# The Consonants of Englishes

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## Overview

There are many different varieties of English, or "Englishes", spoken in the United States (e.g. African American Vernacular English, Eastern Massachusetts English, Southern English), and around the world (e.g. Singapore English, Scottish English). It is obvious to everyone that these varieties of English sound different from one another, but not everyone can put into words what these differences are. In this course, you will learn about the sound systems of a wide range of Englishes, and you will learn how to describe them in terms of the vocabulary of phonology, the sub-discipline of linguistics that deals with sound systems. You will learn about how these varieties differ in their vowels and consonants, in their syllable shapes, in how they accent words, and in the intonation patterns on sentences. We will talk about how these differences play a role in language learning and language use, and will discuss the history and socio-cultural aspects of variation between Englishes. The "socio-cultural aspects of variation" refers to how the variety of English that people speak is related to social factors.

This text focuses on the phonological description of consonants and their patterning across varieties of English, and is aimed at developing the phonological vocabulary needed for this description.

## Table of contents

1.Writing sounds: Phonetic transcription
2. The Consonants of Englishes
    2.1 Basic Inventory
        2.1.2 Consonants by degrees
        2.1.3 Voicing and place of articulation
        2.1.4 Englishes without interdentals
        2.1.5 Consonant inventories in child English
        2.1.6 Consonant inventories in L2 English
    2.2 Phonetic detail of consonants and distribution
        2.2.1 Stop consonants: aspiration, flapping and glottalization
        2.2.2 Light, dark, and vocalized [l]
    2.3 Consonant sequences and syllable structure
        2.3.1 The sonority shape of syllables

# 1.Writing sounds: Phonetic transcription

Many of the writing systems of the world's languages, including that of English, are based on sounds. For example, in the word 'bat', each of the letters of the word corresponds to a separate sound: 'b' and 't' correspond to two different consonant sounds, and 'a' corresponds to a vowel sound. However, sound-spelling correspondence in English is famously imperfect. As an example of this, the following poem is often given by ESL teachers to their students.[1] The poem illustrates cases where a single spelling corresponds to more than one sound. *Try to find examples in the poem where a single sound is spelled in more than one way*.

*Recovering Sounds from Orthography: Brush up Your English*

I take it you already know
Of tough and bough and cough and dough.
Others may stumble but not you,
On hiccough, though, slough and through.
Well done! And now you wish, perhaps,
To learn of less familiar traps.

Beware of heard, a dreadful word
That looks like beard and sounds like bird,
And dead--it's said like bed, not bead.
For goodness's sake, don't call it deed!
Watch out for meat and great and threat:
They rhyme with suite and straight and debt.

A moth is not a moth in mother,
Nor both in bother, broth in brother,
And here is not a match for there,
Nor dear and fear for bear and pear,
And then there's dose and rose and lose--
Just look them up--and goose and choose,
And cork and work and card and ward,
And font and front and word and sword,
And do and go and thwart and cart.
Come, come, I've hardly made a start.

A dreadful language? Man alive,
I'd mastered it when I was five.

[1] Its original source is apparently T.S.Watt (1954) in the Guardian newspaper. See http://www.linguistlist.org/issues/13/13-3353.html for references, as well as other English spelling jokes and poems.

To unambiguously represent the sounds of English and (all?) other languages, linguists use the *International Phonetic Alphabet*. For example, the vowel sound in 'deed' and 'meat' is written in IPA as [i], and the sound in 'bed' and 'dead' is *written* as [ɛ]. IPA transcriptions are placed between square brackets, to distinguish them from orthography.

We will use the IPA in this course, and you will learn to read and write IPA transcription of the English sounds.[2] We will start by introducing the English consonants, and discussing differences between varieties of English in their consonantal system. As we introduce the consonants and their variants across dialects, we will introduce their IPA transcriptions. Similarly, once we move onto the vowels, we will introduce their transcription. However, at various points in the discussion of the consonants, we do use IPA vowel transcriptions, before we discuss them explicitly. You should be able to figure out the corresponding sound from the word being transcribed. For example, you just learned the sound of [ɛ] from its use in 'bed', which is transcribed fully as [bɛd].

# 2 The Consonants of Englishes

## *2.1 Basic inventory*

### 2.1.2 Consonants by degrees

The difference between consonants and vowels is familiar from our writing system. But what does it mean for a sound to be a consonant in terms of how it is pronounced, and in terms of how it sounds? To answer this question, we will start by discussing the most "consonantal" of the consonants, the stops, and then introduce the rest of the consonants in groups that are increasingly vowel-like.

