Post-Graduate Diploma in the Teaching of English

THE PHONETICS OF ENGLISH

BLOCK I

ALLOPHONIC VARIANTS

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Contents

INTRODUCTION TO THE BLOCK

Before you start reading this block, we strongly recommend that you should read Block IV of *Phonetics and Spoken English* [PGCTE materials] – *Consonants and Vowels*, especially Unit 6 of the block, where the difference between a phoneme and an allophone has been drawn, and some important allophonic variants of English phonemes have been described.

In this block, we will be studying in detail all the allophonic variants of both the consonants and vowels of English. There are five units in this block. In the first unit, we will be doing a recap of all that we have learnt in the PGCTE materials regarding phonemes. In the remaining units the description of allophonic variants of consonants and vowels will be in the following order:

Unit 2: Allophonic variants of plosives
Unit 3: Allophonic variants of fricatives and affricates
Unit 4: Allophonic variants of nasals, lateral, and frictionless continuant
Unit 5: Allophonic variants of semi-vowels and vowels.

All these units have a lot of activities with relevant figures and examples. We strongly advise you to spend some time doing each activity before moving ahead. All the examples that have been underlined in this block have audio files, which you will find on your CD. Do use them while going through your material and also for doing the Activities and Review Questions in each unit. It would also be a good exercise to listen to the examples on the CD accompanying the Cambridge Advanced Learner's Dictionary (CALD) or Oxford Advanced Learner's Dictionary (OALD). At the end of each unit, you will find a small list of web sites, which will lead you to relevant web pages for additional practice.

Unit I

Phonemes Revisited

Contents

Unit 1
PHONEMES REVISITED

1.0 Introduction

In this unit, you will be doing a recap of what you have learnt in your PGCTE course regarding phonemes of English. This will ensure your smooth transition from phonemes to their allophonic variants. You will also be introduced to some figures – how to read them and their utility – which have been extensively used to represent the articulation of phonemes and their allophones.

1.1 Phoneme

As we have learnt in Block IV of the PGCTE course, a **phoneme** is the smallest or the *minimal* unit in the sound system of a language. In a word like *cat*, there are three letters: 'c – a – t'. When we pronounce this word, we can perceive three sounds / k / + / **æ** / + /t/. These three sounds, the order in which they occur, represent a four-legged animal. If one of the phonemes in the above word is replaced by another phoneme, a new word is formed, and it has a different meaning.

Activity A

Let us take the same word cat and replace the first phoneme / k / with different phonemes and note the changes:

/ k|æt /:	*cat* :	a four-legged domestic animal
/ p|æt /:	*pat*:	a light tap to indicate appreciation or encouragement
	Pat:	a masculine name
/ b|æt /:	*bat*:	a play thing, a animal

Discussion

As is evident from the above activity, by replacing the first phoneme / k / with / p / or / b /, we have two new words *pat* and *bat* with different meanings. Why don't you try this yourself and replace the first phoneme with other phonemes of English like / s, f, m / etc., and note the formation of new words with different meanings?

Similarly, the medial sound / **æ** / in *cat* can be replaced by vowels such as / **ɪ**, **ɑ**:, **ɒ**, **ɔ**:, **ɜ**:, **ʌ**, **aɪ**, **eɪ** / to form meaningful words, *kit*, *cart*, *cot*, *caught*, *curt*, *cut*, *kite*, and *Kate*. Likewise, the final / t / can be replaced by / p, b, n /, to form meaningful words such as *cap*, *cab*, and *can*. These sounds which can replace one another to form new words with different meanings are called ***phonemes***.

So, a phoneme is not just a minimal unit, it is also *distinctive*, i.e. it is capable of changing the meaning of a word. By substituting one sound with the other, we get a new word in the language. Therefore, a phoneme is defined as a ***minimal distinctive unit*** of a language.

1.2 Allophonic variants of a phoneme

Now, let us pronounce the words: *kill* / kɪl /, *skill* / skɪl / and *lick* / lɪk /. In these words, the phoneme / k / occurs in three different positions: word-initially in *kill*, after / s / in *skill* and word finally in *lick*. Say these words one after the other: *kill . . . skill . . . lick.* If you listen to a native speaker's pronunciation of these words (or your own pronunciation, if you are able to do it the way the native speakers do), you will be able to perceive the difference in quality of / k / in these words. In the first word *kill* / kɪl /, the phoneme / k / is accompanied by a 'puff of breath' or *aspiration*, which is not perceived in *skill* / skɪl /, where / k / is preceded by the phoneme / s /. And, in *lick* / lɪk /, the release of final / k / is silent or soft. This is described as an *inaudible release* of / k /. These differences in quality are due to the different realisations of / k /. And, these realisations of / k / are called its ***allophones***.

The phonemes are represented within *slashes*, for example, *kill* / kɪl /, whereas the allophones of a phoneme are represented within *square brackets*, for example [kɪl]. Additionally, a ***diacritic***, a small extra mark used to indicate qualitative differences, is added to the phoneme to represent the allophone of that phoneme. For instance, in / kɪl /, since / k / is aspirated, the diacritic [^{h}] is added to the phonemic symbol to indicate aspiration. Therefore, the allophonic representation of *kill* would be [k^{h}ɪl]. (At this point, we are not representing the allophones of / **ɪ** / and / l /. But, remember, these two phonemes also have allophonic variants.) On the other hand, in *skill* [skɪl], since / k / is unaspirated, no diacritic mark is added to it. And, in *lick*, the unreleased/unexploded/inaudibly released (these three terms are used synonymously in this course even though phoneticians have pointed out differences in the use of

these terms) allophone of the final / k / is indicated with the diacritic [˺], as in [lɪk˺]. (Note that the allophones of / k / are not restricted to just three. The other allophones of / k / will be introduced later in Unit 2.)

Finally, a note on the two types of transcriptions used here. The representation of phonemes within slashes, for instance *kick* / kɪk /, is known as a **broad** or a **phonemic** transcription. On the other hand, the representation of allophones, for instance *kick* [k^{h}ɪk˺], is known as a **narrow** or a **phonetic** transcription as it includes finer details to show the different realisations of phonemes.

