# Sutra 9. The Atoms of Language – Speech Sounds

**Sutra 9** will examine the physical substance of language – sounds. Speech sounds are the building blocks of morphemes and word-meanings – they are the 'atoms' that make up the larger elements and units of Language.

## 9.1 Phonetics vs. Phonology

Linguistics, we remember, is concerned primarily with *spoken* language.
***Phonetics*** is the study of <u>*speech sounds*</u>. Its aims are to describe and to explain these sounds. Phonetic description is based on *observable* facts about sounds: how they are produced, what they sound like, and what measurable physical properties they have.

***Articulatory phonetics*** (our primary interest in this course) focuses on how we make or '*articulate'* speech sounds. It looks at the movements of the muscles and other bits of our anatomy during speech, and at how we actually make, transmit and perceive speech sounds.

***Acoustic phonetics*** looks at speech sounds as physical events with measurable properties such as duration, energy, wavelength, etc. It relies on instrumental analysis to extract these properties, and applies statistical and other techniques to the measurements obtained. This approach does not concern us here.

***Phonology***, on the other hand, deals specifically with the sounds and *sound patterns* of individual languages.

While ***phonetics*** is the study of all human speech sounds, ***phonology*** is the study of a <u>subset</u> of the sounds human throats are capable of producing; it looks at how these characteristic speech sounds combine to create meaning in a particular language.

**Our goal** in this unit is to learn about:

- ⇒ what *speech sounds* are,
- ⇒ how speech sounds are produced,
- ⇒ how we can write them down, and
- ⇒ how they combine and *interact in connected speech*.

This knowledge will help you speak more clearly (and therefore *effectively*), understand the speech of others more easily, and overcome problems with the spelling and pronunciation of unfamiliar words. Knowing how to write (transcribe) sounds will also make it possible for you to write down the sounds of yet unwritten languages, and in so doing maybe even save some of them from dying.
What visual symbols can we use to represent the flow of speech?

## 9.2 Sound Symbols: International Phonetic Alphabet (IPA)

All sciences require the ability to record and classify data/ideas. People have invented many ways of writing down their thoughts. The majority of written languages today use *alphabetic* writing, which is, essentially, a set of written symbols, each representing a different sound of the language. This correspondence, however, is not always so straightforward – in English, for example,

⇒ ***a single sound can have many different spellings:***

| | | |
|---|---|---|
| he, she | e | One sound: |
| believe | ie | |
| Caesar | ae | |
| see | ee | [ɪ] |
| people | eo | |
| seize, receive | ei | |
| seas | ea | |
| amoeba | oe | |
| key | ey | |
| machine | i | |

⇒ ***a single spelling can correspond to many different sounds:***

| | |
|---|---|
| dame | [deim] |
| dad | [dæd] |
| father | [faːðər)] |
| call | [kɔ:l] |
| village | [vilidʒ] |
| many | [meni] |

⇒ ***individual speech sounds are often represented by multiple letters:***

| | |
|---|---|
| shoot | [ʃu:t] |
| either | [aiðə(r)] |
| character | [kærəktə(r)] |
| deal | [di:l] |
| Thomas | [tɔməs] |
| physics | [fiziks] |
| rough | [rʌf] |

⇒ ***letters in spelling are often not pronounced:***

| | |
|---|---|
| mnemonic | [niˈmɔnik] |
| pneumatic | [nju:ˈmætik] |

| | |
|---|---|
| psychology | [saikɔlədʒi] |
| resign | [ri'zain] |
| ghost | [gəʊst] |
| island | [ailənd] |
| whole | [həʊl] |
| debt | [det] |
| thumb, bomb | [θʌm] [bɔm] |
| knot, know | [nɔt] [nəʊ] |

⇒ ***individual letters sometimes correspond to two speech sounds:***

| | |
|---|---|
| cute, universe | [kju:t] [ju:nivɜ:s] |
| ax, fax, exam, exactly | [æks] [fæks] [igzæm] [igzæktli] |

Confusing, huh? Yet, investigating speech sounds we must have a way of writing them down. Maybe there are languages more consistent than English? Indeed, the so-called 'phonetic' languages (like Russian, Latvian, etc.) show more regular spelling-sound correspondences, but they still do not provide us with a universal way of writing sounds, because the sounds of different languages vary. For example, 'Jesus' is pronounced differently in Spanish ('j' is pronounced as a velar fricative), in German and Latvian ('j' is pronounced as a palatal glide), and in English, where 'j' is pronounced as a palato-alveolar fricative [dʒ].

That is why linguists had to abandon conventional alphabets and devise special systems of notation, in which one symbol represents only one speech sound. Perhaps the best known of these is the International Phonetic Alphabet (IPA), which provides a one-to-one mapping from sounds to written symbols, and can be used for any dialect of any language. Symbols representing sounds are put into square brackets, so that a word such as *cat* is transcribed [kæt] and a phrase such as *'Don't you lose me now'* may be transcribed as [dəʊntʃə lu:zmi naʊ]! See the chart of IPA symbols at the end of Sutra 10.

A number of IPA symbols are borrowed from the conventional written alphabet:

[b] as in ***b***ird
[d] as in ***d***og

Other symbols are modifications of alphabet letters:

[ŋ] as in ba***ng*** is a combination of *n* and *g,*
[ɪ] as in h***i***t is a small-size capital I, etc.

Sometimes obsolete letters are used:
[ʃ] as in di***sh***

Some symbols are from the Greek alphabet:

[θ] as in ***th***in,

and a few symbols are inventions, i.e., the so-called 'dark /ɫ/'

[lʌɫ] as in lu*ll* [lʌɫ] where [l] is a 'clear /l/' and [ɫ] is a 'dark /ɫ/'

In English RP, clear /l/ occurs before a vowel, while dark /ɫ/ occurs after a vowel. However, this is a language-specific rule: in Scottish English, initial /l/ is dark, in German, the final /l/ is clear.

Sometimes supplementary marks ('*diacritics*') are added to the symbols. For example, two dots indicate length:

long /uː/ as in b***oo***t.

By such means the IPA has built up a store of well over a hundred symbols which can, in theory, represent any sound in any language.

IPA is useful to more than academic linguists: people, familiar with the symbols, have no problem in pronouncing unfamiliar words when they look them up in a dictionary featuring phonetic transcription. Among other groups that make extensive use of the IPA are musicians, who wish to sing the lyrics of songs written in languages they do not speak, and actors and secret agents, who regularly use IPA as a guide in learning to imitate unfamiliar voices and accents.

### 9.3 IPA Symbols for the Sounds of English

Before we go into speech sounds, 3 basic concepts that should be familiar to you already:

**consonant**: a speech sound produced by completely or partly stopping the air breathed out through the mouth: p, b, m, k, etc.

**vowel**: a speech sound produced by free flow of air through the speech tract (no contacts or strictures there that you can feel with any precision): a, o, e, u, etc.

**diphthong**: a union of two vowel sounds, as in pipe, out, ate, tour, etc.

We already know that none of the world's alphabets represent sounds exactly as we speak them - that is why linguists use IPA, which has symbols for all the sounds of world's languages. Unfortunately, we cannot learn them all due to the constraints of this course. Since you are a speaker of English, we shall limit ourselves to learning only the 44 symbols for the familiar to us sounds of RP English.

Although the phonetic script used to represent sounds looks complicated, many of the characters used are those found in the regular English alphabet. 15 letters of the English alphabet are used in a very similar way in the phonetic alphabet; they are all consonants [‘kɔnsənənts]:

/b/ as in bag
/d/ as in dog
/f/ as in fat
/g/ as in gap
/h/ as in hat
/l/ as in lap
/m/ as in map
/n/ as in nap
/p/ as in pap
/r/ as in rap
/s/ as in sap
/t/ as in tap
/v/ as in vet
/w/ as in wet
/z/ as in zip

Two more letters found in the English alphabet are used in the phonetic script: k and j, but they are used in different ways:

- Both letters ***k*** and ***c*** – will often be pronounced and transcribed in a similar way*: **/k/** as in *k*eep, *k*in, *k*een, or *c*reep, *c*ream, s*c*reen, *c*lip, *c*ap, etc. (* Letter ***c***, however, will often be pronounced like /s/, as, for example, in *receive, proceed, conceive, perceive*, etc. – this happens only if it is followed by the [ɪ:] sound).

- The /j/ symbol is used in a completely different way to the ***j*** in *j*am or *j*og; it is used to represent many of the sounds we associate with the letter ***y***:

  /j/ as in bo***y***, so***y***, jo***y***, etc.

