

Phonetics and Phonology

Humans have a complex system of using sounds to produce language. The study of linguistic sounds is called **Phonetics**. **Phonology** is the study of systems of sounds, often the sound system of a particular language.

Phonetics

Linguistic sounds are produced by pushing air from the lungs out through the mouth, sometimes by way of the nasal cavity. The movement of the air can then be manipulated by the anatomy of the mouth and throat to produce different sounds. In actual writing, the same sound may often be spelt different ways. For instance, George Bernard Shaw once pointed out that the word *fish* could as easily be spelt *ghoti*, since *gh* has the same sound in *enough*, *o* has the same sound in *women*, and *ti* has the same sound in *nation*. This makes sounds very hard to study without a more precise indication of what sounds we are referring to. The solution is to adopt a phonetic alphabet which always has the same spelling for the same sound. Linguists use phonetic alphabet called the **International Phonetic Alphabet (IPA)**. In the IPA, the word *fish* would be spelt [fɪʃ]. Many IPA letters are the same as those of the English alphabet, so we place IPA spellings in square brackets to indicate that they are phonetic spellings. Note that many dictionaries give phonetic spellings as pronunciation guides, but not all dictionaries use the IPA. Likewise, the system of Phonics does not use the IPA. When looking at phonetic spellings, make sure you know what system you are using. Note also that linguists in the United States do not always follow the accepted international standard. For instance, most linguists in the United States would transcribe *fish* as [fɪʃ]. The individual differences will be described under the section on Phonology below.

Consonants

Consonants are produced by restricting and then releasing the flow of air in three ways: vibrating the vocal cords, changing the part of the anatomy which restricts the air flow, and changing the extent to which the air flow is restricted. Consonants with relatively little vibration of the vocal cords are called **voiceless** consonants. Consonants with relatively more vibration of the vocal cords are called **voiced**. Consonants fall into the following categories, depending on what part of the anatomy is used to restrict the air flow:

Labial	Air flow is restricted with the lips.
Dental	Air flow is restricted with the teeth.
Labiodental	Air flow is restricted with the top teeth on the bottom lip (if both lips are used the sound is called <i>bilabial</i>).
Alveolar	Air flow is restricted by placing the tongue on the hard plate (<i>alveolum</i>) behind the top front teeth.
Palatal	Air flow is restricted by placing the tongue on the soft palate behind the <i>alveolum</i> .
Velar	Air flow is restricted by placing the tongue far back in the mouth.
Glottal	Air flow is restricted by tightening the folds in the vocal cords (<i>glottis</i>).

Consonants can also be categorised by the extent to which the air flow is restricted:

Stop	Air flow is stopped and released quickly.
Fricative	Air flow is released gradually.
Affricate	Air flow is stopped and released gradually.
Nasal	Air flow is channeled through the nasal cavity.
Liquid	Air flow is channeled around the sides of the tongue.
Glide	Air flow is only partially restricted (these sounds are often called semi-vowels).

Some languages have other categories, but only the ones above are the only ones that occur in English. Individual consonants can be made up of nearly any combination of the features above. For instance, [b] is a voiced labial stop and /s/ is a voiceless alveolar fricative.

Vowels

Vowels are produced by directing the flow of air into different parts of the mouth. They can be adjusted by changing the position of the tongue, by rounding of the lips, and by the degree of opening of the mouth. All vowels are voiced.

The position of the tongue can be described in terms of how far forward the tongue is and how high it is. Vowels are categorised as follows, depending on the position of the tongue:

Front	The tongue is in the front of the mouth.
Central	The tongue is further back in the mouth.
Back	The tongue is in the back of the mouth.
High	The tongue is high in the mouth.
Mid	The tongue is lower in the mouth
Low	The tongue is low in the mouth.

All vowels can be described in terms of their location on both vertical and horizontal axes. A look at the Spanish vowel system demonstrates this. Examine the underlined vowels and the descriptions of them below:

Niño “boy”	High Front Vowel	Burro “donkey”	High Back Vowel
Jose	Mid Front Vowel	Jose	Mid Back Vowel
	Mar “sea”	Low Central Vowel	

If you pronounce the High and Mid Back Vowels, you will find that you round your lips. These are called **rounded vowels**.

