INTRODUCTION TO PHONETICS AND BASIC CONCEPTS

1. What is Phonetics?

In the introduction of his book "*A practical introduction to phonetics"*, Catford (1988) simply defined **Phonetics** as "the systematic study of human speech-sounds. It provides means of describing and classifying virtually all the sounds that can be produced by human vocal tracts" (p. 01). To classify the sounds of a particular human language, Phonetics makes use of the International Phonetics Alphabet (IPA), which is a phonetic notation system that was first created by the International Phonetic Association in 1886. In this course, IPA is used to represent all of the speech sounds in the English language and its two most prominent varieties: The Received Pronunciation (RP) and the General American (GA).

2. Branches of phonetics

The field of phonetics is traditionally divided into three sub-disciplines, namely: articulatory phonetics, acoustic phonetics, and perceptual phonetics.

a) Articulatory Phonetics

Articulatory phonetics is the study of the production of human speech sounds. It concerns the manipulation of the shape of the oral tract to change the shape of resulting sound waves, creating human speech. Human beings have evolved a very precise oral mechanism that allows the production of an amazing number of sounds that are then combined into meaningful words and phrases.

Articulatory phonetics covers the anatomic and physiologic aspects behind the airstream mechanisms that can be used to create sound sources along the vocal tract and the articulatory activities of the tongue, jaw, lips and nasal cavities. In other words, "articulatory phonetics identifies precisely which speech organs and muscles are involved in producing the different sounds of the world's languages" (McMahon, 2001).

b) Acoustic Phonetics

Acoustic phonetics is the study of the physical properties of speech created by the different articulatory configurations of the vocal tract, and aims to analyze sound wave signals that occur within speech through varying frequencies, amplitudes and durations. The following figure is an example of how speech is represented in acoustic phonetics:

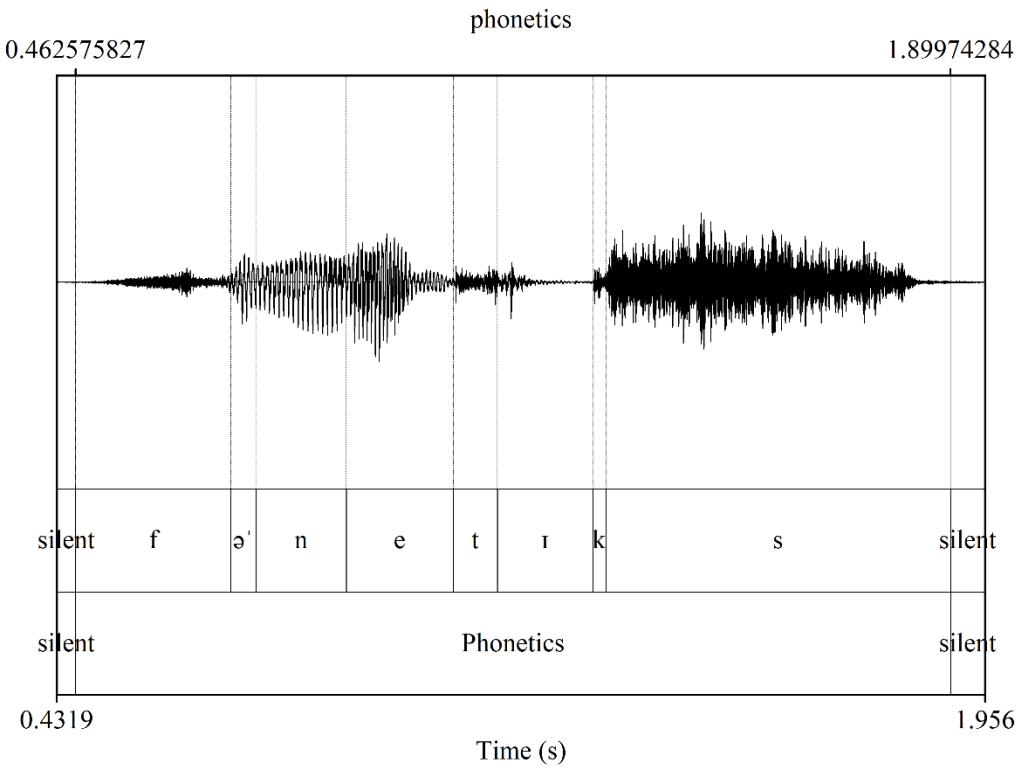

Figure 1. Speech representation is acoustic phonetics using Praat

c) **Perceptual (auditory) Phonetics**

Perceptual phonetics studies how speech sounds are represented by the auditory system and perceived by the listener. Speech perception is a process of converting sounds into ideas (phonological inventory).

