

2. PHONETICS AND PHONOLOGY

2.1 Sounds of English

The study of the sounds of human language is called **phonetics**.

Phonology is concerned with the properties of sounds and the ways that they are combined into words.

Important: Sounds, in the sense that we discuss them, are totally different from letters. A word like *through* has seven letters (*t-h-r-o-u-g-h*), but only three sounds (*th-r-ough*). DO NOT CONFUSE LETTERS AND SOUNDS.

As you may have noticed, with the first exercise we did worked on, the letters of our writing system do not correspond to the actual sounds we make in pronouncing the words in a very straightforward way. That makes it hard to talk about sounds in terms of the written alphabet. For one thing, it's easy to be tricked into thinking the same sounds are involved in different words that partially contain the same letters, even though the actual sounds might be very different. And furthermore, it's difficult to refer to a particular sound, since most, if not all, letters can be pronounced in more than one way in different words.

Exercise 1: Below is a list of words that are, in one way or another, similar to each other. Try to find all the sounds that differ in the two words!

- | | |
|---------------------|--------------------|
| a) think - sink | e) beetle - needle |
| b) though – thought | f) bought – boat |
| c) buy - bye | g) tough – fluff |
| d) light - bite | h) match - mash |

Linguists have therefore devised a phonetic alphabet: a system of symbols that directly represent sounds. We write the words using the International Phonetic Alphabet (IPA), which uses one unique symbol for every sound. This means that sounds like *sh*, that is spelled with two letters, can be written with just one symbol, [ʃ]. This avoids confusion – like about when a sequence of letters *sh* stands for one sound, like in *wash*, or for two, like in *misheard*.

The other thing to do when writing sounds (rather than letters) is to put them in brackets, like above where I talked about the sound [ʃ]. This helps because sometimes the IPA symbols look like regular English letters, and so putting them in brackets makes it very clear that you're using them as sounds, not letters.

The important parts:

- When spelling words, write them like *this* (or this), in italics (or underline).

- When writing sounds, write them like [Is], using IPA symbols and brackets.

The following table gives you a first overview of a number of English consonants. The symbol in the beginning is a character from the International Phonetic Alphabet (IPA). Next, there is a word of English that contains that sound (in the place of the underlined letter). Finally, there is a complete transcription of the word in IPA symbols.

Exercise 2: For each sound, give one more example. If possible, if the given example has the sound at the beginning of the word, give an example where it is at the end of a word and vice versa.

p	pat	[pæt]	θ	thick	[θɪk]	d	judge	[dʒʌdʒ]
b	bat	[bæt]	ð	the	[ðe]	m	mat	[mæt]
t	pat	[pæt]	s	sat	[sæt]	n	gnat	[næt]
d	pad	[pæd]	z	zip	[zɪp]	ŋ	sing	[sɪŋ]
k	cat	[kæt]	ʃ	wash	[wɒʃ]	l	last	[læst]
g	get	[gɛt]	ʒ	garage	[gɑʒ]	r	rat	[ræt]
f	fat	[fæt]	h	hat	[hæt]			
v	vat	[væt]	tʃ	match	[mætʃ]			

A notational convention: [IPA] vs. *English*

Note that it is extremely important to be clear about whether we are using IPA symbols or letters of the English alphabet, especially because most Roman letters also are symbols in the IPA.

With the tool of IPA symbols at hand, let's go back to some of the examples from the exercise above:

- think - sink
- though – thought
- bought – boat
- match – mash

2.2 Classifying sounds by Articulatory Features

So far, we have only introduced a new notation to talk about sounds. That's a useful tool, but it is only a first step towards classifying sounds by their properties. Our next step towards understanding the sound system of English therefore is to address the questions of how sounds differ from one another and which sounds are similar in certain ways.

One piece of evidence indicating that we have unconscious knowledge about what sounds are similar in certain ways comes from the entertaining sport of

misunderstanding song lyrics. Consider the following examples (from www.kissthisguy.com):

R.E.M.

The real lyrics were:

*That's me in the corner,
That's me in the spotlight.*

But I misheard them as:

*Let's pee in the corner,
Let's pee in the spotlight.*

Madonna:

The real lyrics were:

*Like a virgin touched for the very
first time.*

But I misheard them as:

Like a virgin touched for the thirtyfirst time.

Jimmy Hendrix:

The real lyrics were:

'Scuse me, while I kiss the sky

But I misheard them as:

'Scuse me, while I kiss this guy.

