**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 [fˆß]. 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

[fˆš]. 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 *bilabial*).

Alveolar Air flow is restricted by placing the tongue on the hard plate (*alveolum*) behind the top

front teeth.

Palatal Air flow is restricted by placing the tongue on the soft palate behind the *alveolum*.

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 (*glottis*).

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:

Machine Tense High Front Vowel Salute Tense High Back Vowel

Chin Lax High Front Vowel Pull Lax High Back Vowel

Ballet Tense Mid Front Vowel Foal Tense Mid Back Vowel

Get Lax Mid Front Vowel For Lax Mid Back Vowel

**phonology**

While phonetics is the study of the ways in which speech sounds are produced, **phonology** is the study of (1) how the speech sounds of a language are used in that language to distinguish meaningful units (such as words)

from each other, and (2) how sounds are patterned in a language. Consequently, the study of phonology requires us to take meaning into consideration, while phonetics does not. In this section we explore phonology and the basic unit of phonological analysis, the **phoneme**.

**phonemes**

You might reasonably have assumed that whenever speakers distinguish between a pair of sounds, they will use that difference to distinguish between words. For example, we know that English speakers distinguish between [s] and [z], and we use this difference to signal the difference between the words *sip* and *zip*. We will say that [s] and [z] **contrast** with each other in English. In fact, all of the sounds we have described so far contrast with each other in English and so are used by English speakers to distinguish words from each other. You can test this out by taking any pair of sounds (as we took [s] and [z]) and creating a pair of words (like *sip* and *zip*) which are identical, except that where one has one sound, the other has the other sound, just as where

*sip* has [s], *zip* has [z]. Pairs of words like this are called **minimal pairs**, and are used to demonstrate that pairs of sounds are used in a language to distinguish words from each other. Sound units that distinguish words from

each other are called **phonemes**. We enclose phonemes in / / (e.g., /s/, /z/) to distinguish them from sounds ([s], [z]) and ordinary letters (<s>, <z>).

**Exercise**

Phonemes are most easily identified through minimal pairs. Thus *Pete* [pit] and *beat* [bit] differ only in that where [pit] has [p], [bit] has [b]. These two words make a minimal pair that shows that [p] and [b] represent

separate phonemes in English, which we symbolize as /p/, /b/. For each pair of sounds below, identify a minimal pair that shows that they represent different phonemes.

[k]—[g] [T]—[ð] []—[] [l]—[r]

[n]—[N] [w]—[j] [aI]—[aU] [f]—[dZ]

[f]—[s] [i]—[I] [aI]—[oI] [tS]—[dZ]

[s]—[S] [E]—[] [tS]—[s] [k]—[N]

**allophones**

Now listen to the vowels in the words *cat* and *cad*. Are they identical or different?

We hope you said “different.” Can you now say how they differ? Wehope you said that one was longer than the other. Now listen to the consonantsafter the vowels. Are these the same or different? Again, we hope you

said different, and that you know that [t] is voiceless and [d] is voiced. Now,which vowel, the longer or the shorter, precedes [d] and which precedes [t]? We hope you said that the longer vowel precedes the voiced consonant.Are the two vowels similar in any way? Again, we hope you said that they seem to be longer and shorter versions of the same vowel, [{]. Let’s use [:] to indicate extra length. So, the vowel before voiceless [t] is just [{], but the one before voiced [d] is [{:]. Now let’s listen to some more word pairs like *cat* and *cad*:

root rood

moat mode

leaf leave

gape Gabe

Listen to the vowels in each pair. You should hear that the vowel in the second word in each pair is a little longer than the vowel in the first. Now determine the similarities and differences between the consonants

after the vowels in each word pair. You should find that the consonant in the first word is the voiceless version of the consonant in the second word. Turning our attention again to the vowels in each word pair: how are

they related? We hope you said that they were very similar vowels, specifically, short and long versions of the same vowel. You should now be able to determine a very general rule of English.

When are vowels lengthened and when are they not lengthened? Your answer should be something along the lines of: *English vowels are lengthened when they occur before a voiced consonant; otherwise they are not*

*lengthened*. So far we’ve seen [{] and [{:], [u] and [u:], [o] and [o:], [i] and [i:], and

[e] and [e:]; in each case the longer vowel occurs before a voiced consonant.

We’ve also noted that the vowels are otherwise virtually identical—they differ only in length. So it makes good sense to regard these pairs of vowel sounds as slightly different pronunciations of the same vowel, and that

whether the vowel is lengthened or not depends on whether the consonant that follows it is voiced or not.