**Stops.** Of all of the consonants, the ones that are the most different from the vowels are the stops. Speech is produced by pushing air out of the lungs. The stops are sounds that are pronounced by blocking off airflow completely – by "stopping" it. Vowels, on the other hand, allow air to flow almost completely freely. Most varieties of English have the same basic set of stops, though as we will discuss later, there are differences in the fine details of how they pronounced. The stops of English are listed in (1), along with words that start with each of these sounds.

(1.) *The English stops*

| | | |
|---|---|---|
| [p] 'pig' | [t] 'tape' | [k] 'cap' |
| [b] 'bide' | [d] 'dote' | [g] 'got' |

If you try to pronounce one of the stops on their own, you will find that it is impossible to make any sound without inserting a vowel before or after it. A vowel, on the other hand, can easily be produced without an accompanying consonant, as you can verify by pronouncing each of the vowel sounds in (1) on their own (notice that there are 6, not 3, different vowels in (1)). When phonologists are talking about the sounds of a language, and want to refer to the consonantal

[2] If you are interested in learning how to read *and* transcribe IPA symbols for the sounds of a wide variety of the world's languages, as well as how to produce them, take Ling 414, Intro Phonetics for Linguists).

sounds, they often do so by inserting the vowel sound [ʌ] after them. For example, [b] is pronounced [bʌ] (like 'but' without the final [t]). We will follow this convention strictly in this class, to emphasize the fact that we are talking about a sound like [b], rather than a letter like 'b'.

When you pronounce each of the consonant sounds in (1), notice that they have been grouped according to what part of the mouth is closed: [p] with [b], [t] with [d], and [k] with [g].

**Fricatives.** After the stops, the most prototypical of the consonants are the fricatives. They are highly consonantal because they obstruct airflow almost as much as a stop. The high degree of obstruction creates the sound phoneticians call frication, hence the name fricative. Fricative sounds are sometimes described as being "squeezed out", while the stops are "spat out". The fricatives are generally produced similarly across varieties of English, but as we will see, some varieties have a smaller set of fricatives than the one in (2).

(2.) *The English fricatives*

| | | | | |
|---|---|---|---|---|
| [s] 'six' | [ʃ] 'sure' | [θ] 'thin' | [f] 'fix' | [h] 'harp' |
| [z] 'zen' | [ʒ] 'rouge' | [ð] 'then' | [v] 'vine' | |

Unlike the stops, these sounds do not need the support of a vowel to be pronounced. When you pronounce each of these sounds in (2) on their own, you should get a physical sense of frication: you should be able to feel, and hear, a characteristic vibration. Although it is possible to pronounce these sounds on their own, we will also refer to them by adding [ʌ]: [θ] is said [θʌ] (like 'thumb' without the final [m]).

Again, notice that the sounds are grouped in (2) according to where the mouth is (nearly) closed: [s] with [z], [ʃ] with [ʒ], [θ] with [ð], [f] with [v]. The lonely [h] is produced with frication in the throat (more precisely, at the glottis).

**Affricates.** There is a small class of English sounds that are made by starting with a stop sound, and then changing to a fricative. These are called affricates. As far as I know, all varieties of English have these sounds.

(3.) *The English affricates*

[tʃ] 'check'

[dʒ] 'gem'

The pair of English affricates are made by closing the mouth at the same place: with the tip of the tongue. The word 'chuck' without the final [k], [tʃʌ], gives us name of one of ones of these sounds.

**Nasals.** These sounds are produced with the mouth completely closed, but with air flowing through the nasal passage: hence the name nasal. English has three nasals. The third of them does not occur word-initially. Notice that although this third one is spelled with two letters, 'ng', it is a single sound.

(4.) *The English nasals*

[m] 'man' [n] 'nice' [ŋ] 'hang'

Taking the last [n] from 'nun' yields [nʌ], the name of [n]. Since [ŋ] never occurs word-initially, we will use the word 'eng' to refer to it (from Latin *engma*). Like the fricatives, the nasals can be produced without the help of a vowel. One way to see that they are even more vowel-like than the fricatives is by noticing that you can carry a tune while producing a nasal: that is, by humming. This is because like vowels, the nasals are always produced with vibrating vocal cords, with gives them a distinct pitch.

Besides the nasals, the other consonants we have discussed so far can be produced with or without vocal cord vibration. As we will discuss in section 2.1.3, this is the difference between pairs like [s] and [z] that are otherwise identical. Try putting your hand on your throat as you produce [n], [s] and [z] with no accompanying vowel. You should be able to feel the vibration of your vocal cords in the *voiced* [n] and [z], but not in the *voiceless* [s].

