Part 1 – Phonetics: the sound of Language

This document is the first part of a five part series of the 'Introduction to contemporary linguistics – English.

I - Phonetic: the sound of language

II – Phonology: the function and patterning of sound

III – Morphology: the analysis of word structure

IV – Syntax: the analysis of sentence structure

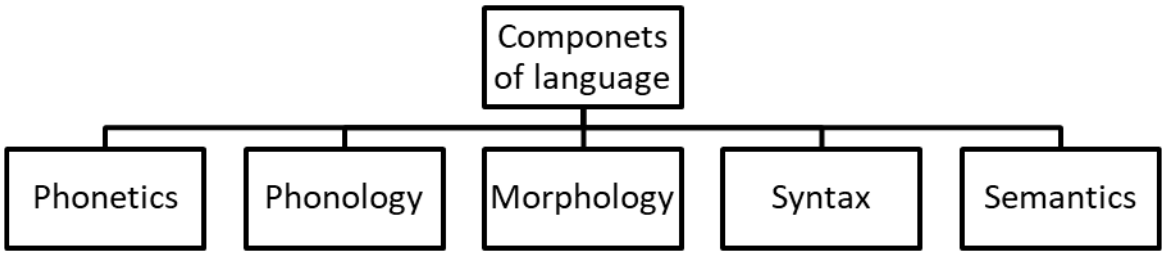
V – Semantics – the analysis of meaning

Summary

1. Language is a vehicle (tool) for communications among humans. We use it when we're talking, listening, reading, writing, and thinking.
2. Linguistics is the study of language: how it is used, how it is acquired, how it changes over time, how it is represented in the brain, and so on. It is concerned with the properties of the language. There are over 7000 living languages in the world today. They are called natural languages (NL).
   a) Linguistic evolution – human have evolved anatomically to create a special capacity for language that is not found in any other species.
      i) Early humans were anatomically like us-they had large brains and vocal tracts capable of producing speech. Archaeological evidence (such as tools, carvings, and cave paintings) suggests that they also had the type of intellect that could accompany language.
      ii) Our speech organs (the lungs, larynx, tongue, teeth, lips, soft palate, and nasal passages) were-and still are-primarily concerned with breathing and eating. However, they have also all become highly specialized for use in language. Their structure and shape is unique to our species, as is the highly developed network of neural pathways that controls them during speech production.
      iii) Human beings are also specially equipped for the perception of speech. New-born respond differently to human voices than to other types of sounds, and six- month-old infants can perceive subtle differences among sounds in languages that they have never heard before.
   b) Linguistic creativity - all human languages are creative. The breadth and diversity of human thought and experience places a demand for languages to be creative, that is, enable us to produce and understand new words and sentences to accommodate new thoughts, experiences, and situations.

c) Linguistic competence – The above creative is balanced by the presence of systematic constraints that establish the boundaries within which the innovation can occur. This linguistic competence is called Grammar.

3. Grammar is a set of rules for generating meaningful communication, using the components of language.
   a) Components of Grammar – grammar is not limited to the forms and structure of words and sentences but include the sound of words and meaning of words and sentences. Therefore, the different components of language are associated with a domain of grammar. The mapping of language components with domain of grammar; and components of language; are shown below in the chart and table respectively.



Component of language	Domain of Grammar
Phonetics	Articulation and perception of speech sounds
Phonology	Patterning of speech sounds
Morphology	Word formation
Syntax	Sentence formation
Semantics	Interpretation (meaning) of word and sentence

Now we will discuss the rules of grammar associated with each component of language. Before doing so, let us list Some common properties shared by all grammar of different languages.

   b) Common properties of Grammar of languages:
      i) Generality – a fundamental claim of linguistic analysis is that all languages have grammar.
         (1) Language is spoken => it must have a phonetic and phonological system.
         (2) Language has words and sentences => it must have morphology and syntax.
         (3) Words and Sentences have systematic meaning => it must have semantic principles

(4) It is not necessary that all languages have a grammar like English

ii) Parity – all grammars are equal.
   (1) There is popular belief that there are primitive languages. On the contrary, some of the most complex languages are found in places untouched by modern science and technology.
   (2) There is no good or bad grammar. All grammar essentially do the same thing: they tell speaker how to form the words and interpret words and sentences of their language. The form and meaning vary from language to language, and even from community to community. However, each language works for its speakers.

iii) Universality – grammars are alike in basic ways.
   (1) There are principles and properties shared by all human languages.
   (2) Sounds:
      (a) There is a set of human speech sounds, independent of any language
      (b) All spoken languages use a sub-set of human speech sounds. The contrastive sounds within the sub-set help to distinguish word from each other (like the *t* and *d* sound that allows us to recognize *to* and *do* as different words).
      (c) All spoken languages do not use the same sub-set of human sounds. There are language specific constraints on which the sub-set is selected.
      (d) All spoken languages have more consonant sounds than vowel sounds.
   (2) Words:
      (a) There are universal constraints on how words can be arranged to form a sentence. Example: a) Mary lost her purse; b) She lost Mary's purse; No language will allow the use of sentence b) in situation where *She* refers to *Mary*.
      (b) No language, uniformly places question word at the end of a sentence.
      (c) All languages have constraints on the order of words to form a sentence by strong tendencies rather than absolute prohibition. Example: A three word sentence '*Indian like cricket'* can have six possible order of words.
         (i) Indians like cricket,
         (ii) Indians cricket like,
         (iii) Like Indians cricket,
         (iv) Like cricket Indians,
         (v) Cricket like Indians,
         (vi) Cricket Indians like.
      (d) All other things being equal, we would expect to find each order employed in about one- sixth of the world's languages.
      (e) In fact, more than 95 percent of the world's languages adopt one of the first three orders for basic statements (and the vast majority of those use one or the other of the first two orders). Only a small handful of languages use any of the last three orders as basic.

ii) Mutability – Grammar change over time.
   (1) The features of language that are not universal and fixed. They are subject to change over time. Indeed, the grammars of all languages are constantly changing. Some of these changes are relatively minor and occur very quickly (for example, the recent addition of new words such as *bitcoin, twerk, selfie, unfriend,* and *carbon footprint* to the vocabulary of English). Other changes have a more dramatic effect on the overall form of the language and typically take place over a long period of time. One such change involves the way sentences were negated in English. Prior to 1200AD, English formed negative constructions by placing *ne* before the verb and a variant of *not* after it. Example: He *ne* speketh *nawt*; Now changed to – He does not speak.

