PHONETICS AND PHONOLOGY

Reader for First Year English Linguistics

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(chapters 1 and 2 based on Vikner 1986)

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PHONETICS AND PHONOLOGY 3

PHONETICS AND PHONOLOGY

1. Introduction.

Whereas syntax is about sentence formation, and semantics about sentence interpretation, phonetics and phonology cover the field of sentence utterance.

Phonetics is concerned with how sounds are produced, transmitted and perceived (we will only look at the production of sounds). Phonology is concerned with how sounds function in relation to each other in a language. In other words, phonetics is about sounds of language, phonology about sound systems of language. Phonetics is a descriptive tool necessary to the study of the phonological aspects of a language.

Phonetics and phonology are worth studying for several reasons. One is that as all study of language, the study of phonology gives us insight into how the human mind works. Two more reasons are that the study of the phonetics of a foreign language gives us a much better ability both to hear and to correct mistakes that we make, and also to teach pronunciation of the foreign language (in this case English) to others.

As phonetics and phonology both deal with sounds, and as English spelling and English pronunciation are two very different things, it is important that you keep in mind that we are not interested in letters here, but in sounds. For instance, English has not 5 or 6 but 20 different vowels, even if these vowels are all written by different combinations of 6 different letters, "a, e, i, o, u, y". The orthographic spelling of a word will be given in italics, e.g. *please*, and the phonetic transcription between square brackets [pli:z]. Thus the word *please* consists of three consonants, [p,l,z], and one vowel, [i:]. And sounds considered from the phonological point of view are put between slashes. We will use the symbols in figure (1).

Relevant exercises are 1, 2, 3, 4.

List of symbols

1. Consonnants

p	as in *pea*	b	as in *bee*
t	as in *toe*	d	as in *doe*
k	as in *cap*	g	as in *gap*
f	as in *fat*	v	as in *vat*
θ	as in *thing*	ð	as in *this*
s	as in *sip*	z	as in *zip*
ʃ	as in *ship*	ʒ	as in *measure*
h	as in *hat*		
m	as in *map*	l	as in *led*
n	as in *nap*	r	as in *red*
ŋ	as in *hang*	j	as in *yet*
		w	as in *wet*
tʃ	as in *chin*	dʒ	as in *gin*

2. Vowels

ɪ	as in *pit*	i:	as in *key*
e	as in *pet*	ɑ:	as in *car*
æ	as in *pat*	ɔ:	as in *core*
ʌ	as in *putt*	u:	as in *coo*
ɒ	as in *pot*	ɜ:	as in *cur*
ʊ	as in *put*		
ə	as in *about*		
eɪ	as in *bay*	əʊ	as in *go*
aɪ	as in *buy*	aʊ	as in *cow*
ɔɪ	as in *boy*		
ɪə	as in *peer*		
eə	as in *pear*		
ʊə	as in *poor*		

2. Phonetics

2.1. The Speech Organs

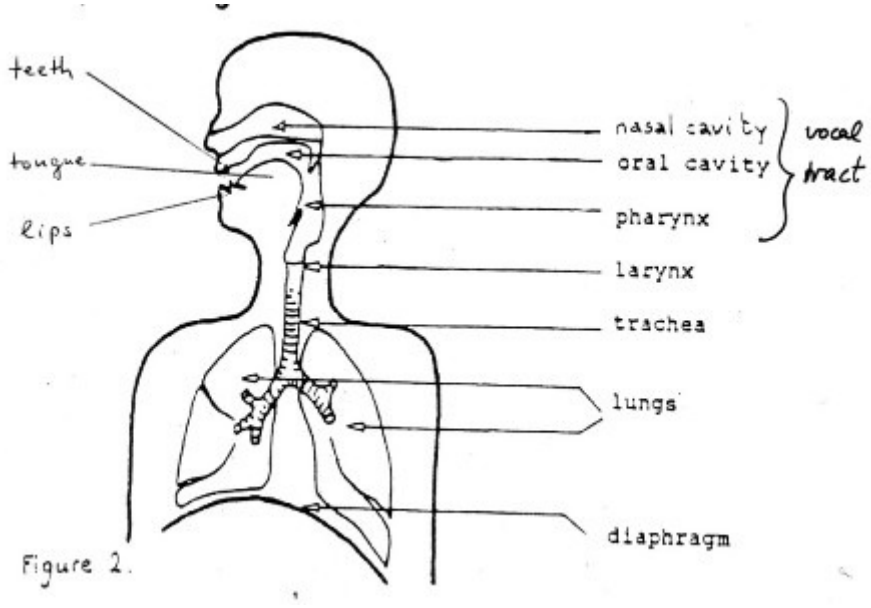


Figure 2.

All the organs shown on figure (2) contribute to the production of speech. All the sounds of English are made using air on its way out from the lungs. The lungs pull in and push out air, helped by the diaphragm. The air goes out via the trachea, where the first obstruction it meets is the larynx, which it has to pass through. Inside the larynx the air passes by the vocal folds, which, if they vibrate, make the sound voiced. Afterwards the air goes up through the pharynx, and escapes via either the oral or the nasal cavity.

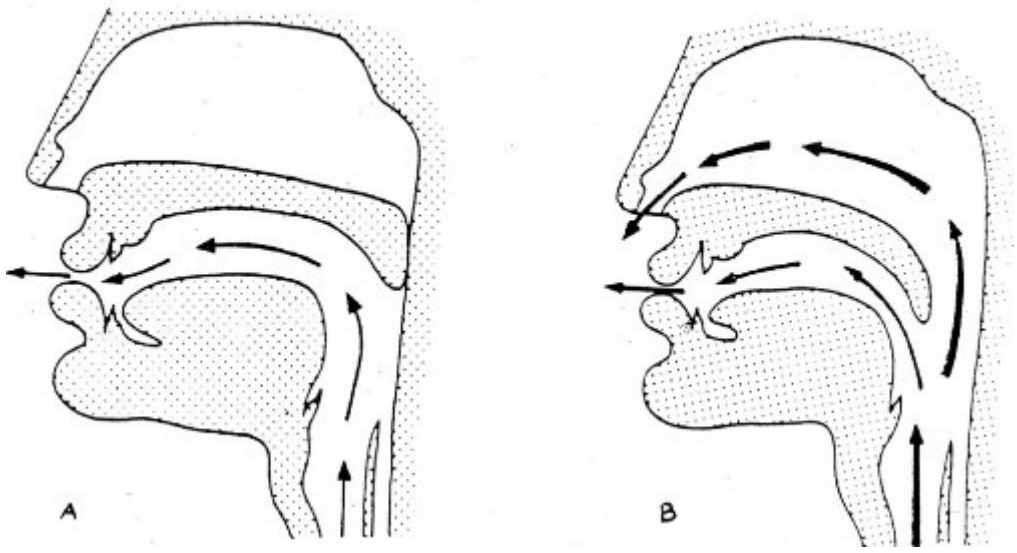


Figure (3) : production of oral and nasal sounds. (Thomas 1976: 32)

Circle the parts that are modified in B to produce nasal sounds.

Almost all the organs involved in speech production also have other functions. The lungs and the diaphragm are obviously involved in breathing, as is the nasal cavity, which cleans, heats and humidifies the air that is breathed in. The teeth and the tongue play a part in digestion, and in a way, so do the vocal folds, as they have to be closed when swallowing, to keep the food from going down the wrong way.

There are 4 places in which a sound can be modified. You have to add to this the fact that the vocal folds can vibrate.

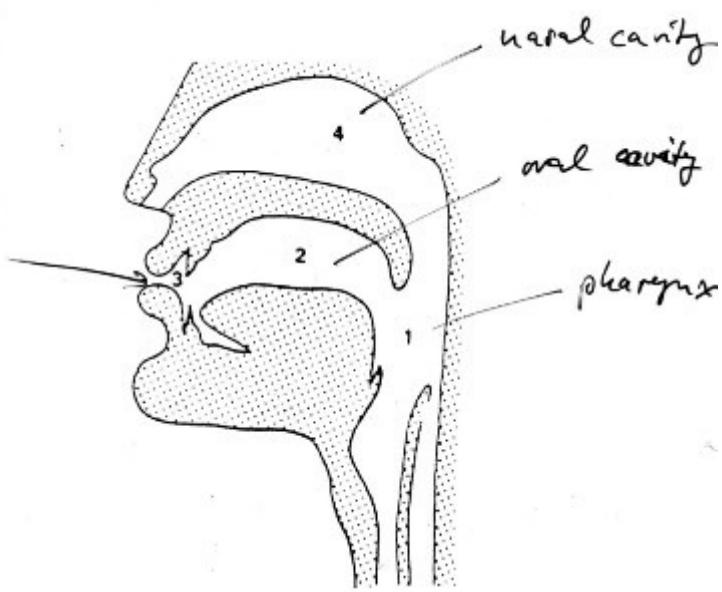


Figure (4): sound modification places. (Thomas 1976:33)

See exercises 5-6 which deal with nasal/non-nasal

2.2. Consonants

On the way out the air flow can be more or less obstructed, producing a consonant, or is simply modified, giving a vowel. If you pronounce the first sound of the word *paper* you close your mouth completely and that is the utmost obstruction, whereas if you pronounce the first sound of the word *after* the mouth is more open than normal, the air flows as freely as it possibly can.

Consonants are often classified by being given a so-called VPM-label. VPM stands for Voicing, Place and Manner:

- voicing means that the vocal folds are used; if they are not, the sound is voiceless (note that vowels always imply the use of vocal folds).
- place of articulation is the place where the air flow will be more or less obstructed.
- manner is concerned with the nature of the obstruction.

2.2.1 Voicing

The larynx is in the neck, at a point commonly called Adam's apple. It is like a box, inside which are the vocal folds, two thick flaps of muscle. In a normal position, the vocal folds are apart and we say that the glottis is open (figure a). When the edges of the vocal folds touch each other, air passing through the glottis will usually cause vibration (figure b). This opening and closing is repeated regularly and gives what is called voicing.

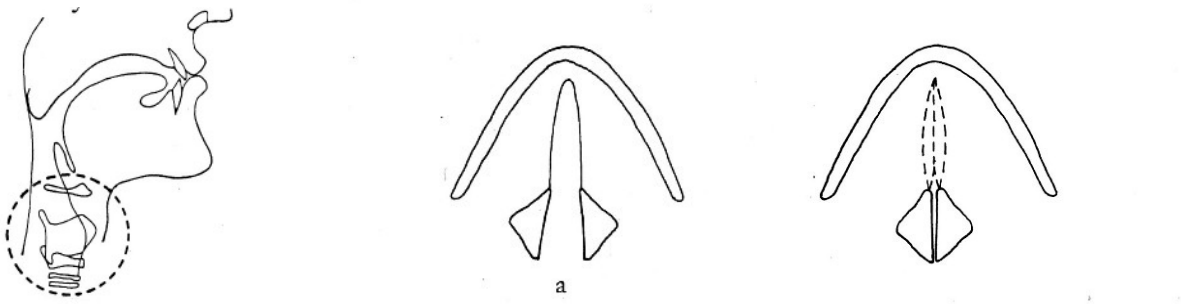


Figure (5): voicing. (Roach 1983:23,25)

The only distinction between the first sounds of *sue* and *zoo* for example is that [s] is voiceless, [z] is voiced. The same goes for *few* and *view*, [f] is voiceless, [v] is voiced. If you now say [sssssszzzzzsssss] or [fffffvvvvvfffff] you can either hear the vibrations of the [zzzzz] or [vvvvv] by sticking your fingers into your ears, or you can feel them by touching the front of your larynx (the Adam's Apple).

This distinction is quite important in English, as there are many pairs of sounds that differ only in voicing. In the examples below the first sound is voiceless, the other is voiced: *pie/buy*, *try/dry, clue/glue*, *chew/Jew*, *thigh/thy*. This distinction can also be made in between two vowels: *rapid/rabid*, *metal/medal*, or at the end of a word: *pick/pig*, *leaf/leave*, *rich/ridge*.

In English the following consonants are voiced: b, d, g, v, ð, z, ʒ, l, r, j, w, dʒ, m, n, ŋ

The following ones are unvoiced: p, t, k, f, θ, s, ʃ, h, tʃ

You can do exercises 7,8.

2.2.2 Places of Articulation.

As we saw above [p,t,k] are all voiceless, so there must be another way to distinguish between them, otherwise we would not be able to tell *try* apart from *pry* or *cry*, or *pick* from *tick* or *kick* . Apart from the behaviour of the vocal folds, sounds can also be distinguished as to where in the oral cavity they are articulated (i.e. where in the mouth there is most obstruction when they are pronounced)

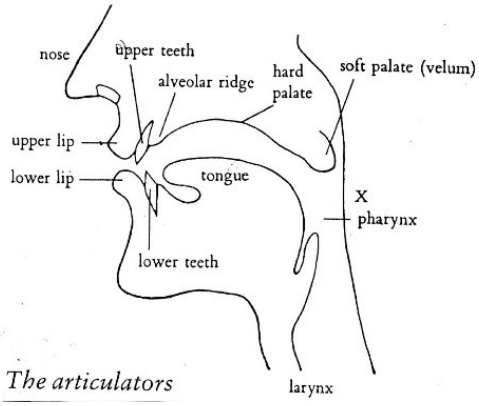
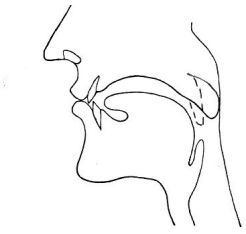
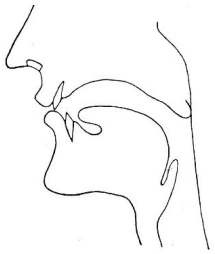


Figure (6): places of articulation.(Roach 1983:8)



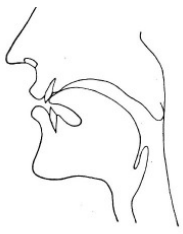
[p, b] ([m])

Bilabial sounds are produced when the lips are brought together. Examples are [p], which is voiceless, as in *pay* or [b] and [m] which are voiced, as in *bay*, *may*.



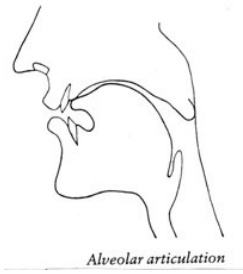
[f, v]

Labiodental sounds are made when the lower lip is raised towards the upper front teeth. Examples are [f] *safe* (voiceless) and [v] *save* (voiced).



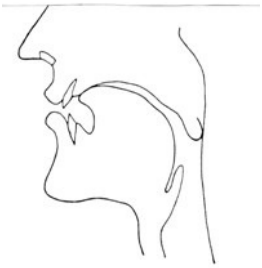
(θ,ð)

Dental sounds are produced by touching the upper front teeth with the tip of the tongue. Examples are [θ] *oath* (voiceless) and [ð] *clothe* (voiced).