Nirvana

The real lyrics were:

Here we are now, entertain us

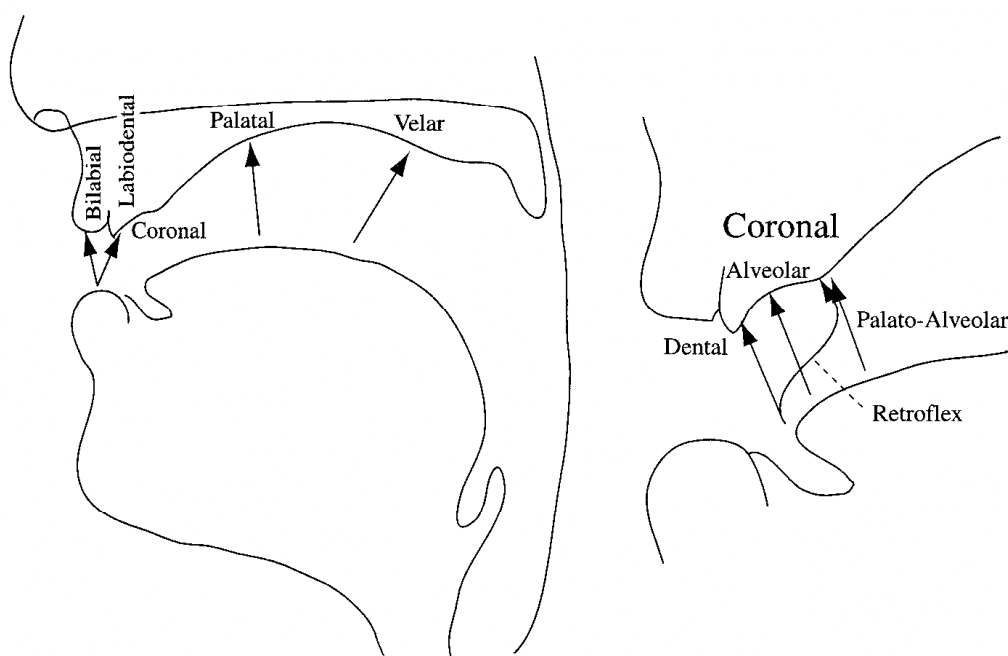
But I misheard them as:

Here we are now in containers

Group Exercise:

Find 10 pairs of sounds (from the IPA chart above) that you think are similar in some way! Don't worry about getting this right or wrong. This exercise is simply about trying out your intuitions about sounds.

FIGURE 1.7 A sagittal section of the vocal tract, showing the places of articulation that occur in English. The coronal region is shown in more detail at the right.



The way that has proven to be most useful in phonological research for classifying sounds is by characterizing how the sounds are articulated in the human vocal tract. As far as consonants are concerned, we can distinguish three aspects of their articulation: place of articulation, manner of articulation, and voicing (state of the glottis – is it vibrating or not (voiced or voiceless)).

Table of English consonants

places manner	bilabial		Labio-dental		Inter-dental		Alveolar		Palatal		Palato-alveolar		Velar		Glottal	
Stop	p	b	f	v	θ	ð	t	d					k	g		
Fricative							s	z			ʃ	ʒ			h	
Affricate											tʃ	dʒ				
Nasal		m						n						ŋ		
Lateral								l								
Rhotic										r						

Shaded: voiced

Unshaded: voiceless

2.3 Manner of articulation (what kind of thing your head is doing)

Stop No air comes out of the mouth (or nose) at first, because the tongue or lips are fully closed and block it; then the tongue or lips open up and air comes out (sometimes in a strong burst).

Test: Put your mouth in position to start saying the sound. Try to exhale. If you can't make air leave your lungs because your vocal tract is completely closed, it's a stop.

Fricative The tongue or lips come very close to each other (or to the teeth, or roof of the mouth) and make a very small opening, which air hisses through, making a friction like sound.

Test: Make the sound for a while, and put your hand in front of your mouth. If you hear continuous hissing, and/or can feel air quickly leaving your mouth, it's a fricative.

Affricate The mouth is closed at first, as in a stop; then it opens a little bit into position for a fricative.

Test: If the sound has two parts, and the first part passes the stop test and the

second part passes the fricative test, it's an affricate.

Nasal No air comes out the mouth; instead, air comes out through the nose.

