

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d			ʃ ʒ c ɟ	k g q	ŋ		ʔ
Nasal	m	ɱ		n			ɲ	ŋ	ɴ		
Trill				ʀ					ʀ		
Tap or Flap				ɾ							
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ	ʕ h ʁ
Lateral fricative				ɬ ɮ							
Approximant				ɹ			ɹ	ɻ			
Lateral approximant				l			ʎ	ʟ			

Where symbols appear in pairs, the one to the right represents a voiced consonant. Shaded areas denote articulations judged impossible.

CONSONANTS (NON-PULMONIC)

Clicks	Voiced implosives	Ejectives
Ø Bilabial	ɓ	ʔ Examples
ɗ Dental	ɗ	ɓ' Bilabial
ɗ (Postalveolar)	ɗ	ɗ' Dental/alveolar
ɗ Postalveolar	ɗ	ɗ' Velar
ɗ Alveolar lateral	ɗ	ɗ' Alveolar fricative

OTHER SYMBOLS

- AW Voiceless labial-velar fricative
- ɤ Z Alveolo-palatal fricatives
- W Voiced labial-velar approximant
- J Alveolar lateral flap
- ɥ Voiced labial-palatal approximant
- ɥ Simultaneous ʃ and ɣ
- H Voiceless-epiglottal fricative
- ʕ Voiceless-epiglottal fricative
- ʕ Epiglottal plosive

DIACRITICS

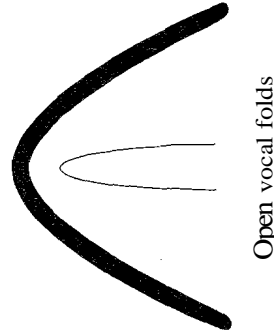
Voiceless	̥	Breathy voiced	̤	Dental	̦
Voiced	̤	Creaky voiced	̨	Apical	̩
h Aspirated	̚	Langsaabhai	̜	Laminal	̜
More rounded	̙	Labialized	̙	Nasalized	̙
Less rounded	̘	Palatalized	̘	Nasal release	̘
Advanced	̟	Velarized	̠	Lateral release	̠
Retracted	̡	Pharyngealized	̢	No audible release	̣
Centralized	̣	Velarized or pharyngealized	̤		
Mid-centralized	̥	Raised	̦	ɹ = voice of alveolar fricative)	
Syllabic	̥	Lowered	̧	ɹ = voice of bilabial approximant)	
Non-syllabic	̥	Advanced Tongue Root	̨		
Retortivity	̥	Retracted Tongue Root	̩		

Figure 2 The International Phonetic Alphabet (revised to 1993, corrected 1996)

# English Phonetics: Consonants (i)

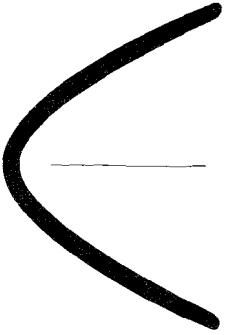
## 1.1 Airstream and Articulation

Speech sounds are made by modifying an airstream. The airstream we will be concerned with in this book involves the passage of air from the lungs out through the oral and nasal cavities (see figure 1). There are many points at which that stream of air can be modified, and several ways in which it can be modified (i.e. constricted in some way). The first point at which the flow of air can be modified, as it passes from the lungs, is in the larynx (you can feel the front of this, the Adam's apple, protruding slightly at the front of your throat; see figure 1), in which are located the vocal folds (or vocal cords). The vocal folds may lie open, in which case the airstream passes through them unimpeded. Viewed from above, the vocal folds, when they lie open, look like this:



Open vocal folds

The vocal folds may be brought together so that they are closed, and no air may flow through them from the lungs:



Closed vocal folds

One way in which the outgoing stream of air may be modified is by applying a certain level of constant muscular pressure sufficient to close the vocal folds along their length, but only just; the build-up of air pressure underneath this closure is sufficient, given the degree of muscular pressure, to force that closure open, but the air pressure then drops, and the muscular pressure causes the folds to close again. The sequence is then repeated, very rapidly, and results in what is called vocal fold vibration. You should be able to feel this vibration if you put your fingers to your larynx and produce the sound which is written as <z> in the word *hazy* (although you will probably also feel vibration elsewhere in your head). Sounds which are produced with this vocal fold vibration are said to be **voiced** sounds, whereas sounds produced without such vibration are said to be **voiceless**.