The English vowel system is more complicated than the Spanish one. In English we create extra vowels by opening the mouth more or less. When the mouth is relatively more open, the vowel is called **lax**. When the mouth is relatively more closed, the vowel is **tense**. Compare the following English words:

Mach <u>i</u> ne	Tense High Front Vowel	Sal <u>u</u> te	Tense High Back Vowel
Ch <u>i</u> n	Lax High Front Vowel	P <u>u</u> ll	Lax High Back Vowel
Bal <u>e</u> t	Tense Mid Front Vowel	F <u>o</u> al	Tense Mid Back Vowel
Ge <u>t</u>	Lax Mid Front Vowel	F <u>o</u> r	Lax Mid Back Vowel

Phonology

Consider the sound of the consonant in the English word *the*. This sound is a voiced dental fricative. In French, this sound does not exist, which is why English spoken with a French accent is famous for replacing it with a voiced alveolar fricative *z*, which is very similar. The reason for this is that the number of linguistic sounds which humans can produce is greater than the number which actually occurs in each language. When studying an individual language, like English, we can therefore focus in only the sound that occur in that language and the system by which they relate to each other. Studying a system of sounds is called phonology.

When looking at the phonological system of an individual language, we limit our study to those sounds which are perceived by speakers as distinct and capable of indicating some grammatical significance. Sounds which meet these criteria are called **phonemes**. For instance, the [l] and [r] are perceived as

distinct and help us understand the difference between *lice* and *rice*. However, [l] and [r] are not distinct phonemes in many Asian languages, which is why speakers of those languages often have trouble distinguishing the two words when speaking English. Linguists use the IPA to represent phonemes but indicate that they are phonemes by placing them between slashes. Thus the word *fish* is rendered /fɪʃ/ (US /fɪʃ/). This is called **phonemic transcription**, as opposed to the **phonetic transcription** described above. In general, it is only necessary to use phonemic transcription when studying the English language. Phonemic transcriptions represent the pronunciation of a word and the precise number of phonemes in the word. Thus the word *fish* has three phonemes, which can be seen clearly in the transcription /fɪʃ/ (US /fɪʃ/). The following is a list of phonemes in US English:

Consonants

	Labial	Labiodental	Dental	Alveolar	Palatal	Velar	Glottal
Stops							
Voiceless	/p/			/t/		/k/	/ʔ/
Voiced	/b/			/d/		/g/	
Fricatives							
Voiceless		/f/	/θ/	/s/	/ʃ/		/h/
Voiced		/v/	/ð/	/z/	/ʒ/		
Affricates							
Voiceless				/tʃ/			
Voiced				/dʒ/			
Nasals	/m/			/n/		/ŋ/	
Liquids				/l/	/r/		
Glides	/w/				/j/		

Note that /l/ and /r/ have range of positions, they are placed in the alveolar and palatal columns only for convenience.

The following equivalencies between International and US usage should be observed:

International	=	US
/f/	=	/ʃ/
/z/	=	/ž/
/tʃ/	=	/č/
/dʒ/	=	/j/ (the ^ should be upside down, as with the others)
/j/	=	/y/

In general, the symbols are interchangeable, but I recommend not using /y/, since this symbol is also used for a vowel sound (the sound in French *lune* “moon” or German *über* “over”). This sound was historically quite common in English as well. Below is a list of IPA spellings of English words. You may not recognise some of the symbols for the vowels.