Test: Rest your fingers on the bridge of your nose and make the sound; if your nose vibrates, it's a nasal. Also, hold your nose and make the sound. If your mouth bizarrely fills up with air and/or you can't hold the sound for long, it's a nasal.

Lateral, rhotic These are all articulations where your tongue makes little or no contact with the roof of your mouth, allowing lots of air to flow out of the mouth.

Test: Is the airflow constricted in your mouth?

Voicing

Voiced: The vocal cords vibrate when the sound is made.

Voiceless: The vocal cords do not vibrate when the sound is made.

Test: Put your hand on your throat, and hold the sound for a while. If you feel your throat (actually, your larynx) vibrating, the sound is voiced. If you don't, the sound is voiceless.

Exercise: For each group of sounds listed below, state the phonetic property or properties they all share.

Example: [p], [t], [k] **stop, voiceless**

a. [g], [p], [t], [d], [k], [b]

b. [t], [s], [ʃ], [p], [k], [tʃ], [f], [h]

c. [v], [z], [dʒ], [ʒ], [n], [g], [d], [b], [l], [r]

d. [t], [d], [s], [n], [z], [l]

e. [f], [v], [θ], [ð], [s], [z], [ʃ], [ʒ], [h]

Ex 2: How do the following sets of consonants differ from each other? For example, [p b t g] differ from [f s ʃ θ] in that the sounds in the first set are all stops and the sounds in the second set are fricatives.

[p t s k]	vs.	[b d z g]	-	[ʃ ʒ]	vs.	[tʃ dʒ]
[b d g]	vs.	[m n ŋ]	-	[p b m]	vs.	[t d n]
[t d]	vs.	[l r]				

2.4 English and French vowels

Our question: How do English and French differ in their vowel systems?

Here again is the set of English vowels from our handout. This set does not include the diphthongs (we'll talk about those next).

	Front	Central	Back
High	i		u
	ɪ		ʊ
Mid	e	ʌ	o
	ɛ		ɔ
Low	æ		ɑ

Shaded: rounded

Unshaded: unrounded

i	be <u>e</u> t	[bit]				u	bo <u>o</u> t	[but]
ɪ	b <u>i</u> t	[brɪt]				ʊ	fo <u>o</u> t	[fʊt]
e	b <u>a</u> it	[bet]	ʌ	b <u>u</u> t	[bʌt]	o	bo <u>a</u> t	[bot]
ɛ	b <u>e</u> t	[bɛt]				ɔ	ca <u>u</u> ght	[cɔt]
æ	b <u>a</u> t	[bæt]				ɑ	co <u>t</u>	[kat]

Tense vs. lax: There are two forms for the front and back high and mid vowels. These can be distinguished by a further feature (tension in the mouth), tense vs. lax. With tense vowels, the tongue is raised just a little bit higher. They also are longer. Only tense vowels can appear in short words (consisting of only one syllable and with no consonant at the end): 'see' [si], *[sɪ], 'say' [se], [sɛ].

	Front	Central	Back
High Tense	i <i>beet</i>		u <i>boot</i>
High Lax	ɪ <i>bit</i>		ʊ <i>foot</i>
Mid Tense	e <i>bait</i>		o <i>boat</i>
Mid Lax	ɛ <i>bet</i>	ʌ <i>but</i>	ɔ <i>caught</i>
Low	æ <i>bat</i>		ɑ <i>cot</i>

And here are the French vowels. This set does not include the nasal vowels (which we'll also talk about those).

	Front	Central	Back	Shaded: rounded
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High	i	y		u	Unshaded: unrounded
Mid	e ɛ	ø	(schwa)	o ɔ	
Low			a		

To pronounce the front rounded vowels, start with the unrounded versions that you have in English, and then round your lips (e.g. [i], [y]).

i lit [li] 'bed'	y lu [ly] 'read'		u loup [lu] 'wolf'
e nez [ne] 'nose'	ø oeuf [øf] 'egg'		o lot [lo] 'prize'
ɛ lait [lɛ] 'milk'			ɔ fort [fɔr] 'strong'
		a chat [a] 'cat'	

What are the differences?

1. List the vowels English has that French does not, and describe them with features.

Vowel (IPA symbol)	Height (High, Mid, Low)	Backness (Front, Central, Back)	Tenseness (Tense, Lax)	Rounding (Rounded only)
[ɪ]	High	Front	Lax	

In terms of the features, what types of vowels does French tend not to have?