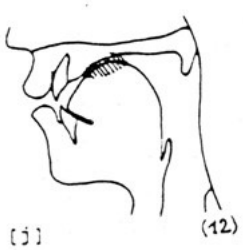
Alveolar articulation

Alveolar sounds are made by raising the tip of the tongue towards the ridge that is right behind the upper front teeth, called the alveolar ridge. Examples are [t,s] *too*,*sue*, both voiceless, and [d,z,n,l,r] *do, zoo*, *nook, look, rook*, all voiced.

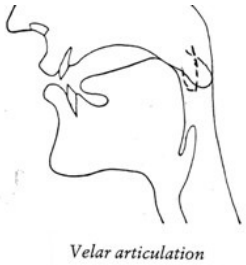


Palato-alveolar fricative

Palatoalveolar sounds are made by raising the blade of the tongue towards the part of the palate just behind the alveolar ridge. Examples [ʃ,tʃ] *pressure*, *batch* (voiceless) and [ʒ,dʒ] *pleasure*, *badge* (voiced).

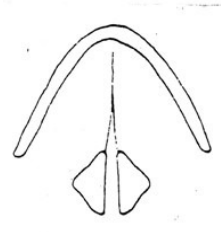


Palatal sounds are very similar to palatoalveolar ones, they are just produced further back towards the velum. The only palatal sound in English is [j] as in *yes*, *yellow*, *beauty*, *new* and it is voiced.



Velar articulation

Velar sounds are made by raising the back of the tongue towards the soft palate, called the velum. Examples [k] *back*, voiceless, and [g, ŋ] both voiced *bag*, *bang*. [w] is a velar which is accompanied with lip rounding.



Glottal sounds are produced when the air passes through the glottis as it is narrowed: [h] as in *high*. (Figure(14):Roach 1983:25)

You can now do exercises 9-10

2.2.3 Manners of Articulation.

We can now distinguish between English consonants from two points of view, that of voicing, and that of place. We can see that [b] and [t] are different in both respects, [b] is voiced and bilabial, and [t] is voiceless and alveolar. [p] differs from [b] only in being voiceless, as both are bilabial, and [p] differs from [t] only in being bilabial, as both are voiceless.

There are still pairs of sounds where we cannot yet describe the difference of one from the other, e.g. [b,m] *bend*, *mend* as both are voiced and bilabial, and [t,s] *ton*, *son* which both are voiceless and alveolar. As the examples show, we can however tell the words apart, and this is because the sounds are different in a way we have not yet discussed, and that is with respect to their manner of articulation.

The manner of articulation has to do with the kind of obstruction the air meets on its way out, after it has passed the vocal folds. It may meet a complete closure (plosives), an almost complete closure (fricatives), or a smaller degree of closure (approximants), or the air might escape in more exceptional ways, around the sides of the tongue (laterals), or through the nasal cavity (nasals).

Plosives are sounds in which there is a complete closure in the mouth, so that the air is blocked for a fraction of a second and then released with a small burst of sound, called a plosion (it sounds like a very small explosion). Plosives may be bilabial [p,b] *park*, *bark*, alveolar [t,d] *tar*, *dark* or velar [k,g] *car*, *guard*. There is a fourth kind of plosive, the glottal stop. The word *football* can be pronounced without interruption in the middle as in [fʊtbɔ:l] or with a complete closure of the glottis instead of [t]: [fʊʔbɔ:l].

In English a voiceless plosive that occurs at the begining of a word and is followed by a vowel, is rather special in the sense that at the release of a plosion one can hear a slight puff of air (called aspiration) before the vowel is articulated. Hence in “pen “we hear [p^hen]. These aspirated voiceless plosives are not considered to be different sounds from unaspirated voiceless plosives from the point of view of how they function in the sound system. This difference, which can be clearly heard, is said to be phonetic.

Fricatives have a closure which is not quite complete. This means that the air is not blocked at any point, and therefore there is no plosion. On the other hand the obstruction is big enough for the air to make a noise when it passes through it, because of the friction. This effect is similar to the wind whistling around the corner of a house. Fricatives may be labio-dental [f,v] *wife*, *wives*, dental [θ,ð] *breath*, *breathe*, alveolar [s,z] *sink*, *zinc*, palato-alveolar [ʃ,ʒ] *nation*, *evasion*, or glottal [h] *help*. [h] is a glottal fricative. As it has no closure anywhere else, and as all air passes between the vocal folds, this means that [h] is like aspiration unaccompanied by any obstruction.

A distinction may be made between **sibilant** and **non-sibilant** fricatives. Sibilant sounds are the fricatives with a clear "hissing" noise, [s,z,ʃ,ʒ] and the two affricates [tʃ, dʒ] *choke*, *joke*.

Affricates are a combination of a plosive and a fricative (sometimes they are called "affricated plosives"). They begin like a plosive, with a complete closure, but instead of a plosion, they have a very slow release, moving backwards to a place where a friction can be heard (palatoalveolar). The two English affricates are both palatoalveolar, [tʃ] which is voiceless, *chin*, *rich*, and [dʒ] which is voiced, *gin*, *ridge*. The way an affricate resembles a plosive followed by a fricative is mirrored in the symbols. Both consist of a plosive symbol followed by a fricative one: [t+ʃ], [d+ʒ].

Nasals resemble plosives, except that there is a complete closure in the mouth, but as the velum is lowered the air can escape through the nasal cavity. Though most sounds are produced with the velum raised, the normal position for the velum is lowered, as this is the position for breathing (your velum is probably lowered right now when you are reading this). The three English nasals are all voiced, and [m] is bilabial, *ram*, [n] is alveolar, *ran*, and [ŋ] velar, *rang*. In the section on places, the dotted line on the pictures of bilabial, alveolar, and velar articulations illustrate the three nasals.

Laterals are sounds where the air escapes around the sides of the tongue. There is only one lateral in English, [l], a voiced alveolar lateral. It occurs in two versions, the so-called "clear l" before vowels, *light*, *long*, and the "dark l" in other cases, *milk*, *ball*. Words like *little*, *lateral* have one of each type. "Dark l" may be written with the symbol [ɬ]. "Clear l" is pronounced with the top of the tongue raised, whereas for "dark l " it is the back of the tongue which is raised. Here again, as with aspirated and unaspirated voiceless plosives, even though "clear l" and "dark l" are phonetically different, they cannot be said to be different sounds from the point of view of how they function in the sound system. If you produce a "dark l" where usually you have a "clear l", for example at the beginning of the word *long*, your pronunciation will sound odd but nobody will understand a different word.

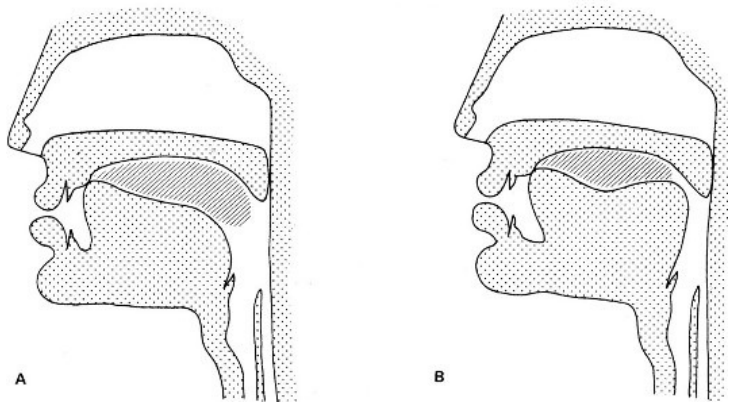


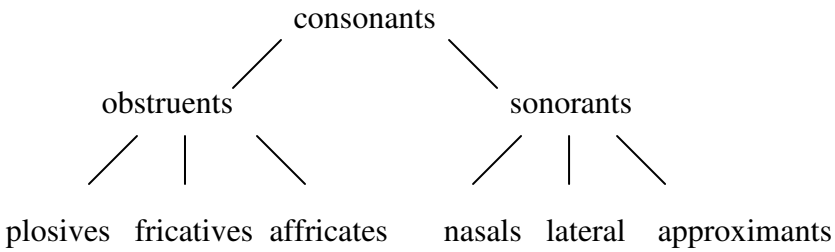
Figure 15: clear and dark “l”.(Thomas 1976:44)

Approximants are sounds where the tongue only approaches the roof of the mouth, so that there is not enough obstruction to create any friction. English has three approximants, which are all voiced. [r] is alveolar, *right*, *brown*, sometimes called post-alveolar, because it is slightly further back that the other alveolar sounds [t,d,s,l]. [j] is a palatal approximant, *use*, *youth*, and [w] is a velar approximant, *why*, *twin*, *square*. [w] always has lip-rounding as well, and therefore it is sometimes called labio-velar.

[r] only occurs before vowels in southern British English, whereas other accents, e.g. Scottish, Irish, and most American ones, also can have it after vowels. Therefore those accents can make a distinction between e.g. *saw* and *sore*, which are pronounced exactly alike in southern British English.

You can do exercises 11,12,13 and revise 5,6.

The manners of articulation can be put into two major groups, obtruents and sonorants. The obstruents are plosives, fricatives and affricates, all sounds with a high degree of obstruction. Obstruents usually come in pairs, one voiceless, one voiced, e.g. [p/b, t/d]. Sonorants have much less obstruction and are all voiced and therefore more sonorous. They include nasals, the lateral, and approximants. The manners can be illustrated as in the following diagram:



2.2.4 Table of the Consonants

The discussion on consonants above can be summarised in the table below (Roach 1983:52). A sound on the left side of a column is voiceless, one on the right side is voiced.

	Bilabial	***Labiodental***	***Dental***	***Alveolar***	***Palato-alveolar***	***Palatal***	***Velar***	***Glottal***
Plosive	p b			t d			k g	
Fricative		f v	θ ð	s z	ʃ ʒ			h
Affricate					tʃ dʒ			
Nasal	m			n			ŋ	
Lateral				l				
Approximant	w				r	j		

2.3. Vowels

We shall first have a closer look at the way in which vowels differ from consonants. Then we shall analyse vowels phonetically, i.e. according to:

- tongue position: how high in the mouth is the tongue, and which part of the tongue is the highest?
- length: are the vowels long or short?
- rounding: are the lips rounded or not?
- nasality: is there free passage of air through the nose?
- diphthongs: are they steady, or do they somehow change in character?

The last section is a table of the vowels. (There are other points of view which we shall not deal with here, since they are irrelevant for our study).

2.3.1 Difference from Consonants

Even though all the languages of the world contain both vowels and consonants, and although almost everybody has some idea of whether a given sound is a vowel or a consonant in his language, there is actually more than one way to distinguish between the two classes of sounds. From a **phonetic** point of view one way of distinguishing is by considering which sounds have the highest degree of obstruction. Although vowels have almost no obstruction, and some consonants (obstruents, nasals, and the lateral) have a high degree of obstruction, there is a group of consonants (the approximants) which would be classified as vowels if this criterion was used: approximants have no more obstruction than vowels. This can be seen by comparing the approximant [j] in *yeast* [ji:st]with the vowel [i:] in *east* [i:st].

From a **phonological** point of view, it is possible to distinguish between vowels and consonants by testing which sounds may be the nucleus of a syllable, i.e. the part of a syllabe that cannot be left out. If you consider a syllable such as [kɑ:t] *cart*, the initial [k] may be left out and we still have a syllable, [ɑ:t] *art*, the final [t] may be left out and we still have a syllable , [kɑ:] *car*. In fact [k] and [t] may both be left out, and the remainder is still a syllable, [ɑ:] *are.* If however you try to leave out the vowel, then there is no syllable anymore:* [kt]. [a:] is then the sound that cannot be left out. Compare with *yeast* whereas [j] can be left out, giving [i:st], [i:] can't:*[jst]. Syllabicity seems to be the criterion to determine whether a sound is a vowel or a consonant.

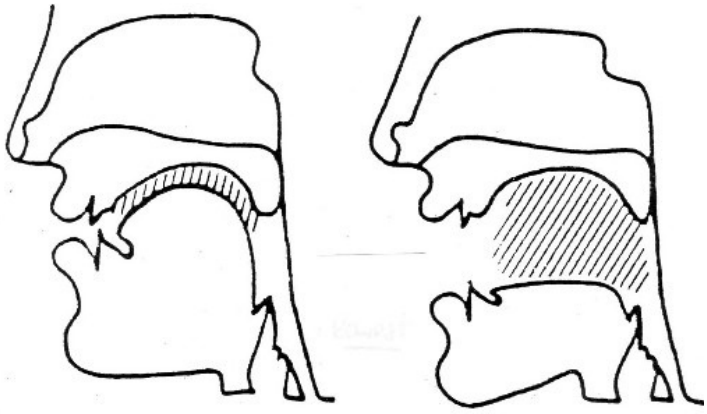
The above discussion would not be complete if we didn't mention the problem of so-called **syllabic consonants**. This is the case when sounds like / r,l,n / may function as a separate syllable consisting of an only sound, as in /kɒt+n/ *cotton* or /æp+l/ *apple*, where English speakers clearly hear two separate syllables. In these words, the /n/ and /l/ seem to function as the nucleus of the second syllable of these words. However they cannot be

classified as vowels, as they can never occur alone as a word. The reader will find an extensive discussion of syllabic consonants in chapter 4.

2.3.2 Tongue Position

Tongue position is described using two criteria: the height (how high is the tongue) and the part of the tongue involved in the production of the sound.

In English the tongue may either be **high**, i.e. when the speaker produces e.g. [i:, u:] in [bi:t, bu:t] *beat*, *boot*, **intermediate**, e.g. [e,ɔ:] in [bet, bɔ:t] *bet*, *bought*, or **low**, e.g. [æ,a:] in [bæt, ba:t] *bat*, *Bart*.



a) tongue is at the highest b) tongue is at the lowest

Figure 16: tongue height. (Thomas 1976:56)

Depending on the language we can have several intermediate tongue heights. English has three heights: high, mid and low, whereas French has two intermediate tongue heights with a total of four tongue heights: high, mid high, mid low and low.

The part of the tongue involved in the production of a vowel can also be illustrated with the examples above. If you say [i:] and then [u:] just after it, you almost have the feeling that you are moving your tongue backwards. This is because [i:] is a **front** vowel, and [u:] is a **back** vowel, or in other words, the highest point in the pronunciation of [i:] is the front of the tongue, whereas the highest point in [u:] is the back of the tongue. Figure (17) gives you two examples of tongue position:
a) is an example of the front of the tongue being at the highest
b) it is the back of the tongue which is nearest to the palate.