To transcribe speech sounds, phoneticians use the International Phonetic Alphabet (the IPA: see figure 2); the IPA symbol for the sound written <z> in *hazy* is [z]. You should be able to feel the presence of vibration in [z] if you put your fingers to your larynx and produce [z], then [s] (as in *miss*), then [z] again: [z] is voiced, whereas [s] is voiceless. This distinction will constitute the first of three descriptive parameters by means of which we will describe a given consonantal speech sound: we will say, for any given consonant, whether it is voiced or voiceless.

## 1.2 Place of Articulation

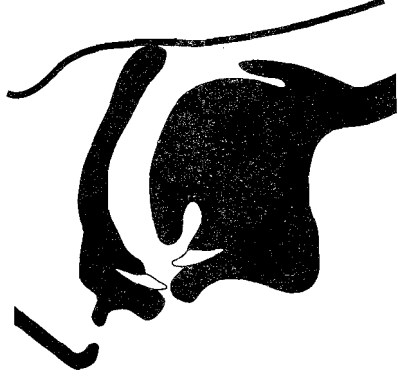
We will refer to the points at which the flow of air can be modified as places of articulation. We have just identified the vocal folds as

a place of articulation; since the space between the vocal cords is referred to as the glottis, we will refer to sounds produced at this place of articulation as **glottal** sounds. There are many other places of articulation; we will identify a further seven.

Firstly, sounds in which the airflow is modified by forming a constriction between the lower lip and the upper lip are referred to as **bilabial** sounds. An example is the first sound in *pit*.

A bilabial sound: the first sound in *pit*

Secondly, sounds in which there is a constriction between the lower lip and the upper teeth are referred to as **labio-dental** sounds. An example is the first sound in *fit*.

A labio-dental sound: the first sound in *fit*

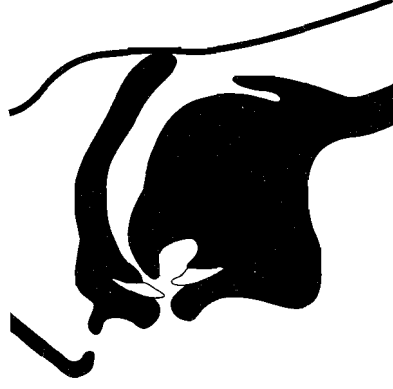
Thirdly, sounds in which there is a constriction between the tip of the tongue and the upper teeth are referred to as dental sounds. An example is the first sound in *thin*.



A dental sound: the first sound in *thin*

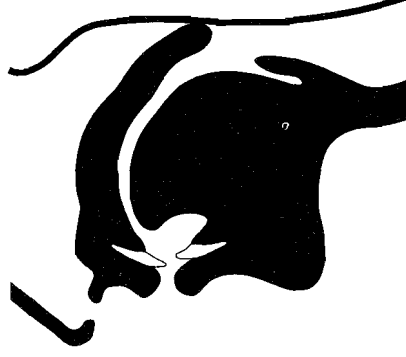
For the remaining places of articulation, let us distinguish between the tip, the blade of the tongue, the front of the tongue and the back of the tongue (as in figure 1). Let us also distinguish various points along the upper part of the mouth. We will identify four different areas: the alveolar ridge (the hard, bony ridge behind the teeth; see figure 1), the hard palate (the hard, bony part of the roof of the mouth; see figure 1), the palato-alveolar (or post-alveolar) region<sup>1</sup> (the area in between the alveolar ridge and the hard palate), and the **velum** (the soft part at the back of the roof of the mouth, also known as the soft palate; see figure 1).

Sounds in which there is a constriction between the blade or tip of the tongue and the alveolar ridge are called alveolar sounds. An example is the first sound in *sin*.



An alveolar sound: the first sound in *sin*

Sounds in which there is a constriction between the blade of the tongue and the palato-alveolar (or post-alveolar) region are called palato-alveolar sounds. An example is the first sound in *ship*.



A palato-alveolar sound: the first sound in *ship*

Sounds in which there is a constriction between the front of the tongue and the hard palate are called palatal sounds. An example is the first sound in *yes* (although this may be less obvious to you; we will return to this sound below).

A palatal sound: the first sound in *yes*

Sounds in which there is a constriction between the back of the tongue and the velum are called **velar** sounds. An example is the first sound in *cool*.