**Liquids.** These sounds are produced with air flowing quite freely through the vocal tract, and like the nasals, are always produced with vocal cord vibration. There is some difference between varieties of English in how the [l] and [r] sounds are produced, which we will discuss later. Also, it is worth noting that the English [r] sound is more accurately transcribed as [ɹ] ([r] is a trill, as in Spanish), but we will use the "right-side-up" character for convenience.

(5.) *The English liquids*

[l] 'light' [r] 'write'

The word 'rut' without its final [t], [rʌ], is our name for [r], and 'love' without the [v], [lʌ], is the name for [l].

**Glides.** This class of sounds contains the most vowel-like of the consonants, which are sometimes referred to as semi-vowels.

(6.) *The English glides*

[w] 'way' [j] 'yes'

If we remove the [n] from 'one', we get the name for [w]: [wʌ]. If we remove the [p] from 'yup', we get the name for [j]: [jʌ].

The pronunciation of each of these sounds is very close to a corresponding vowel: the vowel in 'two' [uw] is pronounced with the lips and tongue in the same position as [w], and the vowel in 'tea' [ij] has the tongue in the same position as [j]. Try saying 'woo' [wuw] and 'ye' [jij] versus 'we' [wij] and 'you' [juw]. 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.

We started out this section by asking the question: what is a consonant? To answer the question, we grouped the consonants into categories ranging from the purely consonantal ones, the stops, through to the most vowel-like ones, the glides. In the end, the answer to the question is that the simple consonant/vowel distinction is inadequate, and that being a consonant is a matter of degree.

### 2.1.3 Voicing and place of articulation

**Voicing.** In the last section, we mentioned that there are pairs of English stops, fricatives and affricates that differ only in whether they are voiceless (no vocal cord vibration) or voiced (with vocal cord vibration). These pairs are repeated in (7).

| (7.) | *Stops* | *Fricatives* | *Affricates* |
|---|---|---|---|
| *Voiceless* | [p] [t] [k] | [s] [ʃ] [θ] [f] | [tʃ] |
| *Voiced* | [b] [d] [g] | [z] [ʒ] [ð] [v] | [dʒ] |

Try saying the names of each of the pairs of sounds (e.g. [pʌ], [bʌ]), and notice how your mouth is in the same position when you are saying both of them. For each pair, pay attention to where the mouth is most closed: is it (i) at the lips, (ii) at the front of the inside of the mouth, or (iii.) at the back of the mouth, near the throat?

Later, we will see that the simple description we have given to the voicing distinction in terms of vocal cord vibration is not entirely adequate, but for now, the important thing to understand is that this set of consonants is a group of voiced/voiceless pairs.

**Place of articulation.** In making the three-way distinction between where the mouth is closed for the sounds in (7), we have just introduced the major categories of place of articulation. The consonants made with the lips are called *labials*, the ones made at the front of the mouth are called *coronals*, and the ones made at the back of the mouth are called *velars*. The following chart groups all of the consonants into these categories, as well as into the categories we have already discussed.

| (8.) | *Labial* | *Coronal* | *Velars* |
|---|---|---|---|
| *Voiceless stops* | [p] | [t] | [k] |
| *Voiced stops* | [b] | [d] | [g] |
| *Voiceless fricatives* | [f] | [s] [ʃ] [θ] | |
| *Voiced fricatives* | [v] | [z] [ʒ] [ð] | |
| *Voiceless affricate* | | [tʃ] | |
| *Voiced affricate* | | [dʒ] | |
| *Nasal* | [m] | [n] | [ŋ] |
| *Liquid* | | [l] [r] | |
| *Glide* | [w] | [j] | |

Some of the sounds may be better described as being in two categories: [w] is usually called a labio-velar, since the back of the tongue is also involved in its articulation, and English [r] also involves rounding of the lips. Note too that [h] has no place on this chart, since it is articulated in the throat, or glottis.