- There is also <u>one vowel</u> that has the same symbol in English as in the phonetic script, and that is:

  /e/ as in ***e***gg, b***e***g, etc.

**IPA Symbols Different from Those Found in the English Alphabet**

/ ʃ / as in ship
/ tʃ / as in chip
/ dʒ / as in jeep
/ ʒ / as in measure
/ θ / as in think
/ ð / as in this
/ ŋ/ as in hang

**Pure Vowels [‘pjʊə ‘vaʊəlz]**

/ æ / as in apple
/ ʌ / as in cut
/ i / as in bit
/ ɪ:/ as in feet
/ ə / as in the
/ ʊ / as in book
/u:/ as in shoe
/ ɒ / as in cot
/ɔ/ as in boy
/ɔ:/ as in pour
/e / as in bed
/a:/ as in car
/ɜ: / as in fur

**Diphthongs [‘difθɔŋz]**

/ei/ as in bay
/ai/ as in buy
/ɔi/ as in boy
/aʊ/ as in out
/əʊ/ as in boat
/ɪə/ as in beer
/eə/ as in bear
/ɛə/ as in fair
/ʊə/ as in doer

The following signs are not strictly used in British English but are commonly understood by R.P. speakers:

/ʍ/ as in whistle where the /w/ is very weak

/X / as in loch
/ʔ / as in butter where /t/ is replaced by the glottal stop: [bʌʔə]

## 9.4 Phonetics: Organs of Speech

The sounds of speech – they are so distinct from all the other sounds we hear. Have you ever wondered what makes them so different? Let us first see what makes the sounds of different musical instruments so distinct: the drums, the guitar, or the piano – they all make their own sounds because of their different shapes and structures. Is this the answer? The special features of our speech organs must determine the quality of the sounds we produce! A look at the special 'design' features of our speech mechanism will help us understand how it can make all the sounds of world's languages.

Our description of human speech organs will necessarily contain some references to the sounds they make, so let's rub them in, again:

- ***consonant***: a speech sound produced by completely or partly stopping the air breathed out through the mouth: *p, b, m, k,* etc.

- ***vowel***: a speech sound produced by free flow of air through the speech tract (no contacts or strictures there that you can feel with any precision): *a, o, e, u*, etc.

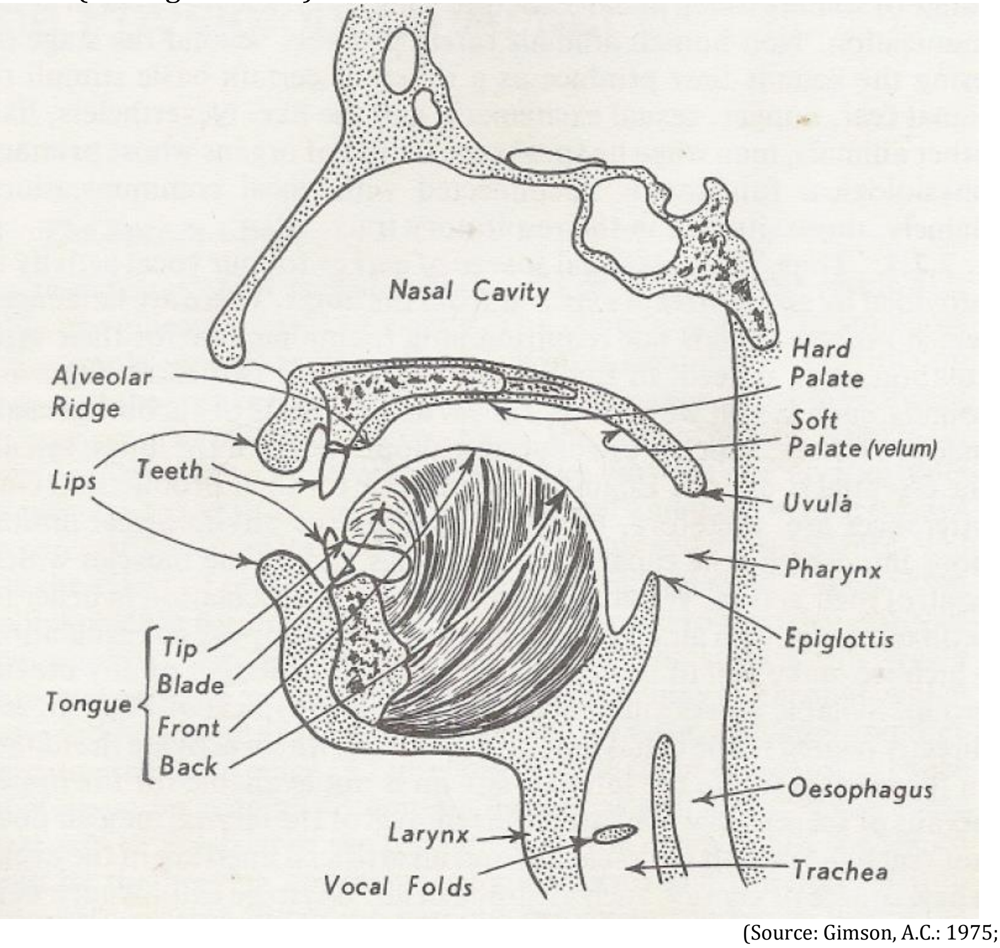
- ***diphthong***: a union of two vowel sounds, as in p*i*pe, *ou*t, *a*te, *tour,* etc.

### 'Organs of Speech' – the Speech Mechanism

The first requisite of speech is breath: it provides the ***energy*** needed for sound production. During the act of normal healthy breathing, air comes from the lungs up through the windpipe (***trachea***) and out either through the nose or through the mouth. Normally, breath is silent and in order to convert it into speech we must make some kind of intentional modification of the stream of breath air. This can be done at a great number of different points on its way out of the lungs, through the respiratory tract and through the mouth and nose. These points at which the breath stream can be modified to produce sounds are called organs of speech or speech organs:

- The vocal cords (vocal folds)
- The lips
- The tongue
- The roof of the mouth

The first three speech organs are movable, while the last is fixed, except for the soft palate (Re: Fig. 1 below):




(Source: Gimson, A.C.: 1975; p.10)

**Fig. 1 Organs of Speech (a schematic diagram)**

## The Vocal Folds

The first point at which the breath stream can be modified is the ***larynx*** (commonly called the '*Adam's apple*'). It is at the upper end of the windpipe; it is a bony structure rather like a box which contains two lip-like structures, stretched from the front to the back of the larynx: they are called the *vocal cords* (or, rather, *folds*). They are fixed in the front but in the back each of them is attached to *movable* cartilages.*

* **cartilage**: the tough white flexible tissue attached to the bones of animals

The whole of the larynx containing the vocal folds can also be raised or lowered. The space between the vocal cords is called ***glottis*** (See Fig. 2 on the next page).

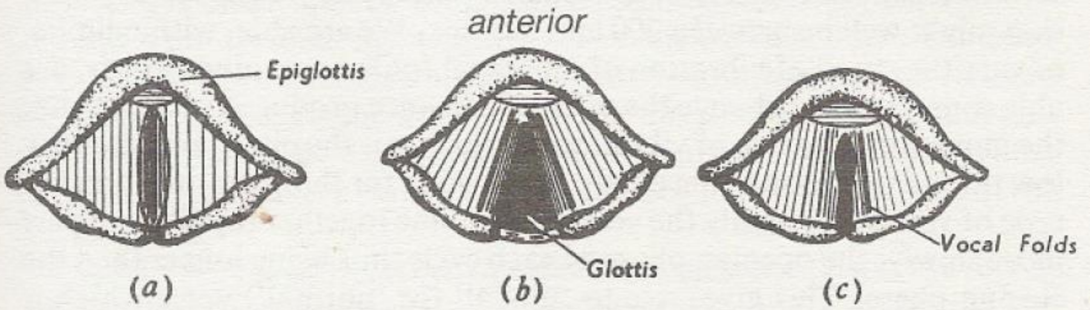



FIG. 2.—Diagrams of the vocal folds as seen from above: (a) tightly closed as for [ʔ]; (b) wide open as for breath; (c) loosely together and vibrating as for voice.

(Source: Gimson, A.C.: 1975; p.11)

**Fig. 2 Larynx diagrams**

Basically, the vocal folds can take **four (4) different positions**:

1. ***Open glottis***: In this position the vocal folds are wide apart and the breath stream passes between them without being modified in any way. This is the position of the vocal folds during normal breathing. This is also the position they are in when we pronounce certain sounds which are said to be *voiceless,* such as /p/, /f/, /s/, etc.