iii) Inaccessibility – Grammatical knowledge is subconscious.
   (1) Knowledge of a grammar differs in important ways from knowledge of arithmetic, traffic rules, and other subjects that are taught at home or in school: it is largely subconscious and not accessible to introspection—you can't figure out how it works just by thinking about it. Example: consider your pronunciation of the past tense suffix, written as *ed*, in the following words: a) hunted, b) slipped, c) buzzed; You probably didn't notice it before, but the *ed* ending has three different pronunciations in these words. Whereas you say *id* in *hunted*, you say *t* in *slipped* and *d* in *buzzed*. Moreover, if you heard the new verb *flib*, you would form the past tense as *flibbed* and pronounce the ending as *d*. If you are a native speaker of English, you acquired the grammatical subsystem regulating this aspect of speech when you were a child, and it now exists subconsciously in your mind, allowing you to automatically make the relevant contrasts.
   (2) The same is true for virtually everything else about language. Once we go beyond the most obvious things (such as whether words like *the* and *a* come before or after a noun), the average person can't say much about how language works.
      (a) Example 1: Sentence - Aisha drank tea or coffee – means 'Either Aisha drank tea, or she drank coffee—I don't know which.'
      (b) Example 2: Sentence – Aisha didn't drink tea or coffee – means 'Aisha didn't drink tea **and** she didn't drink coffee,' not 'Aisha didn't drink tea **or** she didn't drink coffee—I don't know which.' The 'or' seems to mean 'and' in this example.
   (3) As you can see, being able to interpret these sentences is not the same thing as knowing *why* they have the particular meanings that they do. Speakers of a language know what sounds right and what doesn't sound right, but they are almost never able to say how they know. Because most of what we know about our language is subconscious, the analysis of human linguistic systems requires considerable effort and ingenuity. As is the case in all scientific endeavors, observable facts (about the pronunciation of words, the interpretation of

sentences, and so on) must be used to draw inferences about the sometimes invisible mechanisms (atoms, cells, or grammars, as the case may be) that are ultimately responsible for these phenomena.

Relevance

What is the relevance of this entry for Advaita Vedanta Study?

Our main objective is the study of Advaita Vedanta philosophy. How is this entry relevant to the Advaita Study? Advaita uses ten principle upanisads, gita, and brahma-sutra scriptures for the study. The study is mostly initiated with a goal for removing the sufferings in one's life. This goal is slowly and systematically transformed into the ultimate goal of life (moksa), that is, to acquire self-knowledge: the essence (atma) of all individuals (thinker, doer, and experiencer) in the empirical world has an IDENTITY relationship with absolute and ultimate reality (brahman). This self-knowledge culminates in self-realization (experience – different from all other empirical experiences) of IDENTITY relation, depending on the clarity, intensity, and absence of any other obstruction.
All human knowledge and experiences occur in empirical world. Advaita Vedanta philosophy, that is, self-knowledge and self-realization also occur in empirical world. However, the subject matter of advaita philosophy is the essence of human beings (atma) and the absolute and ultimate essence (brahman). The subject matter does not belong to empirical world, it belongs in the transcendental world.
Now, we have a basic issue? The issue: how can the knowledge and experiences of entities belonging to transcendental world be acquired and validated based on the knowledge and experiences of the empirical world? The resolution to the issue involve language This can be explained as follows.

1. The texts for acquisition of self-knowledge are ten principle (foundational) upanisads, gita, and brahma-sutra. The foundational texts, that is, upanisads have no established authorship, they are based on the utterances of teachers, who had successfully acquired the self-knowledge and self-realization, passed on to their students and then from those students to their students and finally transcribed in Sanskrit language. Upanisads, thus, contains the description of self-knowledge and self-experiences, based on the consistency and validity available in empirical world over the many thousands of years. Upanisads are recognized at the maximum level as the description of transcendental world entities, and at a minimum level as the most authentic description of transcendental world entities possible in empirical world. Gita and brahma-sutra are authored by Ved Vyasa. They are respectively the practical and logical interpretation of upanisads.
2. Based on the above narrative, the study of advaita vedanta philosophy, using the texts of upanisads, gita, and brahma-sutra, can lead to two results,

a) As per the maximal recognition, the results will be direct self-knowledge and self-experience of atma and brahman.
b) As per the minimal recognition, the results will be indirect self-knowledge and self-experience of atma and brahman.

3. Let us now focus on the three steps of study process for self-knowledge: listening or reading the texts (sravanam); rational analysis of texts to remove all doubts and confusions(mananam); and finally, internalization of acquired self-knowledge, possibly resulting in self-realization(nididhyasanam). Listening/reading and rational analysis activity are relevant to our discussion here. They belong to language.
   a) Listening/Reading (sravanam)
      i) Practically, we read these texts as translation or as translation/commentary in English or Hindi. The objective of reading is twofold:
         (1) Recognition of proper words and sentences
         (2) Acquisition of intended meaning of the words and sentences etc.
      ii) The recognition of proper words and sentences in the text, requires the knowledge and understanding of the following components of language:
         (1) Phonetics – recognition of occurrence of proper sound of consonants and vowels of the word. Phonetics used is the phonetics of the language in play: Sanskrit, or Hindi, or English.
         (2) Phonology – recognition of proper pronunciation sound of consonants and vowels of the word. Phonology used is the phonology of the language in play: Sanskrit, or Hindi, or English.
         (3) Syntax – recognition of proper word and sentence. Syntax used is the syntax of the language in play: Sanskrit, or Hindi, or English.
      iii) The acquisition of intended meaning of words and sentences requires the knowledge and understanding of semantic of the language in play: Sanskrit, or Hindi, or English.
   b) Rational analysis (mananam)
      i) The purpose of rational analysis is to remove any doubts and confusions, remaining post sravanam. Indian logical systems are used for this purpose.
      ii) There are three Indian logical systems: advaita, mimamsa, nyaya.
      iii) Indian logic systems are extension of the semantic of Sanskrit language.
      iv) Indian logic rules are specific to the philosophy: Advaita, Mimamsa, Nyaya. Advaita has incorporated selected rules from Mimamsa and Nyaya in its logic.
      v) Traditionally, advaita logic is used to remove the doubts and confusions remaining after sravanam.
      vi) Traditionally, the use of non-advaita logic like nyaya is recommended to invalidate the doubts of other philosophies or thinkers.

Introduction to Contemporary Linguistics (English) – Part I – Phonetics: the sound of Language

Why is this entry focused on western language?

The underlying objective of Western and Indian languages is same. All Natural languages like Sanskrit, Hindi, English etc. deal with word and sentences; their structure (syntax); and their meaning (semantics). Similarly, Western, and Indian (Advaita and Nyaya) logic deal with rules and conditions for valid arguments: reach an inference based on a set of logical sentences (derived from the sentences of natural language). Each logical system has its own logical language to accomplish this objective. Further, logical languages have their own syntax and semantics.
Western linguistic (study of language) has made major advanced in recent past. Therefore, it is necessary to have separate entry for Western linguistic. This will complement our knowledge base of Indian Natural languages and Indian logic (Advaita and Nyaya). There will be a separate entry for linguistic of Sanskrit and Indian logic (advaita and nyaya). In addition, there will be a separate entry for Western logic (propositional and predicate).

