PHONOLOGY AND PHONETICS

Phonology is a branch of linguistics which studies the sounds and patterns of sounds of a certain language and across languages. It aims to describe and categorize speech sounds in languages.

Phonetics, on the other hand, is the study of how sounds are produced physically, their acoustic transmission (sound waves), and their perception in the ear and the brain.

Therefore, it can be said that phonology is more theoretically oriented than phonetics, more abstract than phonetics, which is in turn more concrete.
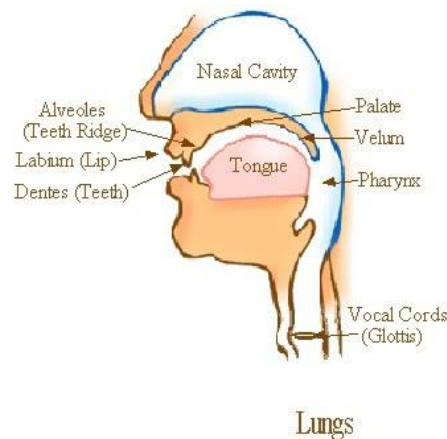

Figure 1 The Human Vocal Tract

Since we are concerned with sounds, we must know that each sound has its own properties or features. This is not unexpected, as we would need to know the properties of each sound to be able to accurately describe it. The **major features or properties** (**features of articulation**) are:

1. *Place of articulation, i.e. WHERE the sound is produced from in our vocal tract.*
2. *Manner of articulation, i.e. HOW we produce the sound.*
3. *Voicing, i.e. whether or not our vocal cords vibrate when we produce the sound.*

To begin describing these features, we must familiarize ourselves with the different parts of the human **vocal tract**. The lowermost part is the **laryngeal tract**; it is where **the larynx**, which contains the **vocal cords**, is located. **The pharynx** is above **the larynx**, and the **velum** is located at the top of it; we call this **the oral cavity**. Then we have the **main articulator**, i.e. **the tongue**.

Above **the tongue**, we have the **palate** which runs up until the upper teeth. Just behind the upper **teeth**, we have the **alveolar ridge**. At the outermost level, we have **the lips**. **The nasal cavity** is located above them all, and **the nose** plays a role in the production of some sounds.

Now that we know the different parts of the vocal tract, we may begin to describe each sound that is <u>humanly possible</u>! Each **place of articulation** has a certain name based on **Latin roots**. For example, if a sound is produced by pressing the lips against each other, then we must look for the Latin equivalent of 'two' and 'lips' + adjective marker (al/ar). If 'two' is 'bis-' and 'lips' is 'labia', then a sound like /b/ is called **'bilabial'**. Now that we know how to construct these names, you may take a look at the different places and be able to tell with precision where they are in the vocal tract:

1. **Bilabial**
2. **Labiodental**
3. **Dental/ Interdental**
4. **Alveolar**
5. **Palatal**
6. **Velar**
7. **Pharyngeal**
8. **Glottal**

Now, a certain language does not have to have sounds produced in all of these places of articulation. For example, English does not have any pharyngeal sounds.

Knowing the place of articulation of a certain sound is not enough to describe it. For example, we said that /b/ is bilabial, but so is /p/ and /m/! We must now turn to the manner of articulation, i.e. **HOW** a sound is produced, to be able to describe said sound.

We can produce a certain sound by restricting the flow of air and then releasing it (sometimes with a puff), this manner of articulation is called a **stop or plosive**.

Stops are sounds that cannot be 'prolonged', e.g. /b/ which can be made only once upon the release of the trapped air.

Fricatives, on the other hand, allow for some airflow from the **oral cavity** during the articulation of a certain sound. This means that **fricatives** can be 'prolonged'. As an example, try to say /s/ and go on saying it. You may go on indefinitely (don't forget to inhale!), but with /b/, you cannot do this.

Affricates are sounds that start as a stop but go on to be fricatives. Examples include German /pf/ and Hungarian /ts/ as in 'cukor' 'sugar' pronounced /tsukor/.