A velar sound: the first sound in *cool*

### 1.3 Manner of Articulation: Stops, Fricatives and Approximants

We have now identified eight places of articulation: glottal, bilabial, labio-dental, dental, alveolar, palato-alveolar, palatal and velar. For

any given sound we will say whether it is voiced or voiceless, and what its place of articulation is. But to distinguish between the full range of speech sounds, we will require a third descriptive parameter: **manner of articulation**. To identify the manner in which a sound is articulated, we will identify three different *degrees of constriction* (complete closure, close approximation and open approximation), and thus three different categories of consonant: stops, fricatives and approximants.

#### 1.3.1 Stops

The articulators in question may form a stricture of **complete closure**; this is what happens when one produces the first sound in *pit*. Here the lower and upper lips completely block the flow of air from the lungs; that closure may then be released, as it is in *pit*, and may then produce a sudden outflow of air. Sounds which are produced with complete closure are referred to as **stops** (or **plosives**).

We may describe the first sound in *pit* as a voiceless bilabial stop (transcribed as [p]) and we will henceforth identify all consonants with three-term labels of this sort. The consonant in *abbey* is also a bilabial stop, but differs from that in *pit*: it is voiced. This consonant (transcribed as [b]) is a voiced bilabial stop.

The first sound in *tin* is a voiceless alveolar stop; it is transcribed as [t]. Its voiced counterpart is the consonant in *ado*. This sound, the voiced alveolar stop, is transcribed as [d].

The first sound in *cool* is a voiceless velar stop; it is transcribed as [k]. Its voiced counterpart, the voiced velar stop, is transcribed as [g]; an example is the consonant in *ago*.

We have now identified bilabial, alveolar and velar stops; stops may be made at many other places of articulation, but we will ignore those, as they are not relevant to the study of English. There is one further stop which we must mention, however, as it is very common in the speech of most speakers of English. This is the **glottal stop** (transcribed as [ʔ]). It is made by forming a constriction of complete closure between the vocal folds. This is the sound made instead of [t] in many Scottish and Cockney pronunciations of, for example, the word *butter*. We will see that it is present in the speech of almost every speaker of English, no matter what the accent.

There is no question of describing the glottal stop as voiced or voiceless, since it is articulated in the glottis itself.

### 1.3.2 Fricatives

Let us now distinguish between complete closure and another, less extreme, degree of constriction: **close approximation**. Sounds which are produced with this kind of constriction entail a bringing together of the two articulators to the point where the airflow is not quite fully blocked: enough of a gap remains for air to escape, but the articulators are so close together that friction is created as the air escapes. Sounds of this sort are referred to as **fricatives**.

The first sound in *fin* is created by bringing the lower lip close to the upper teeth in a constriction of close approximation. This sound is a voiceless labio-dental fricative (transcribed as [f]). Its voiced counterpart (the voiced labio-dental fricative, transcribed as [v]) is the consonant in *Eva*.

The first sound in *thin* is created by bringing the tip of the tongue into a constriction of close approximation with the upper teeth. This sound is a voiceless dental fricative, transcribed as [θ]. Its voiced counterpart, the voiced dental fricative (transcribed as [ð]) is, for some speakers, the first sound in the word *that*.<sup>2</sup>

The first sound in *sin* is created by bringing the tip or blade of the tongue into a constriction of close approximation with the alveolar ridge. This sound, transcribed as [s], is a voiceless alveolar fricative. Its voiced counterpart, the voiced alveolar fricative (transcribed as [z]) is the consonant in *zoo*.

The first sound in *ship* is created by bringing the blade of the tongue into a constriction of close approximation with the palato-alveolar region. This sound, transcribed as [ʃ], is a voiceless palato-alveolar fricative. Its voiced counterpart, transcribed as [ʒ], is the second consonant in *seizure*.

Fricatives may be articulated at any point of articulation, but many of those sounds are irrelevant to the study of English. However, we will mention three.

One is the voiceless velar fricative [x], found in the speech of many Scots, in words such as *loch*. Another is the voiceless fricative [ɱ], again found in the speech of many Scots, as in words like *whale* (as

opposed to *whail*) and *which* (as opposed to *witch*; its place of articulation is labial-velar (explained in 1.3.3)).