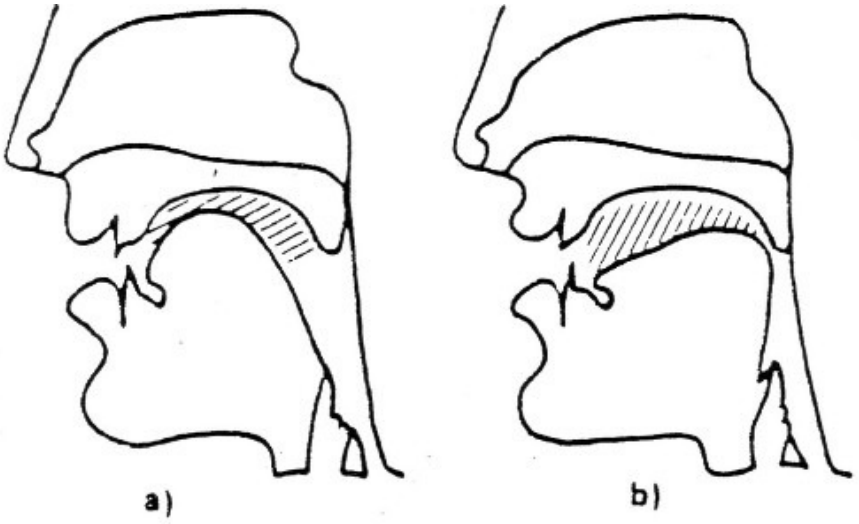
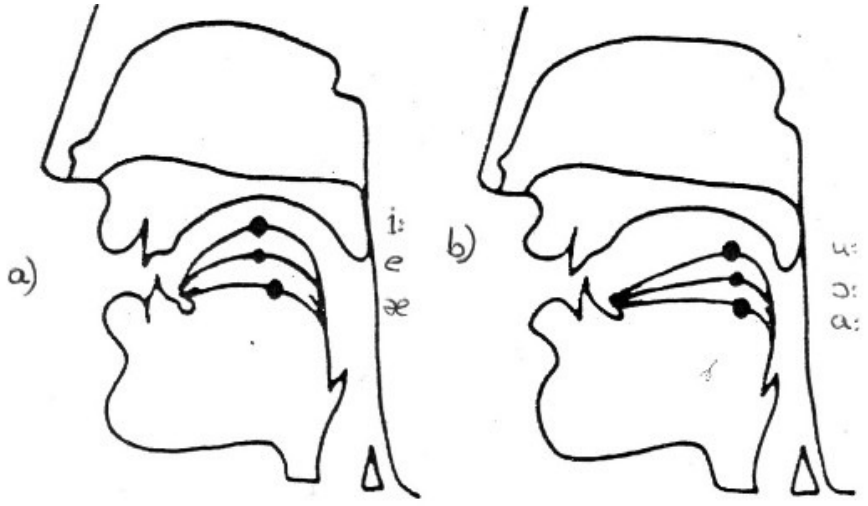


Figure 17: tongue position
(a) front and (b) back. (Thomas 1976:56)

For example [ɛ] is front and [ɔ:] is back, and [æ] front, [ɑ:] back. There are also vowels in between front and back, called **central**, namely [ɜ:,ə,ʌ] as in [wɜ:d, fɔ:wəd, mʌd] *word*, *forward*, *mud*. [ɜ:] for instance is between [e] and [ɔ:], as can be seen from [bed, bɜ:d, bɔ:d], *bed*, *bird*, *board*.

To give an accurate account of tongue position one has to combine height of the tongue and part of the tongue involved.



a) height position for front vowels b) height position for back vowels

Figure 18: tongue position (Thomas 1976:57)

If you put 18a and 18b together and isolate tongue position, you get the following diagram:

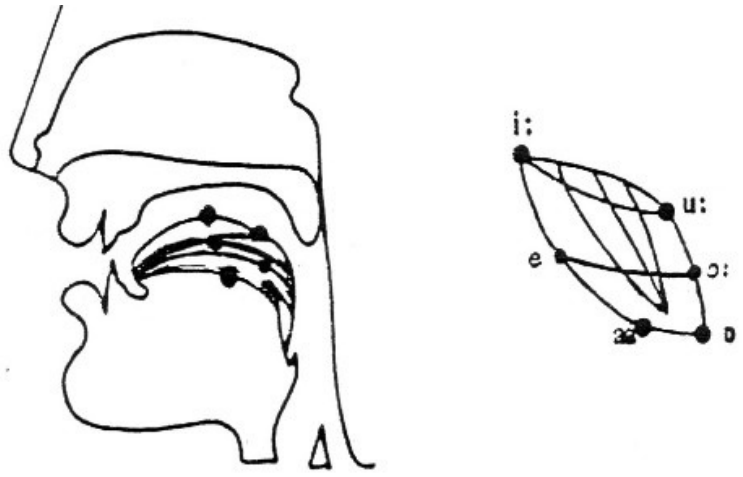


Figure 19: vowel diagram (Thomas 1976:57)

The diagram in (19) is conventionalised as:

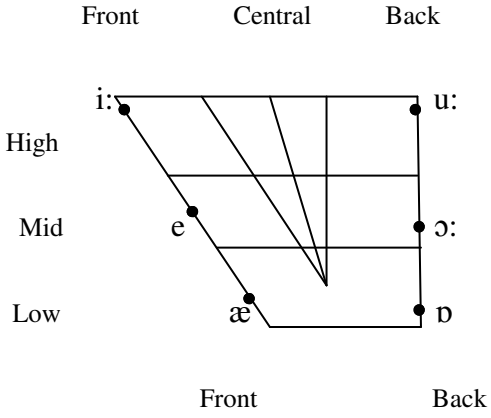


Figure 20: conventionalised diagram.

The complete diagram of English vowels is :

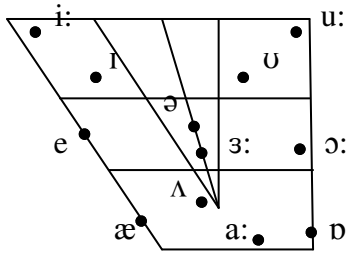


Figure 21: diagram of English vowels.

Note that English vowels do occupy the same "space" as German vowels. This is shown in figure 21a.

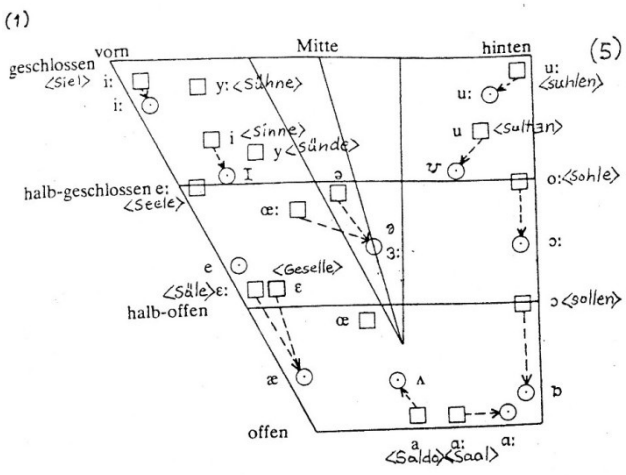


Figure 21a

Do exercise 14, 15, 16.

2.3.3 Length

As you may have seen, there are two types of [i] sound in English placed in two different positions. However for the purpose of description, what is relevant is not the difference of position but that of the perceived length of the vowel. Thus it is said that [i:] is a long vowel and [ɪ] is a short one. The same is valid for [u:] / [ʊ], [ɜ:]/[ə], [ɔ:]/ [ɒ]. Symbols for long vowels all have a colon.

Phonologically, one can establish the rule such as only long vowels may be the last sound of a syllable, whereas short vowels are always followed by at least a consonant. If we take away the final [t] from court, [kɔ:] is a possible syllable (core) whereas [kɒ] could not possibly occur. (Exceptions from this are the three short vowels that occur in completely unstressed syllables, [sɪtɪ, ɪntʊ, swetə] *city*, *into*, *sweater*).

You can have another look at exercise 3a

2.3.4 Rounding

Vowels may also be different from each other with respect to rounding. If you compare [i:] in [tʃi:z] *cheese* with [u:] in [tʃu:z] *choose*, you will see that not only is [i:] a front vowel and [u:] a back vowel, but [i:] is also unrounded where [u:] is rounded. When pronouncing [u:] your lips are rounded, but when pronouncing [i:] the corners of the mouth are much further apart.

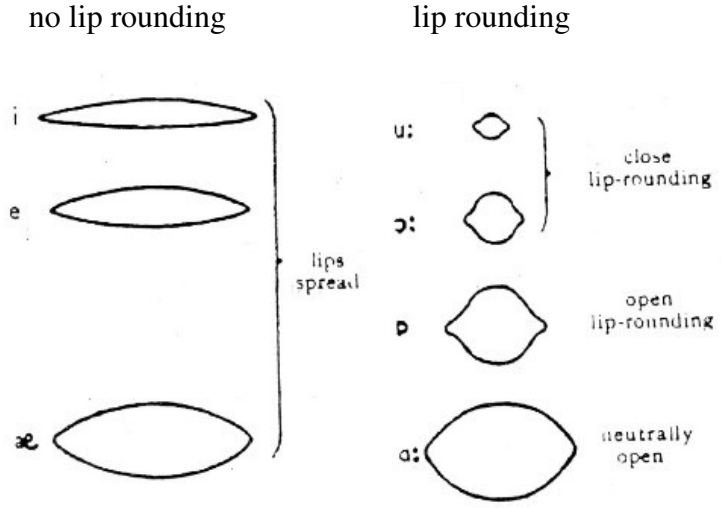


Figure 22: rounding. (McCarthy 1967:31)

2.3.5 Nasality

There are no nasal vowels in British English, i.e. no vowels in which the air also escapes through the nose.

2.3.6 Diphthongs

So far we have only been considering vowels that were constant, i.e. vowels that were pronounced at one and the same place. Such vowels are called monophthongs, and English has 12 of them.

English also has 8 diphthongs, which are vowels that change character during their pronunciation, that is, they begin at one place and move towards another place. Compare for example the monophthong in *car* with the diphthong in *cow*, or the monophthong in *girl* with the diphthong in *goal*. The vowels of *cow* and *goal* both begin at a given place and glide towards another one . In *goal* the vowel begins as if it was [ə], but then it moves towards [ʊ]. Therefore it is written [əʊ], as in [gəʊl] *goal*, with two symbols, one for how it starts and one for how it ends.

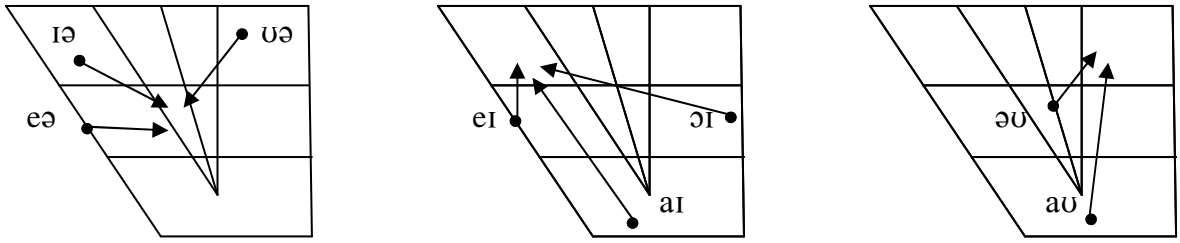
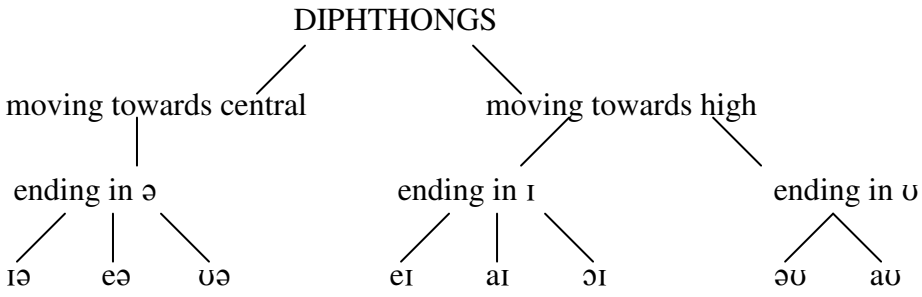


Figure 23: table of diphthongs.

The easiest way to remember them is in term of three groups composed as follow:



Note that some people speak of triphthongs for groups of diphthongs + schwa (ə) Example: .

[məʊə] *mower*.

You can do exercise 17

2.3.7 Table of Vowels

As we saw above, the best way of noting the tongue position is by using the vowel diagrams, as on p.14, but as they do not contain information about length and rounding, we can summarise the description of English vowels in the following table:

i:	long high front unrounded monophthong
ɪ	short high front unrounded monophthong
e	short mid front unrounded monophthong
æ	short low front unrounded monophthong
ʌ	short low central unrounded monophthong
ɑ:	long low back unrounded monophthong
ɒ	short low back rounded monophthong
ɔ:	long mid back rounded monophthong
ʊ	short high back rounded monophthong
u:	long high back rounded monophthong
ɜ:	long mid central unrounded monophthong
ə	short mid central unrounded monophthong

eɪ	diphthong moving from mid front unrounded to high front unrounded
aɪ	diphthong low central unrounded to high front unrounded
ɔɪ	diphthong low back rounded to high front unrounded
əʊ	diphthong mid central unrounded to high back rounded
aʊ	diphthong low central unrounded to high back rounded
ɪə	diphthong high front unrounded to mid central unrounded
eə	diphthong mid front unrounded to mid central unrounded
ʊə	diphthong high back unrounded to mid central unrounded

Exercises

Phonetics

1. Find the phonetic symbol for the first sound in each of the following words:

a.	this	g.	knee
b.	usual	h.	hear
c.	church	i.	phonetics
d.	christian	j.	giant
e.	thousand	k.	one
f.	psychology		

2. Find the phonetic symbol for the last sound in each of the following words:

a.	tough	f.	shapes
b.	kicked	g.	bones
c.	loved	h.	parking
d.	health	i.	wave
e.	dog	j.	large

3. Put the following words into the corresponding columns:

a.

ɪ	i:
sit	*seat*

ill - eel - kneel - nil - will - wheel
field - bean - filled - bin - ski - sick

b.

ɔ:	ɒ	u:
call		

board - two - bored - call - pot
moth - cough - do - through - thought

c.

ɔ:	əʊ	aʊ
sore		

caught - owe - coal - own - sore -mow
scowl - brow - door - now - paw - found

4. Find the mistakes:

[craɪm]	[θi:z]	[sɪxtɪ]
[wɪslɪŋg]	[jækɪt]	
[waɪvs]	[yeləʊ]	

5. Among the following words tick those which start with a nasal sound:

a. know	h. gnaw
b. mother	i. look
c. another	j. go
d. power	k. beer
e. tea	l. dear
f. kill	m. near
g. mare	n. pneumonia

NB. you now have two of the three nasal sounds in English

6. All the nasal sounds have a non-nasal counterpart. In the following series could you fill the missing sound:

e.g.	- bæn	- pæn	- …æn
	- tɪl	- dɪl	- …ɪl
	- log	- lɒ…	- lɒ…

Now find the missing word:

- bæt	- mæt	- …
- nɪə	- dɪə	- …
- bɪd	- bɪt	- …
- hæk	- hæg	- …
- bæg	- bæŋ	- …
- læm	- læb	- …

7.a. Put the following words into two columns according to whether their consonant is voiced or not:

+ voice	- voice
	eɪt, du:, hɪə, pi:, i:gə,
	æd, beɪ, ti:, zu:, səʊ,
	θaɪ, of, ɪtʃ, əv, ðə,
	ʃi:, edʒ

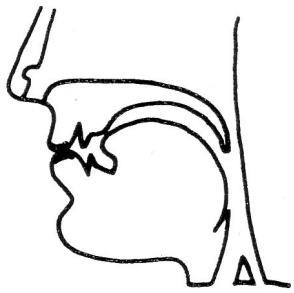
b. For each word of the column +voice find the word in the other column whose first consonant is the voiceless counterpart.