Activity B

Here are some words in which we will be focussing on the allophones of the phonemes / p / and / t /. Remember, / p, t, k / are voiceless plosives. Therefore, some features like *aspiration* and *release* are common to them. Keeping in mind what we have just read about the allophones of / k /, represent the allophones of / p / and / t / using the diacritics [^{h}] and [˺] where necessary. The first one is done for you.

1.	pan	[p^{h}æn]	5.	pat	[ ]
2.	mat	[ ]	6.	spat	[ ]
3.	sap	[ ]	7.	stop	[ ]
4.	sty	[ ]	8.	tap	[ ]

Discussion

Here, we observe that / p / and / t / are **aspirated**, when they occur in the initial position of a word as in ***p****an*, ***p****at*, and ***t****ap*. They are **unaspirated** after / s / as in *s****t****y*, *s****p****at*, and *s****t****op*. And, they are *unexploded* or *unreleased* in the final position of the word as in *ma****t***, *sa****p***, *pa****t***, *spa****t***, *sto****p***, and *ta****p***.

The above activity helps us to realise that the quality of the given sound / p / or / t / is different in different environments. To repeat: a voiceless plosive is aspirated when it occurs in the initial position of a stressed syllable, is unaspirated when it occurs after / s /, and is inaudibly released when it occurs in the final position. So, the environment or the position of the phoneme in a word determines the allophonic realisation of that phoneme. Therefore, the allophones of a phoneme can also be described as **positional variants** of that phoneme.

1.3 Distribution of phonemes and allophones

The distribution of phonemes and their allophones can be better understood by taking three points into consideration: the **phonetic similarity** or **dissimilarity** between them, the **environment** in which they occur, and the **ability to change the meaning** of a word.

1.3.1 Distribution of phonemes

Let us study the distribution of the initial phonemes / p, b, k / in *pat*, *bat*, and *cat.*

1. Firstly, the phonemes / p, b, k / are phonetically dissimilar: /p / is a voiceless bilabial plosive, / b / is a voiced bilabial plosive, and / k / is a voiceless velar plosive. All three are plosives, but / p / and / b / differ phonetically in the feature voicing, and while / p, b / are bilabial sounds, / k / is a velar sound.
2. Secondly, all the three phonemes occur in the same environment, i.e. the initial position followed by the vowel /æ/.
3. Finally, the substitution of one phoneme by the other brings about a change in the meaning.

Therefore, these phonemes are said to be in **contrastive** distribution, i.e. they are phonetically dissimilar sounds occurring in the same environment, and the substitution of one for the other brings about a change in meaning, that is, they stand in contrast to each other.

1.3.2 Distribution of allophones

Now, let's look at the distribution of the allophones of a phoneme, for instance, of / k / as in *kill*, *skill*, and *lick.*

1. Firstly, [k^h, k, $k^\urcorner$] are realisations or positional variants of / k /. All three are voiceless velar plosives. In other words, they are phonetically similar. They differ only in their realisations, which we have learnt, is the outcome of their position in a word.
2. Secondly, the three allophones occur in three different environments, and one cannot replace the other. For instance, / k / was realised as [k^h], when it occured in the initial position of *cat*, but not when it occured after / s / as in *skill,* or

in the final position as in *lick*. So, allophones are said to be in **mutually exclusive** environments.

3. Finally, even if one allophone is substituted with the other, there is no change in meaning. Try this for yourself: try to aspirate / k / in *skill,* and if possible in *lick*. Even if you manage to aspirate them, do you find any change in meaning with the aspiration of / k /? That is, do the words *skill* and *lick* acquire different meanings in English just because the / k / sound in them is aspirated? You'll realize they don't!

Based upon the above three points, we can describe the allophones of a phoneme as phonetically similar sounds occurring in mutually exclusive environments, and the substitution of one for the other does not bring about a change in the meaning. Or, alternatively, they are said to be in **complementary** distribution.

1.4 Phonemes in English

The phonemes and their allophones are specific to a language. Each language makes its own selection of not only the number of phonemes that represent the sound system of that language but also the allophonic variants of these phonemes. As we already know, the English sound system has 44 phonemes. Out of which, 24 are consonant phonemes and 20 are vowel phonemes, as listed below:

1. Consonants:
   /p, b, t , d , k , g, f, v, θ, ð, s, z, ʃ, ʒ, h, tʃ, dʒ, m, n, ŋ, l, r, j, w /
2. Vowels:
   / **iː, ɪ, e, æ, ɑː, ɒ, ɔː, ʊ, uː, ə, ɜː, ʌ, aɪ, eɪ, ɔɪ, ɪə, eə, ʊə, aʊ, əʊ** /

The above distinction of phonemes into vowels and consonants is based on both phonetic and phonological considerations, in other words, the *form* and *function* of these phonemes.

Phonetically, vowels are sounds in the production of which, there is a wide gap between the articulators, and the air flows out freely and continuously without any obstruction. All other sounds, in the production of which there is some stricture or closure involved are known as consonants.

Phonologically, a vowel functions as the nucleus of a syllable, and therefore constitutes the obligatory element of a syllable. On the other hand, consonants are marginal and optional in a syllable. In other words, in English, a word can have one syllable with just a

vowel as in *eye* / **aɪ** / or *ear* / **ɪə** /. But, a word cannot be comprised of just a consonant sound. (Although, we do find onomatopoeic words such as 'sh / ssh / shh . . .' pronounced as / ʃ / or with a diacritic mark [:] to indicate length, which is used to tell someone to be quiet.)

Activity C

We have read in the above section that phonemes and allophones are language specific. Furthermore, that the aspirated [k^h] and the unaspirated [k] are allophones of the phoneme / k / in English: the substitution of one by the other does not bring about a change in meaning.

Let us pick up two pairs of words from a language like *Hindi* to see the distribution of the initial sounds:

1. / kal / : tomorrow or yesterday
2. / k^hal / : a disturbance or to strike terror
3. / pal / : a moment
4. / p^hal / : a fruit

Discussion

In the above examples of Hindi, / k, k^h/ and / p, p^h/ are functioning as phonemes, and therefore transcribed within slashes. If we replace one with the other, there is a new word with a different meaning. How about your mother tongue? Why don't you check the sounds of your mother tongue to see if the aspirated and unaspirated variants are allophones of the same phoneme or two different phonemes?

