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THIRTEENTH EDITION

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Materials for an Introduction to Language and Linguistics

Department of Linguistics

THE OHIO STATE UNIVERSITY

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FILE 3.2

Phonemes and Allophones

3.2.1 Different Sounds Have Different Distributions

As discussed in File 3.1, languages have restrictions on which sounds can occur in certain environments. To illustrate this, say *tan* [tæn] and *gnat* [næt] out loud several times quickly. Did you have any difficulty with this task? Probably not. Now try the same thing with *gang* [gæŋ] and an imaginary new word *ngag* [ŋæg]. Was this any harder? Most likely [ŋæg] was quite difficult! But these tasks were very similar: the first involved producing sequences of an alveolar nasal and stop with a low vowel, and the second involved sequences of a velar nasal and stop with a low vowel. The problem, then, does not lie with these sequences in general. The problem is also not with a sequence of a nasal followed by a velar stop, since *nag* [næg] should cause no problems for you. So what is it about [ŋæg] that makes it so hard to pronounce? The problem here is specifically with where [ŋ] occurs: as noted in the previous file, one of the phonotactic restrictions of English is that [ŋ] cannot occur at the beginning of a word. When we say "cannot," again, we are not talking about some rule that the "grammar police" enforce—your mental grammar is where this rule resides, and you can feel its strong effects when you try to pronounce [ŋæg]. This, then, is a very basic way that sounds have different distributions in languages.

On the basis of this distributional pattern, we could make some predictions: first, we can predict that an English speaker would have a difficult time with a word beginning with [ŋ] in a foreign language and

would likely replace the [ŋ] with [n]. We could also predict that no unfamiliar or new words in English will begin with [ŋ].

We see a different situation in comparing the distributions of the oral velar stops [k] and [g] in English. Are there any restrictions on where they can occur? Can we predict which of the two sounds might occur in any given new word? We can easily think of word pairs like *cot–got, crab–grab, tack–tag, wick–wig, backer–bagger,* and *hunker–hunger,* in which the only sound that differs between the two words is [k] and [g]. (Remember: we are talking about sounds, not spelling! It may help you to phonetically transcribe these words if you have doubts.) And since both sounds occur at the beginning, middle, and ends of words, between vowels and after [ŋ], there do not appear to be any particular restrictions on where they may appear. What this tells us is that the voicing difference between these two sounds is **meaningful** in English. Changing the sound from voiced to voiceless (or vice versa) changes the word produced. Because of this, we cannot predict where either of these sounds will occur in a word.

Does the fact that [k] and [g] are meaningfully different sounds in English tell us anything about their distribution in another language? No. Just as the constraint against word-initial [ŋ] in English tells us nothing about whether other languages allow it word-initially (many do), so also English's contrast between [k] and [g] tells us nothing about their relationship in other languages. Each language must be investigated independently.

Kikamba is a Bantu language spoken in Kenya, and, like English, it has [k] and [g] as part of its phonetic inventory, as seen in its word for 'to guard' [kosuuŋga]. But if we lookmore closely at where these sounds can appear in Kikamba words, we would notice patterns that are different from those in English. The voiced velar stop [g] is quite restricted: it only occurs immediately after the velar nasal [ŋ]. The voiceless stop [k] is not restricted in the same way—it can occur at the beginning of a word, as seen above, as well as in the middle of a word between vowels, as in [kwaaka] 'to build.' The one place it does not occur, however, is after the velar nasal [ŋ] (see Roberts-Kohno 2000): no [ŋk] sequences are permitted. To illustrate how

strong this distributional pattern is in Kikamba, consider the word *katala* ‘to count.’ To say ‘if you count,’ you add an [o] to the beginning of the word: [o͟katala]. But to say ‘if I count,’ you must add an [ŋ], and the word is then pronounced as [ŋ͟gatala].

What this tells us is that the difference between these two sounds is **not** meaningful in Kikamba, in contrast to English. Changing which sound is produced will not change the word being said or the meaning conveyed. If someone learning Kikamba were to use [k] after [ŋ] (e.g., [ŋ͟katala] for ‘if I count’ instead of [ŋ͟gatala]), a native speaker of Kikamba might think that the speaker sounded funny, had an accent, or had mispronounced the word, but the meaning would not change.

3.2.2 Allophones and Phonemes

In every language, certain sounds pattern together as if they were simply variants of the “same” sound, instead of different sounds that can be used to distinguish words. This was the case for [k] and [g] in Kikamba in Section 3.2.1: the voicing difference between these two sounds is not meaningful in that language. It can’t be used to distinguish words, and there is a clear pattern of where one vs. the other appears, which makes these two sounds completely predictable. Therefore, these sounds can be thought of as variants of the “same” sound in Kikamba: the ‘k’ sound is pronounced with voicing when it appears after [ŋ], and without voicing everywhere else.