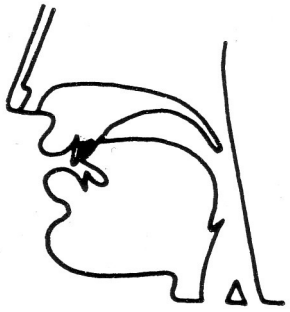
8. Circle the words in which the consonant in the middle is voices:

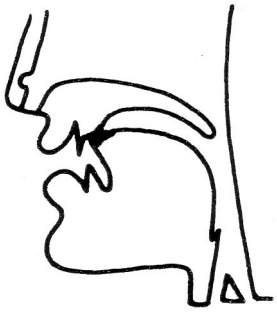
tracking	mother	robber	leisure	massive
stomach	razor	column	briefing	higher

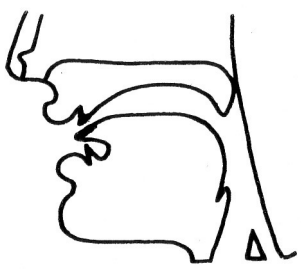
9. The following diagrams each represent a different place of articulation.

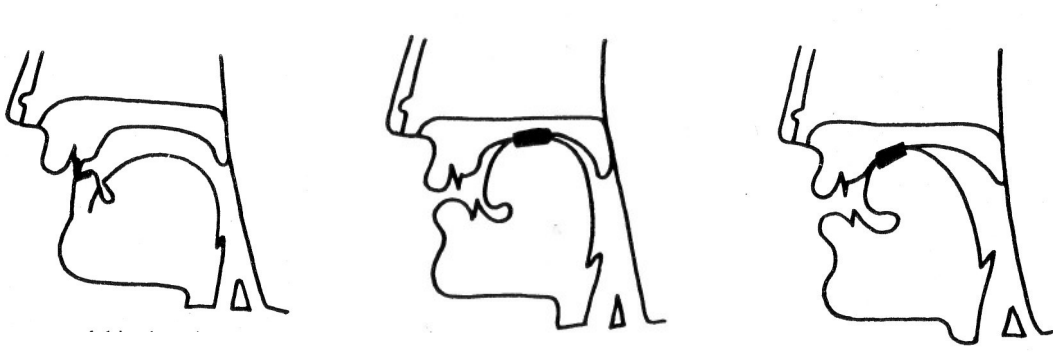
a.Can you name them?











b. Can you list the sounds that are produced at each of these places?

c. For each of these sounds, give a word in which it appears.

10. a. Circle the words that begin with a bilabial consonant:

mat gnat sat bat rat pat

b. Circle the words that begin with a velar consonant:

knot got lot cot hot pot

c. Circle the words that begin with a labiodental consonant:

fat cat that mat chat vat

d. Circle the words that begin with an alveolar consonant:

zip nip lip sip tip dip

e. Circle the words that begin with a dental consonant:

pie guy shy thigh thy high

f. Circle the words that begin with a palato-alveolar consonant:

sigh shy tie thigh thy lie

11. a. Circle the words that end with a fricative:

race wreath bush bring breathe bang
rave real ray rose rough

b. Circle the words that end with a nasal:

rain rang dumb deaf

c. Circle the words that end with a plosive:

pill lip lit graph crab dog hide laugh back

d. Circle the words that begin with a lateral:

nut lull bar rob one

e. Circle the words that begin with an approximant:

we you one run

f. Circle the words that end with an affricate:

much back edge ooze

12. a. Put the following words in the relevant column according to the manner of articulation of the underlined consonant.
sɪstə<u>m</u>, sɪlə<u>b</u>əl, meɪ<u>l</u>, kɒndə<u>z</u>, vaʊəlɪ<u>ŋ</u>, <u>f</u>əʊni:mɪk, leŋ<u>θ</u>, st<u>r</u>es, ti:t<u>ʃ</u>ə, me<u>ʒ</u>ə, rɪd<u>ʒ</u>, <u>v</u>i:ləm, <u>w</u>ʌn, <u>j</u>æp, <u>ʃ</u>ɔ:t, <u>p</u>ælət, brʌ<u>ð</u>ə, <u>s</u>pelɪŋ, wi:<u>k</u>, læŋ<u>g</u>wɪdʒ, <u>h</u>aɪ, gləʊ<u>t</u>əl, laʊ<u>d</u>, den<u>t</u>l

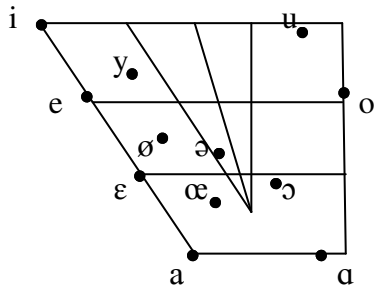
plosive	fricative	affricate	nasal	lateral	approximant

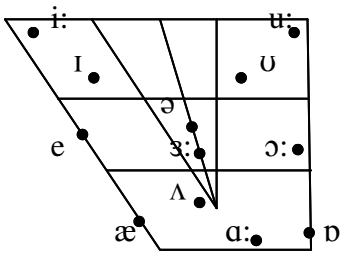
b. Give the English spelling of the words in 12 a.

13. Write the symbol that corresponds to each of the following descriptions, and then give a word that contains the phoneme.
Example: voiceless alveolar plosive : / t /, <u>two</u>.

a. voiced alveolar lateral
b. short high back rounded monophthong
c. voiced dental fricative
d. voiced velar nasal
e. voiced palatal approximant
f. voiceless palato-alveolar affricate
g. voiced bilabial plosive

14. Below are the tables of French and English vowels. Look at them carefully and answer the following questions.





a. In English, how do you account for the difference between [i:], [e] and [æ] ?.

b. Can you apply the same system to account for the difference between[i], [e], [ɛ]and [a] in French? How would you describe the differences between these sounds, knowing that they are all considered to be front.
You see that the description of a sound is constrained by the system it is in.

c. In English, what is the difference between [i:] and [ɪ] on the one hand and [u:] and [ʊ] on the other?
Do you have such a difference in French?

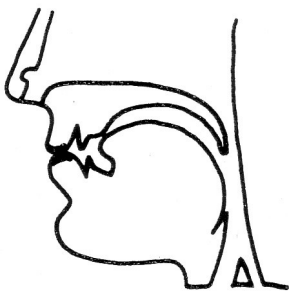
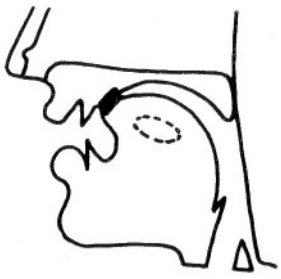
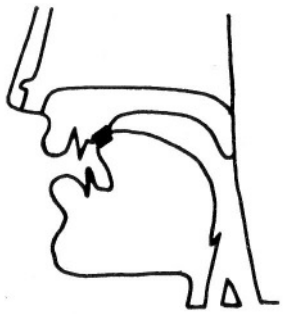
d. Where do you find rounded sounds in English?
Where do you find rounded sounds in French?
How do you account for the difference between [i] and [y] in French, considering that they are both front?
Is rounding a relevant feature in French (cf./ri/ riz and /ry/ rue)?
Is it a relevant feature in English?

e. Now explain why rounding is a relevant feature (i.e. a feature that must be given) in French and not in English.

15. Which sound do you get if you follow the instructions below?

Start at [i:]:
a. Which part of the tongue is involved and at what height is it?
b. Now the back of your tongue is at its highest and you keep the same opening. Is this a possible sound of English? If not, what do you have to do to get one without changing the other parameters?
c. Now lower your tongue to the next possible position. Which sound do you get?
d. Lower your tongue again. What do you get?
e. What is the only thing you have to do to get [ɑ:]?
f. Now where do you move to get [ʌ]?
g. From this position, move to [æ]. Describe the move.
h. What are the two intermediate steps to reach [i:] again?

16. Fill the blanks in the following text in order to describe the sequence of actions required for the pronunciation of the consonants in the middle of the word [ɪmplænt] *implant*.

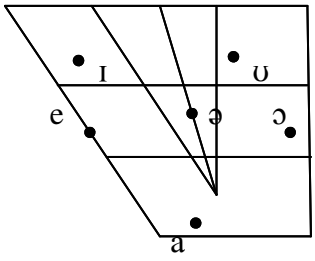
[m] As the vowel ends, the lips ……, the tongue is still …… but the ……is lowered and the vocal chords continue to …….

[p] The ……remains in the same position, the tongue moves to …… in anticipation, nasalisation stops so the …… and the …… stop vibrating.

[l] The lips ……, the tip of the tongue ……, the blade …… so that the air can escape …… and as [l] is voiced the …….

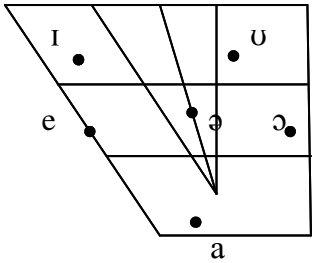
Note that in a sequence such as this one sounds tend to influence each other and do not appear exactly as they would in isolation.
[n] in [bra:ntʃ] is anticipated towards the end of the vowel and the soft palate is lowered; then it anticipated the following [t] with a raising of the soft palate.

17. On the following diagram indicate with an arrow the movement of the tongue for the diphthongs in the given words. Give a phonetic transcription first.



hair
sure
high
owl
own

Do the same thing for the triphthongs in the words:



player
fire
royal
lower
hour

18. There are several phonetic transcription systems. We have given you four of them:

Type I	*Type II*	*Type III*	*Type IV*
ii	iː	iː	iː
i	i	i	ɪ
e	e	e	e
a	a	æ	æ
aa	aː	ɑː	ɑː
o	o	ɔ	ɒ
oo	oː	ɔː	ɔː
u	u	u	ʊ
uu	uː	uː	uː
ʌ	ʌ	ʌ	ʌ
əə	əː	əː	ɜː
ə	ə	ə	ə
ei	ei	ei	eɪ
ou	ou	ou	əʊ
ai	ai	ai	aɪ
au	au	au	aʊ
oi	oi	ɔi	ɔɪ
iə	iə	iə	ɪə
eə	eə	ɛə	eə
oə	oə	ɔə	ɔə
uə	uə	ue	ʊə

a. Which is the one we use?

b. Here is a list of words written in Type I. Transcribe them into Type IV:

pii,
roup
mooniŋ
səətnli
sad

c. In the following list, identify the transcription system used and retranscribe the words into Type IV:
pa:t
dog
baabə
hæbit
kod

19. Below is the American transcription system.

Consonants

Symbol	Examples
p	**sp**it ti**p** **app**le am**p**le
pʰ	**p**it **p**rick **p**laque **app**ear
b	**b**it ta**b** **br**at **bubb**le
m	**m**itt ta**m** **sm**ack E**mm**y ca**mp** co**mb**
t	sti**ck** pi**t** kisse**d** wri**te**
tʰ	**t**ick in**t**end **pt**erodactyl a**tt**ack
d	**D**ick ca**d** **dr**ip love**d** ri**de**
n	ni**ck** ki**n** s**n**ow **mn**emonic **gn**ostic **pn**eumatic **kn**ow
k	s**k**in sti**ck** s**c**at criti**que** el**k**
kʰ	**c**url ki**n** **ch**arisma **c**ritic me**ch**anic **c**lose
g	**g**irl bur**g** longer Pittsbur**gh**
ŋ	si**ng** thi**nk** fi**ng**er
f	**f**at **ph**ilosoph**y** **fl**at **ph**logiston co**ff**ee ree**f** cou**gh**
v	**v**at do**v**e gra**v**el
s	**s**ip ski**p** **ps**ychology pa**ss** pa**ts** democra**cy** **s**cissors fa**s**ten dece**i**ve de**sc**ent
z	zip ja**zz** ra**z**or pa**ds** kisse**s** **X**erox de**s**ign la**z**y sci**ss**ors mai**ze**
θ	**th**igh **th**rough wra**th** e**th**er Ma**tth**ew
ð	**th**y **th**eir wea**th**er la**th**e ei**th**er
š	**sh**oe mu**sh** mi**ss**ion na**ti**on fi**sh** gla**ci**al **s**ure
ž	mea**s**ure vi**s**ion a**z**ure ca**s**ual deci**s**ion rou**ge** (for those who do not pronounce this word with the final sound of *judge*)
č	**ch**oke ma**tch** feature ri**ch** righteous
j	**j**u**dg**e mi**dg**et **G**eorge magistrate resi**d**ual
l	**l**eaf fee**l** ca**ll** sing**l**e
r	**r**eef fear Paris singe**r**
j	**y**ou **y**es feud **u**se
w	**w**itch **sw**im **qu**een
ʍ	**wh**ich **wh**ere **wh**ale (for speakers who pronounce *which* differently than *witch*)
h	**h**at **wh**o **wh**ole re**h**ash
ʔ	bo**tt**le bu**tt**on glo**tt**al (for some speakers)

Vowels

Symbol	Examples
i	b**ee**t b**ea**t b**e** rec**ei**ve k**ey** bel**ie**ve am**oe**ba p**eo**ple C**ae**sar Vasel**i**ne sere**ne**
ɪ	b**i**t consist **i**njury b**i**n
e	b**a**te b**ai**t r**ay** gr**ea**t **ei**ght g**au**ge r**ei**gn th**ey**
ɛ	b**e**t serenity s**ay**s g**ue**st d**ea**d s**ai**d
æ	p**a**n **a**ct l**au**gh comrade
u	b**oo**t l**u**te wh**o** s**ew**er thr**ough** to too tw**o** m**o**ve L**ou**
U	p**u**t f**oo**t b**u**tcher c**ou**ld
ʌ	c**u**t t**ou**gh am**o**ng **o**ven d**oe**s c**o**ver fl**oo**d
o	c**oa**t g**o** b**eau** gr**ow** th**ough** t**oe** **ow**n **o**ver
ɔ	c**augh**t st**a**lk c**o**re s**aw** b**a**ll **awe**
a	c**o**t f**a**ther p**a**lm s**e**rgeant **ho**nor h**o**spital m**e**lodic
ə	sof**a** al**o**ne symph**o**ny s**u**ppose melod**y** tedi**ou**s th**e** Americ**a**
aj	b**i**te s**igh**t b**y** d**ie** d**ye** St**ei**n **ai**sle ch**oi**r l**i**ar **i**sland h**ei**ght s**ign**
aw, æw	**ou**t br**ow**n d**ou**bt c**ow**ard
ɔj	b**oy** d**oi**ly

a. Find the sounds that are pronounced the same way in Standard American English and Received Pronounciation, but transcribed differently.

b. Indicate those which do not exist in Received Pronounciation.