1.5 Description of Phonemes

In this section, we will be focussing only on the consonant phonemes. Later, in Unit 6, we will study vowels in detail. As we know, the difference between phonemes is captured by using the three term labels. For example, / p / is described as a **voiceless bilabial plosive**, while / b / is described as a **voiced bilabial plosive**. These labels look at three important aspects in the production of phonemes: **the state of the vocal cords, the place of articulation,** and **the manner of articulation.** Let us take up each of them and use this opportunity to work through some activities.

1.5.1 State of the vocal cords

You may recollect from your PGCTE course that we describe sounds as **voiced** and **voiceless** depending on whether the vocal cords are vibrating or wide open. Look at the two pictures given below in Figure 1.1.

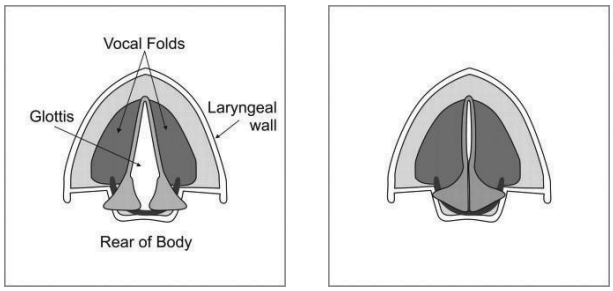


Figure 1.1: The position of the vocal cords for voiceless and voiced sounds.

As the first picture of Figure 1.1 shows, the vocal cords/folds are wide open. This is the position that the vocal cords assume in order to produce **voiceless** sounds, such as / p /, / s /, / tʃ /, etc. On the other hand, the vocal cords are closer to each other, as seen in the second picture, and vibrating (not evident in the picture), which is the position assumed for producing **voiced** sounds, such as / b /, / z /, / dʒ /, / m /, etc.

Review question I

Why don't we check our knowledge of the **voiceless** and **voiced** phonemes by working on the following task? Just put a tick mark in the appropriate column. The first one has been done for you.

	phoneme	voiceless	voiced		phoneme	voiceless	Voiced
1	/ h /	√		9	/ ʊ /		
2	/ w /			10	/ z /		
3	/ æ /			11	/ m /		
4	/ k /			12	/ θ /		
5	/ ɒ /			13	/ t /		
6	/ ʃ /			14	/ ɑ: /		
7	/ p /			15	/ r /		
8	/ d /			16	/ l /		

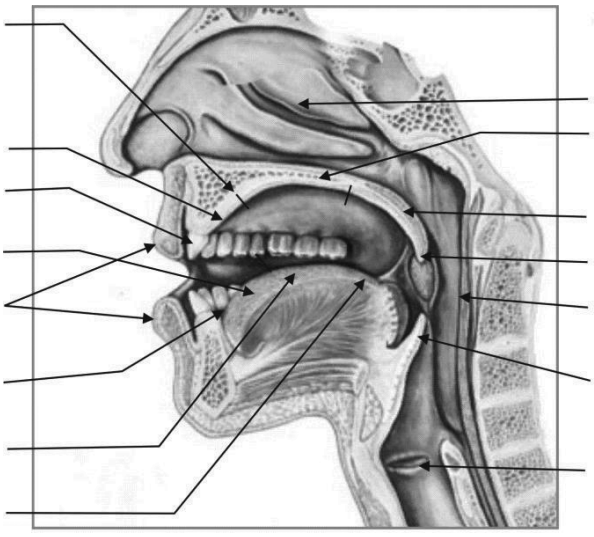
1.5.2 Place of articulation

The place of articulation refers to the point in the oral cavity where the articulation is made, and also to the *active* (mobile) and *passive* (fixed) articulators. On the basis of this feature, consonants are classified into: **bilabial, labio-dental, dental, alveolar, post-alveolar, palatal, palato-alveolar, velar,** and **labio-velar** sounds. For example, bilabials are produced at the lip region. The lower lip (active articulator) moves towards the upper lip (passive articulator) and forms a closure to articulate the bilabial sounds / p /, / b /, and / m /.

Head cross-sections like the one given in the activity below are used frequently in books describing the articulation of phonemes. We also would be working with such head cross-sections wherever necessary. Since they depict the oral, nasal and pharyngeal cavities, and the glottis, they will help us to represent important phases in the articulation of phonemes – the position of the vocal cords, the movement of the active articulator towards the passive articulator, the kind of stricture involved, and to some extent the rounding of lips.

Activity D

Now, let's take a few minutes off to label the different organs of speech in the head cross-section given below. You were introduced to these organs of speech in the *Phonetics & Spoken English* course in PGCTE.



Discussion

In the above figure, the speech organs associated with the upper jaw, i.e. the upper lip, the upper teeth, the alveolar ridge, the hard and the soft palate are called *passive* articulators, while the organs associated with the lower jaw, i.e. the lower lip, and parts of the tongue – tip, blade, front and back of the tongue – are called *active* articulators, since they are mobile and move towards the passive articulators to produce the phonemes.

Look at the labelled figure given below, and check to see whether you have got them right.

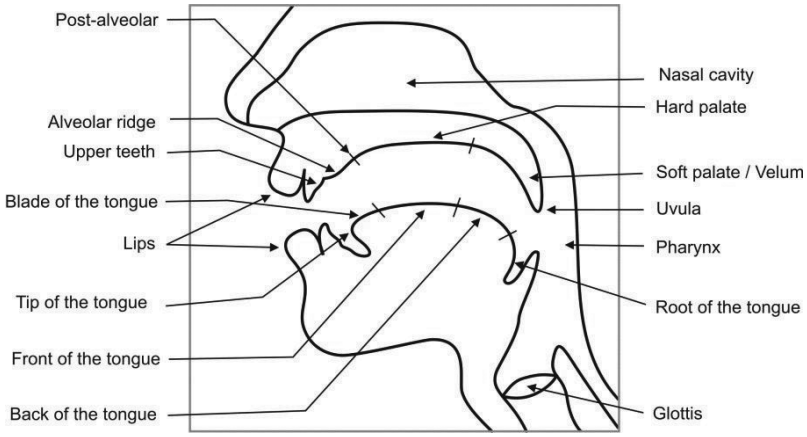


Figure 1.2: Head cross-section showing the various speech organs.

