvantage is that as one continues to learn more about phonetics he becomes able to hear a lot of sound differences that he was not aware before, and students find it depressing to be unable to write down more detailed information at this stage. The English

phonemic system consists of forty four phonemes. Human beings can make many more sounds than these clearly, and when phoneticians are trying to represent sounds more precisely they use a much larger set of symbols. A transcription that is much more accurate in phonetic detail and contained much more information than phonemic transcription is called *Phonetic* transcription. Fromkin supports that by his definition "Phonetic transcription is the representation of speech sounds using phonetic symbols between square brackets. They may reflect nondistinctive predictable features such as aspiration and nasality ,e.g.,[p^hãt] ;[mãn] for 'pat' and 'man' " It has two types: a *narrow* or detailed phonetic transcription which contains a lot of information about the exact quality of the sounds; a *broad* phonetic transcription includes a little more information than a phonemic transcription. Jones believes that broad transcription is the most practical for most linguistic purposes, because it combines accuracy with the greatest simplicity.It is generally recommended in teaching the pronunciation of a foreign language. Narrow transcription is useful in comparative work, and especially when it is desired to make comparisons between the pronunciations of different people who are speaking the same language. Hudson justifies that the narrow phonetic writing is not just difficult. It is quite impractical, since the range of phonetic variation is great and the differences between many of the variants are impossible to hear constantly, or trusted even with training and experience. There is a significant systematic difference

between narrow phonetic writing and a certain kind of broad phonetic writing. This difference deals with the reasons for the presence of the phonetic details in the stream of speech that are:

a. The obligatory pronunciation rules of the language; e.g., / θ / is preceded by /n/ in 'tenth' .Here it is dental while it is used to be alveolar because / θ /affects on it.

b. Idiosyncratic or momentary characteristics of the speaker; e.g., the speaker who has a flu will pronounce /n/ as nasalized /d/ because his nasal cavity is blocked and / n / may lose some of its nasal quality.

Such phonetic characteristics of speech are no contrastive or non phonemic. The neighboring phones or the individual personality of the speaker determines their presence, so they are not associated with the meanings of morphemes as part of their particular form, and their presence is because of necessity of their neighboring phones, or as a characteristics of the speaker's voice, they cannot make a difference of linguistic meaning between one utterance or another. The following chart contains the pronunciation symbols used in modern English dictionaries.

This chart is adopted from (Int b) with modification

vowels		Consonants	
IPA		**IPA**	
ʌ	cup, luck	b	bad, lab
ɑ:	arm, father	d	did, lady
æ	cat, black	f	find, if
e	met, bed	g	give, flag
ə	away, cinema	h	how, hello
ɜ:ʳ	turn, learn	j	yes, yellow
ɪ	hit, sitting	k	cat, back
i:	see, heat	l	leg, little

ɒ	hot, rock	m	man, lemon
ɔː	call, four	n	no, ten
ʊ	put, could	ŋ	sing, finger
uː	blue, food	p	pet, map
aɪ	five, eye	r	red, try
aʊ	now, out	s	sun, miss
eɪ	say, eight	ʃ	she, crash
oʊ	go, home	t	tea, getting
ɔɪ	boy, join	tʃ	check, church
eəʳ	where, air	θ	think, both
ɪəʳ	near, here	ð	this, mother
ʊəʳ	pure, tourist	v	voice, five

w	wet, window
z	zoo, lazy
ʒ	pleasure, vision
dʒ	just, large

The Fifth Lecture:

The International Phonetic Alphabet (IPA)