2. List the vowels that French has that English does not.

Vowel (IPA symbol)	Height (High, Mid, Low)	Backness (Front, Central, Back)	Tenseness (Tense, Lax)	Rounding (Rounded only)

In terms of features, what types of vowels does English not have?

French nasal vowels

French also has three nasal vowels (in my variety - other dialects have more). These are transcribed with a “tilde” over the vowel:

[õ]	maison	‘house’
[ɑ̃]	maman	‘mother’
[ɛ̃]	pain	‘bread’

English speakers who are just beginning to learn French will pronounce these as a sequence of a vowel followed by a nasal consonant.

If you want to sound like a Parisian, try making the plain vowel sound, and then nasalizing it.

English diphthongs

When you pronounce a diphthong, your tongue changes position during the course of the vowel. In a sense, they consist of two vowel sounds, and this is how they are written in IPA.

[ai]	‘write’
[au]	‘cow’
[oi]	‘boy’

Try pronouncing these slowly, and notice that your tongue moves during the course of the vowel.

Glides/Semi-vowels

There are two English (and French) consonants that are very close to vowels, and for this reason are sometimes called semi-vowels:

[j]	‘yet’ ‘use’
-----	-------------

[w] ‘wipe’ ‘one’

The [j] sound is very close to [i], while the [w] sound is very close to [u]. The pronunciation of each of these sounds is very close to a corresponding vowel: the vowel in ‘two’ [u] is pronounced with the lips and tongue in the same position as [w], and the vowel in ‘tea’ [i] has the tongue in the same position as [j]. Try saying ‘woo’ [wu] and ‘ye’ [ji] versus ‘we’ [wi] and ‘you’ [ju]. Notice that for the first pair, your mouth stays in much the same position for the whole word, whereas for the second pair, it changes place from the consonant to the vowel.

2.5 Minimal pairs

A minimal pair is a pair of words that differ in the smallest way- that is, a pair of words that differ minimally. The smallest unit of sound is a phoneme, so **a minimal pair is a pair of words that differ in a single phoneme** (basically, in a single important sound).

We are showing below an example of minimal pairs.

1. [pæt] ~ [bæt] (= *pat* ~ *bat*)
2. [pæt] ~ [pɪt] (= *pat* ~ *pit*)
3. [pæt] ~ [pæd] (= *pat* ~ *pad*)

What you have to remember is that each pair in (1-3) differs **in one single sound in the same place**, that’s what we called **minimal pairs**.

Exercise:

a. pit [p^hɪt] vs pill [p^hɪl]
pick [p^hɪk] vs. peak [p^hi:k]
pit [p^hɪt] vs. kit [k^hɪt]

b. pill [p^hɪl] vs. pills [p^hɪlz]
peak [p^hi:k] vs. keep [k^hi:p]

2.5.1 Predictable aspiration

We are about to talk about one aspect of English consonants to examine minimal pairs behavior.

Up to this point, we have been simplifying in our description of the English stops.

We have called them “voiced” and “voiceless”, transcribed as [b], [d], [g] and [p], [t], [k].

However, English voiceless stops are often produced with *aspiration*.

You may be not aware of the difference between voiceless aspirated and unaspirated stops.

Try placing your hand in front of your mouth, and saying the following words:

spay, pay, stow, tow, ski, key

Which ones have a puff of air?

As the last set of examples starts to show, the distribution of aspirated and unaspirated stops is predictable.

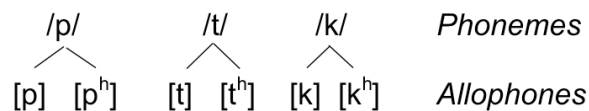
Based on the position of a voiceless stop in a word, we can predict whether it is aspirated or not.

What’s the generalization?

Write the generalization here:

2.5.2 Allophones and phonemes

Linguists usually analyze this in terms of phonemes and allophones:



The distribution of voiced and voiceless stops is *not* predictable; based on the position of a stop in a word, we cannot say if it is voiced or voiceless.

We therefore can have *minimal pairs* in which the only difference between the words is in whether a consonant is voiced or voiceless.

Remember that the IPA is a representation of sounds; when appearing in words, those sounds will be affected by the sound environment. Then, they can find themselves being pronounced differently, for example with or without aspiration or with or without voicing; the IPA transcript will show that change in the symbol of the consonant or vowel in cause.

Allophones Multiple pronunciations of a single phoneme; the choice of which allophone to use in which environment is predictable.