2. ***Closed glottis***: In this position the vocal folds are tightly closed, with the lung air pent up below it. This is the position of the vocal folds when we are holding our breath and also it is the first stage of a cough. If the folds are suddenly released, the breath stream rushes out, making an explosive sound called the ***glottal stop*** **[ʔ].** Although this sound is very common in many varieties of BE pronunciation, no letter of the English alphabet represents it and therefore we are not conscious of its existence. In standard English speech this sound precedes the energetic articulation of a vowel, especially when a long vowel appears in initial stress position, e.g. ['a:mfʊl], ['ɔ:fʊl].

3. ***Position for whisper***: In this position the vocal cords are still tightly closed except at one point where a little gap is left. When we speak with the vocal cords in this position, the breath forces itself through the small gap with audible friction. The greater the force of the breath stream, the louder the whisper.

4. ***Position for voicing***: In this position, the vocal folds are fairly close together, but not touching. As the air pushes between them, they open and suddenly close again. This happens repeatedly at a great speed, resulting in *vibration*. The effect of this vibration is a wave of sound that emerges from the larynx and out through the mouth and nose. When it enters the hearer's ear, it is recognised as voice. Voice does not mean speech. Speech is talking. If we are

not using the vocal cords as in whisper, we still have speech but no voice. Voicing is the position the vocal cords take up in the pronunciation of all voiced sounds.

The vocal cords play an important role in the pitch, loudness and sonority of the sounds. When the sound is higher in pitch, the vocal cords vibrate more rapidly, and vice-versa – the lower the voice, the slower the vibration of the vocal cords. The rate of vibration mainly depends on the length of the vocal cords. The longer they are, the slower the vibration (and therefore, the lower the voice). In a man, the length of the vocal cords is about 23 mm, and in a woman - about 18 mm.

From the larynx, the breath stream is now further modified in the **resonating cavities** through which it passes: the pharynx, mouth and/or nose.

The **pharynx** connects the larynx to the mouth cavity. It has almost fixed dimensions, but its length may be changed slightly by raising or lowering the larynx at one end and the soft palate at the other end. The soft palate also isolates or connects the route from the nasal cavity to the pharynx. At the bottom of the pharynx are the epiglottis and false vocal cords to prevent food reaching the larynx and to isolate the oesophagus acoustically from the vocal tract. The epiglottis, the false vocal cords and the vocal cords are closed during swallowing and open during normal breathing.

The **oral cavity** is one of the most important parts of the vocal tract. Its size, shape and acoustics can be varied by the movements of the palate, the tongue and the lips. Especially the tongue is very flexible, the tip and the edges can be moved independently and the entire tongue can move forward, backward, up and down. The lips control the size and shape of the mouth opening through which speech sounds are radiated.

Unlike the oral cavity, the **nasal cavity** has fixed dimensions and shape. Its length is about 12 cm and volume 60 $cm^3$. The air stream to the nasal cavity is controlled by the soft palate, which makes it of a vital importance in determining whether the sound will be nasalised or not.

From the technical point of view, the vocal system resonating chambers may be considered as a single acoustic tube between the glottis and mouth.

### The Roof of the Mouth

It can be divided into three sections: the alveolar ridge, the hard palate and the soft palate.

**The alveolar ridge** is a fixed speech organ whose chief function is to serve as a point of contact, for the tip of the tongue, in the production of some consonants. It also serves both as a place for narrowing the passage of the breath stream together with either the tip or the blade of the tongue, in the production of /s/, /z/ and /r/ and as a place of vibration of the tongue for the trilled consonant /r/. Furthermore, together with the hard palate it takes part in the production of /s/, /z/, /tʃ/ and /dʒ/.

**The hard palate** is the hard section of the palate between the alveolar ridge and the soft palate. It is also a fixed speech organ. Its chief function is to serve as point at which the breath stream can be narrowed by the front of the tongue in the production of the single voiced palatal fricative /j/. The hard palate together with the alveolar ridge is used in the creation of /s/, /z/, /tʃ/ and /dʒ/. Finally, the hard palate is used as a place the front part of the tongue is raised towards in the production of the front vowels /i/, /i:/, /e/, /æ/, and some of the diphthongs such as: /ei/, /ai/, and /ɔi/.

**The soft palate** (***velum***) is a movable speech organ, which has three main functions:
It serves as a point of contact for the back of the tongue in the production of *velar* (< *velum*) consonants /k/, /g/ and /ŋ/.
It is used as a place towards which the back of the tongue is raised when the back vowels /a:/, /ɔ/, /ɔ:/, /ʊ/, /u:/, and the diphthongs /aʊ/ and /əʊ/ are formed.

It can be raised so that it touches the back wall of the pharynx. In this position the breath stream is prevented from escaping through the nose and it all goes through the mouth regardless of whether there is any obstacle or not. All English sounds produced with the soft palate in this position are known as oral sounds and they include all vowels and diphthongs and the majority of English consonants. When the soft palate is lowered and at the same time there is a complete obstacle in the mouth, which prevents the breath stream from escaping through the mouth, the breath stream rushes out freely through the nasal cavity. The consonants produced with the soft palate in this position are known as nasal consonants /m/, /n/ and /ŋ/. The soft palate can be lowered without having any obstacle in the mouth, in which case the breath stream escapes freely both through the mouth and nose. The nasalised vowels are formed in this way. The majority of French vowels are nasalised in front of nasal consonants.

### The Tongue

The tongue is the most flexible and mobile speech organ - it is so vital in speech production that we sometimes refer to languages as 'tongues.' It is practically <u>four</u> speech organs in one:

- the **tip** of the tongue,
- the **blade**,
- the **front** and
- the **back**.

Because of its great elasticity, the tongue can raise or lower either its back or its front part to different heights in the mouth and thus change the shape of the mouth cavity. This results in production of vowels and diphthongs of different quality. When the front part of the tongue is raised to different heights towards the hard palate, the front vowels are formed. The back of the tongue is raised towards the soft palate in the production of the back vowels. When either the front or the back of the tongue glides from one position to another, various diphthongs are formed. The tongue can also be used to produce consonants, either by blocking the breath stream at one or several points in the mouth (plosives, nasals), or by narrowing the breath passage so that audible friction is created (fricatives). Being able of great mobility the tip of the tongue can be set in vibration against a fixed speech organ (the alveolar ridge) and the result is what is known as lingual trill. The tongue takes part in the formation of all English sounds except /m/, /p/, /b/ and to some extent /a:/.

**The Lips**

As a moveable organ of speech, the lips are capable of producing sounds themselves, e.g. /p/. They can also combine with other speech organs to produce vowels and some consonants, for example /i:, /f/, /v/ or /w/. Since they are flexible, they can take up several positions:

⇒ **spread,**
⇒ **wide open,**
⇒ **close rounded,**
⇒ **open rounded,**
⇒ **neutral** and
⇒ **closed.**

**Spread lips**. The lips are slightly apart and energetically spread. The vowels produced in this position are: / i:/, /i/ and /e/.

**Wide open lips**: In this position the lips have no effect on the breath stream. The only vowel produced with lips in this position is /a:/.

**Close rounded lips**: They are rounded with a small gap between them. In this position they can be flat rounded /ʊ/ and protruded /u:/, /w/.

**The lips** are **rounded** with a rather large gap between them. When flat rounded, the vowel /ɔ/ is produced and when protruded the vowel /ɔ:/ is produced.

**Neutral lips**: The lips are held in a relaxed position with a medium distance between the jaws. This is the position of the lips in the production of /æ/, /ʌ/, /ɛ/ and /ə:/.

**Closed lips:** The lips are completely closed so that the passage of the breath stream is blocked altogether. Then either the lips suddenly open /p/ and /b/ or the soft palate lowers /m/.

The lower lip can be brought into contact with the upper teeth to form a narrow passage so that audible friction is created when the breath stream pushes its way through the passage /f/ and /v/.