Contents

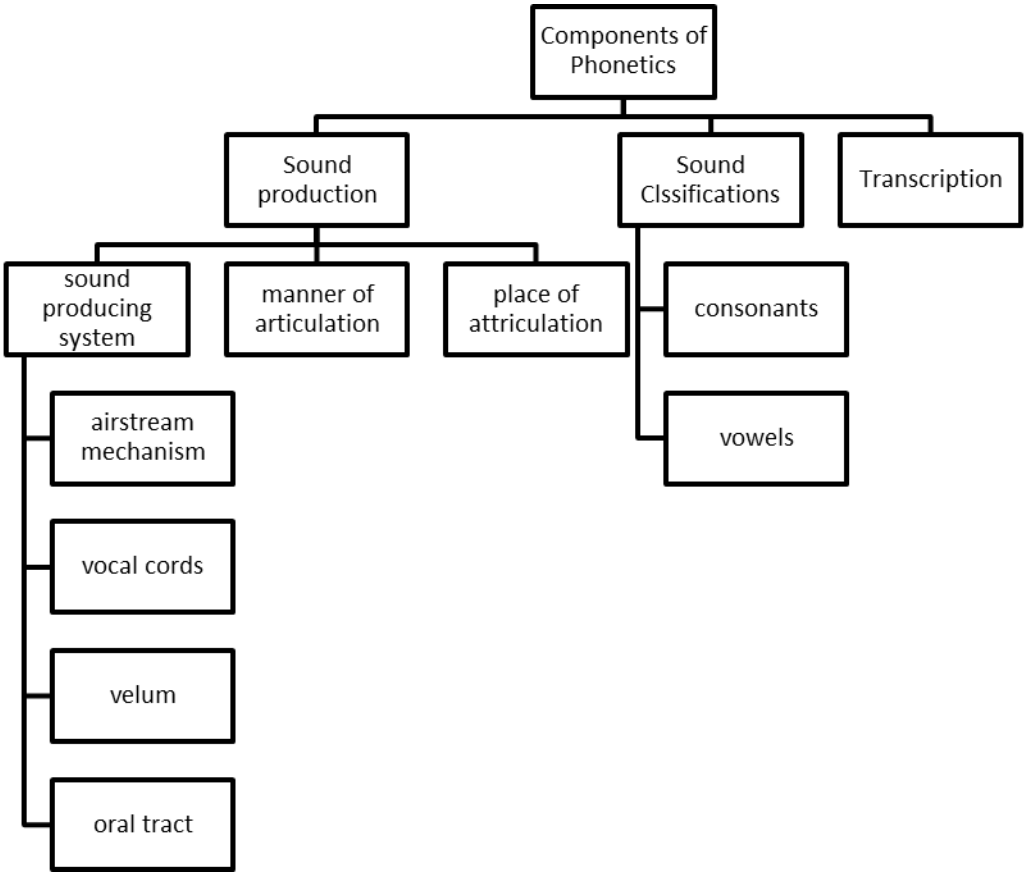
References

1. Contemporary Linguistics – An Introduction, of William O'Grady et al.
2. Exploring Language Structure – A student guide, of Thomas E. Payne.
3. Introducing Phonetics and Phonology – of Mike Davenport and S.J. Hannahs
4. The Study of Language – of George Yule

Phonetics – The sound of language

Introduction

1. Speaking is not necessary to use a language. Language can be written, manually signed, mechanically reproduced, and even synthesized by computers. Nevertheless, speech remains the primary way in which humans express themselves through language. Our species spoke long before we began to write, and this long history of spoken language is reflected in our anatomical specialization for speech. Humans also appear to have specialized neural mechanisms for the perception of speech sounds. Study of language by examining the inventory and structure of the sounds of speech is called phonetics. The components of phonetics are described in the following chart



2. Human languages display a wide variety of sounds, called *phones* (from Greek *phōnē* 'sound, voice') or *speech sounds*. The class of possible speech sounds is finite, and a portion of the total set will be found in the inventory of any human language. By some estimate, there are 600 consonants and 200 vowels in human language. Any human, whether child or adult, can learn to produce any human speech sound.
3. Phonetic transcription - since the sixteenth century, efforts have been made to devise a universal system for transcribing the sounds of speech. The best-known system, the International Phonetic Alphabet (IPA), has been evolving since 1888. This system of transcription attempts to represent each sound of human speech with a single symbol. The following IPA chart shows the symbols for consonants and vowel sounds. These symbols are independent of any particular language. This entry will be discussing the various components of phonetics based on IPA.

[note – we have empty space on this page to accommodate the full page IPA chart on next page]

THE INTERNATIONAL PHONETIC ALPHABET (revised to 2020)

CONSONANTS (PULMONIC) — ©℗® 2020 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	ʙ			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			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.

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

OTHER SYMBOLS

ʍ Voiceless labial-velar fricative
ɕ ʑ Alveolo-palatal fricatives
w Voiced labial-velar approximant
ɺ Voiced alveolar lateral flap
ɥ Voiced labial-palatal approximant
ʢ Simultaneous ʃ and x
ʜ Voiceless epiglottal fricative
ʡ Voiced epiglottal fricative
ʡ Epiglottal plosive

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

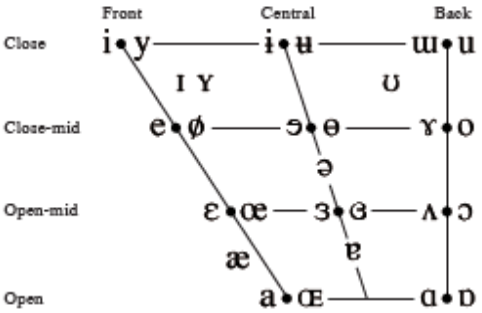
t͡s k͡p

DIACRITICS

◌̥	Voiceless	n̥ d̥	◌̤	Breathy voiced	b̤ a̤	◌̪	Dental	t̪ d̪
◌̬	Voiced	s̬ t̬	◌̰	Creaky voiced	b̰ a̰	◌̺	Apical	t̺ d̺
◌ʰ	Aspirated	tʰ dʰ	◌̼	Linguolabial	t̼ d̼	◌̻	Laminal	t̻ d̻
◌̹	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	e̟			
◌˞	Rhoticity	ə˞ a˞	◌̠	Retracted Tongue Root	e̠			