In addition, finer degrees of description are needed to specify the exact place of articulation for many of these consonants. For most of our discussion in this course, the labels “Coronal” and “Labial” are sufficient, but the following chart provides the more detailed descriptions. The

places of articulation are arranged from the front of the mouth moving progressively back: bilabials are articulated with both lips, labiodentals with the bottom lip against the top teeth, interdentals with the tip of the tongue between the teeth, alveolars with the tongue against the alveolar ridge (just behind the teeth), and alveo-palatals with the tongue a little farther back towards the palate.

| (9.) | *Voiceless* | *Voiced* | *Nasal* |
|---|---|---|---|
| *Bilabial* | [p] | [b] | [m] |
| *Labiodental* | [f] | [v] | |
| *Interdental* | [θ] | [ð] | |
| *Alveolar* | [t] [s] | [d] [z] | [n] |
| *Alveo-palatal* | [tʃ] [ʃ] | [dʒ] [ʒ] | |

The set of sounds in (8), along with [h], make up the basic *inventory* of English consonants, which is quite stable across varieties of English (with the exception of varieties spoken by learners of English, and in some world Englishes, as we will discuss in sections 2.4 and 2.5). There is one pair of sounds, however, that is missing from the inventory of many varieties of English: the coronal fricatives [θ] and [ð]. Because this difference is so widespread, the next section will discuss some examples of Englishes without [θ]/[ð].

## 2.1.4 Englishes without interdentals

The voiceless fricative [θ] appearing in 'thin' and 'bath' and the voiced fricative [ð] that appears in the words 'mother' and 'breathe' are called *interdental* because they are made with the tip of the tongue placed at the edge of the upper teeth and above the lower teeth. The spelling of the voiceless and voiced consonants in the pair is the same in English: 'th'.

Interdental fricatives are rare in the sound inventories of the world's languages, and are also absent from many varieties of English. In the variety of English known as Cockney, which is the working class dialect of London, the interdental fricatives are replaced by the *labiodental* fricatives [f] and [v]: [f] appears in the place of [θ], so that 'thin' is pronounced as [fɪn] (just like 'fin'), rather than as [θɪn]. Similarly [v] appears in the place of [ð], so that 'mother' is pronounced with a [v] between the two vowels: [mʌvə] rather than as [mʌðə].

Which of the two labiodentals – [f] or [v] – would you expect to appear in Cockney in each of the words 'weather', 'both', 'bathe', 'there', breathe', 'thump', 'therapy'? Why?

When varieties of English lack a sound, it is replaced by a sound that is similar. In Cockney, the voiceless [f] replaces voiceless [θ], and voiced [v] replaces [ð]. What other features do [f]/[v] share with [θ]/[ð]? How do they differ?

Among the varieties of English which lack interdental fricatives in their sound inventory, it is in fact more common for stop consonants pronounced with the tongue [t]/[d] to take the place of the interdental fricatives. What features do [t]/[d] share with [θ]/[ð]? How do they differ?

For example, in the English spoken by most people in Southern Ireland (which excludes Ulster or Northern Ireland), dental stop consonants made with the tongue against the upper teeth take the place of the interdental fricatives, with the result that 'though' sounds something like

'dough', 'faith' like 'fate', and 'thin' like 'tin'. The same is true of the varieties of English spoken in India.

The colloquial form of the English spoken in Singapore also lacks interdental fricatives, but shows a slightly different pattern of pronunciation. In words that end in either [θ] or [ð] in standard varieties of English, in colloquial Singapore English we instead find word-final [f] or [v]: [wɪf] for 'with', [bev] for 'bathe', [tuf] for 'tooth'. But when a vowel follows these consonants within a word, we find the stops [t], [d]: so thin is pronounced as [tɪn], and 'then' as [dɛn].

We will see many more examples of the filling of 'inventory gaps' with sounds that are similar when we discuss the consonant inventories of learners of English. You might try to think of examples of when a child or a second language learner makes a "mistake" on a consonant. What sound replaces it? How is it similar to the sound in standard English? How is it different?

### 2.1.5 Consonant inventories in child English

Children learn the consonant systems of their language gradually. When they begin to produce meaningful words (as opposed to babbling), children start out with a relatively small inventory of sounds, and gradually add more consonants over the course of the next several years. In this section, we examine the typical course of development of the English consonant system. This development shows the gradual emergence of the different categories of sounds we have discussed above.[3]

By the time of the second half of their second year of life, children have usually developed a small vocabulary. The consonant system at this stage often looks like the one in (10). The notation for age stands for years and months – 1;6 is read "1 year, 6 months".

(10.) Typical consonant inventory 1;6 – 2;0

| | *Labial* | *Coronal* |
|---|---|---|
| *Voiceless stops* | [p] | [t] |
| *Voiced stops* | [b] | [d] |
| *Nasals* | [m] | [n] |
| *Glide* | [w] | |

The selection of sounds from the full English inventory is by no means random; as the chart shows in (10), they can be grouped into a small number of the categories we have introduced. Compare the full system that was provided in (8) section 2.1.3 to the one in (10). Which categories are missing?