1. **Air is gradually expelled from lungs, through trachea (windpipe) and vocal tract**
2. **Flow of air is blocked or modified by articulators (the tongue, lips, etc.)**
3. **When airflow is wholly or partially blocked by vocal tract, consonants are produced; when airflow is unimpeded by the vocal tract, vowel sounds are produced. Therefore, the consonant/vowel distinction is really a very simple articulatory distinction.**
4. **Typically, air is expelled through the mouth (oral cavity).**

## 9.5 Classification of Speech Sounds

We remember that consonants are caused by obstruction of the flow of air through the mouth, whereas the vowels are never completely obstructed. In other words,

⇒ **Vowels** are sounds we make when our breath air passes freely through the vocal tract, and

⇒ **Consonants** are sounds we make when the air flow from the larynx meets some barrier on its way out.

Therefore, consonants and vowels have their own ***features/characteristics*** that we use to classify them. When talking about **consonants,** we can define

⇒ **Where** the obstruction takes place (***Place of Articulation***) and
⇒ **What *form*** of obstruction causes the sound (***Manner of Articulation***).
⇒ We can also describe consonants based on whether or not the vocal cords vibrate during the enunciation process (**voiced / voiceless** consonants).

It is not so in the case of **vowels**: since there is no contact between the articulators, we cannot talk of any *place of articulation* during their production. What then determines their quality?

### 9.5.1 Vowel Sound Quality: Tone & Stress (Pitch, Loudness, & Length)

**Tone**

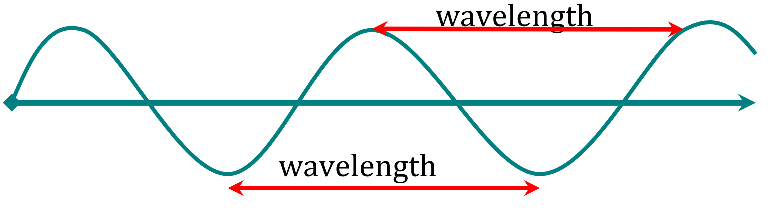
The ***glottal tone*** is the basis of all normal vowels, but we can perceive a large number of vowel qualities, because **our perception of sound quality is determined by the way in which the speaker's vibrator and resonators function together** (i.e., *meet, mate, mute, mat, mail, mall, etc.*).

The ***glottal tone*** is the result of complex, but mainly regular vibrations of the vocal folds. The frequency of these vibrations depends on the length and tension of the vocal folds (male vocal folds are longer, hence the lower frequency of vibrations). The human voice is not a pure single frequency sound, but a rich, buzzy vibration with many sound frequencies blended together. In fact, the vocal folds vibrate in such a way as to produce, in addition to a basic vibration over their entire length (the *fundamental frequency*), a number of overtones with frequencies, which are *simple multiples* of the fundamental tone. Thus, if there is a fundamental frequency of vibration of 100 cycles per second (cps), the upper tones will be of the order of 200, 300, 400, etc., cps. There may even be no energy at the fundamental frequency, only the tones of higher frequency (for example, when a man tries to imitate a woman and starts speaking in a *falsetto* voice ☺) – nevertheless, we still perceive a pitch which is appropriate to the fundamental frequency of 100 cps. Why? Because the fundamental frequency is the highest common factor of all the frequencies present, whether it itself is present or not.

The number and strength of the component frequencies of this complex glottal tone differs from one individual to another, and this, in part, accounts for the uniqueness of our individual voices. What else could shape the one-and-only quality of our individual voices? It must be the singular shapes of our 'personal' resonance chambers, tongues, teeth, alveolar ridges, lips, uvulas and palates! I have heard of some gifted singers refusing dental treatment for fear that it might alter the resonance of their oral cavities! ☺

We can all modify the glottal tone to produce at will vowels as different as /i:/ and /a:/, so that despite our differences of voice quality, we can all convey the distinction between two words such as *key* and *car*. What causes this variation in the quality/timbre ['tæmbə] of the sounds we pronounce and hear?
You know the sound of water filling a bottle: the pitch goes from low (when the bottle is empty) to high, as it gets filled up. Have you ever wondered, why? Physics explains it all! ☺:

We know that the vibrating air from the larynx runs through several resonance chambers before leaving our heads: the throat (*pharynx*) behind the tongue, the mouth region between the tongue and palate, and the opening between the lips. Alternative route (if the passage through your mouth cavity is blocked by your velum/soft palate) is through your nose. Each of these chambers has a particular length and shape, which affects the sound waves passing through them, through the phenomenon called *resonance.* Sounds of different frequencies have different *wavelengths* (i.e., the distance between the crests of sound wave):




A sound wave moving down the length of a tube bounces back when it reaches the opening at the end of it. If the length of the tube is a certain fraction of the wavelength of the sound, then each reflected wave will reinforce the next incoming one; if they are of different lengths, they will interfere with each other (similar to how you get the best effect pushing child on a swing if you synchronize each push with the top of an arc/'crest' of the wave'). Thus, a tube of a particular length will amplify some sounds and filter out others. When you are filling your bottle with water, the noise of the water gets filtered by the chamber of air between the water surface and the opening: the more water, the smaller the air chamber, the higher the resonant frequency of the chamber, and the higher the pitch of the sound you hear.

What we hear as different vowels are the different combinations of amplifications and filtering of the sound coming from the larynx. These combinations are produced by moving *five speech organs** around in the mouth to change the shapes and lengths of the resonant chambers that the sound passes through. For example, [i:] is defined by two resonances, one 200-350 cps produced mainly in the mouth, and one from 2100 to 3000 cps, produced mainly in the throat. The range of frequencies a chamber filters does not depend on the frequencies that enter it – that is why we can hear an [i:]whether it is spoken, whispered, sung high, sung low, screeched, moaned, wailed, giggled, burped, or twanged.

* These are: the ***tongue*** (the *three-in-one*: the tip, the hump/body, and the root, or the muscles that anchor it to the jaw), the ***velum,*** and the ***lips***. The tongue is actually the most important of the speech organs – the word 'tongue' for 'language' is well justified!

Pronounce the vowels in b*et* and b***u**t* repeatedly, [e / ʌ], [e / ʌ], [e / ʌ]. You should feel the body of your tongue moving forwards and backwards (you can feel it with your finger, if you put it between your teeth). When your tongue is in the front of your mouth, it lengthens the air chamber behind it in your throat and shortens the one in front of it in your mouth, altering their resonances.
Now pronounce the vowels in b***ee***t and b***a***t several times over: your tongue will jump up and down – you will even feel your jaw moving. This also alters the shapes of the throat and mouth chambers, and hence their resonances. The brain interprets the different patterns of amplification and filtering as different vowels.

<u>So</u>: variation of ***quality*** - or **timbre** ['tæmbə] - of the glottal tone is caused by the way we change the shapes of our resonators above the larynx – the pharynx, mouth, and nasal cavity. The frequencies of the glottal tone which coincide with the chamber's own resonance will be amplified, and others will be filtered out. Thus, certain bands of reinforced frequencies are characteristic of a particular arrangement of the resonating chambers, which produces a certain vowel sound. These bands of frequencies will be reinforced (amplified) whatever the fundamental frequency. In other words, whatever the pitch on which we say, for example, the vowel sound /a:/, the shape of the resonators and their resonances will be very much the same. This, except on extremely high or low pitches, makes it possible for us to recognize the quality intended.

### Stress: Pitch, Loudness & Length

The next three *kinds* of variation in the ever-changing pattern of sounds**: pitch, loudness,** and **length**, all are important in determining *stress.* ***Stress*** is a term that we apply to ***words in isolation,*** which have more than one syllable*.

*Syllable ['siləbl] - n. any of the units into which a word may be divided, usually consisting of a vowel sound with a consonant before and/or after it: *'Arithmetic'* is a word of four syllables, or a four-syllable word (Oxford Dictionary definition).

Stress refers to the property that certain syllables carry which makes them stand out from the rest of the word. Stressed syllables are articulated more energetically than the unstressed ones. The prominence of the stressed syllables is usually attributed either to their pitch, length, or loudness, or to a combination of several of these factors. The notation for stress is the high mark you can see in the following examples:

['neivi] for stress on the first syllable

[diˈminiʃ] for stress on the second syllable
[juniˈvəːsiti] for primary stress on the third syllable

In some, usually longer words, it is possible to pick out a second, weaker stressed syllable from the primary stress. This is known as secondary stress, and it is notated with the low mark, e.g.: [ˌfəʊtəˈgræfik]

In this example, the third syllable is more prominent than the first syllable, but the first syllable is still more prominent than the other syllables and so it carries the low mark, indicating secondary stress. In English and many other languages, it is usually the content words that will have one or more syllables stressed – function words (such as prepositions, auxiliary verbs, articles and particles) usually carry no stress in running speech. Generally, we know which syllables to stress (or half-stress), and which not to stress at all in the language we speak – it is part of our knowledge of the language.