Some diacritics may be placed above a symbol with a descender, e.g. ŋ̊

VOWELS



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

SUPRASEGMENTALS

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

TONES AND WORD ACCENTS

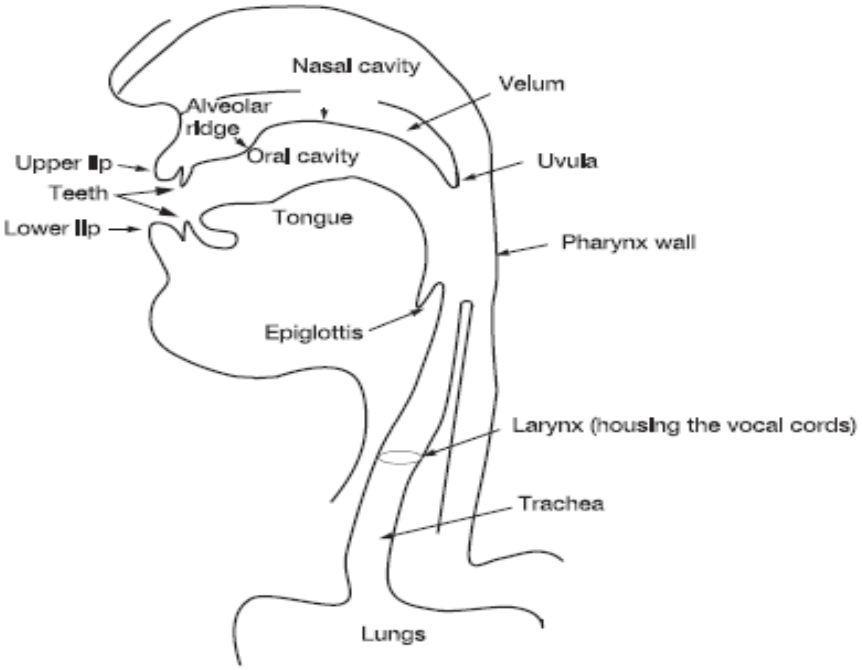
LEVEL		CONTOUR	
e̋ or ◌̋	Extra high	ě or ◌̌	Rising
é ◌́	High	ê ◌̂	Falling
ē ◌̄	Mid	e᷄ ◌᷄	High rising
è ◌̀	Low	e᷅ ◌᷅	Low rising
ȅ ◌̏	Extra low	e᷈ ◌᷈	Rising-falling
↓ Downstep		↗ Global rise	
↑ Upstep		↘ Global fall	

4. Now, each component of phonetics is discussed in detail.

Phonetics - Sound production

Sound production - system

Sound producing system consists of four mechanism: the *airstream mechanism* – where the air used in speech starts from and which direction it is travelling in; the *state of the vocal cords* – whether or not the vocal cords are vibrating, which determines voicing; the *state of the velum* – whether it is raised or lowered, which determines whether a sound is oral or nasal; the *place and manner of articulation* – the horizontal and vertical positions of the tongue and lip. Anatomic parts involved are shown in the figure below.



1. Air stream mechanism –
   a) There are two features of air stream mechanism – where is it initiated and which direction is it travelling in?
   b) There are three initiators of air stream.
      i) Pulmonic airstream – begins at the *lungs* and moves through the *trachea* (windpipe), *larynx* (in the Adam's apple) and vocal tract (mouth and nose). All human languages involve this type of airstream
      ii) Velaric airstream – begins at the *velum* (soft palate). It is used by some human languages.

iii) Glottalic airstream – begins at *glottis* (space between vocal cords). It is used by some human languages.

c) There are two directions of air stream.
   i) Moving outwards – called egressive. This is used by all languages.
   ii) Moving inwards – called ingressive. This is used by some languages.

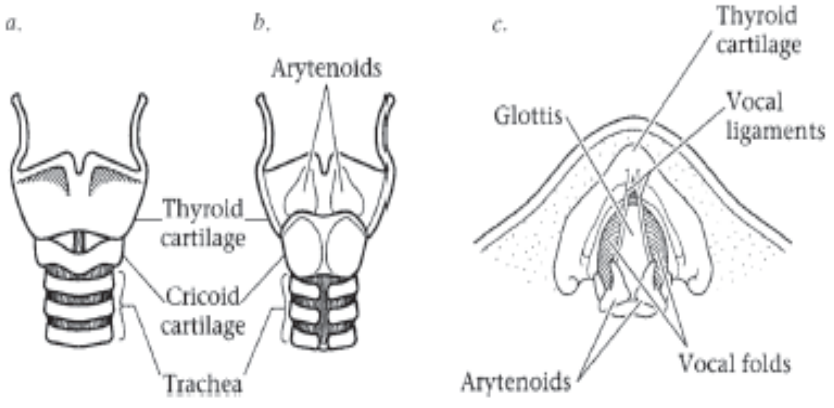
d) Thus, there are six possible airstream mechanisms:
   i) pulmonic egressive – used in all human languages. English language uses only this airstream mechanism.
   ii) pulmonic ingressive – not used in human languages
   iii) velaric egressive – not used in human languages
   iv) velaric ingressive – used in e.g., Zulu (S. Africa)
   v) glottalic egressive – used in e.g., Navajo (N. America)
   vi) glottalic ingressive – used in e.g., Sindhi (India).

e) As noted above in the list, two of the possible types – pulmonic ingressive and velaric egressive – are not found in any human language (it is unclear why this is so).

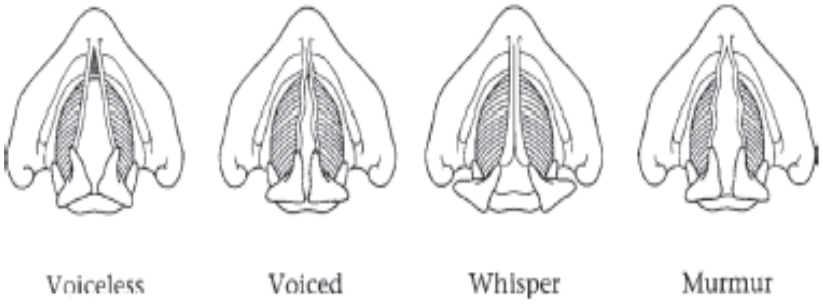
f) Having established the starting point of the airflow and the direction it is travelling in; we can then look at what happens to it as it moves over the other organs involved in speech sound production. For what follows, we will assume a pulmonic egressive airstream mechanism – used by English language

2. The Vocal cords

a) As air flows out of the lungs up the *trachea* (windpipe), it passes through a box-like structure made of cartilage and muscle; this is the *larynx* (commonly known as the voice box or Adam's apple), as shown in figure below. The main portion of the larynx is formed by the *thyroid cartilage*, which spreads outward at its front like the head of a plow. The thyroid cartilage rests on the ring-shaped *cricoid cartilage*. Fine sheets of muscle flare from the inner sides of the thyroid cartilage, forming the paired vocal folds (*vocal cords*). The inner edges of the vocal folds are attached to the vocal ligaments. The vocal folds can be pulled apart or drawn closer together, especially at their back (or posterior) ends, where each is attached to one of two small cartilages, the *arytenoids*. The arytenoids are opened, closed, and rotated by several pairs of small muscles (not shown in figure). As air passes through the space between the vocal folds, which is called *Glottis.* The larynx (which contains the glottic is shown below from three positions: figure a – from the front; figure b – from the back; figure c – from the top with vocal folds in open situation.



b) States of Glottis - The vocal folds may be positioned in several ways to produce different glottal states. There are four glottis states which are shown in the following diagram and then explained.



i) Voiceless - when the vocal folds are pulled apart (see first illustrated in the figure), air passes directly through the glottis without much interference. Any sound made with the vocal folds in this position is said to be **voiceless**. The initial sounds of *fish*, *sing*, and *house* are all voiceless. You can confirm a sound's voicelessness by touching your fingers to your larynx as you produce it. You will not feel any vibration from the vocal folds being transmitted to your fingertips. Voicelessness is a true speech state distinct from breathing; the vocal folds are not as far apart during speech voicelessness as they are in silent breathing.