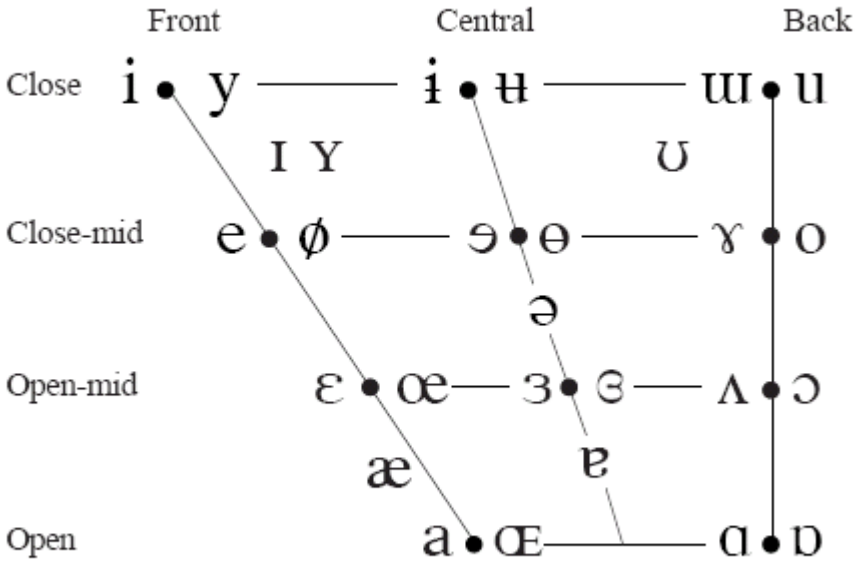
The phonetic symbols used are suggested by the International Phonetic Association . Kansakar states that it is an organization founded in 1886 by a group of European phoneticians.The International Phonetic Alphabet (IPA)is the set of the symbols and diacritics that have been officially approved by International Phonetic Association. IPA aims to symbolize all the distinctive sounds in languages. The intent is to represent the sounds by symbols that serve to distinguish one word from another in a language. This is done by using ordinary letters of the Roman alphabet or simple modifications of these letters. In order to avoid the problem of creating a large number of symbols for a set of related sounds, IPA prefers the use of diacritics. IPA is one of the most popular and well-known phonetic alphabets. It was originally created by primarily British language teachers, with later efforts from European phoneticians and linguists. It has changed from its earlier intention as a tool of foreign language pedagogy to a practical alphabet of linguists. It is currently becoming the most often seen alphabet in the field of phonetics. The International Phonetic Association recommends that a phonetic transcription should be enclosed in square brackets "[ ]". A transcription that stands for only specific phonological contrasts may be enclosed in slashes "/ /" (int c), but there is a big problem with this alphabet that is the symbols of IPA are difficult to type on the most of the computers. It may

be done, but it needs special fonts and special software programmes. It has been under continuous review by the International Phonetic Association since that time , and the latest revision dates from 1996. A certain degree of learning is required to be a well- known with the conventions of the IPA and the characteristics of sounds underlying the notation. Dinneen mentions that a *useful contribution of Phonetics might have been to provide a distinct symbol for every distinct sound in every distinct language of the world.*

The IPA is a system of phonetic symbols that anyone can learn to use and that can be used to represent the sounds of any language. It has been discovered as one of the most important achievements of phonetics in the past century. English writing system does not always give a reliable guide to pronunciation .It is helpful to use phonetic transcription instead of ordinary spelling for different purposes. Many of the symbols are the same as the familiar alphabetic ones, but a slight different set of symbols might be necessary for each of the many different English accents.

The following charts show the vowels, the consonants, the diacritics, symbols and suprasegmentals that are approved by IPA (Int d):

VOWELS



Where symbols appear in pairs, the one to the right represents a rounded vowel.

CONSONANTS (NON-PULMONIC)

Clicks		Voiced implosives		Ejectives	
ʘ	Bilabial	ɓ	Bilabial	’	Examples:
ǀ	Dental	ɗ	Dental/alveolar	pʼ	Bilabial
ǃ	(Post)alveolar	ʄ	Palatal	tʼ	Dental/alveolar
ǂ	Palatoalveolar	ɠ	Velar	kʼ	Velar
ǁ	Alveolar lateral	ʛ	Uvular	sʼ	Alveolar fricative

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2005)

CONSONANTS (PULMONIC) © 2005 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	B			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

DIACRITICS

Diacritics may be placed above a symbol with a descender, e.g. n̥

◌̥	Voiceless	n̥ d̥	◌̤	Breathy voiced	b̤ a̤	◌̪	Dental	t̪
◌̬	Voiced	s̬ t̬	◌̰	Creaky voiced	b̰ a̰	◌̺	Apical	t̺
◌ʰ	Aspirated	tʰ dʰ	◌̼	Linguolabial	t̼ d̼	◌̻	Laminal	t̻
◌̹	More rounded	ɔ̹	◌ʷ	Labialized	tʷ dʷ	◌̃	Nasalized	ẽ
◌̜	Less rounded	ɔ̜	◌ʲ	Palatalized	tʲ dʲ	◌ⁿ	Nasal release	dⁿ
◌̟	Advanced	u̟	◌ˠ	Velarized	tˠ dˠ	◌ˡ	Lateral release	dˡ
◌̠	Retracted	e̠	◌ˤ	Pharyngealized	tˤ dˤ	◌̚	No audible release	d̚
◌̈	Centralized	ë	◌̴	Velarized or pharyngealized	ɫ			
◌̽	Mid-centralized	e̽	◌̝	Raised	e̝	(ɹ̝ = voiced alveolar fricative)		
◌̩	Syllabic	n̩	◌̞	Lowered	e̞	(β̞ = voiced bilabial approximant		
◌̯	Non-syllabic	e̯	◌̘	Advanced Tongue Root	e̘			
◌˞	Rhoticity	ɚ a˞	◌̙	Retracted Tongue Root	e̙			