***Pitch*** is an auditory sensation that places sounds on a scale from high to low.
Every syllable has pitch; however, any syllable that is articulated with a noticeably different pitch will appear to carry more stress. This can go either way: if all the syllables are said in a low pitch except one, then that higher pitch syllable will be deemed to carry the stress of the word. Pitch also plays a central role in intonation.

***Loudness***: some sounds or syllables sound 'louder' than others, and thus have greater prominence as compared to other syllables. This prominence would then make that syllable the stressed syllable. However, it is very difficult to make a sound louder without affecting the length, pitch, or quality of that syllable. If you could only change the loudness of a sound, then the perceptual change would not be as great as you might expect.

***Length*** – some sounds will be appreciably longer to our ears than others. These acoustic variations of length, unlike those in *tone* languages like Chinese or Yoruba, are mostly relative to the length of the neighbouring vowel sounds and cannot be measured in absolute terms. Older stages of English differentiated words by whether their vowels were pronounced quickly or were a bit drawn out, a bit like the modern distinction between [bæd] meaning 'bad' and [bæːd] meaning 'good' ☺. But in the 15th century English pronunciation underwent a convulsion called the Great Vowel Shift. The vowels that had simply been pronounced longer now became 'tense': by advancing the tongue root (the muscles attaching the tongue to the jaw), the tongue becomes tense and humped rather than lax and flat, and the hump narrows the air chamber in the mouth above it, changing the resonances. Also, some tense vowels in modern English, like 'B***ye***!,' 'b***i***te' and 'br***ow***' are 'diphthongs' (two sounds pronounced in quick succession as if they were one). We shall refer later to the 'long' vowels of English, such as those in *bean* and *barn,* as compared with the short vowel in *bin*, but we must remember that these distinctions are made only *in relation to the neighbouring sounds* and depend on the rate of delivery. In English, we cannot measure the difference between long and short vowels in absolute terms, like, for example, in Latvian.*

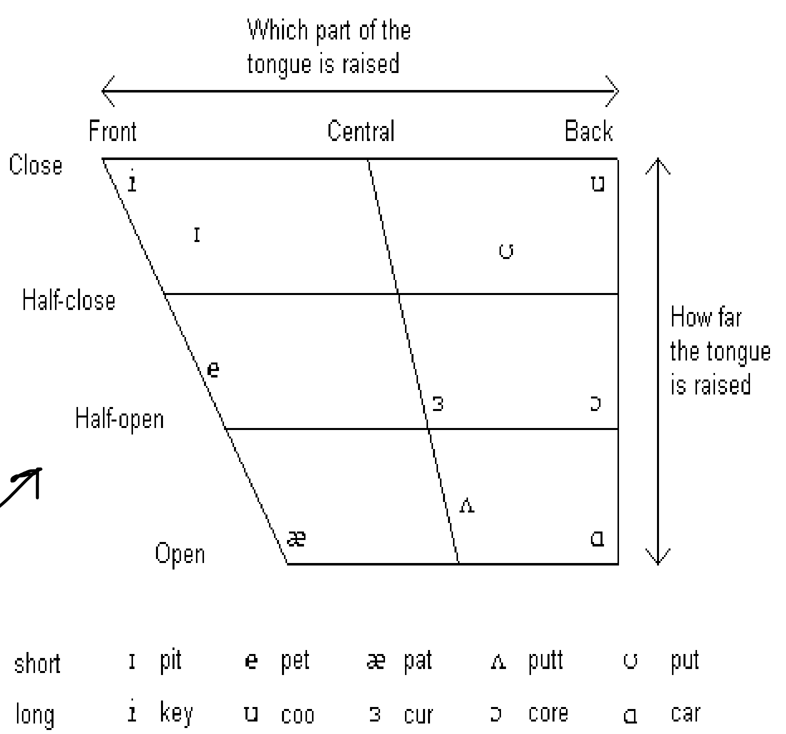
*Latvian examples: plans – plaans (plan – thin), zeme – zemee (land – in the land), varda – vaardaa (toad – in the word), kazas – kaazas (goats – wedding), etc. – the long vowels in Latvian are about 2.5 times longer than the short ones.

Length seems to play a role in stress. Generally, if one syllable has a longer length than the others in a word, then we hear it as the one carrying stress. Length is one of the more important determiners of stress.

The same general principles and terminology are used in classifying the sounds of all human languages. Let us use the sounds of the language we share – English – to see how we can describe and classify them. This knowledge will help you study the sound systems of other languages and, if you put your mind to it, enable you to record some of the fast disappearing languages of Papua New Guinea.

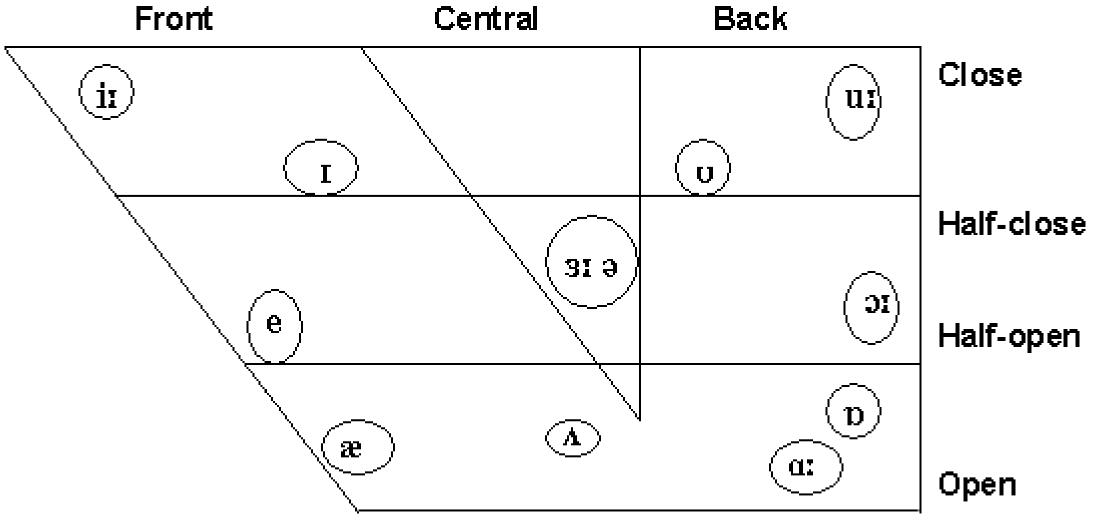
### 9.6 Classification of English Vowels

Because no physical obstruction occurs in our vocal tracts when we pronounce vowels, it is quite difficult to determine exactly *where* each vowel is formed. The tongue clearly influences the flow of air, as does the shape of the mouth and even that of the lips. One of the ways we can plot the position of a vowel is through the **cardinal vowel diagram**:




**The cardinal vowel diagram** represents the shape of the oral resonating chamber which changes with tongue movement while articulating vowel sounds. This diagram indicates:

- **The tongue position in the mouth (front/central/back)** and
- **Which part of the tongue is raised the highest.**




Source: http://home.hib.no/al/engelsk/seksjon/projects/links/charts/charts.html

**English Vowel Chart (12 vowels)**

Try saying /iː/, then /uː/ (as in *pee / pooh*). You should notice the change in the position of your tongue from front to back.
On the vertical axis, those sounds towards the top of the diagram represent those articulated with a relatively closed mouth, whilst those towards the bottom are far more open.
Try saying these sounds in the order they come: /iː/, /e/, /æ/, and /uː/, /ɔː/, /ɒ/, /a:/. You should feel the gradual opening of the mouth.

### Vowel Quality (3-term classification)

According to the Cardinal Vowel Diagram, which tracks tongue position, English vowels may be classified as:

- open/close (low/high)
- front/back, and
- round/unround (depending on the configuration of the lips).

For example:

- [u:] – close back round
- [i:] – close front unround
- [a:] – open back unround

We have already mentioned that English vowels may also be characterized by the *degree of **tension*** in the tongue (tense/ lax, or long/ short) vowels and by whether the vowel is a single sound or a diphthong (glide). Therefore, English vowels also fall into two types:

- short/ long (lax/tense), and
- monophthong / diphthong (triphthong).