/p/	<u>p</u> in	/pɪn/
/b/	<u>b</u> in	/bɪn/
/t/	<u>t</u> in	/tɪn/
/d/	<u>d</u> in	/dɪn/

/s/	<u>s</u> in	/sɪn/
/z/	<u>z</u> oo	/zu/
/k/	<u>k</u> in	/kɪn/
/g/	<u>g</u> o	/go/

/ʔ/	bu <u>tt</u> on	/bʌʔən/
/f/	f <u>in</u>	/fɪn/
/v/	<u>y</u> ote	/vot/
/θ/	ba <u>th</u>	/bæθ/
/ð/	ba <u>th</u> e	/beð/
/dʒ/	<u>J</u> im	/dʒɪm/
/m/	<u>m</u> an	/mæn/

/n/	<u>n</u> o	/no/
/ŋ/	s <u>ing</u>	/sɪŋ/
/l/	<u>l</u> id	/lɪd/
/r/	<u>r</u> id	/rɪd/
/w/	<u>w</u> in	/wɪn/
/j/	<u>y</u> es	/jes/

Vowels

	Front	Central	Back
High Tense	/i/	/y/	/u/
High Lax	/ɪ/		/ʊ/
Mid Tense	/e/	/ə/	/o/
Mid Lax	/ɛ/	/ʌ/	/ɔ/
Low	/æ/	/ɑ/	/ɑ/

The High Back and Mid Back vowels are rounded.

Before looking at some sample words, it is necessary to state that this table is a simplified representation of actual speech. The positions of the low sounds are very unstable, and the /ɑ/ sound may be central or back, depending upon the speaker (some linguists use /ɑ/ or /ɒ/ to represent the back version). In American pronunciation the vowel /ɔ/, which tends to occur in words with *o*, *au*, *ou*, and *aw* spellings, has been almost completely replaced by /ɑ/. So you may find it hard to hear if you pronounce the word *hot* with the same vowel as in *father*. You may think of the vowel /ɔ/ as the vowel in *hot*, spoken with a British accent. Most American speakers still pronounce /ɔ/ before /r/, as in *for*.

The mid central vowel /ə/ has a special name; it is called a **schwa**. This vowel, and the slightly lower /ʌ/, will be discussed under **Syllable Structure** and **Word Stress** below.

Monophthongs and Diphthongs

The vowels shown above are all pronounced in one part of the mouth. These are called monophthongs. English also possesses vowels which are pronounced in two contrasting parts of the mouth, called **diphthongs**. Note the spelling “phth” in both words.

The diphthongs in English are as follows:

	Back-Front	Back-Back
Low-High	/ai/	/au/
Mid-High	/oi/	

Here are some examples of how these sounds are pronounced:

high /hai/

boy /boi/

house /haus/

Note that many students incorrectly try to transcribe the sound in *high* with /ɪ/. The symbol /ɪ/ indicates the monophthongal sound in *bitter* /bɪtər/, and the symbol /ai/ indicates the diphthong in *biter* /baitər/.

The pronunciation of diphthongs varies a good deal in English, which means that linguists often transcribe them in other ways. The following table contains some of the acceptable alternative transcriptions which you may encounter. You may choose any of these if you feel that they more closely reflect your pronunciation.

/ai/	/aɪ/, /ɑɪ/, /aɪ/, /aj/, /aj/
/au/	/aʊ/, /ɑʊ/, /aʊ/, /aw/, /aw/
/oi/	/oɪ/, /ɔɪ/, /ɔɪ/, /oj/, /oj/

As you can see, some people interpret the second element of a diphthong as a glide consonant. However, I suggest that you avoid these transcriptions, since they make the syllabification rule given below more complicated. Note also that the historical English monophthongs /i/, /e/, /u/, and /o/ are largely pronounced as diphthongs today (something like /ij/, /ej/, /uw/, and /ou/ respectively). You can detect this if you listen to an English speaker pronounce the Spanish name *Jose*. Apart from the pronunciation of the *s* as /z/, the English speaker's diphthongal pronunciation of *o* and *e* is responsible for the noticeable English accent. In Spanish, these vowels are true monophthongs. However, in an introductory course like this one, it is not necessary to use separate transcriptions for /i/ and /ij/, /e/ and /ej/, etc., since the sounds are so similar. You may represent these sounds as monophthongs.

Syllable Structure

A word like *measure* has two **syllables**. In order to identify which phonemes are in the first syllable and which are in the second, we need to look at the pattern of vowels and consonants. We can represent each consonantal phoneme with “C” and each vowel (vocalic) phoneme with “V”. Hence *measure* /meɪʒər/ would be “CVCVC”. Notice that the pattern is based on the number of phonemes, not the number of letters in the English spelling.