OTHER SYMBOLS

ʍ	Voiceless labial-velar fricative
w	Voiced labial-velar approximant
ɥ	Voiced labial-palatal approximant
ʜ	Voiceless epiglottal fricative
ʢ	Voiced epiglottal fricative
ʡ	Epiglottal plosive

ɕ ʑ	Alveolo-palatal fricatives
ɺ	Voiced alveolar lateral flap
ʃʃ	Simultaneous ʃ and x

Affricates and double articulations can be represented by two symbols joined by a tie bar if necessary. k͡p t͡s

SUPRASEGMENTALS

ˈ	Primary stress
ˌ	Secondary stress ˌfoʊnəˈtɪʃən
ː	Long eː
ˑ	Half-long eˑ
◌̆	Extra-short e̯
|	Minor (foot) group
‖	Major (intonation) group
.	Syllable break ɹi.ækt
‿	Linking (absence of a break)

The Sixth Lecture:

Consonants versus Vowels

Davenport and Hannahs distinguish between the consonants and vowels according to the structure of the syllable. They declare that syllable structure plays a very important role in making a major distinction between the types of speech –sound, namely, *Vowels* and *Consonants*. . There are two ways in which 'vowels' and 'consonants' are defined: in *phonetic* terms and in *linguistic* terms, i.e. in terms of the production of sounds and their function in a given language, respectively. So consonants are speech sounds in which air pushing from the lungs is obstructed in the mouth seriously. They are articulated with either total obstruction of the air-passage or (partial obstruction) with a narrow oral passage so the air escapes and friction is heard. Vowels, on the other hand, are speech sounds that do not have obstruction, and narrowing of a degree that would cause audible friction, in the pharynx and the mouth. All other sounds are 'consonants'. They are speech sounds in which air pushing from the lungs leaves the mouth with no interference and articulated with a free oral passage for the air to escape. It seems, phonetically, that the essential difference is with the degree of stricture, which refers to the distance between the active and passive articulators. Oral and nasal stop consonants, fricatives and liquids all have a stricture of at least close approximation. Liquids and nasals may seem to be counterexamples to this claim because the air flows out freely for them.

However, there is an obstruction in the oral tract in every case; for nasal consonants, complete closure. For liquids, there is a contact between articulators, but it does not extend across the full width of the oral tract. There is a problem in the glides since there is a stricture of open approximation for them. The distinction between consonants and vowels for glides rests not a lot with phonetics as with phonology that means how the sounds function in the language, rather than with the details of their articulation. Pure or true vowels are syllabic, they comprise the main part of the syllable. Glides behave as consonants in that they do not form the nuclei of syllables, but rather occur on the edges of syllables. For English and many other languages a vowel sound is produced with open approximation and it is a syllable nucleus; this will make glides excluded since they are not nuclei. Syllabic liquids as final /I/ and nasals as final /n/ will be excluded because they are not produced with open approximation. Kansakar describes consonants depending on:(1) airstream mechanism which leads us to take into our account that all sounds are articulated with a pulmonic ingressive airstream mechanism, i.e. air is pushed out from the lungs.(2) The state of the glottis during the articulation to show whether there is a vibration in the vocal cords or not. Consonants are classified as voiced and voiceless while all vowels are voiced. (3) The position of the soft palate in which the speech sounds can also be oral or nasal .An oral sound is articulated with the soft palate raised to shut off the nasal passage of air .A nasal sound is articulated with the soft palate lowered to open the nasal passage along with an oral closure. Sometimes

the sounds may be nasalized. (4) Active and passive articulators are required. The active articulators move during the process of articulation of the speech sounds but the passive articulators do not move. (5)Stricture involved which refers to the way in which the air passage is restricted by the various organs of speech. There are eight types of strictures involved in the articulation of consonants:

i- Complete closure and sudden release by which the stop or plosive consonants as / p, b, t, d, k, g / are produced. The active and the passive articulators are firmly in contact in order to prevent the lung air from escaping through the mouth. A velic closure will be at the same time. So the soft palate is raised to block the nasal passage of air. When the active articulator is removed from the passive articulator suddenly, the air escapes with a small explosive noise.

ii-Complete closure and slow release in which the oral and nasal passages are closed and the oral closure is released slowly. A friction is heard at that moment without the explosive noise of plosive or stop consonants. Then affricates sounds are produced when a stop followed by friction such as the initial sounds / tʃ, dʒ / in 'chalk' and 'joke'.

iii- Complete oral closure in which there is velic opening when the nasal passage is opened and the lung air escapes freely through the nostrils. A complete oral closure with the active and passive articulators firmly in contact will be at the same time. Then nasal sounds are articulated with

this stricture as final / m, n, ŋ / sounds in the following words successfully 'calm', 'learn' and 'thing' .

iv- Intermittent closure: when an oral sound articulated with the active articulator striking several times against the passive articulator permits the air to escape between them intermittently. Trill or rolled consonants are articulated with this kind of stricture as / r / in 'spirit'.