3. Mark and Mary Brown (Segmental Phonology)

3.1 Phonemes

Mark and Mary Brown are both doctors in the same hospital. One of them is a physician, the other is a biologist. When an invitation addressed to Dr M. Brown arrives , the secretary of the hospital wants to know which Dr Brown is invited. She asks a collegue: “Who’s the physician?”. The answer is :”She is”. Hence it is Mary who’s invited. Had the answer been “He is”, it would have been Mark. This important information is conveyed by a single segment of the utterance. If we transcribe the two possible answers in phonetic symbols, we get:

(1) a. [ʃiːɪz]
b. [hiːɪz]

These two answers refer respectively to Mary and Mark

(2) a. [ʃiːɪz] she is = Mary
b. [hiːɪz] he is = Mark

If we permute [ʃ] and [h] we change the meaning of the sentence and hence we aren’t speaking about the same person.

Consider the following sentence:

(3) [ðə kæt ɪz ɒn ðə mæt]
the cat is on the mat

If we change the first consonant of the noun *cat* and insert [h] instead we get the sentence

(4) [ðə hæt ɪz ɒn ðə mæt]
the hat is on the mat

which does not have the same meaning.

Again, if in (3) we substitute [b] for [k], we get

(5) [ðə bæt ɪz ɒn ðə mæt]
the bat is on the mat

The three strings of sound [kæt], [hæt] and [bæt] differ only because of their initial sound and thus are potentially three different words.

As in the case of Mark and Mary the substitution of one sound for another one changes the meaning completely.

Now if we say:

(6) a. the cat is on the mat
b. the mat is on the cat

What is the difference in sounds?
What is the difference in meaning?

Obviously the set of sounds uttered in (6a) and (6b) is identical. So the difference lies in the order in which these sounds appear: [k]and [m] permute in (6b). We see that the order of appearance can alter meaning. In (6a) and (6b) the relationship between the cat and the mat is inverted.

In our examples we produce a change in meaning through a substitution of segments in a string of sounds. These segments are called **phonemes**. A precise definition will be given later on.

Now imagine you're in London and you want to go to Bond Street. You ask a couple: "Excuse me, could you tell me where Bond Street is?". They both answer in chorus: "Second left and then right",which can be transcribed as

(7) a [sekənd left ən ðen raɪt]
b [sekənd left ən ðen Raɪt]

Both have given you the same information although you perceive a difference in the sounds used, that is, the woman has used [r], the regular English / r / sound, whereas the man used the rolled lingual [R] instead. They are transcribed phonetically respectively as

[raɪt] and [Raɪt]

This difference in the pronunciation, which allows you to deduce that the wife is English and the husband Scottish, doesn't entail a change in meaning.

The two segments [r] and [R] can be used indifferently since there is no change of meaning: the difference between the two is said to be **phonetic**. This was not the case for the substitution of [h] for [ʃ] in [ʃiːɪz] - [hiːɪz], which brings about a change in meaning and is said to be **phonological** (or **phonemic**).

3.2 Minimal Pairs

Let's come back to the concept of phoneme. Since the substitution of [h] for[ʃ] changes *she* into *he*, [h] and [ʃ] belong necessarily to two different phonemes. Whereas [r] and [R], which under no circumstances change the information given, are said to belong to the same phoneme /r/. In the discussion of phonological versus phonetic differences, what matters is whether the substitution of one sound for another brings about a change in meaning or not; the description of this change does not enter the field of phonology.

Generally, when we wish to decide whether two segments belong to the same phoneme or, on the contrary, are realisations of two different phonemes, we put them in an identical context, that is the same string of sounds. When there is a difference between two otherwise identical strings of sound and this difference results in a change of meaning, these two strings are said to constitute a **minimal pair**. Examples of minimal pairs were given in (1a) and (1b), and in (3), (4) and (5) above.

If we substitute one segment for another and this results in a change in meaning the two segments belong to two different **phonemes**. Thus [k] and [m] are realisations of two different phonemes /k/ and /m/ because substituting one for the other as first element of the string [-æt] gives two different words: /kæt/ (*cat*) and /mæt/ (*mat*).

One can safely say that the phonemes of a given language form a system in which they are all opposed to one another. Take English /p/:

/p/ is opposed to /b/ as in	/pɪg/ : /bɪg/	*pig : big*
/p/ is opposed to /t/ as in	/pi:/ : /ti:/	*pea : tea*
/p/ is opposed to /d / as in	/pɪg/ : /dɪg /	*pig : dig*
/p/ is opposed to /k/ as in	/pæt/ : /kæt/	*pat : cat*
/p/ is opposed to /g/ as in	/pɒt/ : /gɒt/	*pot : got*
/p/ is opposed to /m/ as in	/pæt/ : /mæt/	*pat : mat*
/p/ is opposed to /n/ as in	/pɪt/ : /nɪt/	*pit : knit*
/p/ is opposed to /ŋ/ as in	/rɪp/ : /rɪŋ/	*rip : ring*
/p/ is opposed to /f/ as in	/pi:t/ : /fi:t/	*peat : feet*
/p/ is opposed to /v/ as in	/pet/ : /vet/	*pet : vet*
/p/ is opposed to /θ/ as in	/pɔ:t/ : /θɔ:t/	*port : thought*
/p/ is opposed to /ð/ as in	/pæt/ : /ðæt/	*pat : that*
/p/ is opposed to /s/ as in	/pæt/ : /sæt/	*pat : sat*
/p/ is opposed to /z/ as in	/pɪp/ : /zɪp/	*pip : zip*
/p/ is opposed to /ʃ/ as in	/pi:/ : /ʃi:/	*pea : she*
/p/ is opposed to /ʒ/ as in	/lepə/ : /leʒə/	*leper : leisure*
/p/ is opposed to /tʃ/ as in	/pi:p/ : /tʃi:p/	*peep : cheap*
/p/ is opposed to /dʒ/ as in	/pi:p/ : /dʒi:p/	*peep : jeep*
/p/ is opposed to /l/ as in	/pɪt/ : /lɪt/	*pit : lit*

/p/ is opposed to /r/ as in	/pɒt/ : /rɒt/	*pot : rot*
/p/ is opposed to /w/ as in	/pi:/ : /wi:/	*pea : we*
/p/ is opposed to /j/ as in	/pəʊk/ : /jəʊk/	*poke : yoke*
/p/ is opposed to /h/ as in	/pi:/ : /hi:/	*pea : he*

table 1: /p/ as opposed to the other consonant phonemes of English

This procedure can theoretically be applied to each phoneme of the language. Note, though, that in the chart above, /p/ is opposed to other consonants only. This is because even though all phonemes of a given language form a system, oppositions in that language are organised in such a way that consonants can only be opposed to consonants and vowels to vowels. We shall see in the next chapters how oppositions are organised according to the rules of syllable structure, word formation and other contingencies.

Do exercise 1

3.3 Features

A phoneme is opposed to all other phonemes of its subsystem (respectively, consonants and vowels) in several ways. /p / has to be defined as an unvoiced bilabial plosive to account for all the oppositions found with the other consonants in English. These three features are all necessary because if /p/ was described as an unvoiced consonant it could be opposed to /b/, /d/, /g/, /v/, /ð/, /z/, /ʒ/, /dʒ/, but would not appear as distinct from all other unvoiced sounds. If /p/ was described as a bilabial only it could be opposed to all non-bilabials but would not appear as distinct from /b/ and /m/. If /p/ was described only as a plosive it would be opposed to all non-plosives but would not appear distinct from /t/, /d/, /g/, /b/, /k/.

Hence we can say that
1) voiceless
2) bilabial
3) plosive

are the **distinctive features** of /p/.

Consider the phoneme /m/. Phonetically it is described as a voiced bilabial nasal. However if bilabiality is necessary to account for its opposition to /n/ for example and nasality is necessary to account for its opposition to /b/ voicing is not a phonological feature since there are no voiceless nasals. As voicing is not a distinctive feature of /m/, we say is it as **redundant** feature from a phonological point of view.

Let's have a look at /l/. It is described phonetically as a voiced alveolar lateral. However since there are no other lateral sounds in English, voicing and alveolarity are **redundant**

phonological features. Voicing is also a redundant feature for vowels since there are no voiceless vowels.

Each language has its own set of phonemes; oppositions among those phonemes differ necessarily from language to language : they have been based on different sets of features for each language. For example nasality exists both in French and in English. However in French nasality is a distinctive feature of both consonants and vowels. The French /m/ is opposed to /p/, /b/ because it is nasal, as in English. But whereas there are no nasal vowels in English (at least in Received Pronunciation of British English) in French there are nasal and oral (non-nasal) vowels: /bo/ *beau* ("beautiful") is opposed to /bõ/ *bon* ("good") because of its nasality. So is /pla/ *plat* ("flat") when it is opposed to /plã/ *plan* ("map").

Another example of the relevancy of sets of features would be the role of lip rounding in French and in English. Lip rounding exists in both languages. In English, only back vowels are rounded and rounding alone will never account for the opposition between two vowels. So rounding is a redundant feature of English vowels. In French , both /i/ and /y/ are high front vowels, but /y/ is distinct from /i/ because of its rounding only: /vy/ *vu* ("seen") is opposed to /vi/ *vit* ("saw"). Rounding is a distinctive feature of French vowels.

Segmentation of the string of sounds can also differ from one language to the other. For example, phonetic [tʃ] is considered as one phoneme in Spanish (/tʃ/), as two in French (/t/+/ʃ/) and as one or two in English depending on the analysis of the set of consonants. More details can be found in the exercises given below and in exercise 22.

You can now do exercises 2,3,4,5.

3.4 Allophones

Each phoneme can be described as a maximal set of distinctive features. We have seen that /p/ must be described as 'voiceless bilabial plosive' to account for all the oppositions it can be found in. Every sound which is a realisation of a given phoneme must show the same set of distinctive features. The realisations of phonemes - or **phones** - are called **allophones**. All allophones of a phoneme share the same set of distinctive features but each one can also show additional features. For example the phoneme /p/ is realised as [p^h] in [p^hɪt], as it would be every time it occurs in a word as initial consonant before a vowel, and as [p] in all other cases. [p^h] and [p] are said to be allophones because

1) they can both be described as voiceless bilabial plosives and
2) if we substitute one for the other we do not get any change in meaning but rather an odd pronunciation.

The feature 'aspirated' , which we find in [p^hɪt], is context-bound. Its relevance is not a change of meaning but its position in a string of sounds or context. [p^h] and [p] are realisations of the same phoneme, i.e. allophones that are **in complementary distribution** : [p] can never occur instead of [p^h] and vice-versa. Note that these non-phonological variations are not always perceived.

Allophones can also be in **free variation**. That is, there are no restrictions as to their appearance. Probably no one ever utters the same phoneme twice in the very same way: with an appropriate acoustic instrument, one could always find a small difference between two allophones, a difference which can be attributed to a physiological state, the sort of conversation held, the climate, etc. More systematic instances of allophones may be due to regional “accent”: we have already mentioned the case of the two / r /: [r] and [R], which can occur in exactly the same context without change of meaning, hence with an identical set of distinctive features but accompanied by non-distinctive features indicating that the speaker is, for example, a Scotsman.

Do exercise 6

4. / ekstrə / (Syllable Structure)

4.1 The syllable

We have seen that the sounds of a language form a system or a system of sub-systems in which the various elements are opposed to one another. However this is not enough to explain the organisation of the sound pattern of language, whose units are used to convey meaning. The various elements of the system or sub-systems combine in certain ways which reveal the various levels of structure of the sound system. On the first level we find the structure called **syllable**.

In English a syllable consists of a phoneme or a sequence of phonemes. If the syllable receives word stress it can be associated with meaning and form what is usually called a word. No word in English can consist of anything less than a syllable and no syllable can consist of anything less than a vowel. There aren’t many examples of monosyllabic words consisting of only a vowel in English. However, we have /a:/ *are* , /ɔ:/ *or*, *awe*, /aɪ/ *eye , I* or *ay(e)*, /əʊ/ *owe* , etc. It would be nice to show that given the appropriate intonation, these words could form a sentence. However, there is no such example in English. Latin offers a good example of a sentence formed of a single word formed itself of a single syllable which consists of a vowel only: / i /, *i* which means “Go !”.

Each vowel has the possibility of constituting a syllable (hence a monosyllabic word) by itself whereas this is never possible for a consonant. This is the great phonological distinction between vowels and consonants. Examples of monosyllabic words consisting of a vowel are given above. But not all English vowels can form a word by themselves. /ʊə/, for instance, is not an existing English word. However, what matters is that it could be a word. If we were to invent

a name for a new product, we could well use the single-vowel syllable [ʊə]. We would then have made use of what is called an **accidental gap**. Accidental gaps are formed of possible combinations of phonemes at any level of the structure of the sound system of a language, which have not yet been assigned meaning.

4.2 Clusters

Most English syllables consist of more than one vowel. We must examine what they can consist of, because it is not sufficient to add any consonant or group of consonants to a vowel to get an English syllable: /pteɪ/ is not a syllable of English whereas /pleɪ/ and /steɪ/ are.

The construction of a syllable is always organised around a vowel which is the **nucleus**, i.e. the indispensable element of the syllable. What comes before the nucleus is called **onset** and what follows it is called **termination**. Neither onset nor termination are necessary. They occur separately, or together with the nucleus, as illustrated in the table below:

	onset	nucleus	termination	examples
nucleus only	--	X	--	/ɑ:/ *are*
onset + nucleus	X	X	--	/bi:/ *bee*
nucleus + termination	--	X	X	/ɔ:t/ *ought*
onset + nucleus + termination	X	X	X	/bed/ *bed*

table 2: structure of the syllable

There are restrictions as to the position consonant phonemes can occupy: for example /ŋ/ can never occur before a vowel; just as /h/, /w/ and /j/ can never occur after a vowel. Our list does not include /r/ as in RP, it never occurs in a termination cluster. Some of the many problems related to this phoneme will be dealt with in section 4.5.l

Both onset and termination can consist of one or more consonant phonemes. Two or more consonants in the onset or in the termination form **consonant clusters**. Here again there are restrictions as to how the consonants can combine in the onset and termination respectively (onset clusters do not have the same restrictions as termination clusters and vice-versa)

Any consonant can be the sole element of the onset except /ŋ/ as mentioned before. Note that /ʒ/is rare and is found in initial position only in words directly imported from French, such as /ʒɪgələʊ/ *gigolo* or /ʒi:g/ *gigue* (examples from Gimson 1980:189). The largest onset consonant cluster can consist of three elements. In this case the first one is necessarily /s/ : /s C C nucleus/ (where C stands for "consonant").
Examples:

s	+	p	+	l =	spteɪ	*splay*
				r =	spreɪ	*spray*
				j =	spju:	*spew*
		t	+	r =	strɔ:	*straw*
				j =	stju:	*stew*
		k	+	l =	skle(rɔ:zɪs)	*sclerosis*
				r =	skru	*screw*
				w =	skwi:z	*squeez*
				j =	skju:	*skew*

Two consonant clusters are more frequent: possible combinations are exemplified in table 3 below.

	p	t	k	b	d	g	f	θ	s	ʃ	h	v	ð	z	ʒ	m	n	ŋ	l	r	w	j	tʃ	dʒ
p	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	play	pray	-	pew	-	-
t	-	-	-	-	-	-	-	-	1	?2	-	-	-	-	-	-	-	-	-	tray	twin	tune	-	-
k	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	clay	crow	quick	queue	-	-
b	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	blue	brow	-	beauty	-	-
d	-	-	-	-	-	-	-	-	-	-	-	-	-	-	?2	-	-	-	-	dry	dwell	due	-	-
g	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	glue	grin	1	-	-	-
f	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	flue	fry	-	few	-	-
θ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	throw	thwart	-	-	-
s	spy	stay	sky	-	-	-	sphere	-	-	-	-	-	-	-	-	smell	snow	-	slow	1	sweat	sue	-	-
ʃ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	shrew	1	-	-	-
h	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	huge	-	-
v	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	view	-	-
ð	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
z	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
ʒ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
m	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	muse	-	-
n	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	news	-	-
ŋ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
l	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	lewd	-	-
r	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
w	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
j	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
tʃ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
dʒ	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes :

1. Examples for these clusters could be found; however they are all foreign or onomatopeic: psoriasis - pterodactyl - pshaw - tsetse - gwen - Sri-Lanka - Schweppes.
2. A decision has to be made here as to whether /tʃ / and /dʒ/ are single phonemes or clusters.
3. It is a matter of pronunciation: some dialects pronounce [ʍeə(r)] for *where* (the sound /ʍ/ is a voiceless velar approximant.