A third is the glottal fricative [h], as in the first sound in *hit*. This sound is produced by bringing the vocal cords into a constriction of close approximation, so that friction is produced. As the vocal cords are not vibrating, we will take it that this is a voiceless sound.

### 1.3.3 Approximants

The least radical degree of constriction occurs when the articulators come fairly close together, but not sufficiently close together to create friction. This kind of structure is called **open approximation**. Consonants produced in this way are called **approximants**.

The first sound in *yes* is an approximant. It is produced by bringing the front of the tongue close to the hard palate. Although the sides of the tongue are in a constriction of complete closure with the upper gums, the air escapes along a central groove in which the front of the tongue is not close enough to the hard palate to create friction. This sound, transcribed as [j], is a voiced palatal approximant. Approximants are normally voiced, so we will not discuss any voiceless counterparts for these sounds.

The first sound in many English speakers' pronunciation of *rip*, *rope*, *rat*, etc. is an approximant. It is produced by bringing the blade of the tongue into a constriction of open approximation with the alveolar ridge. This approximant, transcribed as [ɹ], is referred to as an alveolar approximant. As with [j], the sides of the tongue form a constriction of complete closure with the gums at the sides of the mouth, but the air escapes along a central groove without creating friction. For most speakers (and in varying degrees, depending on the accent), the tongue body is somewhat retracted when [ɹ] is uttered; it is therefore often referred to as a post-alveolar approximant, but 'alveolar approximant' will suffice for our purposes.<sup>3</sup>

We will be looking at more English approximants in chapter 2. For the moment, let us identify one further such sound, the sound at the beginning of *wet*. In producing this sound, the lips form a constriction of open approximation: there is no friction produced. But its articulation is more complicated than that of [j], the palatal approximant, since it also involves another articulation, between the

back of the tongue and the velum (i.e. a velar articulation). We will therefore refer to it as a voiced *labial-velar* approximant; it is transcribed as [w].

### Notes

- 1 Many phonologists and phoneticians use the term 'palato-alveolar', but the chart of symbols used by the International Phonetics Association uses the term 'post-alveolar'. It will suffice for our purposes if the student takes the two terms to be interchangeable. There are no rigid physiological divisions between the alveolar ridge and the hard palate; the transition from one to the other is a continuum. And the range of articulations which can be made in between the two is relatively varied, leading some phoneticians to distinguish alveo-palatal from palato-alveolar articulations. We will simplify by ignoring these details.
- 2 Many speakers of English do not have a voiced dental fricative; rather, the sound lacks friction: it is a voiced dental approximant.
- 3 The articulation of an [ɹ] kind of articulation in some American and West Country accents is also referred to by some as *retroflex* approximant. The term 'retroflex' means that blade and tip of the tongue are curled upwards and backwards to some extent, so that the underside of a part of the tongue forms the relevant articulation. Somewhat inaccurately, we will use [ɹ] for these sounds.

### Exercises

- 1 Give the appropriate three-term description for each of the following sounds (e.g. [k]: voiceless velar stop):  
[f] [b] [θ] [ʃ] [t] [j]
- 2 Give the appropriate phonetic symbol for each of the following sounds:  
(a) a voiced palato-alveolar fricative  
(b) a voiced alveolar stop  
(c) a voiced velar stop

- (d) a voiced dental fricative  
(e) a voiced labio-dental fricative
- 3 What phonetic property distinguishes each of the following pairs of sounds (e.g. [p] and [b]: voicing; [s] and [ʃ]: place of articulation; [t] and [s]: manner of articulation)?  
(a) [k] and [g] (b) [b] and [d] (c) [d] and [z]  
(d) [z] and [ʒ] (e) [ʃ] and [ʒ] (f) [d] and [g]
- 4 Which of the following English words begin with a fricative?  
*ship psychology veer round plot philosophy think*  
*late xylophone*
- 5 Which of the following English words end with a fricative?  
*stack whale swim epitaph half halve hash haze phase*  
*use path cuts pleads*
- 6 Which of the following English words begin with a stop?  
*philanderer plasterer parsimonious ptarmigan psyche*  
*charismatic cereal carping kinky ghoulish gruelling*  
*guardian thick tickle bin dreary*
- 7 Describe the position and action of the articulators during the production of the following sounds (e.g. [d]: the blade of the tongue forms a constriction of complete closure with the alveolar ridge; the vocal cords are vibrating):  
[b] [k] [θ] [v]