v- Single closure: where /r/ sound may also be articulated sometimes./ r / sound is called a tap or a flap in this case as in 'very'/ r / is pronounced as a tap by some English speakers.

vi- Close approximation in which the active articulator moves to be close to the passive articulator leaving a very narrow opening between them. The lung air escapes through this narrow opening with audible friction. Fricative consonant sounds are articulated with this stricture such as the initial sounds/ f, v, θ, ð, s, z, ʃ, h / in the following words successively 'fat', 'vast', 'think', 'this', 'sea', 'zoo', 'should' and 'he'.

vii-Partial closure: when the active and passive articulators make a closure in the centre of the mouth and the air escapes along the sides of the tongue without friction. Lateral consonant sounds are articulated with this stricture as the initial sound /1 / in 'look'.

viii-Open approximation by which a wide gap or opening between the active and passive articulators is made. The air escapes through this gap without any friction. Frictionless continuants or semi-vowels are articulated such as the initial sound / j / in 'yesterday'.

The Seventh Lecture:

General Criteria for the Description of Consonants

Vocalic and consonantal are the phonetic features used to describe the consonant sounds. The vocalic feature concerns the passage of the breath through the oral cavity and the position of the vocal cords. When the vocal cords are drawn together in such a way that the breath moves through them making a vibration and then passes out of the oral cavity without interference, here the articulated sound is [+vocalic]. All the English vowels as well as the consonants /l/ and /r/ have this feature. So the other English sounds are [-vocalic] since the air stream is fully (closure) obstructed for a while from passing through the oral cavity as with the following sounds /p, b, t, d, k, g, ʧ, ʤ, m, n, ŋ/; or there is partial closure that makes interference as with the following sounds /f, v, θ, ð, s, z, ʃ, ʒ, w, j/; or there is no vibration of the vocal cords although there is no real obstruction in the vocal cords as with /h/ sound. The consonantal feature refers to the movement of the vocal tract when some part of them is spread apart from the pre speech position and an obstruction to the air stream is formed in the oral cavity. This leads to the fact that [-vocalic] sounds are [+consonantal], and [-consonantal] are [+vocalic]. These two phonetic features deal with vocal tract activities which may be implemented independently of each other, there is a possibility of being [+vocalic, +consonantal] or [-vocalic, -consonantal] at the same time. Note that the property [consonantal] does not necessarily require that the obstruction cause closure or actual interference with the air stream. An

obstruction to the air stream may happen allowing enough space for the breath to move around that obstruction without interference as with /l/ and /r/. The phonetic features [vocalic] and [consonantal] divide the English sounds into four groups as follows:

Phonetic features	English sounds	common name of group
[+vocalic -consonantal]	/ɪ, iː, e, ʌ, æ, aː, ɒ, oː, u, uː, ə, əː/	vowels
[-vocalic +consonantal]	/p, b, t, d, k, g, m, n, ŋ, f, v, ɵ, ð, s, z, ʧ, ʤ, ʃ, ʒ,/	consonants
[+vocalic +consonantal]	/l, r /	liquids
[-vocalic -consonantal]	/ h, w, j /	glides

The following points are taken into consideration while describing consonants.

1-The pulmonic or non-pulmonic airstream set in motion by the lungs or by some other means.

2- The egressive or ingressive airstream forced outwards or sucked inwards.

3- The vibration of the vocal cords.

4- The position of the soft palate as oral, or nasal or nasalized.

5- The place of articulation that refers to at what point or points and between what organs does the closure or narrowing take place.

6- The Manner of articulation that refers to what is the type of closure or narrowing at the point of articulation.

A more detailed description includes additional information dealing with the shape of the rest of the tongue, the relative position of the jaws, and the position of the lip.

Classification of Consonants

The description of consonants according to the general criteria mentioned above will be as follows:

1. Egressive Pulmonic Consonants

Most speech sounds are produced with egressive air pushed from the lungs. All English sounds are egressive except /p, t, k/ practically.

2. Voicing

It has been stated already that his category shows us whether the consonant is voiced or voiceless on the basis of articulatory phonetics. In the production of consonants the vocal cords take two basic

positions: 1) When they are drawn together they will vibrate because the air pushes them apart repeatedly in order to pass through, then the consonant is voiced. 2) When the vocal cords are spread apart, the air that is pushed from the lungs will pass between them freely without obstacles and they do not vibrate, then the consonant produced in this way is voiceless. There is a tendency for a voiceless sound to become voiced and vice versa in company with each other. Stops, fricatives, and affricates come in voiced and voiceless pairs except for /h/ sound. Nasals, liquids, and glides are voiced, as are vowels. The following 15 sounds are voiced consonants in English: /b, d, g, v, ð, z, ʒ, m, n, ŋ, r l, j, w and dʒ / and the remaining nine consonants are voiceless specifically: /p, t, k, f, θ, s, ʃ, h, and tʃ/.