**Vowel Quality – 5-term classification**

If we want to give a full description of any vowel sound, we would have to characterise it using the full **5-term classification**, indicating whether the sound is:

- close/half open/open
- front/central/back
- round/unround
- short (lax)/long (tense)
- monophthong/diphthong (triphthong)

Using the 5-term classification, we can describe English pure vowels in the following way:

/iː/ - close, front, unround, long (tense), monophthong
/i / - close, front, unround, short (lax), monophthong
/e/ - mid (half open), front, unround, short (lax), monophthong
/æ/- open, front, unround, short (lax), monophthong
/ə/- open, central, unround, short (lax), monophthong
/ɛ:/- mid (half open), central, unround, long (tense), monophthong
/ʌ/- mid (half open), central, unround, short (lax), monophthong
/ɒ/- open, back, round, short (lax), monophthong
/ɔː/- open, back, round, long (tense), monophthong
/ʊ/- close, back, round, short (lax), monophthong
/u:/- close, back, round, long (tense), monophthong
/a:/- open, back, unround, long (tense), monophthong

## 9.6.1 The Diphthongs ['difθɔŋz]

In English, as in most languages, vowels can also glide into one another to form ***diphthongs*** and even (according to some classifications) ***triphthongs***. Diphthongs are those sounds that consist of a movement or glide from one vowel to another. The first part of a diphthong in English (unlike Latvian diphthong 'ie') is always longer and stronger than the second part; as the sound glides into the second part of the diphthong, the loudness of the sound decreases.
Diphthongs are classified according to the direction of the glide (toward closer or more central second element):

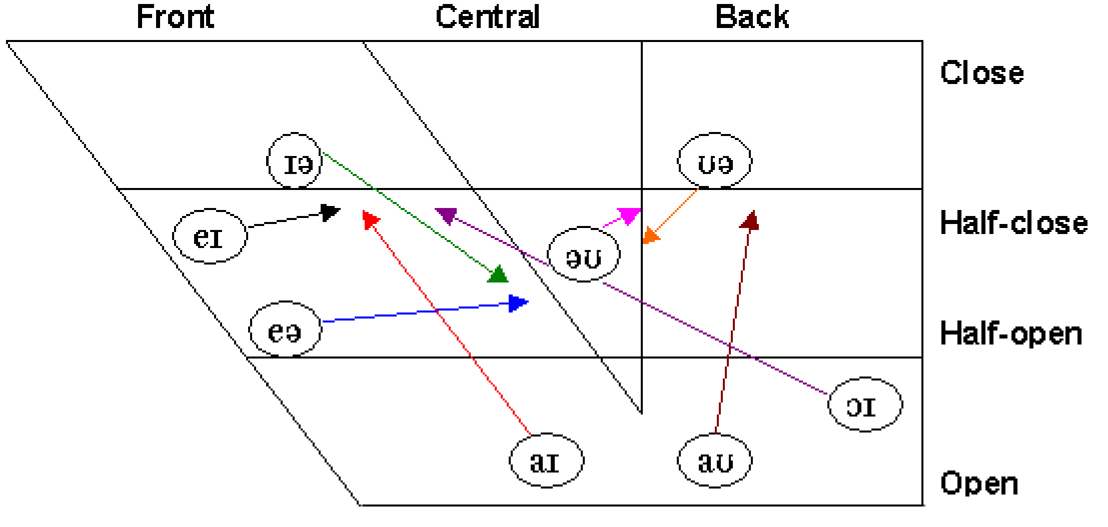
**<u>English *Closing* Diphthongs</u>:**

| | | | |
|---|---|---|---|
| **/i /-glides:** | **/ei/** | as in 'face' | [f**ei**s] |
| | **/ai/** | as in 'nice' | [n**ai**s] |
| | **/ɔi/** | as in 'boy' | [bɔi] |
| **/u/-glides:** | **/ əʊ/** | as in 'rope' | [rəʊp] |
| | **/aʊ/** | as in 'house' | [h**aʊ**s] |

**<u>English *Centering* Diphthongs</u> (Schwa-glides):**

| | | |
|---|---|---|
| /iə / | as in 'fierce' | [fiəs] |
| /ɛə/ | as in 'fair' | [fɛə] |
| /ʊə/ | as in 'tour' | [tʊə] |

The chart below shows all these 8 English diphthongs:




Source: http://home.hib.no/al/engelsk/seksjon/projects/links/charts/charts.html

Phoneticians disagree on whether to consider vowel sounds containing three elements as *diphthongs* or *triphthongs*, depending on their understanding of the term *syllable.* Each syllable can have only one vowel: If 'hire' and 'higher' are monosyllabic, /aiə/ is a triphthong. If they are bisyllabic, then the diphthong /ai/ is followed by schwa /ə/.

Vowels play an essential role in every language. They are far more difficult to transcribe than consonants and are also an extremely important area of English phonology, as they make up the greatest difference between English varieties.
As we know, vowels are determined by changes in the position of the lips, tongue and palate. Vowel sounds break up clusters of consonants by allowing air to pass

through the mouth. Every word in the English language uses a vowel in some form or another – in fact, words have roughly as many syllables as they have vowel sounds.

We also have two ***semi-vowels***: /j/ and /w/. These sounds start with the tongue taking the position for the respective vowels, /ʊ/ and /u:/, but then further constriction of the air passage produces the qualitative change that places the resulting sounds half-way between vowels and consonants. We shall talk more about them, when considering English consonants:

### 9.7 English Consonants ['iŋgliʃ 'kɔnsənənts]: Classification

English consonants are classified according to **three criteria**: **manner, place and force of articulation.**

English consonants are classified according to **three criteria**: **manner, place and force of articulation.**

__**Manner of Articulation**__**:** English consonants can be classified into two basic types, differentiated by the type of obstruction that produces the sound (complete blockage, or a kind of constriction of the vocal tract); they fall into ***obstruents*** and ***sonorants.***

In the pronunciation of ***obstruents*** the air-stream is *obstructed*, which means that the air from the lungs meets an obstruction/ narrowing in the vocal tract that may block it for a moment. ***Sonorants*** are made without any such obstruction of the air-stream, and that means that they are relatively louder than other sounds (they are said to have greater *sonority*). **Obstruents** are further divided into:

- **stops/plosives** are made by forming a complete obstruction – stop - to the flow of air through the mouth and nose and then suddenly releasing the pent-up air, making an explosion of air: /p/, /b/, /t/, /d/, /k/, /g/
- **fricatives** which are characterised by incomplete obstruction to the flow of air; this allows the air to escape through a narrow stricture, producing audible friction: /f/, /v/, /θ/, /ð/, /s/, /z/, /h/, /ʃ/, /ʒ/, and
- **affricates** – an affricate is a *plosive* immediately followed by a *fricative* in the same place of articulation: /tʃ/, /dʒ/. If you think about it, the **/**tʃ/ sound is made up from the plosive /t/ and the fricative /ʃ/ pronounced simultaneously: ***church, ch**ip, etc.* The same applies to /dʒ/: /d/ + /ʒ/ = /dʒ/, as in ***judge, j**eep,* etc.

**Sonorants** also have two main categories:

- **Nasal stops** /m/, /n/, /ŋ/ - these are sonorant, because although the air is blocked in the mouth by lowering the soft palate, it continues to resonate and flow through the nose. If the nasal passage is blocked, as when you have a cold, or squeeze your nose tightly, these nasal stops will be realised as [b, d, g] – try it! ☺

- **Approximants** (**liquids** /l/ and /r/, and **semi-vowels** /j/ and /w/) are sonorants - as well as all vowels – because when we pronounce them, the air resonates without being stopped.

**Place of Articulation**: After the air has left the larynx, it passes through the vocal tract. Consonants are produced by obstructing the air flow through the vocal tract. There are a number of places where the point of contact (or approximation) can take place. These places are called ***articulators.*** They include:

- Lips *(Labial)*: /p/ /b/ /m/
- Teeth *(Dental)*: /θ/, /ð/
- Lip + teeth *(Labio-Dental)*: /f/ /v/
- Alveolar Ridge *(Alveolar)*: /s/ /z/ /t/ /d/ /l/ /r/ /n/
- Hard Palate *(Palatal)*: /j/
- Hard Palate & Alveolar Ridge *(Palato-Alveolar)*: /ʃ/, /ʒ/, /tʃ/, /dʒ/
- Soft Palate *(Velar)*: /k/ /g/ /ŋ/ /h/
- Throat *(Glottal)*: /ʔ/

**Force of Articulation:** If we classify the two phonemes /f, v/ according to their *place* and *manner* of articulation, we shall see that they are both labio-dental fricatives. How can we distinguish between these two phonemes? We commonly refer to this difference as being 'voiced' and 'voiceless,' where *voiced* means that the vocal cords are vibrating. However, this is not an accurate term because voicing varies according to their position in the word. In initial and final positions the voiced stops /b, d, g/ are hardly voiced at all. In order to distinguish between the phonemes /p, f, t, θ, s, k/ and /b, v, d, ð, z, g/ phoneticians say that the first group is pronounced with more ***force*** than the second group, and this distinction is called ***fortis*** (meaning *strong*) and ***lenis*** (meaning *weak*), accordingly.