3. Why study Phonetics and who needs it?

"The study of both phonetics (the science of speech sound) and phonology (how sounds pattern and function in a given language) are going to help you to learn more about language in general and English in particular. If you're an English native speaker, you'll be likely to discover much about your mother tongue of which you were previously unaware. If you're a non-native learner, it will also assist in improving your pronunciation and listening abilities. In either case, you will end up better able to teach English pronunciation to others and possibly find it easier to learn how to speak other languages better yourself. You'll also discover some things about the pronunciation of English in the past, and about the great diversity of accents and dialects that go to make up the English that's spoken at present." (Collins and Mees, 2003).

a) ***Students of English (casual and professional speakers of English):*** The study of phonetics is crucial for EFL students. It increases their awareness of phonemic and prosodic features in English pronunciation. This, in turn, make them effective speakers of the target language**.**

b) ***Students of Linguistics:*** "Phonetics is absolutely essential to the student of linguistics. It is virtually impossible to do serious work in linguistics without a thorough knowledge of phonetics. Clearly, without phonetics, field work, the most important source of linguistic data, is impossible, and phonological rules become meaningless and unmotivated rules of letter substitution. Even in the study of syntax and morphology questions of phonetics frequently arise.

c) "***The Teachers of Languages***, including the teachers of English as a second/ foreign language, must be able to diagnose the pronunciation errors made by students, and to devise means of correcting them – this is impossible without both theoretical and practical knowledge of phonetics" (Catford, 1988). The study of phonetics is especially important for second language teachers. It helps them to detect students' pronunciation needs and improvements.

d) ***Language Researchers:*** Phonetics helps language researchers understand different aspects of production and perception of human speech and how to measure or assess them accurately.

e) ***Computer Scientists and Engineers:*** "computer engineers and other 'speech-scientists' working on the improvement of speech transmission systems, on speech synthesis, and on automatic speech recognition, also need to have a considerable knowledge of phonetics" (Catford, 1988).

f) ***Speech Pathologists****:* Speech pathologists have an obvious need for phonetics, which they readily acknowledge, both for a general understanding of how the vocal apparatus works and for the diagnosis and treatment of minor articulatory defects.

4. Components of English speech

When addressing English speech, there are two main components: 1) a phonemic (also called segmental) focus where individual sounds are taught (vowels and consonants), and 2) a prosodic, or so-called suprasegmental, focus where the pronunciation of words and sentences are taught.

a) Phonemes

Speech is a continuous flow of sound with interruptions only when necessary to take in air to breathe, or to organize our thoughts. The first task when analyzing speech is to divide up this continuous flow into smaller chunks that are easier to deal with. We call this process **segmentation**, and the resulting smaller sound units are termed **segments** (these correspond very roughly to vowels and consonants). There is a good degree of

agreement among native speakers on what constitutes a speech segment. If English speakers are asked how many speech sounds there are in man, they will almost certainly say 'three', and will state them to be [m], [æ] and [n].

Segments do not operate in isolation, but combine to form words. In man, the segments [m], [æ] and [n] have no meaning of their own and only become meaningful if they form part of a word. In all languages, there are certain variations in sound which are significant because they can change the meanings of words. For example, if we take the word man, and replace the first sound by [p], we get a new word pan. Two words of this kind distinguished by a single sound are called a **minimal pair**.

Let's take this process further. In addition to pan, we could also produce, for example, *ban, tan, ran,* etc. A set of words distinguished in this way is termed a **minimal set**. Instead of changing the initial consonant, we can change the vowel, e.g. *mean, moan, men, mine, moon,* which provides us with another minimal set. We can also change the final consonant, giving yet a third minimal set: *mat, mad*. Through such processes, we can eventually determine those speech sounds which are phonologically significant in a given language. The contrastive units of sound which can be used to change meaning are termed **phonemes**. We can therefore say that the word man consists of the three phonemes /m/, /æ/ and /n/.

But not every small difference that can be heard between one sound and another is enough to change the meaning of words. There is a certain degree of variation in each phoneme which is sometimes very easy to hear and can be quite striking. English /t/ is a good example. It can range from a sound made by the tip of the tongue pressed against the teeth-ridge to types of articulation involving a 'catch in the throat' (technically termed a glottal stop). Compare /t/ in tea (*tongue-tip* t) and /t/ in button (usually made with a *glottal stop*). Each phoneme is therefore really composed of a number of different sounds which are interpreted as one meaningful unit by a native speaker of the language. This range is termed **allophonic variation**, and the variants themselves are called **allophones**.