Nasals are sounds that allow some airflow from the **nasal cavity**, but not the oral tract. These include sounds such as /m/ and /n/.

Flaps/Taps are sounds produced through a very brief closure of the oral cavity. The double 'tt' of General American (GA) 'butter' is pronounced as a **tap or flap** [ɾ].

Trills are sounds that allow for intermittent airflow, continuously changing from restricted to unrestricted airflow. Examples include Hungarian and Italian /r/ as in 'erre' 'from here' and 'arrivederci' 'goodbye'. German /r/ is another type of trill.

Approximants are sounds produced with very little restriction to the airflow. Approximants include **semivowels/glides** which are sounds that are pronounced like vowels, only that the tongue is not at rest (slightly curved toward the roof of the mouth). Examples of **semivowels/glides** include /w/ and /j/ in English. **Laterals** are sounds produced with the side of the tongue, like English /l/. English /l/ and /r/ constitute a class called **liquids**.

Now that we have described the manners of articulation, can you guess the properties of /b/ /z/ /k/ and /d/?

Voicing: Let us do this quick experiment. Place your index finger on your throat and say /s/ for 3 seconds. Now say /z/ with your index finger still placed on your throat. What is the difference?

Voiced sounds are sounds that are produced with a vibration in the vocal cords. The absence of vibration in the vocal cords causes a sound to be otherwise **voiceless**. Now you are able to describe a sound with its full primary features of articulation; the difference between /b/ and /p/, for instance, is now clear to you.

Exercise: What are the features of articulation of the following sounds?

/b/: voiced, bilabial stop   /d/:

/f/:   /g/:

/k/:   /n/:

/p/:   /s/:

/t/:   /v/:

Just like consonants, vowels can be described according to their place, or where the tongue is placed horizontally, i.e. back**, center or front**. The shape of the lips while producing a certain vowel is also important, i.e. **rounded or unrounded**. The height of the tongue is the last feature we use to describe vowels, i.e. **high, mid or low**.
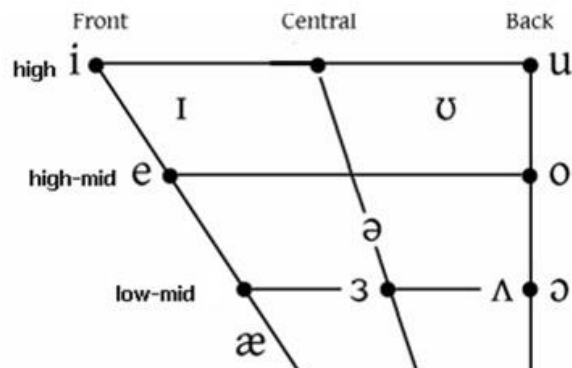
Figure 2 The Vowel Diagram

With this, we have completed the list that we need to describe consonants and vowels of a certain language. In fact, you can now describe the sounds of any language! Mind you that these features we discussed are not the only features out there, but rather the most common and most general ones. For example, some languages contain whistles or clicks, for which we need another place or manner of articulation. Moreover, what we have covered only encompasses **primary features of articulation**, there are secondary features which we will not be getting into in this course.

Exercise: What sounds do these features describe? Try saying them out loud. Don't be alarmed if you miss some of them!

1. Voiceless labiodental fricative
2. Voiced alveolar stop
3. Voiceless velar stop
4. Voiced lateral approximant
5. Glottal stop
6. Voiced velar fricative
7. Bimanual fricative
8. Bidigital stop
9. Labio-velar glide
10. Palatal glide
11. Voiceless bilabial fricative
12. Voiced bilabial trill

Now that we have all of this sorted out, what remains to be decided is how we represent these sounds. Since each language has its own alphabet, and thus assigns different symbols to different sounds, linguists must agree on a universal alphabet to be used for sounds (transcription). Transcription or to transcribe is to convert spoken words into written symbols that accurately represent it. In order to transcribe, we must have a unified way of representing sounds, since, for example, 'j' refers to a palatal glide in languages like Hungarian, but a voiced palatal fricative in French. This is why we will refer to the **International Phonetic Alphabet,** otherwise known as the **IPA**, which has nothing to do with Indian Pale Ale, although you will want to be sober when you study the following chart.