Example with English

pad [pæd] man [m æ̃ n] hat [hæt] Sam [s æ̃ m]
wrath [ræθ] hang [h æ̃ ŋ] mass [mæs]

We should look at the contexts where [æ] and [æ̃] appear and see if there's a way to predict which of those sounds gets used in which environment. When you're looking at sounds' contexts, it's usually easiest to start by looking at the segments before and after the sounds and see whether they have anything in common. An easy way to do this is to make lists of the sounds' preceding and following elements, and then see if the collections of contexts have anything in common.

Before [æ]: [p], [h], [r], [m]

Before [æ̃]: [m], [s], [h]

After [æ]: [d], [t], [θ], [s]

After [æ̃]: [n], [m], [ŋ]

The sounds **before** [æ]/[æ̃] don't predict which sound to use – both [æ] and [æ̃] can follow [m] and [h]. Therefore, you can't use the existence of a preceding sound e.g. [m] to tell you whether you should use the allophone [æ] or [æ̃] in a given context – either allophone could appear there.

The two vowels are followed by totally different sets of sounds though, so one could use the sound **following** the vowel to figure out which pronunciation to use. Looking more carefully, the sounds that follow [æ̃] are all nasals, and the sounds that follow [æ] are all not nasals.

We can thus predict which sound appears where, like this:

[æ] always appears before non-nasal elements; [æ̃] always appears before nasal elements.

2.5.3 Voicing and aspiration are contrastive in Thai

The following examples illustrate that voicing and aspiration are contrastive in Thai:

[bet]	‘fishhook’
[pet]	‘duck’
[p ^h et]	‘spicy’

Exercises: In the following examples, you find pairs of sounds. Are they allophones of one phoneme or two separate phonemes?

(d) **Spanish** [d] and [ð]

pain	[dolor]	side	[laðo]
drama	[drama]	hatred	[oðio]
curtain	[toldo]	food	[komiða]
to last	[durar]	each	[kaða]

(e) **Quebecois** [t] and [ts]

all	[tu]	you	[tsy]
such	[tɛl]	title	[tsit]
very	[tʁɛ]	culture	[kyltsyʁ]
table	[tab]	tube	[tsyb]

2.6 How to proceed

Possible environment/contexts that can determine the pronunciation of an allophone

- Preceding/following vowel
- Beginning of a word
- Preceding/following consonant
- End of a word

Are [X] and [Y] phonemes or allophones? A summary of how to work it out.

Is there a minimal pair of words, differing only in that one has [X] where the other has [Y]?

YES ⇒ [X] and [Y] are phonemes.

NO ⇒ no information.

Look at the environments where [X] and [Y] appear in words.

Are [X] and [Y] in complementary distribution? That is, does either sound have a

consistent, predictable context, such that you could say something like:

“[X] is always before sounds like z1, z2 and z3; [Y] is never before sounds like z1, z2 or z3”?

YES \Rightarrow [X] and [Y] are allophones.

NO \Rightarrow [X] and [Y] are phonemes.

Do [X] and [Y] have the same distribution? Can you find exactly the same sounds before and after?

YES \Rightarrow [X] and [Y] are phonemes.

When YES \Rightarrow [X] and [Y] are allophones.

They **differ by their placement**: If [X] appears at the end and [Y] at the beginning, we just have to say which appear where.
and/or

We will look for a common **feature** (voiced/voiceless, alveolar, stops, etc.) shared by the elements appearing **in the same position**.

2.7 Finding the basic phoneme

The last section talked about two segments (like [æ] and [æ̃]) being allophones in a general way.

We can get a little more specific and say that there's one fundamental sound, which sometimes gets pronounced as itself and other times turns into the other sound in particular contexts.

Remember: [...] for sounds/allophone;

We will use /.../ for phoneme.

If [X] and [Y] are allophones, and

- [X] appears in a very limited context (like only before nasals), while
- [Y] appears in a more general context (like before every other kind of sound, and at the end of words)

Then /Y/ (means, the phoneme Y) is the basic phoneme.

Then [X] and [Y] are allophones of /Y/.

So [Y] is one of the realization of /Y/, but is not himself a phoneme – he is one of the multiple pronunciation of that phoneme.

So:



[Y]

[X]

Allophones

Study guide for the phonetics/phonology exam

Be able to...

- be able to transcribe in IPA any small word.
- ... work on a set of different languages.
- When two sounds are allophones of each other, be able to use their environments to describe how their distribution are predictable.
- ...find the 'basic phoneme'.