Only the allophones of a phoneme can exist in reality as concrete entities. Allophones are real – they can be recorded, stored and reproduced, and analyzed in acoustic or articulatory terms. Phonemes are abstract units and exist only in the mind of the speaker/listener. It is, in fact, impossible to 'pronounce a phoneme' (although this phrasing is often loosely employed); one can only produce an allophone of the phoneme in question. As the phoneme is an abstraction, we instead refer to its being **realized** (in the sense of 'made real') as a particular allophone.

Although each phoneme includes a range of variation, the allophones of any single phoneme generally have considerable **phonetic similarity** in both acoustic and articulatory terms; that is to say, the allophones of any given phoneme:

- usually sound fairly similar to each other
- are usually (although not invariably) articulated in a somewhat similar way.

b) Prosodic features

Unlike vowels and consonants, which are single speech sounds, prosodic features normally stretch over more than a single segment – possibly a syllable, a complete word or phrase, whole sentences, or even more. The use of prosodic features often reflects the speaker's emotional state, the form of the utterance (i.e. declarative statement, question, or command), the presence of irony or sarcasm; emphasis, contrast, and focus. It may otherwise reflect other elements of language that may not be encoded by grammar or by choice of vocabulary. The term prosody mainly includes the following aspects of speech: stress, rhythm, and intonation.

Stress refers to an emphasis on a particular syllable within a word or a word within a sentence. In a stress-timed languages like English, syllable and sentence stress patterns highlight the meaning of spoken utterances and give them the unique musical rhythm of English pronunciation. In English, four phonetic variables appear most significant as indicators of stress: *intensity*, *pitch variation*, *vowel quality* and *vowel duration.* 1) **Intensity** in physiological terms is the greater breath effort and muscular energy associated with stressed syllables. It's closely related to what is perceived by the listener as loudness. 2) **Pitch variation** appears to be, as far as English is concerned, the most important single factor in determining stress. In English, higher pitch tends to be associated with stronger stress. **Vowel quality**, i.e. whether a vowel is central or peripheral, also determines stress. Take the English vowels in the noun present /ˈpreznt/ as opposed to the verb (to) present /prəˈzent/. The stressed syllables contain the peripheral vowel dress /e/, whereas the unstressed syllables have a central vowel /ə/.

Sentence stress is the basis of **rhythm** in English. Stressed syllables tend to occur at roughly equal intervals of time. This is because the unstressed syllables in between give the impression of being compressed if there are many and expanded if there are few. For example, in the sentence "ˈJimmy's ˈbought a ˈhouse near ˈGlasgow.", the words "Jimmy", "bought", "house", "Glasgow" are stressed; while the contraction of has "s", article "a", and adjective "near" are unstressed. For the most part, the stresses fall on the content words, whereas the function words usually lack stressing.

Intonation refers to the pitch variation in discourse, this can include single words or sentences. Such variations in pitch, and unlike stress, influences the type of an utterance more than its literal meaning. For this reason, intonation can make the difference between a declarative statement, an interrogative statement, or an exclamatory statement. For example, in the use of a falling intonation in the sentence "you parked the car outside", the listener can perceive it as a declarative statement providing an information about parking the car. However, in the use of a rising intonation in the same sentence "you parked the car outside?", the listener would perceive it as a question and/or an exclamatory statement. Generally speaking, rising intonation is mostly used for interrogative and exclamatory statements, while falling intonation is used for declarative and command statements. Such functions, however, are characterized by irregularity as different intonation directions can influence statements differently depending on the context.

Recommended sources to study English Phonetics

Dictionary

Oxford learner's pocket dictionary

Books

Carr, P. (2019). *English phonetics and phonology: An introduction*. John Wiley & Sons.
Collins, B., & Mees, I. M. (2013). *Practical phonetics and phonology: A resource book for students*. Routledge.
Hancock, M. (2009). *English Pronunciation in Use. Intermediate*. Cambridge University Press.
Roach, P. (2009). *English phonetics and phonology paperback: A practical course*. Cambridge university press.

Websites and courseware

- Oxford Dictionary of English (requires internet connectivity)
- BBC learning English (free mobile application/ requires internet connectivity)
- Duolingo (requires internet connectivity)
- Tell Me More (offline language learning program/ premium)
- MyET (an online computer-assisted pronunciation training software/ sample courses are free/ complete program is premium)