3. The Place of Articulation

Most of linguists review the main places of articulation of consonant sounds as follows:

(i) ***Bilabial*** (from bi 'two' + labial 'lips'): The primary constriction is at the two lips articulators, e.g. /p, b, w/.

(ii) ***Labio-dental*** (from labio 'lip '+ dental 'teeth'): The active articulator is the lower lip with the passive articulator the upper teeth, e.g. /f, v/.

(iii) ***Dental (***from 'teeth'): The active articulator is the tip of the tongue with the passive articulator the upper teeth, e.g. / θ, ð /.

(iv) ***Alveolar (***from 'alveolar ridge')*:* The active articulator is the blade, or tip and blade of the tongue with the passive articulator the alveolar ridge, e.g. /t, d, l, n, s, z /.

(v) ***Post-alveolar*** (from post ‘after' or ‘beyond’ + alveolar ‘alveolar ridge’): The active articulator is the tip of the tongue with the passive articulator the backward part of the alveolar ridge, e.g. the initial sound in 'read' that is /r/.

(vi) ***Retroflex (***from retro‘backwards’+ flex ‘bend’)***:*** The active articulator is the bottom of the tip of the tongue and the passive articulator is the front of the hard palate immediately behind the alveolar ridge. The tip of the tongue is curled back in such a way that only its lower part articulates, e.g. /r/ that is found in south-west British and American English of pronunciation.

(vii) ***Palato-alveolar*** (from palato ‘palate’ + alveolar ‘alveolar ridge’): The blade, or the tip and the blade of the tongue (active articulator) articulates against the alveolar ridge (passive articulator), and the front of the tongue (active articulator) is raised towards the hard palate (passive articulator), e.g. /ʃ, ʒ, tʃ, dʒ/.

(viii)***Palatal*** (from ‘palate’)*:* The active articulator is the front of the tongue with the passive articulator the hard palate, e.g. /j/.

(ix) ***Velar*** (from ‘velum’): The active articulator is the back of the tongue with the passive articulator the soft palate, e.g. /k, g, ŋ/.

(x) ***Uvular*** (from‘uvula’): The back of the tongue articulates with the uvula, e.g. /ʒ/as in French ‘rouge’.

(xi) ***Glottal*** (from ‘glottis’)*:* The two vocal cords are the articulators for the glottal sounds. The sounds are produced by an obstruction, or a narrowing causing friction, but not vibration between the vocal cords, e.g. /h/.

Thus, in this section the consonants are classified according to the place of articulation.

The Eighth Lecture:

We explain the fourth criterion for the description of consonants:

4. Classification of consonants based on the manner of articulation:

The manner of articulation specifies the kind of closure or narrowing involved in the production of a consonant sound. In other words, it specifies the kind of stricture (or constriction) involved in the articulation of a sound. Depending on the stricture involved, that is, on whether there is a complete closure, a partial closure, or only a narrowing that causes audible friction, consonants are classified into plosive, affricate, nasal, lateral, and fricative. Then there are 'consonants' in the production of which the narrowing is not sufficient to cause noise and audible friction. These consonants are called frictionless continuants or approximant and semi-vowels. In the second chapter, there is a description for all these groups but below include a survey. It must be taken into consideration that in all nasal consonants, the soft palate is lowered and at the same time, the oral passage is blocked at some point, so that the breath goes out of the nose. The linguists classify the consonants according manner of articulation as follows:

(i) ***Plosive*** or ***stop***: It involves a stricture of complete closure. The articulators are lips, tongue, teeth, etc. e.g. /p, b, t, d, k, g/.

(ii) ***Fricative***: It involves a stricture of close approximation. It means there is no closure anywhere; there is only a narrowing, e.g. /f, v, θ, ð, s, z, ʃ, ʒ, h/.

(iii) ***Affricate****:* It involves a stricture of complete closure followed by a slow

release. The articulations are those that begin like plosives and end like fricatives, e.g. / tʃ, dʒ /.

(iv) ***Nasal****:* It involves a stricture of complete closure of the oral passage only, e.g. /m, n, ŋ/.

(v) ***Lateral****:* It involves a stricture of partial closure. Since the air passes continuously, the sound produced is a continuant and frictionless, e.g. clear /l/ and dark/l/. In the production of the former there is a contact between the tip of the tongue and the centre of the teeth ridge; but there is no such contact, at least on one side, the airstream escapes on one or both sides of the contact, e.g. the initial sound in 'learn' /lɜːn /. The latter that is dark /l/ in production of which the back of the tongue is simultaneously raised towards the soft palate, e.g. the final sound in 'call'/ kɔːl /.