We have similar relationships between “same” and “different” sounds in English. One of the major goals of this file is to help you understand this distinction more clearly, and we can begin by building on some of what we learned about English sounds in Chapter 2. First, look at the list of words in (1): if you asked someone who had not studied phonetics if the underlined sound was the same in each word, what do you think their answer would be?

(1) t̲op s̲top li̲ttle ki̲tten

Most people would say “yes,” identifying all of the words as containing the sound ‘t.’ But now that you have learned about the phonetics of English, would you answer the same way? If you transcribe the words on a separate piece of paper according to what you learned in the previous chapter, you will probably write them as follows:

(2) [tɑp] [stɑp] [lɪɾ̩] [kɪʔn̩]

So here we have three sounds: the voiceless alveolar stop [t], the voiced alveolar flap [ɾ], and the voiceless glottal stop [ʔ]. We did not talk much about how these sounds were related to each other in the previous chapter, but most English speakers, with a little practice, are able to hear the difference between very carefully enunciated pronunciations like [lɪt̩] and [kɪtn̩] (such as some people produce when doing formal speaking or singing) and the everyday pronunciations [lɪɾ̩] and [kɪʔn̩], with the flap and glottal stop. So what is the relationship among these sounds? If someone says [lɪt̩], does that mean something different from [lɪɾ̩], or is a [kɪtn̩] a different kind of animal from a [kɪʔn̩]? For native English speakers, the answer is “no”: both are the same word, and if we notice the difference in pronunciation at all, we may think someone saying [kɪtn̩] is not from the United States oris perhaps being a bit pretentious in exaggerating the pronunciation. This tells us that the three sounds [t], [ɾ], and [ʔ] are not meaningfully different in English: they are different pronunciations of the “same” sound.

What about the ‘t’ sounds in *top* and *stop*? Many of you likely transcribed them the same, as the difference between these sounds was not focused on in Chapter 2. Say these words out loud, carefully, focusing on the ‘t’ sound while holding your palm in front of your mouth. You should be able to detect a short burst or puff of air after the ‘t’ in *top* that is absent in *stop.* That puff of air is what we call **aspiration** (see Section 2.6.5), and it is transcribed with a superscripted [ʰ]. These words can thus more accurately be transcribed as [tʰɑp] and [stɑp], respectively (and *kitten* as [kʰɪʔn̩]). Is this a meaningful difference? Our first indication that it is not is that native

English speakers have a very difficult time hearing these as different sounds (more so than is usually the case with the [ɾ] and [ʔ] pronunciations of 't'). More importantly, however, switching the sounds does not change the meaning of the word: [stʰɑp] sounds odd, but it does not sound like any word other than *stop.*

So here we have four different sounds in the American English inventory ([t, tʰ, ɾ, ʔ]) that are somehow the "same" sound 't.' This is the essence of the difference between phonetics and phonology: physically (articulatorily and acoustically), there are four different sounds, but at some psychological level these are all the same sound to a native speaker.[1] A similar pattern of aspirated vs. non-aspirated stops is seen with 'k' (*kit* [kʰɪt] vs. *skit* [skɪt]) and 'p' (*pit* [pʰɪt] vs. *spit* [spɪt]).

As we saw with [k] and [g] above, the patterning of aspirated vs. unaspirated voiceless stops in English doesn't tell us how they are categorized in other languages, however, and we see a different pattern in Hindi, for example. A native speaker of Hindi does not (and cannot) ignore the difference between aspirated and unaspirated sounds. Hindi contains many words that are pronounced almost identically, except that one word will have an aspirated stop where the other has an unaspirated version of the same stop. The data in (3) illustrate this.

(3)

Hindi	**Gloss**
[pʰəl]	'fruit'
[pəl]	'moment'
[bəl]	'strength'

Long Description

So for a Hindi speaker, pronouncing the voiceless stop in the word for 'moment' with aspiration would change the word being said, just as in English changing the voiceless stop in *pit* to voiced would give *bit,* a different word and meaning. For the native Hindi speaker, then, aspirated [pʰ] is as different from unaspirated [p] as [pʰ] is from [b] to our ears. But

since, unlike voicing, aspiration never makes a difference in the meanings of English words (e.g., [mæp] and [mæp^{h}] would simply be recognized as different pronunciations of the word *map*), native speakers of English are usually not consciously aware of the difference between aspirated and unaspirated stops.

The different ways that [p] and [p^{h}] affect meaning distinctions in English and Hindi tells us that these sounds are categorized differently in the phonological systems of the two languages. We say that these two sounds are **noncontrastive** in English, because interchanging the two does not result in a change of meaning, while in Hindi [p] and [p^{h}] are **contrastive,** because replacing one sound with the other in a word can change what word is beingsaid and thus the meaning of the utterance. The meaning of a word with [p] (e.g., [pəl] 'moment') contrasts with the meaning of a similar word with [p^{h}] (e.g., [p^{h}əl] 'fruit'). We will have more to say about this terminological distinction below.