Table 3: onset two-consonant clusters

Notice that among two-consonant clusters /s/ seems to combine most easily when in initial position.

see exercise 7

Whereas it was possible to list the combinations of onset clusters fairly faithfully, it is practically impossible to present termination clusters in a chart that would allow immediate reading. Trnka (cited in Troubetzkoy 1967: 269) devotes over 22 pages trying to enumerate and explain possible clusters in English and yet doesn't succeed in producing simple rules!

Hence we will restrict ourselves to showing some of the most frequent termination clusters. Any consonant may be a final consonant i.e. be the only element of a termination except for /h/, /w/, /j/ and to a certain extent /r/, as we have seen.

Examples of two-consonant clusters in termination (table 4):

bump	/___mp/
rent	/___nt/
bank	/___ŋk/
belt	/___lt/
beds	/___dz/
bets	/___ts/
nest	/___st/
bathes	/___ðz/

Note that /pm/ wouldn't be possible, nor /kn/, /tl/ (/bi:tl/ *beetle* is considered to be split into two syllables; see section 4.5 below).

Examples of three-consonant clusters in termination (table 5):

bumps	/___mps/
bonds	/___ndz/
banks	/___ŋks/
helped	/___lpt/
belts	/___lts/
twelfth	/___lfθ/
fifths	/___fθs/
next	/___kst/
lapsed	/___pst/

Examples of four-consonant clusters in termination (table 6):

twelfths	/____lfθs/
sixths	/___ksθs/
texts	/___ksts/

(Examples in tables 3,4,5,6 from Roach 1983: 59-61)

4.3 Constraints on Syllable Formation

Although there seems to be no systematic rule explaining all the possible combinations, there are a number of constraints. Look at the first three examples of two-consonant clusters (table 4) : /bʌmp/, /rent/, /bæŋk/. These clusters are composed of a nasal and of a plosive that shares the same place of articulation:

/m/ = bilabial nasal + /p/ = bilabial voiceless plosive
/n/ = alveolar nasal + /t/ = alveolar voiceless plosive
/ŋ/ = velar nasal + /k/ = velar voiceless plosive
This explains why in *bank* we say /_ŋk/ and not */_nk/.

This is a rule, called homorganic nasal rule, which requires that a nasal + plosive be articulated at the same place. It is only valid for termination clusters as there is no nasal + plosive onset cluster. Moreover the reverse cluster plosive + nasal is impossible in English whether in onset or termination. Spelling is misleading in this respect since

knitting is pronounced /nɪtɪŋ/
pneumonia is pronounced /nju:məʊnjə/

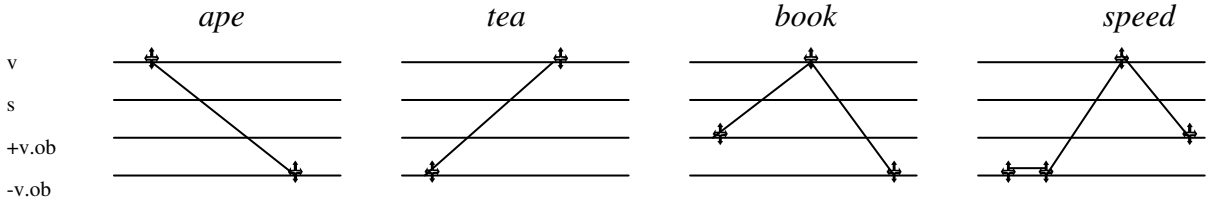
Another constraint is the so-called sonority rule. According to this rule the further from a syllable nucleus a phoneme is, the less sonorous it must be. A well formed syllable will therefore have a sonority peak in its nucleus with the onset rising in sonority towards the nucleus and the termination decreasing in sonority away from the nucleus, as illustrated in table 7.

most sonorous	^	vowels
	|	sonorants
	|	voiced obstruents
least sonorous	v	voiceless obstruents

table 7: the sonority scale of English phonemes

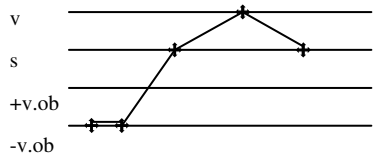
Examples are:

(8)a b c d



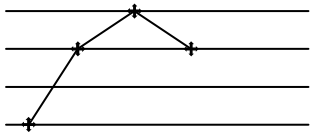
eɪ p t i: b ʊ k s p i: d

d *stream*



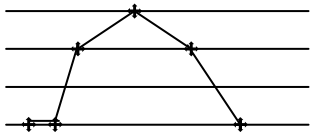
s t r i: m

e *twelfth*



t w e l f θ

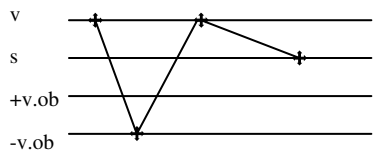
f *strength*



s t r e ŋ θ

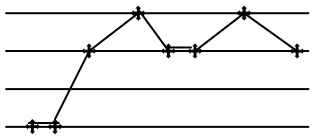
If there is more than one sonority peak there is more than one syllable:

(9)a *aping*



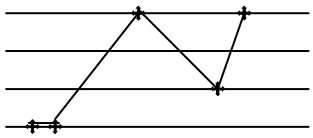
eɪ p ɪ ŋ

b *streamline*



s t r i: m l aɪ n

c *speedy*



s p i: d ɪ

Note that although this sonority rule explains the structure of existing English syllables, it is not powerful enough to exclude wrong predictions: according to this rule only, /rɒh/ is a possible syllable of English. So this rule doesn't cover all the aspects of the problem.

You can do exercises 8,9,10.

4.4 Syllable Perception

Now let's place the syllable in a larger context, the word for example, and let's consider syllable perception.

The word *extra* /ekstrə/, for example, having two vowels, consists of two syllables. Where is the syllable boundary? According to P. Roach (1983:58) there could be five possible ways of dividing the word

(10) a) e+kstrə b) ek+strə c) eks+trə d) ekst+rə e) ekstr+ə

Phonetically speaking, all solutions are acceptable since in each case both syllables contain their vowel. However it is not really surprising that solutions (10b) and (10c) are preferred. Solution (10d), is also worth considering, since in all three cases the syllables resulting from the division are perfectly well-formed according to both onset and termination cluster rules.

Solution (10b), illustrated in (11) yields:

(11)a /ek/ is as much a syllable as the only syllable of the word /eɪk/ *ache*

(11)b/strə/ is as much a syllable as monosyllabic /stra:/ *straw*

Solutions (10a) and (10e) are not acceptable phonologically as their division yields sequences of phonemes that cannot be considered as phonological syllables:

(12)a(= 10a) /ekstr/ does not follow termination cluster rules

b(=10e) /kstrə/ does not follow onset cluster rules

4.5 Syllabic Consonants

It is interesting to notice that in the case of /ekstr/ one would be tempted to analyse this sequence into [ekst+ṛ] (the diacritic mark for syllabic consonants is the dot under the phoneme). We know that /ṛ/ is not a vowel and hence cannot be considered to form a syllable by itself. However this [ṛ] could be said to be a **syllabic consonant** as much as [ṇ] in [kɒtṇ] *cotton* or [l̩] in [bi:tl̩] *beetle*.

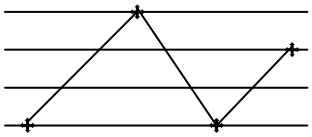
The consonants [ṛ], [l̩] and [ṇ] are syllabic only from the point of view of perception and do not have their place in a phonological analysis, since they are considered to be syllabic only when they are part of a word. Apart from the problem of division of a word into syllables, their syllabicity is never discussed.

The gap between syllables obtained by syllabication on the one hand and syllables resulting from a phonological analysis on the other is very puzzling.

An answer to syllabication that yields syllabic consonants in words like [kɒtṇ] *cotton* , [bi:tl̩] *beetle* , [lɪsṇ] *listen* and even [tʌnl̩] *tunnel* could be found in the sonority rule.

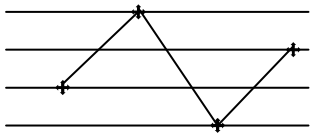
According to this rule,our examples would be analysed as:

(13)a



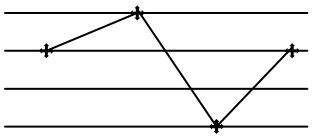
k ɒ t ṇ

b



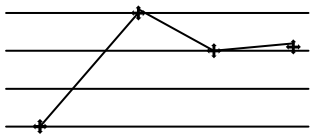
b i: t l̩

c



l ɪ s ṇ

d



t ʌ n l̩

All these words have more than one sonority peak, which is shown here by a change in direction (although /n/ and /l/ are both classified as sonorants, the intensity is obviously higher in /l/ than in a nasal stop).

Another answer suggests that a syllabic consonant is in fact the combination of a vowel and a consonant. A trace of the vowel can be found in the spelling: *cotton* . *beetle* , *tunnel* , *listen* . We will come back to this when discussing stress placement (example (18) and in chapter 7, when examining cases of elision).

A third direction should be investigated. Perhaps the discrepancy between phonetic syllabication and syllabication obtained through phonological rules is due to the fact that syllabication of a word is not as important in English as it is in French for example. In English, words are entities signalled by the presence of a primary word-stress, whereas in French words are mainly collections of syllables. Metrics in English and in French seem to reflect this perception. In English, for example, pairs of words like *pillow* /'pɪləʊ/ and *below* /bɪ'ləʊ/ are not considered to form a rhyme (example given by V. Fehlbaum). Compare with the rhyming French pair *rose* /roz/ and *éclose* /ekloz/ in Ronsard, "Mignonne, allons voir...").

5. Is John really a nice husband ? (Word Stress)

Upon hearing an English sentence - even without understanding its meaning - one can distinguish a certain number of prominent syllables. The prominence is at its highest on the vowels, which are louder, longer, higher in pitch and sometimes different in quality. In the word /bənɑ:nə/ *banana*, the syllable which bears the **stress** is /na:/. It is pronounced with more strength, it lasts longer and it reaches a higher pitch than the surrounding syllables; it also differs from them because it has a full vowel as opposed to /ə/ (schwa), which is the most central and hence the most neutral of all vowels.

This prominence does not belong to the vowel itself but characterises the whole syllable. This explains why stress is called **suprasegmental** as opposed to phonemes which are segmental. At this stage we can clarify the distinction between different types of phonological elements:

- distinctive features always appear simultaneously in bundles that are characteristics of the phonemes

- phonemes are maximal bundles of distinctive features and have their own time-space. This is why they are segmental

- supra-segmental elements include :
    a) syllables: they are supra-segmental units formed of phonemes and characterised as units by the presence of the vowel

b) stress:it is a supra-segmental feature characterising the units which we intuitively recognise as words.

Do exercise 11.

5.1 Word and Stress

To avoid interference with meaning we have chosen to examine an accidental gap consisting of a whole sentence:

(14) ’dʒi:kɪzə’nju:s’hɪspet

This sentence can be divided into six syllables, the limits of which are not always obvious (cf chapter 4, the discussion of *extra*). Let’s examine the first and the last syllables.

We know that /dʒ/ is the beginning of the first syllable and that /i:/ is the nucleus. However, this syllable could either stop directly after the nucleus and we would have a syllable /dʒi:/; or it could have a termination /k/, producing the syllable /dʒi:k/. The next syllable could then have either a zero onset /ɪ../ or the onset /k/: /kɪ../.

The last syllable finishes with /t/ and has /e/ as a nucleus. However it could:
- have no onset and yield a syllable /et/
- have an onset consisting of /p/ and yield a syllable /pet/
- have an onset consisting of the cluster /sp/ and yield a syllable /spet/.

All this is possible because the previous syllable can be either /hɪsp/ or /hɪs/ or /hɪ/.

Usually the notion of stress is related to the notion of word and there is one stressed syllable per word. In our example, if this were true, we would have three words. Where would the word boundaries be, bearing in mind that there is no meaning to help us?

Here are some of the possible words:

(15)a ’dʒi:kɪzə | ’nju:s | ’hɪspet

b ’dʒi: | kɪzə’nju:s | ’hɪspet

c ’dʒi:kɪz | ə’nju:s | ’hɪspet

Do exercise 12

5.2 Effects of Stress on Words

In actual fact, our accidental gap sentence an English sentence in disguise:

(16) /ˈdʒɒn ɪz ə ˈnaɪs ˈhʌzbənd/
John is a nice husband

Now that we know what the sentence means, we realise that there are more words than stresses. So the notion of word as it is usually understood is not always absolutely compatible with the notion of stress. We have five words and yet two of them, i.e. /ɪz/ and /ə/ do not bear any stress even though they are well formed syllables. Each word has a potential word stress, even "little" words like articles, prepositions etc. For instance *into* /ɪnˈtʊ/ has a stressed syllable and an unstressed one even though most of the time the stress is not realised. Why then are *is* and *a* not stressed in our example?

In the realisation (utterance) of a sentence, functional words (i.e. our former "little words": articles, prepositions, auxiliaries, conjunctions etc.) do not receive stress as lexical words do. However they can receive stress under given circumstances which will be discussed in chapter 6.

In polysyllabic lexical words, there is one and only one prominent syllable, where the **primary stress** is realised. There can also be a so-called **secondary stress** in long words (ex: *photographic* /ˌfəʊtəˈgræfɪk/) but this stress is not a phonological sign since its placement never results in an opposition between two words; it may indicate word structure. Primary word stress is signalled with an apostrophe (') which precedes the stressed syllable, and secondary stress with a comma before the stressed syllable.