There are two more, namely, frictionless continuant or approximant and semi-vowel which, in strictly phonetic terms, must be regarded as vowels, but since in many languages they function phonologically as consonants, i.e. they appear at the edges of syllables, they cannot function as the nucleus of a syllable, they are grouped along with consonants. All of the approximant sounds characteristically involve a raised position of the tongue-back as a secondary articulation. Liquids and glides are the alveolar and pre-palatal approximants sometimes. These groups differ phonetically from the vowel sounds in either of two ways: 1) the articulation may not involve the body of the tongue, e.g. /r/ sound in 'red' that is post - alveolar and /v/ sound that is labiodentals. 2) Where they involve the body of the tongue, the articulation represent only brief glides to a following vowel. The manner of articulation category 'approximant' includes /r, l, w, j/ consonants as well as vowels. Nevertheless, there are two questions: 1) how do we distinguish these

consonants from each other, especially between /l/ that is articulated when the tongue contacts the alveolar ridge and the absence of such contact in /r/ (as it is articulated as retroflex)? To answer this question according to place of articulation, favored to say that the sound /l/ is articulated with a firm voiced air stream through the mouth. The tongue-tip or blade is raised to touch the alveolar ridge firmly. /l/ is a continuant sonorant because its contact does not produce closure of the oral cavity. Its contact occurs in the middle of the mouth and the airstream escapes freely along the sides that are not raised. /l/ is a lateral approximant since the air stream escapes without friction. The sounds, which do not have that lateral articulation of /l/, are called central or non lateral. All English sounds are central except /l/. The manner of articulation of /r/ is that of a central approximant and it is not different from those like /w, j/significantly. In one way or another, the retroflex position of the tongue is the feature of /r/ in many English accents. Some English speakers (Scottish) articulate /r/ as a series of rapid contacts of the tongue-tip with the back of the alveolar ridge (trill) or with a single tap in that place of articulation occasionally. The most important feature refers to /r/ as a post alveolar approximant. 2) What precisely is the difference between vowels and consonants in the set of approximants? The vowel in ‘woo’ /wu:/ is rather similar to the consonant preceding it. It is a high back rounded vowel. This means that the tongue back is raised highly towards the velum and the lips are followed-up. The consonant /w/ has narrowing of the oral cavity both by lips and the tongue back (less obviously) towards the velum. Therefore, the two descriptions really express the same fact: narrowing in the bilabial and velar areas. The obstruction of the air stream does not produce closure and friction in the case of both sounds. The vowel and the consonant in ‘ye’ /ji:/ are also approximants, as for place of articulation, the vowel is high front unrounded

and the consonant is palatal. The lips are spread and the tongue-front is raised towards the palate without producing closure or friction in both sounds. The phonetic analysis or description of the previous sounds predicts that their qualities are rather similar.

(vi) ***Frictionless continuant***: In the oral passage of air, if there is a narrowing of such a degree that the sound produced is accompanied by audible friction, then the sound is called a fricative. If, on the other hand, the narrowing is of a lesser degree, i.e. the articulators do not come so close together, then no audible friction accompanies the sound produced. Such a sound is a frictionless continuant, now more often called an approximant, e.g. /r/.

(vii) ***Semi-vowel:*** Semi-vowels are essentially very short approximants. They are gliding sounds in which the organs of speech start at or near a 'close'vowel and at once glide apart to other vowel or to other sound, which is equal or greater prominence, such as the syllabic sound /l̩/. They differ from both approximants and vowels in that they are momentary in nature. Thus, /j/ in 'yes' /jes/ is a glide since it starts from /i/ and /w/ in 'when' /wen/ starts from /u/.

The Ninth Lecture:

English Vowels

Earlier we mentioned that in the production of vowels in the pharynx and the mouth (the oral tract), there is no obstruction and no narrowing of a degree that causes audible friction. All vowels are soft, voiced and musical in effect. They are produced with a primary articulation made by the front, centre or back of the tongue (the tip and blade of the tongue do not participate) and located at the front, centre or back of the palate. It is possible to articulate vowels in a voiceless method when there is no vibration in the vocal cords, as in whispering a word that contains a vowel. A vowel is a sound produced by the unobstructed passage of the air stream without the oral cavity being constricted enough to cause audible friction. Such a definition of vowels might be adequate in distinguishing vowels from consonants. But it does not help us in distinguishing vowels from vowels. Therefore, what distinguishes one vowel from other is the modification of the tone resulting from modification in the shapes and sizes of the resonating chambers through which the tone passes, via: the pharyngeal cavity, the nasal cavity, and the mouth. Mainly responsible for such modifications of the resonating chambers are the soft palate, the lips, and the tongue. Vowels have a relatively open gap of articulation more than that in consonants.