Over the next six-month period, child usually begin to add the consonants articulated at the back of the mouth, as shown in (11). This includes the first fricative [h].

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[3] The source for this set of inventories is Marilyn Vihman's *Phonological Development: The Origins of Language in the Child,* Blackwell, 1996. We emphasize that there is a great deal of variation across children, even amongst typically developing ones. These inventories should not be used as a means of assessing a delay in language acquisition. If you are wondering if a child has a delay in language development, contact a licensed speech-language pathologist.

(11.) Typical consonant inventory 2;0 – 2;6

| | *Labial* | *Coronal* | *Velar* | *Glottal* |
|---|---|---|---|---|
| *Voiceless stops* | [p] | [t] | [k] | |
| *Voiced stops* | [b] | [d] | [g] | |
| *Voiceless fricative* | | | | [h] |
| *Nasals* | [m] | [n] | [ŋ] | |
| *Glide* | [w] | | | |

Fricatives at other places of articulation usually get added in the next stage, around the time of children's third birthday.

(12.) Typical consonant inventory 2;6 – 3;6

| | *Labial* | *Coronal* | *Velar* | *Glottal* |
|---|---|---|---|---|
| *Voiceless stops* | [p] | [t] | [k] | |
| *Voiced stops* | [b] | [d] | [g] | |
| *Voiceless fricative* | [f] | [s] | | [h] |
| *Nasals* | [m] | [n] | [ŋ] | |
| *Glide* | [w] | [j] | | |

There is only a small set of fricatives at this point. Which categories are missing?

Around the time children turn four, they have added some of the missing fricatives, as well as some more of the coronals.

(13.) Typical consonant inventory 3;6 – 4;6

| | *Labial* | *Coronal* | *Velar* | *Glottal* |
|---|---|---|---|---|
| *Voiceless stops* | [p] | [t] | [k] | |
| *Voiced stops* | [b] | [d] | [g] | |
| *Voiceless fricative* | [f] | [s] [ʃ] | | [h] |
| *Voiced fricative* | [v] | [z] | | |
| *Voiceless affricate* | | [tʃ] | | |
| *Voiced affricate* | | [dʒ] | | |
| *Nasals* | [m] | [n] | [ŋ] | |
| *Liquid* | | [l] | | |
| *Glide* | [w] | [j] | | |

The remaining sounds [θ], [ð], [ʒ] and [r] are usually not acquired until after 4;6.

Usually, children change words so that they fit their current inventory of sounds (it has also been documented that children will sometimes avoid using words whose pronunciation they have not mastered). Like the interdental substitution patterns discussed in the last section, these substitution patterns are not random; rather, children substitute sounds that are featurally similar to the adult forms. And like the interdental substitution patterns, children differ in which ways the sounds are similar.

Take for example, two English-learning children who lacked the labial fricative in early stages of their development. One, named Julia, produced *fish* as [pɪʃ]. The other, Trevor, produced *fig* as [hig]. Which feature of [f] did Trevor preserve? Which feature of [f] did Julia preserve?

### 2.1.6 Consonant inventories in L2 English

Speakers of other languages who learn English as an adult may have a different consonant inventory in their variety of English, using only those consonants that are present in their native language. However, it is important to emphasize from the outset that it is *not* the case that second language learners are limited to using only the sounds of their native language. Whether a new second language sound will be acquired depends on many things, including:

(14.) a. How we measure acquisition – do we require it to be pronounced just as a native speaker would, 100% of the time? Or do we have a somewhat weaker criterion?

b. The sound in question – some new sounds are harder than others, either because of intrinsic articulatory or perceptual difficulties, or because of the relationship to the native language sound system.

c. Age of acquisition – the younger you are when you start learning a new language, the more native-like you are likely to sound.

d. Amount of exposure – the more experience you have with a new language, the more native-like you are likely to sound.

Nonetheless, the native language inventory is the starting point for learners of English.

Japanese, for example, has the following consonant inventory:[4]

| **(15)** | *Labial* | *Coronal* | *Velars* |
|---|---|---|---|
| *Voiceless stops* | [p] | [t] | [k] |
| *Voiced stops* | [b] | [d] | [g] |
| *Voiceless fricatives* | | [s] | |
| *Voiced fricatives* | | [z] | |
| *Nasal* | [m] | [n] | [ŋ] |
| *Liquid* | | [r] | |
| *Glide* | [w] | [j] | |

*What sounds are missing from the English inventory*?