Review question II

In the following table, the place of articulation is given in the second column. **Listen** to the CD, then, list the phonemes, and name the active and passive articulators for each place of articulation. For this exercise, first listen and produce the sounds, for example, / p, b, m / are bilabial sounds. Then, while producing the sounds, focus both on Fig. 1.2 and the movement of your own articulators in the oral cavity. This will help you to list the phonemes and the articulators involved in their production. The first one is done for you:

	place of articulation	phonemes	active articulator	passive articulator
1	bilabials	/ p, b, m /	lower lip	upper lip
2	alveolars			
3	velars			

4	dentals			
5	labio-velar			
6	Palatal			
7	labio-dental			
8	post-alveolar			
9	palato-alveolar			
10	glottal			

1.5.3 Manner of articulation

The manner of articulation refers to the type of *stricture* involved. Stricture refers to the kind of obstruction, if any, in the oral cavity. On the basis of this feature, consonants are classified into: **plosives, fricatives, affricates, nasals, lateral, frictionless continuant,** and **semi-vowels.** The lateral, frictionless continuants and semivowels are also known in the literature as 'approximants'.

Review question III

In this exercise, we are testing our knowledge of the type of stricture involved in the production of different phonemes, in other words, the manner of articulation. **Listen** to the sounds grouped under each label (for instance, plosive), and list the phonemes, and also write the type of stricture against each label. (Reminder: Listen to the sounds in the ☉)
The first one is done for you.

	manner of articulation	Phonemes	type of stricture
1	plosive	/ p, b, t, d, k, g/	complete closure and sudden release
2	frictionless continuant		
3	affricate		
4	lateral		
5	nasal		
6	fricative		
7	semivowel		

Review question IV

Let us round it off by writing the **three-term labels** for some of the consonants given below. The first one has been done for you.

	phoneme	three term label		
		voiceless/ voiced	place of articulation	manner of articulation
1	/ ʃ /	voiceless	palato-alveolar	fricative
2	/ k /			
3	/ n /			
4	/ w /			
5	/ ð /			
6	/ j /			
7	/ tʃ /			
8	/ f /			
9	/ ʒ /			
10	/ t /			

1.6 Phonemes vs. Allophones

One can read the description of phonemes and observe the movements of the articulators in one's vocal tract while producing them. But, it is always helpful to have a visual representation of the articulation of the phonemes. We will be using **two** types of figures (Head cross-sections and speech wave forms) to aid us in the understanding of the various intricate movements in the production of the phonemes and their allophonic variants.

1.6.1 Head cross-sections

As we have mentioned earlier, head cross-sections will be used to discuss the three aspects in the production of phonemes – state of the glottis, place of articulation and manner of articulation.

Now, let us see how the head cross-sections will help us by comparing the articulation of / t / and / n /. We know that / t / is a **voiceless alveolar plosive**, while / n / is a **voiced alveolar nasal**. These two sounds differ in **two** of the three aspects of their articulation – voicing and manner. Let us focus on the three parts that have been numbered in the following figures:

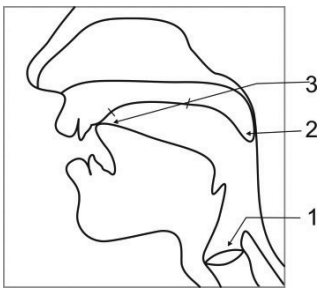


Figure 1.3: Head cross-section for / t /.

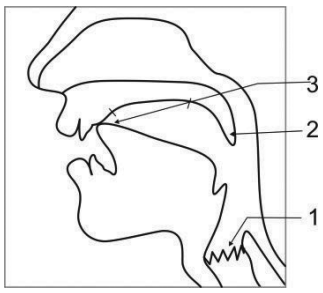


Figure 1.4: Head cross-section for / n /.

Number 1: It indicates the position of the vocal cords, which is wide open (open glottis) for the **voiceless** / t / and vibrating for the **voiced** / n /.

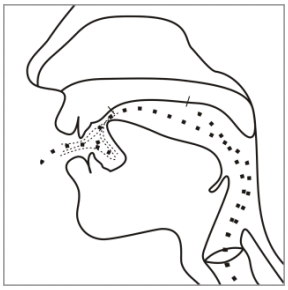
Number 2: It indicates the position of the soft palate, whether raised or lowered. Since / t / is an **oral** sound, the soft palate is raised, thereby closing the nasal passage. On the other hand, for / n / which is a **nasal** sound, the soft palate is lowered to open the nasal passage.

Number 3: It indicates the place of articulation of the sound, and also the manner of articulation. Since both / t / and / n / are **alveolar** sounds, the active articulators, i.e. the tip and blade of the tongue, are moving towards the passive articulator, i.e. the alveolar ridge.

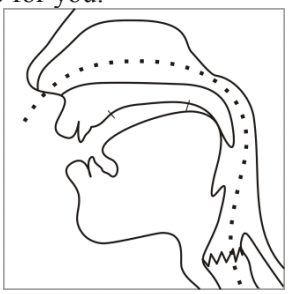
Therefore, when you come across such figures, there are **three** things that you should look out for: the state of the glottis, the position of the soft palate, and the articulators involved in the production of the sound. There may be a few other things, but we shall look at them as and when necessary.

Review question V

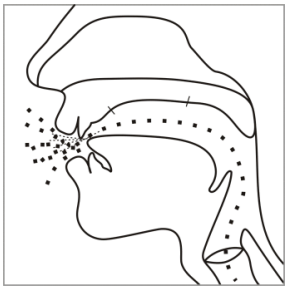
Here are some figures showing the articulation of a few consonants. Identify the consonant and write the three term label for each. The first one has been done for you.