Vowels are produced more slowly as continuants. They are the most

prominent, long lasting acoustic cues and more prosodic information may be provided by using them. Thus vowels carry information about stress, speaker identity and emotional tone.

The General Criteria for the Description of Vowels

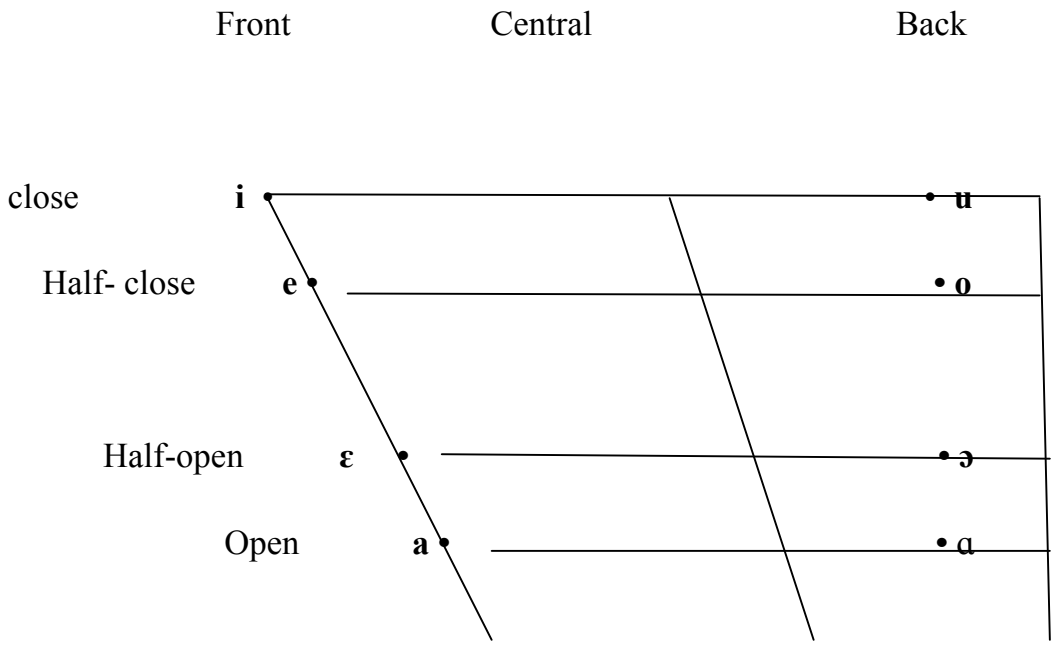
Vowels are produced with a voiced egressive air-stream passing through different mouth- shapes. The various positions of the tongue and the shapes of the lips cause these differences in the shape of the mouth. A detailed description of the position of the tongue for the vowels will not help us to pronounce them correctly because it is very difficult to observe or to feel the tongue differences . A good question arises that is' in what ways do vowels differ from each other?' The following are the general criteria to describe vowels:

1. The shape and position of the tongue. They refer to two possibilities: 1) the vertical distance between the upper surface of the tongue and the hard palate (high, middle or low) and 2) the part of the tongue (front, center or back) which is raised highest.

2. The position of the soft palate refers to its raising so that the nasal cavity is shut off to produce oral vowels, or lowering to produce nasalized vowels.

3. The shapes of the lips include three positions: spread that is formed with the corners of the lips moved away from each other such as /ɪ, i:/,

neutral is made where the lips are neither rounded nor spread such as /ə, ʌ/, or rounded is formed where the corners of the lips are brought towards each other and the two lips pushed forwards, e.g. /u, u:/. Phoneticians make use of the system of cardinal vowels in order to standardize their reference to vowels. This system must not be identified with the vowels of any actual language. It refers to theoretical points on which the trained phonetician can scheme the vowel sounds of particular languages. There are primary cardinal vowels that are most familiar to most European languages speakers, they include /i, e, ɛ, a, u, o, ɔ, ɑ/, and secondary cardinal vowels, that are less familiar, include /y, ø, œ, ɶ, ɒ, ʌ, ɣ, ɯ, ʉ, ɨ /. The following diagram shows the set of vowels that do not belong to any particular language.



The front primary cardinal vowels /i, e, ɛ, a/ and the back /ɑ/ are articulated with spread lips, while the other back cardinal vowels /u, o, ɔ/ are articulated in different degrees of the rounding of lips. The cardinal vowels are eighteen and may be transformed into their nasalized counterparts when the soft palate is lowered. They are classified according to lip shapes, with corresponding tongue positions:

Unrounded vowels include /i, e, ɛ, a, ɑ, ʌ, ɣ, ɯ, ɨ/

Rounded vowels include /y, ø, œ, ɶ, ɒ, ɔ, o, u, ʉ/

The cardinal vowels inform the learner the range of vowels that human beings able to articulate and to learn how to describe, classify and compare the vowels of any particular language.