As we have said, prominence is also achieved through quality, which affects mainly the vowel. As an example, let's examine the triplet

(17)a. phone ˈfəʊn
b. phonology fəʊˈnɒlədʒɪ
c. phonological ˌfəʊnəˈlɒdʒɪkəl

Notice first that the three words in (17) all bear a primary stress and the word *phonological* bears an extra, secondary stress. Even though these words are derived from the same root, the stress is placed on different syllables (the placement of stress may follow certain rules some of which are dealt with in exercises 13 and14).

The nucleus [əʊ] of the first syllable remains unchanged even though in (17a) it appears in a stressed syllable, in (17b) it appears in a weak syllable and in (17c) in a syllable with a

secondary stress. But not all nuclei remain constant. Let's examine the nuclei of the second and third syllables in *phonology* and *phonological* (example (17b) and (17c)).

The nucleus of the second syllable in *phonology* is stressed and is realised as /ɒ/ whereas the same nucleus in *phonological* is unstressed and is realised as /ə/; the vowel of the third syllable of *phonology* , being unstressed, is realised as /ə/ whereas its counterpart in *phonological* is stressed and realised as /ɒ/.

We see that the vowel /ə/ is never found in a stressed syllable. Recall our example of a foreign word such as *banana*. As the spelling indicates, it was pronounced /banana/ (the /ɑ/ sound is like the French one in /lɑk/ *lac*) when it was borrowed from the Spanish and Portuguese who themselves imported it from a Guinean word. The placement of the stress in English required that the only "full" vowel /ɑ/ to be kept as such was the one in the stressed syllable. The others, being unstressed, came to be pronounced in a very neutral way: /bə'nɑ:nə/.

Do exercises 15,16.

5.3 Stress and Oppositions

Stress placement is linked to vocalic quality. There are many pairs of words which are spelled the same way but are pronounced differently due to the placement of stress :

(18)a.	ˈkɒndʌkt	(N)	-	kənˈdʌkt	(V)	*conduct*
b	ˈdezət	(N)	-	dɪˈzɜ:t	(V)	*desert*
c.	ˈprezn̩t	(N,A)	-	prɪˈzent	(V)	*present*

In such cases we can verify our theory that placement of stress affects the quality of the nucleus of the syllable. Stressed /C ɒ C/ in /'kɒndʌkt/ becomes unstressed /C ə C/ in /kənˈdʌkt/; stressed /C e / in /ˈdezət/ becomes unstressed /C ɪ / in /dɪˈzɜ:t/ and unstressed /C ə C/ becomes stressed /C ɜ: C/.

Even more interesting is our third example (16 c) where in the unstressed second syllable of /'prezn̩t/ we find a syllabic consonant, i.e. no vowel at all, which appears as vowel+consonant /en/ in an unstressed syllable. This point, which has already been mentioned, will be finally discussed in chapter 7 which deals with connected speech (elision).

It has been argued that in English one can find a certain number of minimal pairs in which it is the placement of stress which determines the opposition, the string of phonemes being rigorously the same. For example /ˈæbstrækt/ *abstract* (A) differs from /æbˈstrækt/ *abstract* (V) because the adjective bears the stress on the first syllable and the verb on the second one. The same is true for *import*, *increase*, *insult* . One can discuss whether it is really worthwhile creating a category of opposition due to placement of stress only from such a small corpus of evidence. The fact that these vowels do not change (whether they appear in a strong or in a weak

syllable) is perhaps due to some of their intrinsic characteristics such as length, position or quality. There could also be a morphological explanation linked to the presence of a prefix.

5.4 Weak Forms

As we have seen, each word, in the most common use of the term, has a potential word-stress. In our example (14) /'dʒi:kɪzə'nju:s'hɪspet/ we knew that phonologically there were three "words" (units equal to or higher than a syllable but smaller than a sentence) but we couldn't tell how many lexical and function words the sentence contained. When we translated our sentence into a meaningful one (/'dʒɒnɪzə'naɪs'hʌzbənd /) we saw that two of the words (*is* and *a*) had no stress. They were realised in their weak form, that is either with a schwa such as in /ðə/ *the* , /ə/ *a* , /ən/ *and* , /əv/ *of* , /bət/ *but* , /ðən/ *than* , /əs/ *us* , /həv/ *have* , /əz/ *as* , /məst/ *must* , /ðə/ *there* , or with their long vowel being shortened such as in /ʃi/ *she* , /bi/ *be* , /ju/ *you* ; weak forms can also drop their initial /h/ such as in /ɪz/ *his* , /i/ *he*, /ə/ *her* .

Function words often have both a weak and a strong form. They usually appear in their weak form when unstressed. They can appear in their strong form without a stress, but if they are stressed, they necessarily appear in the string form. In the discussion about weak and strong forms, recall what we said about example (18).

5.5 Compounds

Let's take a case where a lexical word loses its own stress. Compound words are single words that can be analysed into two lexical words, both of which exist independently as English words and hence bear their own stress.

Examples of this are *White House* which can be analysed into '*white* and *'house*; '*typewriter* which can be analysed into *'type* and '*writer* ; '*car-ferry* which can be analysed into '*car* and ' *ferry* . As one can see, when these words are brought together, one of them loses its stress. However, it is not always possible to predict which one.

Some compounds like *loudspeaker* have not yet been subjected to a univocal treatment. According to some authors the stress placement is ' *loud- speaker* , which is rather a combination of two words, since they both bear a primary stress; others see it as *loud* '*speaker*_, i.e. a compound.

If one considered *cupboard* /ˈkʌbəd/ as a compound word, one could say that upon losing its stress, the word *board* /'bɔ:d/ changed the nucleus of its single syllable into a schwa. This case of compounding would tend to prove that unstressed syllables lose the specific quality of their vowel.

6. You ate it ?! (Intonation)

Intonation characterises the highest supra-segmental unit of the English sound system that we want to study (the other units were the syllable and the word). the scope of intonation being rather large, it very often goes beyond the field of linguistics. Therefore we shall not study intonation when it is used to express emotions and attitudes. Neither shall we look into the discourse function of intonation since we want to limit ourselves to the utterance of sentences.

6.1 The Tonic Syllable

It is quite safe to say that unless some intonation is produced one doesn't know whether an utterance is complete or not. Where exactly this utterance ends, giving thus the limits of the sentence, cannot be decided easily. The most common form of intonation is the fall in pitch which occurs on the last stressed syllable, i.e. the stressed syllable of the last lexical word, which we will call **tonic syllable.** Usually we can decide where the utterance stops after the tonic syllable thanks to

1) meaning
2) silence
3)the beginning of a new utterance

There are other intonation marks. A sudden rise in pitch can also indicate that the utterance is complete. This rise in pitch is used to indicate that the sentence uttered is a question when there is no interrogative word or auxiliary-subject inversion to convey this meaning.

(19) you ⌣/ ate it ?

instead of

(20)a. did you ⌣/eat it ?
b. did you ¬\ eat it?

There are also double changes in pitch direction (rise-fall /\ or fall-rise \/). However, they do not seem to have the same function as rise or fall only. Fall-rise, for example, tells us more about internal boundaries within the sentence than actual utterance boundaries.

(21)a. 'Those who 'sold\/quickly |¬) made a ¬) profit

b. 'Those who\/ sold | ,quickly ,made a ¬\profit

This fall-rise indicating the boundariy between two parts of the sentence enables us to disambiguate the utterance. In (21a) it is the quick sale that yielded a profit and in (21b) it is the sale that yielded a quick profit. (21)is a good example of how the possible divisions of a sentence (here through the use of intonation) allow us to organise meaning differently. In this sense, this fall-rise intonation could be said to have a grammatical function.

In the literature on intonation rise-fall intonation is said to convey rather strong feelings of approval, disapproval or surprise, such as

(22) Isn't the view lovely ?
^Yes

Rise-fall doesn't seem to have anything to do with utterance boundaries, as in ⌒*yes* or even with a question, as in ⌒*yes* but merely with what we called attitudinal function of intonation. However, the matter would be worth investigating, especially because of the parallel that could be established with the less problematic fall-rise intonation.

6.2 Emphasis

Emphasis is a very clear-cut case in which the manipulation of intonation serves a grammatical purpose specific to English. It consists of singling out a word of the sentence by giving it the intonation pattern that would normally occur on the tonic stress, i.e. the stressed syllable of the last lexical item. For example, in the sentence

(23) it was ⌒very boring

the intonation is moved from *boring* (last lexical word) to *very* to indicate emphasis on this word.

We can go a step further. Consider examples in (24) (from Roach 1983:):

(24)a. [aɪ ˌwʌnt tə ˌnəʊ weə hɪz ˈtrævəlɪŋ tu]
I want to know where he's travelling to

b. [aɪ ˌwʌnt tə ˌnəʊ weə hɪz ˌtrævəlɪŋ tu]
I want to know where he's travelling⌒to

The contrast between (24a) and (24b) lies in the fact that in (24b) to is emphasised. Usually this is understood as an implicit opposition with another possible word that could take its place, for example *from* . Hence (24b) could be understood as:

(24)c. (implicit: I don't want to know where he's travelling from, but)

I want to know where he's travelling to

If these two sentences were actually uttered in a sequence, one would get:

(24)d. I 'don't want to 'know where he's 'travelling˅ from |
I ,want to ,know where he's ,travelling ¬ to.

Note that the ˅ on *from* serves two functions:
1) it indicates sentence-internal boundary
2) as it is removed from the last lexical word (*travelling*) onto a normally unstressed grammatical word (*from*), it indicates emphasis.

7. Banana/-z/ again... (Connected speech)

So far we have examined phonological units as separate entities. But we must now say something about phenomena that occur when these entities influence each other because of their contiguity. We will restrict ourselves to stating a certain number of problems and not attempt to give general rules.

Since phonemes always appear as members of units such as syllables or words, we will examine the phenomena of connected speech at the level of:

a) the syllable
b) the morpheme, i.e. the smallest string of phonemes to which a meaning is attached
c) the word

Two important categories of modifications are:

1) **assimilation** in which one sound influences another one in the same syllable or in a neighbouring syllable, whether it belongs to the same word or to a contiguous one. One speaks of **progressive** assimilation when the features of a phoneme are modified by the features of the phoneme immediately before it. **Regressive** assimilation occurs when the features of a phoneme are modified by those of the phoneme immediately following it.

2) **elision** which is the results of the disappearance of a sound.

7.1 Intra-syllabic Level

The word *bank* is not pronounced */bænk/ but /bæŋk/ because in the termination cluster nasal+plosive, the nasal adopts the place of articulation of the plosive, i.e. it becomes velar. This phenomenon is no longer perceived as regressive assimilation. It has in fact become one of the rules of syllable formation in English (cf. homorganic rule, page 8).

In the word *castle* pronounced [kɑ:s̩l], the sound /t/ that is still found in the word /kæsteleɪtɪd/ *castellated* has disappeared. This is a case of elision. Moreover there is a double elision since the intermediary vowel between /t/ and /l/ (still found as /e/ in /kæst̲eleɪtɪd/) has also disappeared. This double elision should have led to the complete disappearance of the second syllable, since the nucleus has gone. The second syllable survives in the form of a syllabic consonant [l̩]. Thus our hypothesis (formulated on page 13) seems to be validated.

Do exercises 17,18,19.

7.2 Inter-morphemic Level

The morpheme of the plural spelled as *-s* like in *cats* and in *dogs* appears as two distinct phonemes /s/ and /z/ due to progressive assimilation. This suffix is voiceless [s] when it is preceded by a voiceless consonant and voiced [z] when preceded by a voiced consonant:

(25)a. /kæt+s/
b. /dɒg+z/

Again, this assimilation has reached the status of a rule. However, this rule needs to be completed as it doesn't apply to:

(26)a.	/bənɑ:nə/	*banana*
b.	/bʌs/	*bus*
c.	/bʌz/	*buzz*
d.	/kæʃ/	*cash*
e.	/gəra:ʒ/	*garage*
f.	/bætʃ/	*batch*
g.	/bædʒ/	*badge*

The case of / bənɑ:nə/ is quite straightforward. The final sound is a vowel; it is necessarily voiced and will be followed by the voiced version of the morpheme:

(27)= (26a) / bənɑ:nə+z/

Let's now examine (26b) and (26c), /bʌs/ and /bʌz/.According to our "rule" we should add respectively /s/ and /z/. However gemination does not exist in English and */bʌss/ is not a possible form. We know that the correct plural for /bʌs/ is /bʌsɪz/ obtained by:

-the insertion of a vowel between /s/ or /z/ and the plural form

-and the selection of the voiced version of the morpheme

In the cases (26d-g), the contiguity of the last phoneme (respectively /ʃ/, /ʒ/, /tʃ/ and /dʒ/) with /s/ or /z/ would transform the palato-alveolar feature of these sounds into respectively /s/or /z/ through assimilation. This leads us back to the problem of */bʌss/ and */bʌzz/ which is avoided through the insertion of [ə/ɪ] and the voiced version of *-s*.

Let's look at elision between two morphemes. Our examples will be rather special , since they deal with compounds. The word *grandfather* is pronounced /grænfa:ðə/. In this case, the last consonant of the termination cluster of the first word has disappeared in the compound. The case of *cupboard* is less clear in the sense that from the pronunciation / kʌbəd/, the string of sounds of *cup* has partially disappeared, and the /ɔ:/ of *board* has turned into a schwa: /ə/ Note that in this case the meaning of the compound is very remote from the meaning of the two parts.

Do exercise 20

7.3 Between Words

Some times, assimilation, especially between words, is less standardized and yet the phenomenon remains quite powerful. Compare a. to b. in the following examples:

(28)a. /hɪtʃ ju:/ *hit you*
b. /hɪt mi:/ *hit me*

(28a) illustrates a regressive assimilation between the first consonant of the second word and the last consonant of the first one. The place of articulation of /j/ induces the palatalisation of /t/ in /hɪt/ into /tʃ/.

Our last example really shows that elision seems the only way to avoid an unfortunately complex consonant cluster. "George the Sixth's throne" is an utterance where "no normal English speaker would ever pronounce all the consonants between the last two words" (quoted by Roach 1983:108). Most probably, the outcome of the complex cluster in *sixth's throne* would be /-sɪks θrəʊn/ where two morphemes, /-θ/ to indicate ordinal and /s/ for the Saxon genitive, are elided simultaneously.

You can do exercise 21

7.4 Linking r

We will now look at a marginal phenomenon called linking "r". We have seen that in Received Pronunciation of British English the phoneme /r/ never occurs in syllable-final position. However, this /r/ has not completely disappeared in such a position. For instance, before a vowel, this final /r/is often pronounced, as in /fɔ:r egz/ *four eggs*.

This would suggest that rather than having a linking "r" before a vowel, we have an elided /r/ in all other positions. This elision has not taken place in most dialects of American English nor in many varieties of British English. By a phenomenon of over-generalisation, speakers of Received Pronunciation tend to insert an /r/ between vowels even where there has never been a /r/. This leads them to pronounce "Anna and John" as /ænər ənd ʒɒn/.

Do exercise 22, and then exercise 23 as a recapitulation.

Exercises

Phonology

1. On the model of table 1 in the text, show the oppositions the phoneme /f/ can enter into in English. You may have difficulties with the phoneme /ʒ/.