Importantly, the long and short pairs of vowels do not contrast with each other: English contains no pairs of words that are identical except that where one contains a short version of a vowel, the other contains the longer

version of the same vowel. Consequently, the long and short versions of vowels do not represent separate phonemes.

Let’s now turn our attention to some consonants. For example, English speakers pronounce the [t] in *toll* differently from that in *stole*. The [t] of *toll*is breathier than the [t] of *stole*. The former is said to be **aspirated**, and the latter **unaspirated**. We represent the aspirated [t] as [th], with the **diacritic** [h] indicating aspiration. We represent the unaspirated [t] as [t] with no diacritic. The important point here is that English speakers do not signal any difference in meaning with the difference between [th] and [t]. They treat the two sounds as variant ways of pronouncing the “the same sound.” Substituting one of these sounds for the other would not affect the meaning of a word, but it would create an odd and perhaps non-native pronunciation of the word. No pair of English words is distinguished solely by the difference between [t] and [th]. You can satisfy yourself that this is so by trying to find a minimal pair of English words differentiated solely by the fact that where

one has an aspirated consonant the other has an unaspirated version of that same consonant. (Don’t spend too long trying!) Let’s now look at a different pair of English sounds. If we replace the [t] in [rt] (*rot*) with [d], then we get the sequence of sounds [rd] (*rod*), which, of course, is quite distinct in meaning from *rot*. Clearly, English speakers treat the difference between [d] and [t] differently from the way they treat the difference between [th] and [t] and between longer and shorter versions of vowels. In the case of [t] and [d], the difference can signal a difference in meaning; in the other cases it cannot. Differences in sound that signal differences in meaning are said to be **phonemic**, **distinctive**, or **contrastive**. Differences in sound that do not signal meaning differences are **non‑distinctive** or **non‑contrastive**. One objective of phonology is to identify which sound differences are contrastive and which are not. As we have seen, the contrastive sound units are called phonemes.

***Phonemes and allophones***

A good way to think about a phoneme is as a group of phonetically similar sounds that are treated as members of the same sound category. Because the members of a sound category are treated as “the same sound” in a language, they cannot be used for communicating differences in meaning. English speakers treat [th] and [t] as belonging to the same sound category, so they cannot be used to distinguish one word from another. Different phonemes are different categories of sounds and the differences among these categories can signal differences in meaning. English speakers treat [t] and [d] as belonging to different sound categories—/t/ and /d/, respectively—and so these can be used to differentiate one word from another.

Sound categories are abstractions. We can only perceive them when one of their members is pronounced. The sounds that make up the category are called the **allophones** of that phoneme. Thus [t] and [th] are allophones of

the English phoneme /t/. Notice that the individual sound symbols are the same as those we used for phonetics, but to distinguish phonology from phonetics, we enclose phonemes in **slanted brackets** / / and use square

brackets [ ] for phonetic notation. Perhaps the following diagram will help. It represents the phoneme /u/ and two of its allophones:

/u/

[u] [u:]

That is, the phoneme /u/ is pronounced in (at least) two ways, [u] and [u:],

depending upon its context. Table 8 lists the phonemes of English.

Consonants: /p, t, k, b, d, g, m, n, N/

/f, T, s, S, h, v, d, z, Z/

/tS, dZ/

/r, l, w, j/

Vowels: /i, I, e, E, , A, O, o, U, u, (@)/

Diphthongs: /OI, aU, aI/

As you have no doubt noticed, there are nearly 40 phonemes of English

(the number varies somewhat from dialect to dialect), while there are only

26 letters in the English alphabet. This is one of the reasons why the alphabet

appears to fit the language so poorly.

**Exercise**

1. What phoneme is represented by the bolded letter(s) in the following words? Make sure to enclose the symbols you choose in the phoneme slashes //.

***t****on,* ***b****ump,* ***d****ip,* ***c****omb,* ***ch****in,* ***z****oom,* ***sh****ave,* ***m****ango, thi****ng****,* ***l****ame,*

***r****ead, sl****ee****p, r****e****d, m****a****t, g****oo****d, c****augh****t, k****i****t****e****, b****i****d, c****oy****.*

2. Transcribe the following words in a phonemic (**broad**) transcription.

That is, just represent the phonemes that each word is composed of and ignore the allophonic detail.

thin, then, cheese, rouge, June, shin, fling, heave, yak, cow.