The ***fortis consonants*** are always ***voiceless***, while the ***lenis consonants*** are sometimes ***voiced.*** All the consonants mentioned above belong to pairs distinguished by the difference between fortis and lenis. The remaining English consonants are not paired in this way, so it is not necessary to include this distinction when classifying the other consonants:

| | **Lenis / Fortis** | **Place of Articulation** | **Manner of Articulation** |
|---|---|---|---|
| /p/ | fortis | labial | Plosive |
| /b/ | lenis | labial | Plosive |
| /t/ | fortis | alveolar | Plosive |
| /d/ | lenis | alveolar | Plosive |
| /t/ | fortis | palato-alveolar | Plosive |
| /d / | lenis | palato-alveolar | Plosive |
| /k/ | fortis | velar | Plosive |
| /g/ | lenis | velar | Plosive |
| /f/ | fortis | labio-dental | Fricative |
| /v/ | lenis | labio-dental | Fricative |
| /θ/ | fortis | dental | Fricative |
| /ð/ | lenis | dental | Fricative |
| /s/ | fortis | alveolar | Fricative |
| /z/ | lenis | alveolar | Fricative |
| /tʃ/ | fortis | palato-alveolar | Affricate |
| /dʒ/ | lenis | palato-alveolar | Affricate |
| /h/ | fortis | glottal | Fricative |
| /m/ | | labial | Nasal |
| /n/ | | alveolar | Nasal |
| /ŋ/ | | velar | Nasal |
| /l/ | | alveolar | Approximant |
| /w/ | | bilabial/velar | Approximant |
| /r/ | | alveolar | Approximant |
| /j/ | | palatal | Approximant |

These three criteria (force, place, and manner of articulation) enable us to describe most consonants in human languages.

### 9.8 Sounds in Connected Speech

Discussing speech sounds, we have seen that their quality is determined by the shape of the resonance chambers and the position of the tongue and other articulators. When we speak, we do not make pauses between words – we produce long strings of sounds, all blending into a stream of sounds.

**Assimilation** [əˌsimiˈleiʃən]

Many factors affect sounds in running speech, most of them resulting from the physical limitations of our organs of speech: our tongues, lips and soft palates are not fast, or flexible enough, to cope with the flow of speech! They cannot move quickly enough to get from one position to another in order to articulate the next sound *precisely*. Many sound changes are due to the influence of one sound upon another, causing the other sound to become more like the 'influencing' sound itself. If a sound change results in more *shared phonetic features between two sounds*, this results in ***assimilation.*** **There are 3 main types of assimilation:**

1. **<u>Assimilation of Place</u>**: **/t/ → /p/** in *ra**tb**ag* [ˈræpˌbæg], *good boy* [ˈgʊpˌbɔi], or *oa**tm**eal* [ˈəʊpmiːl], etc. This is because the alveolar plosive /t/ is simplified into the /p/ sound, which is closer to the bilabial plosive /b/ and to the bilabial nasal /m/.

2. **<u>Assimilation of Manner</u>**: occurs when two different manners of articulation influence each other to form a different manner of articulation: *Indian* [ˈindʒiən] and *soldier* [ˈsəʊldʒə]. This is because the plosive /d/ combines with the approximant /j / to form an affricate.

3. **<u>Assimilation of Voice</u>**: have to [ˈhæftə] (voiced fricative followed by a voiceless consonant)

Assimilation of place will, of course, affect the manner of articulation, so these different types of assimilation usually occur together. ***Assimilation*** can be

- **Partial*,*** when the changed sound retains at least one of its original features (p*artial regressive assimilation* examples: **in**divisible [ˌindiˈvizəbl], **im**balance [imˈbæləns], **in**credible [iŋˈkredəbl], **in**admissible [ˌinədˈmisəbl], etc.

  or
- **Total**, when the two sounds end up identical (a *geminate*, or phonetically double sound; you can see many examples of ***total regressive assimilation*** in Modern English word formation, where the last prefix consonant becomes totally like the following sound:

  | | | | |
  |---|---|---|---|
  | **ab**breviate | **ag**gressive | **ap**peal | **at**tend |
  | **ac**count | **al**leviate | **ar**rive | |
  | **af**fect | **an**nual | **as**sent | |

  <u>But</u>: **ad**mire, **ad**just, **ad**jacent, **ad**vance, etc. All the highlighted prefixes are adaptations of prefix **'ad-**' meaning 'to, toward.' The ***d*** in **ad-** always changes to the sound of any following consonant, except m, j, and v

The *direction* of assimilation can be

- ***Regressive*** – operating backwards, i.e., when the ***preceding*** sound is changed (A < B), or
- ***Progressive*** – operating forwards, when the ***following*** sound becomes more like the preceding one (A > B)

***<u>Voicing</u>*** of intervocalic stops and ***<u>devoicing</u>*** of voiced consonants in word final positions are also a common type of assimilation in many languages:

<u>Russian</u>: [got] 'year' → [goda] 'of the year'; [boχ] 'god' → [boga] 'from god'
<u>German</u>: *Bad* [ba:t] 'bath'; *Tag* [ta:k] 'day'; *Hund* [hunt] 'dog', etc.

Under normal circumstances, apart from our rather clumsy articulators, our breathing also affects the sounds we make – try to say something after a race, a break dance, or even a waltz! ☺ In order to combine the two functions (breathing and speaking), every language has developed a rhythm of its own, largely determined by its stress patterns. A number of phonological adaptations occur in connected speech, particularly in the ***unstressed*** segments, where ***neutralisation*** is common.

**Neutralisation** [ˌnju:trəlaiˈzeiʃən] **of Weak Forms**

***Weak forms*** are those words that are pronounced in an *unstressed* manner. Many of the most common words in English can come in either a strong form or a weak form. The *weak forms* are nearly all ***function words***, such as conjunctions, articles, pronouns, prepositions and some auxiliary and modal verbs.

Generally, the ***strong forms*** of these words are used when they are being directly quoted, when they are being contrasted, or if they appear at the end of a sentence.

The pronunciation of a weak form can be very different from the strong form of a word: if said in isolation, it could be all but unintelligible. It is usually the context that makes it understandable.

In connected speech, many sounds in unstressed positions get neutralised, blurred between the two distinct sounds. This intermediate sound is known as neutralisation. This occurs in both vowels and consonants.

Neutralisation results in the centering of vowels to the neutral schwa [ə], and sometimes in total omission of sounds and even whole syllables:

[stɒp] [ənd] [ʃɒp] → [stɒp ən ʃɒp]
[kʌp] [ɔv] [ti:] → [kʌpəti:], etc.

**Elision** [iˈliʒn], (***deletion*** [diˈli:ʃn] or ***omission*** [əʊˈmiʃn]) particularly affects:

- Consonant clusters
- Weakly stressed syllables that are not especially missed
- Words that end in an alveolar consonant and that are immediately followed by a word beginning with a consonant (*Stop'n'Shop*, etc. ☺)

The sounds that are elided are those that are so weakly articulated that they become insignificant.

- The loss of a weak vowel after the voiceless (fortis) plosives /p/, /t/, /k/:
  [pˈteitəʊ] is an example of the schwa being elided after /p/. Other examples: [ˈsekritri] rather than [sekritəri], [præps] rather than [pəˈhæps], [intrəstiŋ] rather than [intərəstiŋ]. Often [pəˈli:smən] becomes [pli:smən], [medisin] → [medsin], etc.

- Another cause of ***elision*** is when a weak vowel is elided before a syllabic consonant (/l/ or /n/: [lesn] – *lesson, lessen*; *session* [seʃn], etc.

- Complex consonant clusters are usually elided in running speech: *George the VI$^{th}$ throne*: [dʒɔːdʒ ðə siks θrəʊn], we say [mʌsnt] for [mʌstnt], [igzækli] for [igzæktli]; *christening* [krisniŋ], *listening* [lisniŋ], etc. **/v/** is often elided before a consonant: [ˈləʊdz ə ˈmʌni] ‘*loads of money*,’ *cup of coffee* [kʌpə ˈkɒfiː], etc.