While a Japanese learner of English has to acquire a number of new sounds, the greatest difficulty is posed by the pair [l] and [r]. This is likely because the Japanese [r] overlaps considerably with both of these sounds in the way that it is pronounced. Even fairly advanced Japanese learners, who can pronounce distinct [l] and [r], still have difficulty in reliably perceiving the difference.

[4] Like our English inventory, we are at this point abstracting from many of the phonetic details of the sounds. For a thorough description of the Japanese consonant system, see http://en.wikipedia.org/wiki/Japanese_phonology

## *2.2 Phonetic details of consonants and distribution*

The inventory of English consonant sounds that was introduced in section 2.1 can be thought of as the "basic" set of consonants that is found in just about every variety. We will now move on to consider the finer details of the consonants. We will see that these details can depend on:

(15.) i. The variety of English being spoken

ii. The *phonological context* in which the consonant is found

iii. The social context in which an utterance is spoken

We will be focusing on the first of these two, and will put off social context until later in the course.

### *2.2.1 Stop consonants: aspiration, flapping and glottalization*

The first phonetic detail that students typically find out about in learning phonology is the aspiration of English voiceless stop consonants. The following are examples of aspirated and unaspirated stops in English. Note that aspirated stops are transcribed with a superscript [h].

| | | | |
|---|---|---|---|
| (16.) | Aspirated: | [$p^h$] | party punch peach |
| | | [$t^h$] | teach touch time |
| | | [$k^h$] | keep cut cat |
| | Unaspirated | [p] | cup lip kept ripped spit happy |
| | | [t] | pit pot net stop stew |
| | | [k] | tack pick locked scoot stucco |

This is a case where the details of a consonant depend on the phonological context, which given the data in (16), we might state as follows:

(17.) Voiceless stops are aspirated word-initially, and are unaspirated elsewhere.

When we consider more data, however, we find that the statement in (18) isn't quite accurate:

| | | | |
|---|---|---|---|
| (18.) | Aspirated: | [$p^h$] | appeal apply |
| | | [$t^h$] | attract attach |
| | | [$k^h$] | vacation account |

The actual generalization:

(19.) Voiceless stops are aspirated at the beginning of a stressed or word-initial syllable, and unaspirated elsewhere.

We now have discussed three types of stop in English:

(20.) Voiced [b] [d] [g]
Voiceless unaspirated [p] [t] [k]
Voiceless aspirated [$p^h$] [$t^h$] [$k^h$]

In English, voicing and aspiration are different in terms of their *predictability*:

(21.) Aspiration is predictable in English, voicing is not.

That is, there is no generalization like the one in (22) that we can draw about the voicing of English stops. Voiced and voiceless stops can occur in the same phonological context: both can appear word-initially, word-finally, and so on. Because voiced and voiceless stops can occur in the same phonological context, we can get words that differ only in whether a stop is voiced or voiceless, so-called "minimal pairs":

(22.)

| | | | | | | |
|---|---|---|---|---|---|---|
| *Voiced* | bat | two | cap | tab | bid | log |
| *Voiceless* | pat | do | gap | tap | bit | lock |

No such minimal pairs exist for voiceless unaspirated and aspirated stops, because they cannot occur in the same phonological context – if a word differs in whether it has a voiceless aspirated or unaspirated version of a voiceless stop, it will differ in other ways too. Since a difference in voicing can contrast two different words, we cay that voicing is a *contrastive* feature in English:

(23.) Voicing is contrastive in English, aspiration is not.

Predictable distribution and contrast are what defines the difference between sounds that are called allophones and phonemes:

(24.) *Phonemes*: Sounds that can occur in the same phonological context and can form minimal pairs (= contrastive).

*Allophones*: Sounds that cannot occur in the same phonological context (= predictable) and are phonetically similar.

Note that the definition of phonemes does not simply say that they can occur in the same phonological environment – it also specifies that they can form minimal pairs (lead to meaning differences). This is because sounds in *variation* also appear in the same environment:

(25.) *Variants:* Sounds that occur in the same position of the same word spoken by the same speaker over different speaking occasions

As an example, we can think of speakers that vary in whether they use [d] or [ð] for the first consonant of *they*. Here, the difference between [d] and [ð] is not contrastive – it is not signaling a meaning difference.

For allophones, we specified that they must be "phonetically similar". This is because we can have two sounds that never occur in the same phonological context but are *not* allophones. For example, we want to say [t] and [$t^h$] are allophones, not [t] and [$p^h$].