2. Given the two Spanish strings of sounds /tr/ and /tʃ/, observe the following possible and impossible oppositions:

/tr/	/tʃ/
t r a to	tʃ a to
t a to	t a to
r a to	* ʃ a to
k r a to	* kʃ a to

a. Can you have /t/ without /r/ and /r/ without /t/?
b. Can you have /t/ without /ʃ/ and /ʃ/ without /t/?
c. What are then the necessary conditions for the appearance of /t/, /r/ and /ʃ/?
d. Do you analyse /tr/ as one + one phoneme or as one phoneme by itself ?
e. Do you analyse /tʃ/ as one + one phoneme or as one phoneme by itself?

3. In the sound system of English, can you consider /tr/ and /tʃ/ as respectively one or two phonemes?

a. Organise the data below:

/tʃɪp/ /tɪp/ /rɪp/ /ʃɪp/ /trɪp/

b. What can you say about the conditions of appearance of /t/, /r/ and /ʃ/?
c. Are /tr/ and /tʃ/ respectively one or two phonemes?

4. Using your answers to exercises 2 and 3, discuss the phonemic status of /tʃ/ in Spanish and in English.

Here are a few guidelines:

- rewrite your answers to exercise 2 as a coherent paragraph
- do the same thing for your answers to exercise 3.
- in a third paragraph, compare the above two.

5. Given the opposition system of English consonants, how can you describe /r/, /w/ and /j/ using all and only those features by which they can be opposed to other consonants. In order to do this:
a. List all the features
b. Determine those that are redundant.

6. The aim of this exercise is to prove that [p^h] and [p] share exactly the same set of distinctive features. In order to do so, you have to place both [p^h] and [p] in opposition to all other consonants of the system, wherever possible. If there is no difference, i.e. if [p^h] and [p] share the same distinctive features, they can be said to be allophones of the same phoneme /p/. In table 1. part of the work is done.

[p^h] is opposed to [b] as in [p^hɪg] : [bɪg]	[p] is opposed to [b] as in [rɪp] : [rɪb]
[p^h] is opposed to [t] as in [p^hi:] : [t^hi:]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [d] as in [p^hɪg] : [dɪg]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [k] as in [p^hæt] : [k^hæt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [g] as in [p^hɒt] : [gɒt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [m] as in [p^hæt] : [mæt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [n] as in [p^hɪt] : [nɪt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [ŋ] as in *[p] : [ ]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [f] as in [p^hi:t] : [fi:t]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [v] as in [p^het] : [vet]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [θ] as in [p^hɔ:t] : [θɔ:t]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [ð] as in [p^hæt] : [ðæt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [s] as in [p^hæt] : [sæt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [z] as in [p^hɪp] : [zɪp]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [ʃ] as in [p^hi:] : [ʃi:]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [ʒ] as in ?[ ] : [ ]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [tʃ] as in [p^hi:p] : [tʃi:p]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [dʒ] as in [p^hi:p] : [dʒi:p]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [l] as in [p^hɪt] : [lɪt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [r] as in [p^hɒt] : [rɒt]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [w] as in [p^hi:] : [wi:]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [j] as in [p^həʊk] : [jəʊk]	[ ] is opposed to [ ] as in [ ] : [ ]
[p^h] is opposed to [h] as in [p^hi:] : [hi:]	[ ] is opposed to [ ] as in [ ] : [ ]

We have given you table 1 above, with square brackets for phonetic signs.

a. Complete column 1.
b. Fill in column 2 in which you indicate the features that differentiate the second sound from [p^h].
c. Except for the cases of [ŋ], [ʒ] and [h], are there differences of features in columns 1 and 2?

7. In table 3:

a. Analyse the entries: have the sounds been placed indentically in the horizontal and vertical entries? In which way have they been ordered?
b. Define the zone where most clusters occur.
c. List the clusters of this zone: what do they consist of?
d. Do all second elements of these clusters have a common feature?
e. Concentrate on the first elemts of these clusters: which manners of articulation are represented?
f. Do all the manners listed in e. accept the same second elements? If not, list the various behaviours you can find.
g. The phoneme /s/ as first element of a cluster accepts many different second elements: What are they (in terms of VPM)? Can you see a connection between the VPM description of /s/ and that of the elements it accepts in an onset cluster?

8. Give:

a. a syllable beginning with a cluster labio-dental fricative + lateral
b. a syllable beginning with a cluster labio-dental fricative + palatal
c. a syllable beginning with a cluster fricative + alveolar nasal
d. a syllable beginning with a cluster s + plosive + velar
e. a syllable ending with a cluster lateral + plosive + alveolar
f. a syllable ending with a cluster velar nasal + plosive
g. a syllable ending with a cluster voiced plosive + alveolar fricative

You may have had to eliminate some of the syllables of the exercise which are not possible in English. If you did, explain on what basis you did so.

9. Are the following strings of sounds possible words in English?

a. [rbeɪ]	e. [ɪŋ]	i. [ɒksts]
b. [t^hæm]	f. [spju:]	j. [ru:ʒ]
c. [kni:]	g. [rʌgh]	k. [sɪfθs]
d. [ŋɪt]	h. [dwi:ɬ]	l. [ɬɪmp]

10. A. Consider the following pairs of sounds:

1. l - ɬ
2. h - ŋ

a. Why can't you ever find [l] opposed to [ɬ]?
b. Why can't you ever find [h] opposed to [ŋ]?

c. Intuitively, it is clear that the problem encountered in 1 is not the same as the one in 2: what is the difference?

d. How can you account for this intuition? (exercise 7 can help you).

e. Which are the distinctive features involved in [l]-[ɬ], respectively [h]-[ŋ]?

f. How would you characterise the difference between [l] and [ɬ] on the one hand and [h] and [ŋ] on the other hand?

g. Now write a short essay answering the following question: what are the differences between the pairs of sound [l] - [ɬ] and [h] - [ŋ]?

11. Group the various elements of the definition of "phoneme" that you can find in the text. Write a short essay in which you give a clear picture of what a phoneme is and what the problems around the definition of the phoneme can be.

12. In examples (15) of the text, we have given you possible division into words of the string /'dʒi:kɪzə'nju:s'hɪspet /.

As you can notice , all three possibilities isolate /'hɪspet/ as a word. Starting from the whole sequence of syllables, explain why there is no other possibility of division at this place.

13. Given the following examples (partly from Roach 1983:76), find the characteristics that seem relevant for the placement of stress.

A.		Verbs			Adjectives	
1.	a.	ə'plaɪ	*apply*	2. a.	dɪ'vaɪn	*divine*
	b.	ə'raɪv	*arrive*	b.	ə'laɪv	*alive*
	c.	ə'laʊ	*allow*	c.	ɪ'neɪt	*innate*
3.	a.	ə'trækt	*attract*	4. a.	kə'rekt	*correct*
	b	ə'sɪst	*assist*	b.	dɪ'stɪŋkt	*distinct*
	c.	ɪn'vent	*invent*	c.	ɪ'mens	*immense*
5.	a.	'entə	*enter*	6. a.	'lʌvlɪ	*lovely*
	b.	'envɪ	*envy*	b.	'prɪtɪ	*pretty*
	c.	'wɔ:tə	*water*	c.	'betə	*better*
7.	a.	'əʊpən	*open*	8. a.	'əʊpən	*open*
	b.	'i:kwəl	*equal*	b.	'ni:dfʊl	*needful*
	c.	'ri:zn̩	*reason*"	c.	'rəʊgɪʃ	*roguish*

B. Nouns

1.	a.	'mʌnɪ	*money*	2. a.	ɪ'steɪt	*estate*
	b.	'prəʊdʌkt	product	b.	bə'lu:n	*balloon*
	c.	'bʌtə	*butter*	c.	rɪ'gɑ:d	*regard*
	d.	'lærɪŋks	*larynx*	d.	kəm'leɪnts	*complaints*

14. A.
As you will see in the examples below, the addition of a suffix can modify the placement of stress. (based on Roach 1983:82)

- əd'vɑ:ntɪdʒ	*advantage*	- ædvən'teɪdʒəs	*advantageous*
- 'fəʊtəʊ	*photo*	- fə'tɒgrəfɪ	*photography*

a. How would you describe the shift of stress?

b. Can you predict the placement of stress in the second word of these pairs?

- ˈprɒvɛb	*proverb*	- prevɜ:bɪəl	*proverbial*
- ˈklaɪmɪt	*climate*	- klaɪmætɪk	*climatic*
- ˈtræŋkwəl	*tranquil*	- træŋkwɪlɪtɪ	*tranquillity*

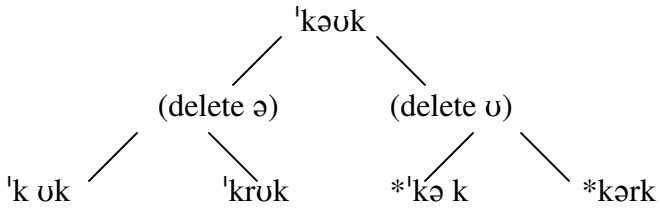
B. You probably answered to Ab. using Aa. and applying it systematically. However, there is another clue, based on vocalic quality in weak and strong syllables. Using the model:

ədˈvɑ:ntɪdʒ ædvənˈteɪdʒəs

replace the stress on the following pairs of words:

- pɜ:fɪkt	*perfect*	- pəfekʃn̩	*perfection*
- ɪndʒə	*injure*	- ɪndʒʊərɪəs	*injurious*
- ri:fleks	*reflex*	- rɪfleksɪv	*reflexive*

15. Consider the following data, presented by Martinet (1974: 119)



It seems that the diphthong /əʊ/ you can take /ə/ away and still get a possible word, but you cannot take /ʊ/ away. How can you explain this situation?

16. Why are the strings below not possible words in English?

a. /pedi:/	d. /ˈbədɔ:/
b. /ɪˈŋɪt/	e. /bætˈn̩/
c. /təhˈi:z/	f. /ˈsɪtɑ:/

17. American English (AE) shows nasal vowels. Here are examples (from Fromkin & Rodman 1985:75):

[bi]	*bee*	-	[bid]	*bead*	-	[bĩn]	*bean*
[le]	*lay*	-	[les]	*lace*	-	[lẽm]	*lame*
[bæ]	*baa*	-	[bæd]	*bad*	-	[bæ̃ŋ]	*bang*

Note that the American transcription system is used, but it does not interfere with the problem we are going to discuss.

a. Where do nasal and non-nasal vowels occur?
b. Is there a set of nasal vowels in AE that can be opposed to non-nasal vowels (as in French [o/ õ] in *beau/bon* , [ɑ/ ɑ̃] in *bas/banc* etc).
c. Are nasal vowels phonemic in AE?
d. If not, give a rule which accounts for nasal vowels in AE.

18. Here is a nice French assimilation found in baby talk: children say

/kromnɑd/ for *promenade*
/velt/ for *verte*

Describe this assimilation process, motivating it in terms of features.

19. Syllabic consonants are obviously a problem in the phonological description of syllable structure.
a. Find the various places throughout the booklet where the syllabic consonants are mentioned.
b. Identify all the problems encountered.
c. Where can you find answers to the problem in the text?
d. Organise these answers and link them together.
e. Now you can write a coherent essay dealing with syllabic consonants.

20. a. In English, the phonological transcription of the words bomb , iamb , crumb are:

/bɒm/ /aɪəm/ /krʌm/

What syllable formation rule prevents having:

*/bɒmb/ */aɪəmb/ */krʌmb/

b. By what phenomenon do we get the correct /bɒm/ and not the starred */bɒmb/?

c. And yet, words like [bɒmbədɪə], [aɪəmbɪk] and [krʌmbl̩] are perfectly possible. Explain the re-apparition of /b/ in these words using

- your syllable formation rule in a.
- and syllabication

21. Given the two phonetic transcriptions (check the difference with phonological transcription!)

1) [hi: laɪz]
2) [hi: ɬaɪz]

and knowing that they correspond to the two meanings

a) heal eyes
b) he lies

1. Give the rules for the use of [l] and [ɬ] according to context.
2. Define the contexts in these examples.
3. How can you explain the presence of [ɬ] in 2) ?
4. Which transcription corresponds to which meaning?
5. Rewrite the rule in 1. using the context that you have here.
6.a. Give the narrow phonetic transcription of /ketl/ indicating the variety of /l/ used.
b. What generalisation can you give about syllabic consonant [l]?
7. Given answers to 5. and 6.c can you formulate a general rule of the contextual distribution of [l]/[ɬ]?

22. Recall exercise 2 in which the English /tʃ/ phoneme was examined. Use it as an example to work on its voiced counterpart /dʒ/.
A. From the word /dʒæm/ jam , build your own data with the help of the following instructions:
see if you can build a new word if:
a. You substitute another sound for /ʒ/ in /dʒæm/
b. You take /ʒ/ away in /dʒæm/, i.e. substitute ∅ for it.
c. You substitute another sound for /d/ in /dʒæm/.
d. You take away /d/ in /dʒæm/.

B. a. Do you get a word for each substitution as there was in the data given in exercise 3?
b. What can you conclude as to the phonemic status of /dʒ/ (i.e. is /dʒ/ mono- or bi-phonemic)?

C. Considering the data, write a short essay explaining the phonemic status of the clusters /tʃ/ and /dʒ/:

Here are the elements you should use:

- Since /tʃ/ and /dʒ/ differ only in voicing. you should replace /dʒ/ in the pair it forms with /tʃ/:
- although in exercise 2 you had /tʃɪp/, /ʃɪp/ and /tɪp/, you cannot have */pʃɪp/ or */kʃɪp/.
- /tʃ/ and /dʒ/ should have the same phonemic status (since they form a pair).
- you have the results of the analysis of /tʃ/ (exercise 2) and /dʒ/ (ex. 9B).

23. Using exercises 2, 3, 4, 15 and 22, write a two-page essay on how to decide whether a string of sounds is to be considered as one or two phonemes.

Suggestions for further readings:

Chapter 2: Phonetics

Vikner (1986:1-17)
Fromkin & Rodman (1988: ch. 2)
Gimson (1980)
Ladefoged (1982) for figures 7-13 and exercises 8, 10, 11, 16.
Mc Carthy (1967)
Roach (1983: ch. 2, 3, 4, 6, 7)
Thomas et al. (1976)

Chapter 3: Segmental Phonology

Fromkin & Rodman (1988: ch. 3)
Jones (1950: § 751)
Martinet (1974: ch. 4)
Roach (1983: ch. 5, 13)

Chapter 4: Syllable Structure

Roach (1983: ch. 8 and §9.4)
Troubetzkoy (1976:269-274)

for the sonority rule, see also:
Ladefoged (1982:221-222)
Lass (1984: 263-64) which includes references to Hooper (1976)
Vikner (1986:21-22)

Chapter 5: Word Stress

Gimson (1980: § 9.05)
Lass (1984 : ch. 10.3)
Mc Carthy (1967: § 557)
Roach (1983: Ch. 10,11,12)

Chapter 6: Intonation

Roach (1983: ch. 15, 19)

Chapter 7: Connected Speech

Mc Carthy (1967: ch. 19)
Roach (1983: ch. 14)

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