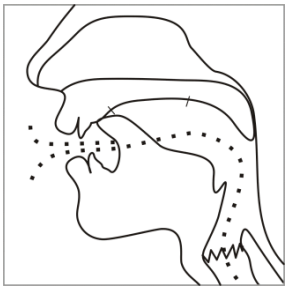
1. a. / s /
   b. voiceless alveolar fricative



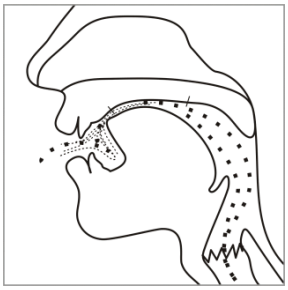
2. a. / /
   b. _____



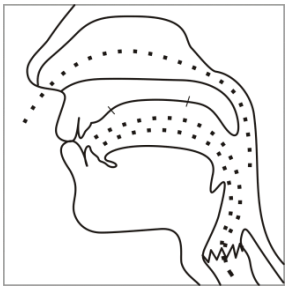
3. a. / /
   b. _____



4. a. / /
   b. _____



5. a. / /
   b. _____



6. a. / /
   b. _____

1.6.2 Speech waves

The head cross-sections, like those discussed above, are very useful for representing the articulation of phonemes. But, when it comes to the representation of certain allophonic variants of

phonemes, they are not adequate. We can take the analogy of a doctor using his stethoscope to read the heart beats of a patient. The doctor can feel the pulse and hear the heart beats of his/her patient. But, in order to examine his/her patients with heart problems, or in an emergency, where careful monitoring is necessary, s/he takes the help of an ECG in which the heart beats are graphically represented in the form of waves.

Let us take the word *peach* / pi:tʃ /. We know that the first phoneme is / p / and, also that when / p / occurs in the initial position of an accented syllable it is realised with some aspiration. So, the allophonic variant of / p / in the above word is represented as [p^h].

Here are the head cross-sections showing the articulation of / p / (you will be reading detailed descriptions of the three stages involved in the production of plosives in 2.1.2):

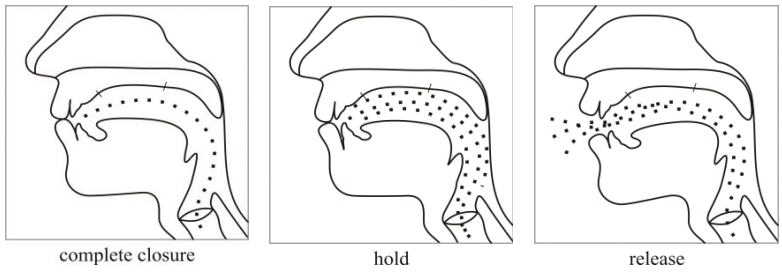


Figure 1.5: Head cross-sections showing the three stages in the articulation of / p /.

From the above pictures, the articulation of / p / is clear enough, but how does one represent [p^h]? It is difficult to show the aspiration of / p / in a head cross-section like the one above. Now, let's look at the following figure which is a speech wave of *peach.* (Note that in a speech wave the square brackets [ ] have been used to represent the allophonic variant which is being discussed in that particular speech wave.)

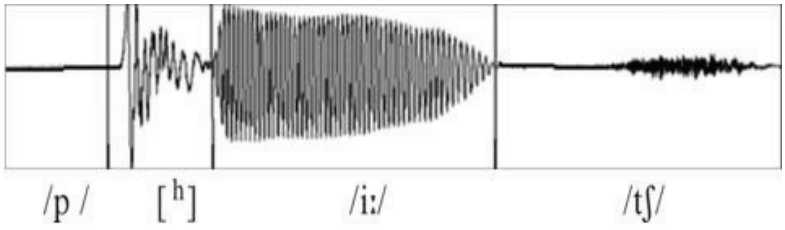


Figure 1.6: Speech wave of *peach*.

Just like the heartbeats can be represented in the form of waves in an ECG, speech sounds can also be represented in the form of waves. (This is not an attempt to teach you the physics of speech. That is an area of Acoustic Phonetics. At this stage, we are just using the speech waves to exemplify some points being discussed in this block.)

For convenience in description, vertical lines have been used to divide the above speech wave into four segments. The word *peach* has three phonemes / p /, / i: /, / tʃ /, and the four segments in the figure represent / p /, [^{h}], / i: /, and / tʃ /. If you observe the first two segments, you see a horizontal line with some noise or disturbance towards the end, indicating complete closure followed by aspiration or a puff of breath. The first two segments together represent [p^{h}] an allophonic variant of / p /. If you compare this speech wave with the head cross-section in Figure 1.5, you will realise how useful speech waves are to represent the finer differences in the *quality* of a sound.

Now, let us compare the speech wave of *peach* with that of *speech* below.

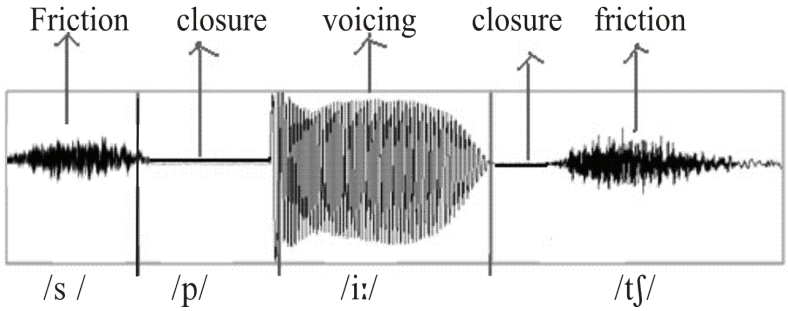


Figure 1.7: Speech wave of the sounds in the word *speech* / spi:tʃ /.

The above figure is a speech wave of the word *speech* / spi:tʃ / which has four phonemes. If you compare the first two segments of *peach* with the second segment of *speech*, you will observe that in *speech*, there is no aspiration after / p /. This is [p], the unaspirated realization of / p / when it is preceded by / s / in words like *speech, spine, spoon,* etc.

Now, let us examine each segment of *speech* in order to perceive how the characteristic quality of each sound appears in a speech wave.

The first segment shows friction for the fricative / s /, the second shows closure (lack of any activity) for the plosive / p /, the third shows steady cycles, or up and down movements, of the wave for the voiced vowel / i: /, and the final shows a combination of closure (for the first part) and friction/noise (for the second part) for the affricate / tʃ /.

Here are small portions of each segment from the above speech wave. They give us a close up view of the speech wave for each phoneme in the word *speech.*

1. Segment I: The following speech wave shows the irregular ups and downs in the wave indicating that it is just noise or friction. This is how the voiceless fricative / s / appears in a speech wave.

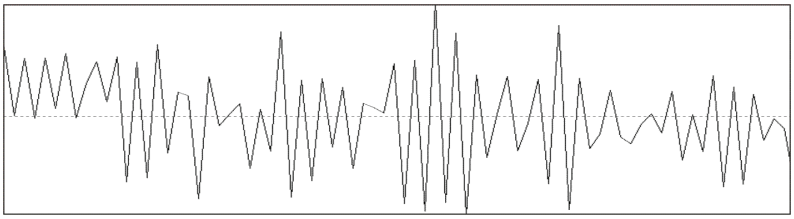


Figure 1.8: Speech wave of / s / showing friction.