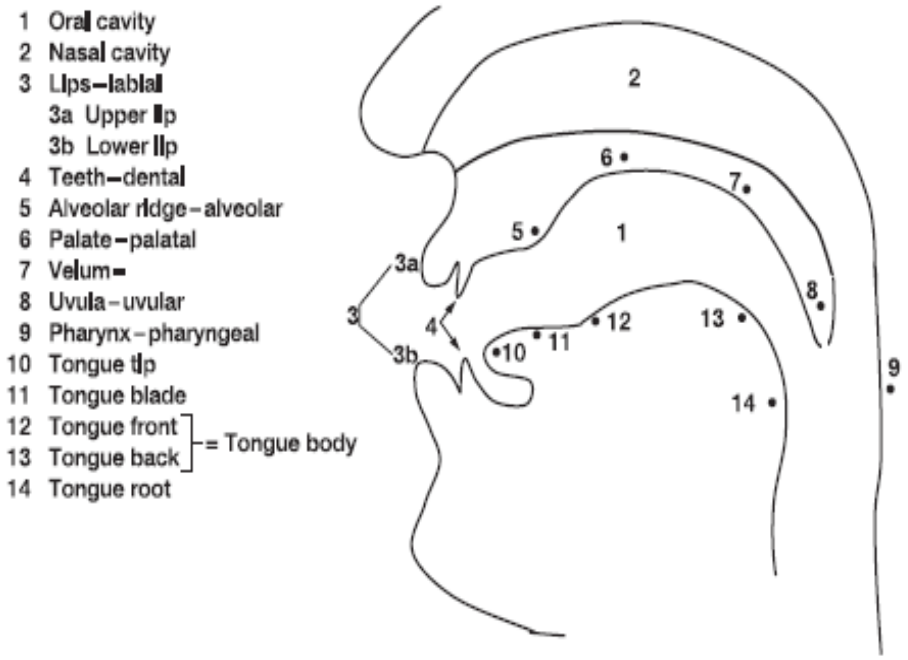
ii) Voice - when the vocal folds are brought close together but not tightly closed, air passing between them causes them to vibrate, producing sounds that are said to be **voiced**. (See the second illustration in the figure).You can determine whether a sound is voiced in the same way you determined voicelessness. By lightly touching your fingers to your larynx as you produce an extended version of the initial sounds of the words *zip* or *vow*, or any vowel, you can sense the vibration of the vocal folds within the larynx. It can be helpful to contrast voiced versus voiceless sounds while resting your hand on your throat.

iii) Wisper - another glottal state produces a **whisper**. Whispering is voiceless, but the vocal folds (see third illustration in the figure) are adjusted so that the anterior (front) portions are pulled close together, while the posterior (back) portions are apart.

iv) Murmur - yet another glottal state produces a **murmur**, also known as **breathy voice**. Sounds produced with this glottal configuration are voiced, but the vocal folds (see fourth illustration in the figure) are relaxed to allow enough air to escape to produce a simultaneous breathy effect. There are languages in the world (Hindi) that use breathy voice as an integral part of the sound system. Although it is difficult to generalize, sometimes when you see words or place names that have been borrowed

into English with spellings such as 'bh' as in *Bhagavad-Gita*, 'dh' as in *dharma* or *dhal*, or 'gh' as in *ghee,* they can represent murmured sounds.

3. The velum – The position of the velum is the next consideration (refer to the diagram below).The **velum**, or soft palate, is a muscular flap at the back of the roof of the mouth; this may be raised – cutting off the nasal tract – or lowered – allowing air into and through the



nose (see figure). When the velum is raised (known as 'velic closure'), the air can only flow into the oral tract, that is, the mouth; sounds produced in this way are known as ***oral sounds*** (all those in 'frog', for example). When the velum is lowered, air flows into both mouth and nose, resulting in ***nasal sounds*** (the first and last sounds in 'man' or the vowel in French *pain* 'bread', for example).

4. Oral Tract – The position of oral tract is the next consideration (refer to the diagram above). We have thus far considered the type of airstream mechanism involved in the production of a speech sound, the state of the vocal cords (whether the sound is voiced or voiceless) and the state of the velum (whether the sound is nasal or oral). We must now look at the state of the oral tract; in particular, the position of the ***active articulators*** (lower lip and tongue) in relation to the ***passive articulators*** (the upper surfaces of the oral tract).
   a) The **active articulators** are, as their name suggests, the bits that move – the lower lip and the tongue. It is convenient to consider the tongue as consisting of several sections (though these cannot move entirely independently, of course). These are the tip(10), blade(11), front(12), back(13) and root(14); the front and back together are referred to as the body (see figure above).
   b) The **passive articulators** are the non- mobile parts – the upper lip(3a), the teeth(4), the roof of the mouth and the pharynx wall(9). The roof of the mouth is further subdivided

into alveolar ridge(5), hard palate(6), soft palate or velum(7) and uvula(8). (see the figure above).

c) Consideration of the relative position of active and passive articulators allows us to specify what are known as the ***manner of articulation*** and the ***place of articulation*** of the speech sound. These will be discussed now.

Sound production – manner of articulation

Manner of articulation - *refers to the vertical relationship between the active and passive articulators*, i.e., the distance between them (usually known as **stricture**). There are two possible states: a) being close together, preventing air escaping; b) being wide apart, allowing air to flow through unhindered. There are variations in the manner of articulation takes place, producing different sounds. These are described below.

1. Stops - when the articulators are pressed together (known as **complete closure**), a blockage to the airflow is created, causing air pressure to build up behind the blockage. When the blockage is removed, the air is released in a rush. The sounds produced in this way are known as ***stops***.
   a) these may be oral (with velum raised), as in the first and last sounds in 'bad', or
   b) nasal (lowered velum), as in the first and last sounds in 'man'
   c) the only difference between these words is the position of the velum since the active articulators are in the same positions for both words.
2. Affricates - The first and last sounds in 'church' also involve complete closure but have a different release of air. In the oral stops we have looked at so far, the active articulator is lowered completely, giving a wide 'escape hole' for the air, as for the stop sounds in 'bad'; for the first and last sounds in 'church' the active articulator is lowered only slightly, giving a slower release of the air through a narrow channel between the articulators. As the air passes through this narrow space there is friction (see fricatives in the next paragraph). Sounds produced in this way are known as ***affricates***.
3. Fricatives - When the articulators are close together but without complete closure (a stricture known as ***close approximation***), the air is forced through the narrow gap between the articulators, causing some turbulence; sounds so produced are known as ***fricatives*** (the first and last sounds in 'fez').
4. Liquids, Glides, and Vowels - For the other major sound types – ***liquids, glides*** and ***vowels*** – there is free passage of air through the oral tract, though the exact relation between the articulators will vary. For vowels (the middle sounds in 'cat', 'dog', 'meat' etc.) and glides (sometimes known as 'semi-vowels'; the initial sounds in 'yak' and 'warthog'), the articulators are wide apart and the air flows out unhindered (this is known as ***open approximation***). For liquids (the first and last sounds in 'rail'), there is both contact and free air passage: for the 'r' sound, the sides of the tongue are in contact with the gums, but the air flows freely down the center of the tongue, and for the 'l' sound, the center of the tongue is

in contact with the alveolar ridge but the air flows out freely over the lowered sides of the tongue.