Phonemes are the basic categories, and they may have multiple allophones or variants. When we want to distinguish between the abstract phonemes and the actually pronounced

allophones/variants, we use square brackets for the pronounced forms, and slashes for the phoneme. Here are examples:

(26.) [pʰ] and [p] are allophones of /p/

[d] and [ð] are variants of /ð/

The phoneme /t/ has a number of allophones. As well as the aspirated voiceless stop [tʰ] and the unaspirated voiceless stop [t], MAE (mainstream American English) also has the flap [ɾ]:

(27.) [ɾ] pretty Betty rattle butter bottom

This allophone of /t/ occurs between two *vocalic* sounds, when the first is stressed. The last three examples have "syllabic consonants"; we'll find out what that means when we talk about syllable structure.

The one exception is that we find the glottal stop [ʔ] allophone of /t/ between a stressed vowel and a following syllabic [n]:

(28.) [ʔ] button fatten lighten

Glottal stop allophones sometimes appear in other contexts as well, especially the end of a syllable/word when another consonant follows. Abstracting from this variation, we can describe the MAE system of /t/ allophony as follows:

(29.) *Allophones of /t/ in MAE*

[tʰ] Beginning of a stressed or word-initial syllable

[ɾ] Between two vocalic sounds where the first is stressed, and the second is not [n]

[ʔ] Between two vocalic sounds where the first is stressed, and the second is [n]

[t] Elsewhere

Varieties of English differ considerably in their systems of /t/ allophony. We will work on describing other varieties in class.

### *2.2.2 Light, dark and vocalized /l/*

As another example of phonetic detail and predictable distribution (allophony) we can consider the pronunciation of /l/ in different phonological contexts. In MAE, there are two allophones of /l/ – "light" [l] and "dark" [ɬ]. The clearest difference is between the pronunciation in word-initial position, and word-final position (intervocalic position is subject to considerable across- and within-speaker variation).

(30.) [l] Larry light lip lop

[ɬ] pull pill cool fell

The dark [ɬ] is more accurately described as "velarized" – it involves the raising of the back of the tongue. Try saying the words in (30), and prolonging the /l/. You should be able to feel a difference in the position of your tongue, and hear a difference in the sounds. You may also

notice that the pronunciations of the vowels preceding dark [ɬ] are different from how they are pronounced elsewhere.

Some varieties of English lack dark [ɬ], having only [l]. Other varieties of English replace dark [ɬ] with a more vocalic sound – for instance, a glide [w] at the end of a syllable (e.g. *fell* as [fɛw]), or a vowel [o] or [u] when the sound is syllabic (e.g. *bottle* as [bɑʔo]). Again, we'll look at this in more detail in class.

## *2.3 Consonant sequences and syllable structure*

To better understand the differences between the consonantal systems of varieties of English, we now look at how the different varieties put sequences of consonants together to form syllables and words. In every language, there are restrictions on the ordering of consonants. For example, words in English can begin with [pr] (*pretty*, *prepare*, *proper*), but no English word begins with the same consonants in the reverse order [rp]. In this section, we'll look at some of the restrictions on consonant sequences that hold across varieties of English. We'll discuss differences across varieties in class.

### *2.3.1 The sonority shape of syllables*

Syllables organize sounds into groups, which can be smaller than the entire word. You probably have an intuition about the number of syllables in each of the following words:

| | | | | | | |
|---|---|---|---|---|---|---|
| (31.) | a. | see | bat | trapped | splint | clump |
| | b. | hello | trio | lovely | expect | Cleveland |
| | c. | Canada | potato | amplitude | suspicion | satisfied |

All of the words in (31a.) have a single syllable, all of the words in (31b.) have two, and all the words in (31c.) have three. One thing you can note right away about the words in (31) is that not all syllables contain the same number of sounds. For example, *splint* [splɪnt] has six sounds in a single syllable. *Canada* [kænədə], on the other hand, has six sounds in three syllables.

Why are the six sounds of *splint* placed into a single syllable, but those of *Canada* into three? Part of the answer is obvious: [kænədə] has three vowels, but [splɪnt] has two. Every syllable has a *peak*, and that peak is usually (but not always) a vowel. Notice that in the words in (31), every syllable contains one and only one vowel sound. To make sure that you are getting the difference between vowel *sounds* and *letters*, identify all of the cases in (31) in which there are more vowel letters than sounds. Also, you should be able to find a case in which a written consonant corresponds to a vowel sound.