2. Segment II: This shows complete closure (or lack of any activity in the speech wave) for the plosive / p /. The speech wave appears as a horizontal line with a spike at the end indicating the release of the plosive into the following vowel.

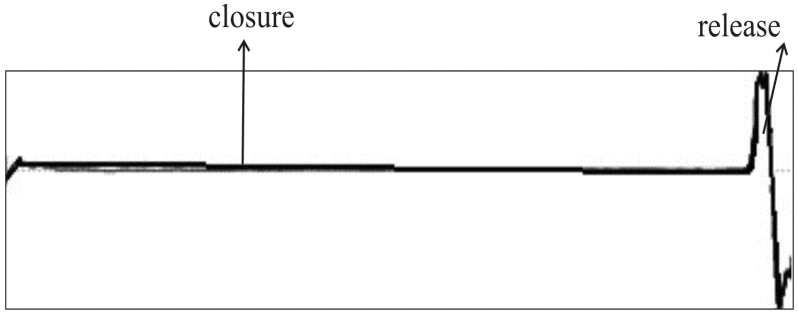


Figure 1.9: Speech wave of / p / showing closure and release.

3. Segment III: This has a very steady pattern of up and down movements in the wave. The regular cycles indicate the vowel / i: /. Do remember that all vowels have such regular cycles.

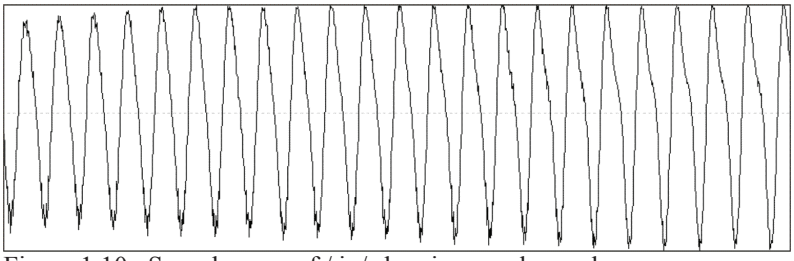


Figure 1.10: Speech wave of / i: / showing regular cycles.

4. Segment IV: This represents the affricate sound. You can see the closure – no activity on the horizontal line – followed by irregular movements indicating friction for / tʃ /

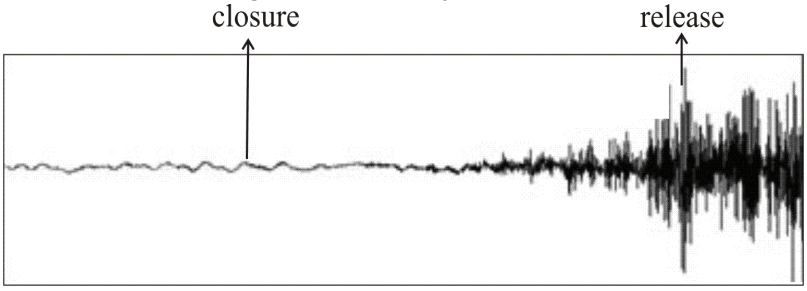


Figure 1.11: Speech wave of / tʃ / showing complete closure and release with friction.

Now, let's look at another speech wave which represents all voiced sounds:

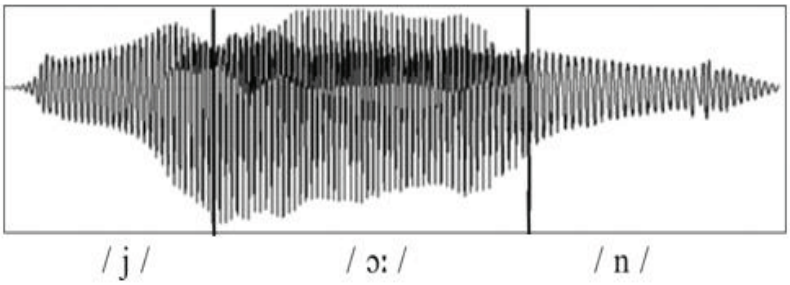


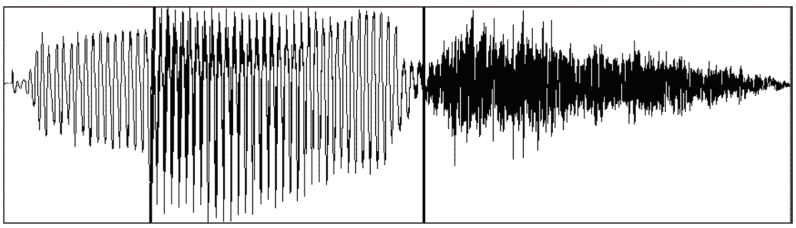
Figure 1.12: Speech wave of *yawn* / jɔːn /.

The above figure has three segments for the three sounds in *yawn* / jɔːn /. These sounds are both voiced and frictionless, therefore, you do not see any friction or noise in the speech wave.

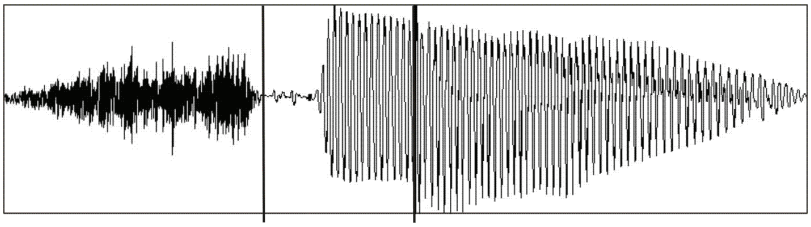
Activity E

Identify the speech wave for the following three words: *sky*, *lash* and *snore*. All the three speech waves are segmented. First, transcribe each word, and then identify the speech wave for it.