- Contracted forms are caused by elision: [aim] instead of [ai əm], [dəʊnt] instead of [du: nɒt], [wəʊnt] instead of [wil nɒt], [kɑːnt] instead of [kæn nɒt], etc.

- Sometimes we swallow even whole syllables: we say [prɔbli] for [prɔbəbli], [ləˈbɔrətri] for [ləˈbɔrətəri]; [ˈlaibri] for [ˈlaibrəri], [ˌmɔ:fəˈnɒlədʒi] for [ˌmɔ:fəfəˈnɒlədʒi], [prəˈpɒstrəs] for [prəˈpɒstərəs], etc.

**<u>N.B.</u>**:

- When a vowel sound is elided, it is usually a weak vowel, typically, the schwa. The schwa is a weak sound because we do not need much energy to pronounce it. Many vowels sound like schwa when they are neutralised in unstressed positions.

- When a consonant is elided, it is usually because it occurs in consonant clusters, or is in an environment with other consonants.

Some elided syllables are represented in standard punctuation (for example, we write *I’m* for *I am*, *don’t* for *do not, isn’t* for *is not,* etc.). In standard speech, the missing vowel is understood, and so meaning does not suffer from this contraction.

Elision is particularly common in connected speech, when the speech sounds we make are so open to the influence of the neighbouring sounds. It stands to reason, that the faster the speech, the more likely we are to ‘swallow’ some of the sounds / syllables.

Energy conservation / economy of effort is often the underlying principle of the various forms of assimilation, neutralisation and elision: people always tend to choose the path of least resistance. The same principle applies in the seemingly contrary to it ***sound insertion***:

**Linking** [liŋkiŋ]

If you have ever listened to people speaking a foreign language that was unknown to you, you may have noticed that it was impossible to pick out individual words from the string of sounds that you heard. This is because in real, connected speech, words *are* linked to one another. This is especially significant in RP, where the phoneme **/r/** does not occur in syllable-final position, unless the word with a final '**r**' is followed by a word beginning with a vowel. Say, in 'f*ear*' [fiə] / '*fear of God*' [fiər əv gɒd], etc.

So one example of linking is the **re-activation** of an **/r/** sound:

| | |
|---|---|
| *For bette**r** or worse*: | [fə ˈbetə**r** ɔ: w3:s] |
| *Fathe**r** o**r** aunt*: | [fa:ðər ɔ:r ˈa:nt] |
| *Fathe**r** of three:* | [fa:ðə**r** əf θri:] |

*There a**r**e oranges o**r** apples in the cupboard*: [ðeəra:**r** ɔrindʒiz ɔ:**r** æplz in ðə ˈkʌbəd]

Another example of linking is when two vowels meet over a word boundary: we find it easier to articulate them, if we insert an extra phoneme in order to help the transition. So, another example of linking is to ***insert*** /r/ between two vowels, for example:

| | | |
|---|---|---|
| *That's the idea of it* | → | [ðæts ði aidiə**r** əv it] |
| *The pilot saw an explosion* | → | [ðə pailət sɔ:**r** ən ekspləʊʒn] |
| *They're withdrawing their troops* | → | [ðej r wiðdrɔ:**r**iŋ ðeə tru:ps] |
| *Pretty awful* | → | [priti**r**ɔ:fʊl] |

/j/ and /w/ may also link words, for example:

| | | |
|---|---|---|
| How often? | → | [ˌhaw ˈɔfn] is easier to articulate than [ˌhaʊ ˈɔfn] |
| They are | → | [ðej ˈa:] is usually said, rather than [ˌðei ˈa:] |

We have seen how the principle of economy (energy conservation) results in most of the phonological conditioning in connected speech. Are there any general tendencies in sound change that are common to all languages?

## 9.8 Other Natural Tendencies in Sound Change

Sound change, both in connected speech, and changes accumulated over time, is one of the driving forces of language evolution. Explaining language diversity, Prof. John McWhorter of the University of California at Berkeley said in a 2002 NewsHour interview:
'…it's the nature of language to evolve in any number of different directions in the various parts of whatever our language is. And so each word, each grammatical structure, each sound, there are all sorts of directions that it might go. If all human beings lived as this great teeming mass of humanity out in some parking lot or some forest, then presumably that wouldn't happen, and we would still all have one language. But once you get an offshoot population, then the changes that happen in the language go in different directions, and the changes that are going on back in the homeland. As a result, after a while, you've got two different languages. Multiply that by all the different peoples that have you in the world, and you see that today we have 6,000 languages. Many would say that at other points in human history there were a great many more languages at any given time.'

In answer to a question about the possibility of us ending up with one, or just a handful of languages as a result of increased travel and communication, which tend to simplify, and to collapse languages into each other, McWhorter said:

'Well, it looks like we are going to wind up with a handful, depending on what you call a handful. By many estimates, we are going to have 500 out of today's 6,000 languages alive after 100 years. Basically, the big bad Berlitz languages like English, and French and Portuguese and Russian and Arabic and Chinese are gobbling up most of the other languages. It's the linguistic consequence of what you might call globalisation. And so many linguists are involved in either trying to keep these languages alive or at least to write down what they were like. So certainly there was a time when probably there were about 100,000 languages in the world, and we are going to get to a point where we will have lost 90% of the ones that are alive today. Some people say that we lose a language every two weeks, for example. …
…You cannot revive it [language]. And it's even worse, because if that language was not written down, there is no such thing as a fossil. You know, language… an individual language is not in our DNA, and most languages around the world are only spoken. Only about 200 are written and read on a regular basis. And so that means that if a language dies without being recorded, it is most certainly unrecoverable forever.'

Online NewsHour: 'The Power of Babel' – February 22, 2002
Wysiwyg://38/http://pbs.org/newshour/conversation//jan-june02/babel_2-22.html

*Transformation*, as we remember, is one of the three characteristics of any living structure (the other two being *wholeness* and *self-regulation*. Tracking sound change in language makes one *feel* the *breath* of language. Speakers constantly re-create language, just like metabolic processes are constantly renewing our bodies. In the process of 'language metabolism' all kinds of changes and transmutations are also possible – they 'can go in any number of different directions in the various parts of whatever our language is' (McWhorter).

However, as we noted in the previous section, people are clever - they tend to avoid *unnecessary* difficulties ☺. Therefore, despite the diversity of human languages, we can still talk of some **natural tendencies**, based on the fact that certain types of sound change are very common, whereas others are unlikely. A few types of sound change that shaped the development of many languages are:

- **Final vowels often disappear:** ME [na:mə] → Modern English [ne:m] → [neim]
- **Voiceless sounds become voiced between vowels:**
  [ʃʌt] [ʌp] → [ʃʌd ʌp]
- **Consonants become voiceless at the end of words:** German *Hund*, Russian [got], etc.

We have discussed speech sounds and their interaction in connected speech (mostly in English, but also in some other languages, i.e., Russian and German. We can now see that many of these rules express the more general, natural tendencies in the way people speak. These tendencies are due to the limitations of our anatomy (our tongues are not fast enough to enunciate each sound precisely in connected speech). This is one of the forces driving language change.

Sutra 10 will look the distinctive sounds and patterns of sounds in individual languages. We will also learn the phonological rules that we can use to actually identify and record sound changes in connected speech.

**Summary**

- ➢ The kind of vowel you pronounce is determined by the shape of your resonance chambers
- ➢ Stress patterns, distinguished by the pitch, loudness, and length of vowel sounds, affect the quality of the sounds we hear.
- ➢ Consonants are classed according to the force, place, and manner of articulation.
- ➢ Vowels are classed according to the position of the tongue (front/back, high/mid/low), whether the lips are rounded or not when pronouncing them, whether they are long/short (tense/lax), and by whether they are monophthongs or diphthongs
- ➢ In running speech, sounds interact and influence each other, because

    - our articulators are not fast or flexible enough to keep up with the flow of speech
    - our speech has stress patterns, which influence sound quality, etc.
- The various phonological adaptations usually include:
    - Assimilation of Place, Manner or Voice::
        - progressive / regressive,
        - partial / total
    - Neutralisation, often leading to elision, and
    - Linking, or sound *insertion* for the sake of ease of articulation.
- Sound change is one of the fundamental driving forces of language evolution
- Despite the diversity of human languages, we can still talk of some **natural tendencies** in their development, based on the fact that certain types of sound change are very common, whereas others are unlikely.