Figure 3 The International Phonetic Alphabet

After carefully studying the chart, we may begin transcribing various words from English. For other languages, we may need extra symbols, but what we have is sufficient for English as a start.

When transcribing, always include the words between slashes '/ /'. This is called phonemic transcription. For phonetic transcription, we use square brackets '[ ]'. We will discuss the difference in the coming section. /nau wi want tə trænskraib səm ingliʃ wərdz ənd sentənsəz/

As you may have noticed, this symbol /ə/ is quite abundant in English. This is called a '**schwa**' and it is, as a matter of fact, the most common vowel of English. This is because unstressed vowels are pronounced as a **schwa** /ə/. *Look at the words marked in red above. These refer to 'to' and 'and' respectively. Why were they transcribed as /tə/ and /ənd/, not /tu(w)/ and /ænd/?*

Exercise: Read the following transcribed text. Convert it to written English.

lets bəuθ əv əs stʌp traiŋ tə dʒʌstəfai ðis həul θiŋ ənd ədmit jəur in deindʒər! huː ar juː tɔːkiŋ tu rait nau? huː iz it juː θiŋk juː siː? du juː nəu hau mʌtʃ ai meik ə jiːr? ai miːn, iːvən if ai təuld juː, juː wudənt bəliːv it. du juː nəu wət wud hæpən if ai sədənli dəsaidəd tə stʌp gəwiŋ in tə wərk? ə biznəs big inʌf ðæt it cud bi listəd ən ðə NASDAQ gəuz beliː ʌp, disəpiːrz. it siːzəz tu igzist wiðaut mi. nəu. juː klirli dəunt nəu huː jəuːr tɔːkiŋ tu, səu let mi klu juː in. ai am nʌt in deindʒər skailər. ai am ðə deindʒər. ə gai əupənz hiz dɔːr ənd gets ʃʌt, ænd juː θiŋk ðæːt əv mi? nəu. ai am ðə wʌn huː nʌks!

Let us now talk about phonemes. What is a phoneme exactly?

A phoneme is the smallest unit of sound, like /b/ or /k/. Phonemes of a certain language must have an **opposition** among them. An opposition means that replacing one phoneme with another would change the meaning of the word.

Consider these words: /bin/ and /pin/ .. these words mean two different things, which means that /b/ and /p/ are phonemes in English, they are in **contrastive distribution**, which means that there are contexts where one or the other is a viable option (see 'bin' and 'pin'). Moreover, words like /bin/ and /pin/ are called **minimal pairs**, that is because there is only one phoneme that distinguishes them. Other examples of minimal pairs include 'bear' and 'pear', 'bear' and 'boar', 'rose' and 'toes', and 'phone' and 'foal' etc..

So /b/ and /p/ have an opposition in English (but not in Arabic, for example!).

Now consider these two words: /riŋ/ and /ʀiŋ/ .. both refer to the same word 'ring', only the second one is spoken by someone whose native language has a uvular trill instead of an alveolar approximant. Since both pronunciations have the same meaning, then /r/ and /ʀ/ are NOT phonemes in English. They are called **allophones**, and are represented with square brackets, i.e. [r] and [ʀ]. **Allophones** refer to the many different **phones** of a certain **phoneme**. What is a **phone**? A **phone** is the **phonetic realization** (actual sound during pronunciation) of a certain **phoneme**. For example, in English 'pin', /p/ is realized as an aspirated [pʰ] and not [p]. However, [p] and [pʰ] are considered **allophonic** in English, since using one or the other does not change the meaning, i.e. they are in **complementary distribution**. If two sounds are allophonic, we can predict when they will be used in a certain context. For example, [pʰ] is used word-initially, while [p] is used after /s/ as in 'spin'.

Note that this is only the case of English, in other languages (such as Thai), there might be an opposition between /p/ and /pʰ/, in which case they are phonemes, not allophones.