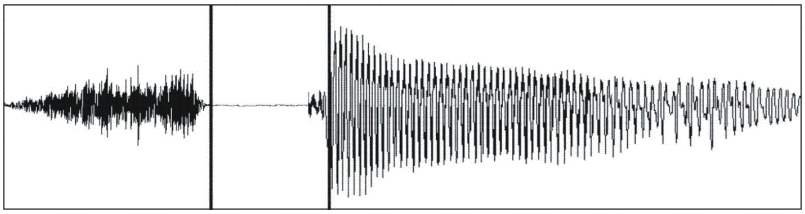
Later, under each segmented portion, write the phonemic symbol which is represented by that portion.



a. This is a speech wave of the word _____ which is transcribed as / /.



b. This is a speech wave of the word _____ which is transcribed as / /.



c. This is a speech wave of the word _____ which is transcribed as / /.

Discussion

The trick in doing this activity is to examine the speech wave keeping in mind the nature of the sound it represents. If you examine the three speech waves, you will observe that speech waves (b) and (c) show some friction in the first segment, whereas the last segment of (a) shows friction. So, (a) is the speech wave of the word *lash* which has a final fricative sound indicated by the friction in the speech wave.

Now, let us examine the speech waves (b) and (c) which represent one of the two remaining words, *sky* and *snore*. We know that

both of them have a fricative as the first sound. How do we match the words to their speech waves? If you compare the second segment of these waves, you will find that (c) depicts a closure with no vibration which is representative of a voiceless plosive. Since the word *sky* has a fricative followed by a plosive, we can safely identify (c) as representing *sky*, and consequently, (b) represents *snore*.

1.7 Alternative ways of describing phonemes

Before we study the allophonic variants of all the consonants and vowels, let us understand some terms which we will be using later.

1.7.1 Obstruents vs Sonorants

Obstruents are sounds which are accompanied by noise or friction due to the stricture involved in their production. Now, which sounds in English are accompanied by noise? – plosives, fricatives and affricates. Let us reflect on the stricture involved in their production.

a. The stricture for plosives is **complete closure** and **sudden release**. When the articulators are suddenly released, there is a sudden explosive noise.
   Eg. / p / as in *appear*
b. The stricture for fricatives is **close approximation** between the articulators. When air flows through the narrow gap there is a hissing sound or friction.
   Eg. / s / as in *sport*
c. The stricture for affricates is **complete closure** and **slow release**. When the articulators are slowly parting from each other, due to the narrow gap that is formed, the air flows out with a hiss or friction.
   Eg. / tʃ / as in *church*

All other sounds – nasals, approximants (lateral, frictionless continuant, semi-vowels) and vowels – are called **sonorants**. For these sounds, the air flows out freely without any noise or friction, as there is no major obstruction or narrowing in the oral cavity. In the case of nasals, although there is complete oral closure there is a free flow of the air stream through the nasal cavity. Let's study them.

a. For nasals, the stricture is **complete oral closure***,* but since the soft palate is lowered, the air flows out of the nasal cavity without friction. Eg. /m / as in *mine*

b. For the lateral approximant sound, there is a **partial closure** at the alveolar ridge but the sides of the tongue are lowered. Therefore, air flows out freely without any friction. Eg. / l / as in *line*

c. For the other approximants and vowels there is an **open** or **wide approximation** between the articulators. The articulators are wide apart, therefore air flows out freely. Eg. / w / and / aɪ / as in *whine*

1.7.2 Fortis vs Lenis

Now that we know what obstruents and sonorants are, let us look at two more terms – **fortis** and **lenis**. We have learnt in our PGCTE course that some sounds are voiced, while others are voiceless.

All sonorants are voiced, but obstruents, i.e. plosives, fricatives and affricates, are both voiceless and voiced. Among obstruents, / **p, t, k, f, θ, s, ʃ, h, tʃ** / are voiceless, and / **b, d, g, v, ð, z, ʒ, dʒ** / are voiced.

These voiceless and voiced sets of sounds are also distinguished from each other on the basis of the energy (the degree of breath force and muscular effort) used in producing them. The voiceless sounds require greater energy than the voiced sounds. In other words, the voiceless sounds require greater breath force and muscular effort when compared to the voiced sounds. Therefore, the voiceless sounds are also referred to as **fortis** or 'strong' sounds, and voiced sounds as **lenis** or 'weak' sounds. In case you are wondering why we need terms like *fortis* and *lenis*, to describe the *voiced* and *voiceless* sounds, we would like to point out the subtle difference that exists between the two sets of terms. When a *voiced* sound gets devoiced in certain contexts, as you would learn in the course of this block, it still remains *lenis*. The term *fortis* would also help you understand the concept of *pre-fortis clipping* which will be discussed a little later.

It is important to point out what Roach says in this regard. It is probably true that /p, t, k/ are produced with more force (though nobody has really proved it- force of articulation is very difficult to define and measure). (Roach 2000: 35)

Activity F

I am not sure whether this activity will help you understand the need for greater breath force and muscular effort to produce fortis consonants. But, there is no harm in trying it out. I tried it in my class, and they **did** appreciate the difference between fortis and lenis consonants.

Okay. This is what you need to do. Say the first sounds, / s / and / z /, as in the words *Sue* and *zoo*. Take care not to say / es / in place of / s /. Also, remember / s / and / z / are continuous sounds, i.e. they can be produced continuously for a period of time. Say / s . . . s . . . s . . . / and then / z . . . z . . . z . . . /. Now, cover your ears lightly with the palms of your hands. Say / s . . . s . . . s . . . / and / z . . . z . . . z . . . / once again. Now, reverse the order: first say / z . . . z . . . z . . . / and then say / s . . . s . . . s . . . /. What do you observe?

Discussion

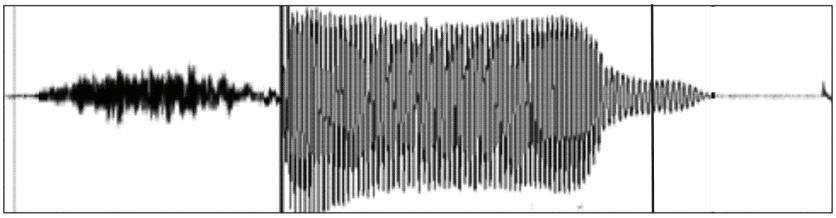
As I do this exercise, I hear an energetic hissing sound at the lip region when I produce / s /. And, on switching over to / z /, the hissing sound is reduced. What I hear clearly for / z / is the vibration of the vocal cords, since it is a voiced sound. This vibration is also felt in my hands (covering my ears) through bone conduction. Try it a couple of times.