The Tenth Lecture:

The raised part of the tongue:

The front, the centre (the middle) and the back parts of the tongue are accountable for the production of vowels. The vowels produced when each of these parts is raised are called the front vowels, the central vowels, and the back vowels respectively, e.g. /i:, æ/, /ɜ:, ʌ/ and /u:, ɔ:/.

Front vowels are those vowels in the production of which the front part of the tongue is raised towards the hard palate, e.g. /i:/ in ‘meet’ and /æ/ in ‘cat’.

Central vowels are those in the production of which the centre of the tongue is raised towards an intermediary position in the mouth i.e. in between the hard palate and the soft palate, e.g. /ɜ:/ in ‘bird’ and/ʌ/ in ‘cup’.

Back vowels are those in the production of which the back of the tongue is raised towards the soft palate, e.g. /u:/ in ‘soon’ and /ɔ:/ in ‘ball’.

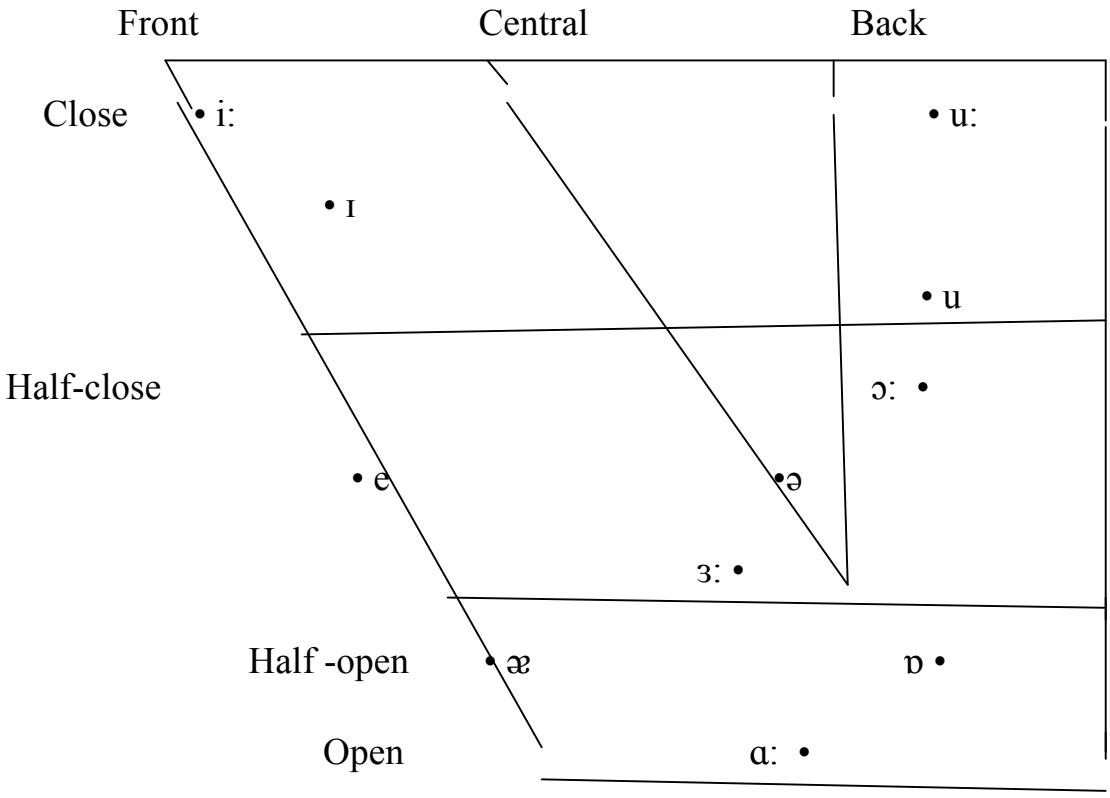
The classification of the vowels according to part of the tongue raised:

Front	Central	Back
i:	ɜ:	u:
ɪ	Ǝ	u
e	ʌ	ɔ:
æ		ɒ
		ɑ:

The height of the tongue:

The vowels produced by raising the body of the tongue above the neutral position to the highest point, are called high or close vowels, e.g. /i:, u:/ and those produced without such a raising of the body of the tongue are nonhigh sounds.

Thus the vowels produced by lowering the body of the tongue below the neutral position are low or open vowels, e.g. /ɑ:, æ/ and nonlow sounds are produced without such a lowering. The close or open distinction does not enable us to distinguish between all of vowel sound. So there is a need to mark two imaginary positions between close and open that are half-close, e.g. /e, ɔ:/ and half-open, e.g. /ɜ:, ʌ/. This is done in such a way that the positions labelled as close, half-close, half-open, and open are the same distance. The English vowels diagram



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