Sound production – place of articulation

Place of articulation - *refers to the horizontal relationship between the articulators*. It specifies the position of the highest point of the active articulator (usually some part of the tongue, but the lower lip may also be the active articulator) in relation to the passive articulator. The passive articulator involved typically gives its name to the place of articulation. The major places of articulation are shown in the following table. In the table most places of articulation are self-explanatory to the English speaker (see figure above).

Place of articulation	*Active articulator*	*Passive articulator*	*Example*
Bilabial	lower lip	upper lip	bat
Labiodentals	lower lip	upper teeth	fish
Dental	tongue tip or blade	upper teeth	moth
Alveolar	tongue tip or blade	alveolar ridge	dog
Retroflex	curled tongue tip	area immediately behind alveolar ridge	Malayalam [kuṭṭi] 'child'
palato-alveolar (or alveo-palatal)	tongue blade	area immediately behind alveolar ridge	shark
Palatal	tongue front	hard palate	yak
Velar	tongue back	velum	goat
Uvular	tongue back	uvula	French rat 'rat'
Pharyngeal	tongue root	pharynx wall	Arabic [ʕamm] 'uncle'
Glottal	vocal cords	vocal cords	hare

Let discuss two places of articulations that were not mentioned earlier: retroflex and pharyngeal.

1. A ***retroflex sound*** involves a particular shape of the tongue as well as a horizontal relationship between the articulators. The tongue tip is curled towards the back of the mouth. Such sounds may be heard in Indian English for 't' and 'd' due to the influence of native languages of the Indian subcontinent, many of which have retroflex consonants.
2. A ***pharyngeal*** sound involves moving the root of the tongue towards the back of the throat, i.e., the pharynx wall. Such sounds are common in many varieties of Arabic and Hebrew.

It is also possible for a speech sound to have two places of articulation simultaneously, known as 'dual articulation'. The articulations may be of equal importance, as in the initial labial-velar sound in 'wombat', involving as active articulators the lower lip and the back of the tongue, or one place may be 'added on' to another (primary) place. This latter situation is found, for example, in the palatalized stops of Slavic languages such as Polish or Russian, where a raising

of the tongue body towards the hard palate accompanies the main place of articulation of the stop, as in Russian [brat^{j}] ‘to take’.

Phonetic (sound) - classification

Introduction

1. We now have a method of describing the articulation of any speech sound by specifying
   a) the airstream mechanism,
   b) the state of the vocal cords,
   c) the position of the velum,
   d) the place of articulation, and
   e) the manner of articulation.
2. The sounds of language can be grouped into **natural classes** based on the phonetic properties that they share. The most basic division among sounds is into two major classes, **Consonants** and **Vowels**
   a) Consonants –
      i) The ‘p’ sound in ‘pig’ could be classified – using these five features – as a *pulmonic egressive*, *voiceless*, *oral, bilabial*, *stop*.
      ii) It is common practice to use three-term classification for consonants:
         (1) voicing,
         (2) place, and
         (3) manner
      iii) Airstream and velum only referred to when they are not pulmonic egressive and oral, respectively
      iv) Examples:
         (1) The ‘p’ sound in ‘pig’ is normally referred to as a voiceless bilabial stop
         (2) The ‘z’ sound in ‘fez’ is a voiced alveolar fricative
   b) Vowels –
      i) For vowels, the classification is slightly different.
         (1) Voicing is typically irrelevant, since in most languages, vowels are always voiced,
         (2) Vertical (manner for consonants) and horizontal (place for consonants) dimensions are more restricted. All vowels are produced with a stricture of open approximation, so manner as employed for consonants is irrelevant.
         (3) However, different vowels do involve differences in the highest point of the tongue; for the vowel sound in ‘sit’ the tongue is higher than for the vowel sound in ‘sat’; we refer to ‘high’, ‘mid’ and ‘low’ vowels, indicating the degree of tongue raising. Horizontally, vowels are restricted to the palatal and velar regions; compare the vowels in ‘fee’ (made in the palatal area) and ‘far’ (made further back in the velar area); in this dimension we refer to vowels as ‘front’, ‘central’

and 'back', indicating the horizontal position of the highest point of the tongue. There is a further consideration for vowels, however, not usually relevant for consonants: that of lip ***rounding***. (Note that even though the upper lip is considered a passive articulator, it does participate in lip rounding.) The vowel sound in 's<u>ee</u>' involves no lip rounding, while the lips are rounded for the vowel sound in 's<u>ue</u>'; you can check this by looking in a mirror as you say these sounds. Thus, the vowel sound in 's<u>ee</u>' can be referred to as a high front unround vowel, that in 's<u>o</u>rt' as a mid back round vowel.

Consonants

1. As we read in the introduction of this section, the class of consonants can be divided into several subgroupings based on their manner of articulation. The first division we will consider here is ***obstruent*** versus ***sonorant***.
   a) For obstruents, the airflow is noticeably restricted, with the articulators either in complete closure or close approximation. The class of obstruents can be further subdivided based on stricture type.
      i) ***stops,***
      ii) ***fricatives,*** and
      iii) ***affricates***
   b) For sonorants, either there is no such restriction in the oral tract, or the nasal tract is open; either way, the air has free passage through the vocal tract. The vowels are slso sonorants, but not sonorant consonants. The class of **sonorant consonants** can be further subdivided.
      i) ***nasals***,
      ii) ***liquids,*** and
      iii) ***glides***
2. A further important distinction between obstruents and sonorants is with reference to voice.
   a) Obstruent subtypes listed may have both voiced and voiceless counterparts in most languages,
   b) Sonorant subtypes are typically only voiced.
   c) English can distinguish 'pad' from 'bad' due to the voicing contrast of the initial bilabial obstruents (stops) represented orthographically by 'p' and 'b'. With sonorants no such pairs exist; for the nasals, for example, there is only one bilabial – the (voiced) nasal found in '<u>m</u>ad' – and no voiceless bilabial nasal.