In order to have a syllable, you must have a vocalic phoneme, which may or may not be accompanied by consonants on either side. So “CVCV” has two syllables because it has two vowels. In English, there are only two significant syllable patterns: “VCV” and “VCCV”. In other words, English has syllables divided by one consonant or more than one consonant (it does not matter if the first vowel is preceded by a consonant or if the second vowel is followed by a consonant). As you can see, *measure* follows the “VCV” pattern. The syllable division for each type is as follows:

V	CV
VC	CV

Note that English words with double consonants (like *bitter*) can be tricky. The double consonant tells us something about the preceding vowel (compare *biter*), not that the word has two consonant phonemes. Words like *bitter* really follow the “VCV” pattern in English.

Nasal and liquid consonants can sometimes be vocalic; that is, they combine the functions of vowels and consonants. Linguists represent this function by placing a small circle underneath the IPA symbol. But do these consonants constitute separate syllables? This is a more complex issue than can be dealt with in an introductory course, and we will not go too far astray if we avoid the issue. If you perceive a consonant to

be vocalic, it is best to simply insert a “dummy” vowel into your transcription. The best choice is to use the schwa (/ə/). Hence the word *golden* would be transcribed /goldən/.

Word Stress

Words of more than one syllable have differing degrees of stress on each syllable. **Stress** is indicated by a combination of higher pitch and louder volume, but many students find it difficult to identify which syllable is stressed. To practice, try making a list of words with more than one syllable and guessing which syllable is stressed. Then go to a dictionary which gives a pronunciation guide and see which syllable is marked as stressed. Most dictionaries mark stress by placing a small tick before the beginning of the syllable.

In English, the vowels of unstressed syllables have often changed historically. The spelling often indicates the original sound, but over time, the number of vowels that occur in unstressed vowels has diminished. In general, unstressed vowels tended to become /ə/, especially in suffixes with grammatical significance (e.g. **plural** –*es*, **present tense** –*es*, **past tense** –*ed*, and **past participle** –*en*). In some varieties of English, including US English, this sound alternates with /ɪ/, depending upon the word: compare village /vɪlɪdʒ/ (or /vɪlɪʃ/) with cower /kauəɪ/. There is no rule for which words contain which of these vowels, and, in general, I will accept either one. If in doubt, use the schwa (/ə/).

Sometimes the mid central vowel /ʌ/ appears in a stressed syllable, as in *sun* /sʌn/. The sound can be distinguished from schwa by pronouncing the word *oven* /ʌvən/. However, some textbooks simplify things by using the symbol /ə/ for all mid central vowels (e.g. /əvən/). You may choose to adopt this simplification if you find it helpful. In some cases, historically unstressed vowels have disappeared completely, although we may still spell them. The most famous example is the so-called “silent *e*” in words like *name* /nem/ and *begged* /begd/. Make sure that you do not transcribe these as two-syllable words.

Phonetic Processes

A wide variety of sound changes take place when certain sounds come into contact with each other. The most important is called **assimilation**. This process is best illustrated by comparing the words *incapable* and *impossible*. Both words contain the prefix *in-*, which makes the adjective negative. However, the prefix is pronounced /ɪn/ or /ɪm/, depending on whether or not the following consonant is labial. If it is, the alveolar /n/ becomes a labial /m/, assimilating the quality of the following labial consonant. A particularly important occurrence of assimilation is in words with the grammatical endings (plural or present tense –*s* and past tense or past participle –*d*). Consider the following words and their pronunciations:

cats	/kæts/	scolds	/skoldz/
dogs	/dɔgz/	worked	/wɜrkt/
thinks	/θɪnks/	begged	/begd/

In each case, the grammatical ending varies between voiceless /s/ or /t/ and voiced /z/ or /d/, depending on whether or not the preceding consonant is voiced or voiceless. In a few cases, the consonant in the grammatical ending is assimilated to a preceding vowel (all vowels are voiced):

horses /hɔrsəz/ scolded /skoldəd/