1.7.2.1 Pre-fortis clipping

All fortis (voiceless) consonants have the effect of reducing the length of the preceding sonorant whether a consonant or a vowel. In the words *leap* / **liːp** /, *loot* / **luːt** /, and *lurk* / **lɜːk** /, the length of the vowels / **iː, uː, ɜː** / are considerably reduced due to the following fortis plosives. Similarly, in *belt*, *prompt*, and *pant*, the sonorants / **l, m, n** / are reduced in duration. This process is called **pre-fortis clipping**, which is seen both at the word final and the medial positions.

Let us experiment with two words: *seed* and *seat*. You can see the speech waves for them below. While producing these sounds care was taken to ensure that they are said with the same intensity, duration and pitch movement (falling tone).

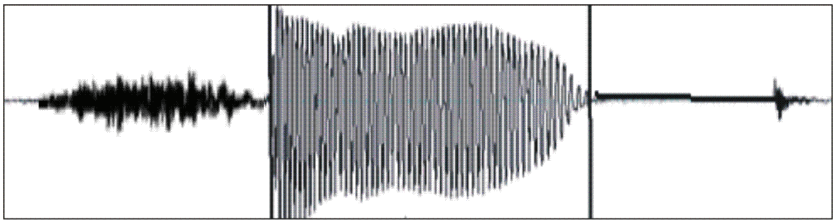
a. s*eed* / si:d /



/ s / / i: / (0.320 sec) / d /

Figure 1.13: Speech wave of *seed*.

b. *seat* / si:t /



/ s / / i: / (0.300 sec) / t /

Figure 1.14: Speech wave of *seat*.

In *seed*, the final consonant is a lenis / d /, and if you observe, the length of / i: / is 0.320 sec. On the other hand, in *seat* with a final fortis / t /, the duration of / i: / is 0.300 sec, which is 0.020 sec less than in *seed*. This shows how the length of the preceding sonorants is reduced by fortis consonants.

Review question VI

Each word given below has two sets of slashes. In the first set of slashes, transcribe the word, and in the second, write the symbol of the phoneme if it undergoes pre-fortis clipping.
The first one has been done for you.

1.	bulb	/	bʌlb	/	;	/	_	/
2.	belt	/		/	;	/		/
3.	cheek	/		/	;	/		/
4.	guard	/		/	;	/		/
5.	wooed	/		/	;	/		/
6.	want	/		/	;	/		/
7.	curled	/		/	;	/		/
8.	tempt	/		/	;	/		/
9.	surfed	/		/	;	/		/
10.	sent	/		/	;	/		/

1.8 Summary

In this unit, we have done a recap of Block IV of your PGCTE materials, focussing mainly on the consonant phonemes and also introduced you to the figures that are used to capture the distinction between phonemes and allophones. Section 1.1 and 1.2 worked towards arriving at a definition of a phoneme and an allophone. Section 1.3 looked into the distribution of phonemes and allophones. Section 1.4 dealt with the phonemes in English. Section 1.5 studied three important aspects in the production of phonemes, which differentiate one phoneme from the other. Section 1.6 introduced the types of figures used in this block to represent the various phonemes and their allophones. And, the final section, Section 1.7 introduced and discussed the terms such as obstruents, sonorants, fortis and lenis.

1.9 Sources and recommended reading

Gimson, A. C. (1989). *An Introduction to the Pronunciation of English,* 4th ed. London: Edward Arnold.

Ladefoged, Peter. (2001). *A Course in Phonetics,* 4th ed. London: Harcourt Publishers.

1.10 Answers to review questions

Review question I

1.	voiceless	9.	voiced
2.	voiced	10.	voiced
3.	voiced	11.	voiced
4.	voiceless	12.	voiceless
5.	voiced	13.	voiceless
6.	voiceless	14.	voiced
7.	voiceless	15.	voiced
8.	voiced	16.	voiced

Review question II

2.	/ t, d, n, s, z, l /:	tip of the tongue;	alveolar ridge
3.	/ k, g, ŋ /:	back of the tongue;	soft palate
4.	/ θ, ð /:	tip of the tongue;	upper teeth
5.	/ w /:	lower lip;	upper lip
		back of tongue;	soft palate
6.	/ j /:	front of the tongue;	hard palate

7.	/ f, v /:	lower lip;	upper front teeth
8.	/ r /:	tip of the tongue;	post-alveolar ridge
9.	/ ʃ, ʒ, tʃ, dʒ /:	blade & front of the tongue;	alveolar ridge & hard palate
10.	/ h /:	the two vocal cords	

Review question III

2.	/ r /:	open approximation
3.	/ tʃ, dʒ /:	complete closure and slow release
4.	/ l /:	partial closure
5.	/ m, n, ŋ /:	complete oral closure
6.	/ f, v, θ, ð, s, z, ʃ, ʒ, h /:	close approximation
7.	/ j, w /:	open approximation

Review question IV

1.	/ ʃ /:	voiceless, palato-alveolar, fricative
2.	/ k /:	voiceless, velar, plosive
3.	/ n /:	voiced alveolar nasal
4.	/ w /:	voiced, labio-velar, semi-vowel
5.	/ ð /:	voiced, dental, fricative
6.	/ j /:	voiced, palatal, semi-vowel
7.	/ tʃ /:	voiceless, palato-alveolar, affricate
8.	/ f /:	voiceless, labio-dental, fricative
9.	/ ʒ /:	voiced, palato-alveolar, fricative
10.	/ t /:	voiceless, alveolar, plosive

Review question V

1.	/ s /:	voiceless alveolar fricative
2.	/ ŋ /:	voiced velar nasal
3.	/ θ /:	voiceless dental fricative
4.	/ l /:	voiced alveolar lateral
5.	/ ʒ /:	voiced palato-alveolar fricative
6.	/ m/:	voiced bilabial nasal

Review question VI

(Note: A ____ implies that there is no pre-fortis clipping.)

1.	/ bʌlb /:	____	6.	/ wɒnt /:	/ n /
2.	/ belt /:	/ l /	7.	/ kɜ:ld /:	____
3.	/ tʃi:k /:	/ i: /	8.	/ tempt /:	/ m /
4.	/ gɑ:d /:	____	9.	/ sɜ:ft /:	/ ɜ: /
5.	/ wu:d /:	____	10.	/ sent /:	/ n /