3. An inventory of English language consonants is shown below.

I *Obstruents*			
Ii *Stops*		*Symbol*	*Examples*
bilabial	voiceless unaspirated	[p]	happy, tap
	voiceless aspirated	[pʰ]	pit
	voiced	[b]	bit, rubber, lob
alveolar	voiceless unaspirated	[t]	writer, hit
	voiceless aspirated	[tʰ]	tip
	voiced	[d]	dip, rider, bid
	voiced flap	[ɾ]	writer, rider (North American English)
velar	voiceless unaspirated	[k]	looking, tick
	voiceless aspirated	[kʰ]	kit
	voiced	[g]	game, muggy, dog
glottal	voiceless	[ʔ]	writer, hit (many British English varieties)
Iii *Affricates*			
palato-	voiceless	[ʧ] ([č])	chuck, butcher, catch
alveolar	voiced	[ʤ] [(ǰ)]	jug, lodger, fudge
Iiii *Fricatives*			
labio-dental	voiceless	[f]	fun, loafer, stuff
	voiced	[v]	very, liver, dive
dental	voiceless	[θ]	thin, frothing, death
	voiced	[ð]	then, loathing, bathe
alveolar	voiceless	[s]	sin, icing, fuss
	voiced	[z]	zoo, rising, booze
palato-	voiceless	[ʃ]([š])	ship, rasher, lush
alveolar	voiced	[ʒ]([ž])	treasure, rouge
glottal	voiceless	[h]	hop
velar	voiceless	[x]	loch (Irish Eng, Sc Eng, Welsh Eng)

II *Sonorants*			
Iii *Nasals*			
bilabial		[m]	man, tummy, rum
alveolar		[n]	nod, runner, gin
velar		[ŋ]	drinker, thing
Iiii *Liquids*			
alveolar	'clear'	[l]	long, mellow
lateral	'dark' (velarised)	[ɫ]	dull
alveolar		[ɹ]	run, very (also car, cart in rhotic varieties – e.g. Scottish English, North American English)
rhotic			
Iiiii *Glides*			
palatal		[j]	yes
labial-velar		[w]	with

Vowels

1. As we read in the introduction of this section, criterion used for consonants sub classifications cannot be used for vowels.
   a) Vowels are articulated in a manner different to that of consonants: the articulators are far enough apart to allow the airflow to exit unhindered, that is, with open approximation. Therefore, the manner of articulation classifications used for consonants are inappropriate for vowels.
   b) Vowels are produced in a smaller area of the vocal tract – the palatal and velar regions – which means that the consonantal place specifications are also inappropriate.
   c) Vowels are sonorants, that is, that they are typically voiced. Hence the voiced/voiceless distinction important for consonants is generally unnecessary.
2. However, voiceless vowels are also found in some languages.
   a) In Japanese, Ik (Uganda) and several Native American languages of the Pacific Northwest. The status of these vowels is not always clear: often, as in Japanese, voiceless vowels are positional variants of voiced counterparts.
   b) A small number of languages have vowels produced with other glottal states, such as the breathy voiced or murmured vowels of Gujarati (India).
3. There is nonetheless an established three-term classification system for vowels like that for consonants.
   a) ***Vowel height*** (like consonantal manner) – is determined by the distance between the articulators: the higher the tongue, the higher the vowel, with the classifications being **high, mid,** and **low**, with intermediate terms **high-mid** and **low-mid** being available if necessary. (The alternative terms 'close' and 'open', for high and low, are used sometimes). The vowels in English 'see', 'set' and 'car' are high, mid, and low, respectively.
   b) ***Vowel backness*** (like consonantal place) - is classified horizontally, as **front**, **central** and **back**, referring to which part of the tongue is highest, with front being equivalent to palatal and back equivalent to velar. The vowels in most varieties of English 'sit', 'sir' and 's<u>oo</u>n' are front, central, and back, respectively. The figure below shows a midsagittal view of the tongue position for the vowels [i], [ɑ], and [u] based on X-ray studies of speech.

c) ***Vowel rounding*** - The third classification has to do with the attitude of the lips, which are either **rounded** or **unrounded** when making vowel sounds. If you look in a mirror, you should be able to see that when you produce the vowel in English 'see' your lips are unrounded (or spread), while for the vowel in 'sue' your lips are rounded.

d) Examples:

i) The vowel 'i' in 'fish' is classified as a high front unround vowel.

ii) The vowel 'o' in 'horse' is a low-mid back round vowel.

4. So far, we have classified vowels in terms of quality: height, backness, and roundness. There are several other distinctions which are relevant to the description of vowels: such as how long the vowel lasts (***vowel length***); whether or not the tongue remains in the same position during the production of the vowel (***monophthong*** vs. ***diphthong)***; whether the velum is raised or lowered (***nasality***).

a) ***Vowel length***

i) Consider the English words 'sit' and 'seat'; you should be able to hear that the vowel in 'seat' [i] is considerably longer lasting than that in 'sit' [ɪ]. While there are other differences between the vowels ([ɪ] is also lower and more central than [iː]), one of the most obvious differences is their length: [ɪ] is a short vowel, [iː] is long (the colon indicates a long vowel). Long vowels are typically 50 to 100 per cent longer than short vowels and are sometimes represented by doubling the symbol (rather than using a colon) to indicate this; thus, [ii] for the vowel in 'see'. This notation also represents long vowels as being in some ways like diphthongs (discussed later in this section).

ii) While length in most kinds of English is never the sole factor distinguishing between vowels (as in 'sit' vs. 'seat'), this is not always the case for all languages. For example, Danish *loesse* 'to load' is distinguished from *loese* 'to read' purely by the length of the first vowel; [lɛsə] versus [lɛːsə] (the [ə] represents a vowel sound like that at the beginning of 'about').

iii) Similarly, in several Scottish and Northern Irish varieties, length may be the only factor distinguishing between pairs of words like 'road' [rod] and 'rowed' [roːd], or 'daze' [dez] and 'days' [deːz] (for most English speakers, these words will be homophones).

b) ***monophthong*** vs. ***diphthong***

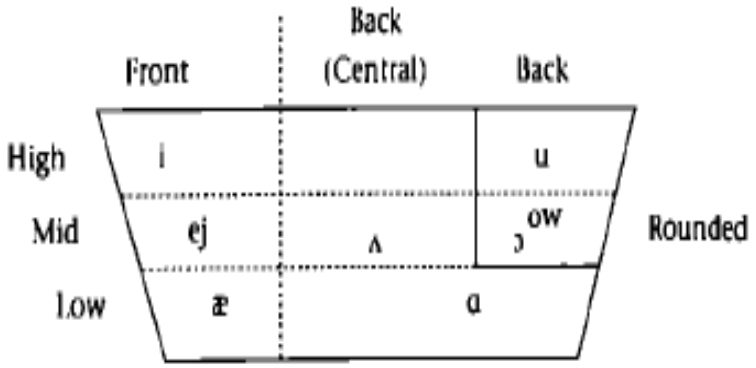
i) Monophthong - vowels do not show a noticeable change in quality during their articulation. The vowels of *pit*, *set*, *cat*, *dog*, *but*, *put*, and the first vowel of *suppose* are all simple vowels.