This brings us to our first principle of English syllable structure, which might even be true of all syllables in every language in the world.

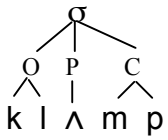
(32.) SYLLABLE PEAK PRINCIPLE

Every syllable has a peak

Syllables can also optionally have consonants preceding the peak, and following it. In syllable making up *clump* [klʌmp], for example, the consonants [kl] precede the peak [ʌ], and [mp]

follow it. The string of consonants preceding the peak is called the *onset*, and those following it are referred to as the *coda*. This syllable structure is shown diagrammatically in (33):

(33.) *Parts of the syllable*




O = Onset, P = Peak, C = Coda

There are restrictions on the shape of both onsets and codas. One general restriction that holds of both of them makes use of notions that we introduced in §2.1.2. In that section, we placed the consonants into categories of increasing vowel-likeness, from the purely consonantal stops through to the glides. This "vowel-likeness" is usually referred to as *sonority*. Stops have the lowest sonority of the stops, and glides the greatest. The full set of categories from §2.1.2 is shown in order of increasing sonority in (34)

(34.) *Sonority scale*

Stop < Fricative < Nasal < Liquid < Glide

e.g. [t] < [s] < [n] < [l] < [j]

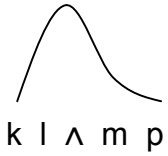
With this concept in hand, we can now state a very general restriction on the shape of English syllables, the Sonority Slope Principle, which we will henceforth call the SSP.

(35.) SONORITY SLOPE PRINCIPLE (SSP)

Sonority rises from the edges of the syllable to the peak

The sonority shape of [klʌmp] is illustrated in (36). Sonority rises relatively steeply from [k] to [l], peaks at [ʌ], and then descends relatively quickly to [m], then bottoms out again at [p].

(36.) *Illustration of the Sonority Slope Principle*




This syllable thus obeys the SSP. If we switch the order of the consonants in either the onset or the coda, we get a syllable type that does not exist in English. The ill-formed sonority slopes are illustrated in (37).

(37.) *Violations of the Sonority Slope Principle*




In this case, sonority drops in the onset, and rises in the coda, both contrary to the SSP.

Although the SSP is generally a true statement about the syllables of English, there are some cases in which it does not seem to hold. If you look through the monosyllabic words in (1a.), you should be able to find two counter-examples to the SSP.

One case involves the fricative [s], which in English can precede even stops (e.g. ‘spy’ [spaj], ‘sky’ [skaj]), thus producing a drop in sonority. For onsets, this is the only counter-example: all other ones rise in sonority (try verifying this with as many as you can think of). The other case involves the stop [t] following another stop; there are a number of words without suffixes that end this way (e.g. ‘act’ [ækt] ‘opt’ [ɑpt]), as do many words with the past tense suffix (e.g. ‘seeped’ [sipt] and ‘leaked’ [likt]). These are counter-examples to the SSP because they form a sonority “plateau” - a flat sonority profile, rather than a drop. Note that when the past tense suffix is added after a voiced sound, it is also voiced, and if that sound is a stop, we get a sonority plateau (e.g. ‘dubbed’ [dʌbd] ‘flagged’ [flægd]; these voiced stop clusters are never found in unsuffixed words). Along with [t] (and plural [d]), [s] also forms codas that disobey the SSP. Two examples are ‘ax’ [æks] and ‘lapse’ [læps]. These clusters equally arise from suffixation (e.g. plural ‘backs’ [æks] and ‘laps’ [læps]. As with the stop clusters formed by adding the past tense, agreement in voicing produces voiced clusters not found in unsuffixed words (e.g. ‘bags’ [bægz] ‘buds’ [bʌdz]). These are the only examples of coda clusters with rising sonority in English. Phonologists have proposed several different explanations for these counterexamples to the SSP. What any explanation needs to capture is the fact that the exceptions involve a small class of sounds: the alveolar stops and fricatives.

Sonority also plays a role in another important restriction on the shape of possible syllables in English: the case of consonantal peaks. In unstressed syllables, we sometimes find consonants, rather than vowels in this position: ‘butter’, ‘bottle’, ‘bottom’ and ‘button’ have [r], [l], [m] and [n] as the peaks of the second syllable. Only the highest sonority of the consonants can take this position (if a glide [j]/[w] were in this position, it would be pronounced as the corresponding vowel [i]/[u]). That is, stops and fricatives are completely banned from the peaks of syllables.