ii) Diphthong - vowels that exhibit a change in quality within a single syllable. English diphthongs show changes in quality that are due to tongue movement away from the initial vowel articulation toward a glide position. In the vowels classified as *major*

diphthongs, the change in articulation is quite extreme and hence easy to hear. Listen to the change in articulation in the following words: *buy* ([aj]), *boy* ([oj]), and *now* ([aw]). Each of these diphthongs starts in one position (e.g., [a]) and ends up in another position (e.g., [w]). In *minor* diphthongs, the change in position of the articulators is less dramatic. If you listen carefully and note the change in your tongue position as you say *play* ([ej]) and your lip position as you say *go* ([ow]), you will realize that in each of these diphthongs, too, the starting position is different from the ending position. In the vowels of words like *heed* and *lose*, the change is more difficult to hear and in fact is not made by all English speakers, so we will not transcribe these as diphthongs.

c) ***nasality***
   i) Finally, as with consonants, it is possible to distinguish between vowels by considering the state of the velum; vowels produced with a lowered velum are known as ***nasal vowels*** and those produced with raised velum are known as oral vowels.
   ii) French contrasts the two types in pairs such as *banc* [bɑ̃] 'bench' versus *bas*[bɑ] 'low', where a diacritic '~' (tilde) above the vowel indicates a nasal vowel.
   iii) English doesn't make contrasts of this sort but does have ***nasalised vowels***; a vowel preceding a nasal stop will be produced with the velum lowered in anticipation of the following consonant, as in 'bean' [bĩːn]. That is, the vowel assimilates to the nasality of the following stop.

5. English language vowels are shown below.
   a) Monophthong vowels –



   b) Diphthong vowels - [eɪ, aɪ, aʊ, ɔɪ, oʊ]

Phonetic - transcription

1. As discussed in the introduction, efforts have been made since the sixteenth century to devise a universal system for transcribing the sounds of speech. The best-known system, the International Phonetic Alphabet (IPA), has been evolving since 1888. This system of transcription attempts to represent each sound of human speech with a single symbol. These symbols are enclosed in brackets [ ] to indicate that the transcription is phonetic and does not represent simple spelling. For example, the sound spelled *th* in English *this* is transcribed as [ð] (the symbol is called *eth*, as in *weather*). The IPA uses this symbol to represent that sound in whichever language it is heard, whether it is English, Spanish, or Turkmen (a Turkic language spoken in Central Asia and written in the Cyrillic alphabet). Use of [ð] in transcribing speech phonetically is shown in the following table.

Language	Spelling	IPA	Meaning
English	this	[ðis]	'this'
Spanish	boda	[boða]	'wedding'
Turkmen	aдak	[aðak]	'foot'

IPA has also transcribed the sounds of Sanskrit and Hindi Language

2. The following two tables [2.17 and 2.16 – reference William O'Grady book] present the phonetic symbols for vowels and consonants commonly used to transcribe American English. To illustrate how each symbol is used, one word is transcribed completely, and then some other words in which the same sound is found are given. You will notice that in the example words, the spelling of the sound may vary. Be careful of this when you transcribe words phonetically-the sound of a word, not its spelling, is what is transcribed!

TABLE 2.17 Transcribing English vowels

Symbol	Word	Transcription	More examples
[i]	fee	[fi]	she, cream, believe, receive, serene, amoeba, creepy
[ɪ]	fit	[fɪt]	hit, income, definition, been (for some speakers)
[ej]	fate	[fejt]	they, clay, grain, gauge, engage, great, sleigh
[ɛ]	let	[lɛt]	led, head, says, said, sever, guest
[æ]	bat	[bæt]	panic, racket, laugh, Vancouver
[u]	boot	[but]	to, two, loose, brew, Louise, Lucy, through
[ʊ]	book	[bʊk]	should, put, hood
[ow]	note	[nowt]	no, throat, though, slow, toe, oaf, O'Conner
[oj]	boy	[boj]	voice, boil, toy
[ɑ]	saw	[sɑ]	cot, caught, father, bought, across, Toronto
[ʌ]	shut	[ʃʌt]	other, udder, tough, lucky, was, flood
[ə]	roses	[rowzəz]	collide, hinted, telegraph, (to) suspect
[aw]	crowd	[krawd]	(to) house, plow, bough
[aj]	lies	[lajz]	my, tide, thigh, buy

TABLE 2.16 Transcribing English consonants

Symbol	Word	Transcription	More examples
[pʰ]	pit	[pʰɪt]	pain, upon, apart
[p]	spit	[spɪt]	spar, crispy, upper, Yuppie, culprit, bumper
[tʰ]	tick	[tʰɪk]	tell, attire, terror, Tutu
[t]	stuck	[stʌk]	stem, hunter, nasty, mostly
[kʰ]	keep	[kʰip]	cow, kernel, recur
[k]	skip	[skɪp]	scatter, uncle, blacklist, likely
[tʃ]	chip	[tʃɪp]	lunch, lecher, ditch, belch
[dʒ]	judge	[dʒʌdʒ]	germ, journal, budgie, wedge
[b]	bib	[bɪb]	boat, liberate, rob, blast
[d]	dip	[dɪp]	dust, sled, draft
[ɾ]	butter	[bʌɾər]	madder, matter, hitting, writer, rider
[g]	get	[gɛt]	gape, mugger, twig, gleam
[f]	fit	[fɪt]	flash, coughing, proof, phlegmatic, gopher
[v]	vat	[væt]	vote, oven, prove
[θ]	thick	[θɪk]	thought, ether, teeth, three, bathroom
[ð]	though	[ðow]	then, bother, teethe, bathe
[s]	sip	[sɪp]	psychology, fasten, lunacy, bass, curse, science
[z]	zap	[zæp]	Xerox, scissors, desire, zipper, fuzzy
[ʃ]	ship	[ʃɪp]	shock, nation, mission, glacier, wish
[ʒ]	azure	[æʒər]	measure, rouge, visual, garage (for some speakers), Taj Mahal
[h]	hat	[hæt]	who, ahoy, forehead, behind
[j]	yet	[jɛt]	use (before the *u*), yes, cute (between the *c* and the *u*)
[w]	witch	[wɪtʃ]	wait, weird, now, queen (between the *q* and the *ee*)
[ʍ]	which	[ʍɪtʃ]	what, where, when (only for some speakers)
[l]	leaf	[lif]	loose, lock, alive, hail
[l̩]	huddle	[hʌdl̩]	bottle, needle
[r]	reef	[rif]	rod, arrive, tear
[ɹ̩]	bird	[bɹ̩d]	early, hurt, stir, purr, doctor
[m]	moat	[mowt]	mind, humour, shimmer, sum, thumb
[m̩]	'm-m'	[ʔm̩ʔm̩]	bottom, random
[n]	note	[nowt]	now, winner, angel, sign, wind
[n̩]	sadden	[sædn̩]	Jordan, mitten
[ŋ]	sing	[sɪŋ]	singer, longer, bank, twinkle