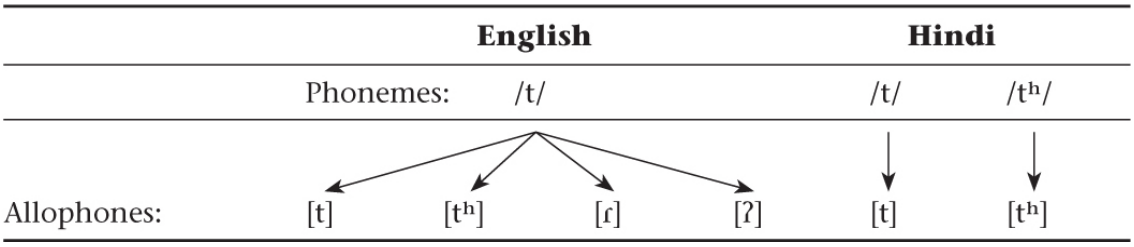
Linguists attempt to characterize these different relations between sounds by grouping the sounds in a language's phonetic inventory into sets. Each set contains all of the sounds that a native speaker considers to be the "same" sound. For example, [t] and [t^{h}] in English would be members of the same set. By contrast, speakers of Hindi would not classify [t] and [t^{h}] as members of the same set, because they perceive them as different. That is, they are contrastive in Hindi, as seen in the words [tal] 'beat' and [t^{h}al] 'plate.'

A set of speech sounds that are perceived to be variants of the same sound is called a **phoneme.** Each member of a particular phoneme set is called an **allophone,** which corresponds to an actual phonetic segment produced by a speaker. That is, the various ways that a phoneme is pronounced are called allophones. For example, then, the 't' sounds in words like *stop, top, little,* and *kitten* ([t, t^{h}, ɾ, ʔ]) all belong to a single set, a phoneme that we will label with the symbol /t/. From now on, pay special attention to the difference between square brackets and slashes: a sound given in square brackets ([t^{h}]) is an allophone (a phonetic segment), while a

sound given in slashes (/t/) is a phoneme (a psychological category representing a set of speech sounds). So by saying that *stop* and *top* each have the phoneme /t/, we are saying that the sounds [t] and [tʰ] are related—that they are the "same" sound in English.

In (4) we see how the phoneme /t/ is related to its allophones [t], [tʰ], [ɾ], and [ʔ] in English, and how the Hindi phonemes /t/ and /tʰ/ are related to their allophones [t] and [tʰ]. Since [t] and [tʰ] contrast in Hindi, they are therefore allophones of different phonemes, unlike in English.

(4)



Long Description

By providing a description like this, linguists attempt to show that the phonological system of a language has two levels. The more concrete level involves the physical reality of phonetic segments pronounced in everyday speech, the allophones, whereas phonemes are something more abstract, which can be described as the form in which we store sounds in our minds. So phonemes are abstract psychological concepts, and they are not directly observable in a stream of speech; only the allophones of a phoneme are. It is important to note that any sound that is pronounced, then, is an allophone of some phoneme; the phoneme itself is never pronounced.

The phoneme is a unit of linguistic structure that is just as significant to the native speaker as the word or the sentence. Native speakers reveal their knowledge of phonemes in a number of ways. When an English speaker makes a slip of the tongue and says [ʧeɪn ɹɛk] for *rain check,* reversing [ʧ] and [ɹ], they have demonstrated that [ʧ] functions mentally as a single unit of sound, just as [ɹ] does. Recall from File 2.2 that [ʧ] is phonetically complex, consisting of [t] followed immediately by [ʃ]. Yet,

since [ʧ] represents the pronunciation of a single phoneme /ʧ/ in English, no native speaker would make an error that would involve splitting up its phonetic components; you will never hear [tɹeɪn ʃɛk] or [ʃɹeɪn tɛk] as a slip of the tongue (see File 9.3).

Knowledge of phonemes can also be revealed in alphabetic spelling systems (see File 15.2). For example, English does not have separate characters for [pʰ] and [p]; they are both spelled with the letter *p.* Examples like this show that the English spelling system ignores differences in pronunciation that don't result in meaning distinctions. For the most part, the English spelling system attempts to provide symbols for phonemes, not phonetic segments. In general, alphabetic writing systems tend to be phonemic rather than phonetic, though they achieve this goal with varying degrees of success. As noted in File 2.1, of course, there are multiple ways to represent the same sound (e.g., the [kʰ] sound is written with a <k> in the word *kitten* but with a <c> in the word *cool*). What's crucial here, though, is that both of these spellings represent /k/, and not, for example, the difference between [k] and [kʰ].

3.2.3 Identifying Phonemes and Allophones: The Distribution of Speech Sounds

In order to determine whether particular sounds in a given language are allophones of a single phoneme or whether they contrast and are allophones of separate phonemes, we need to consider the distribution of the sounds involved, as we saw above. The **distribution** of a sound is the set of **phonetic environments** in which it occurs, that is, the sounds that come before and after it in a word. For example, nasalized vowels in English occur only in the environment of a nasal consonant. More precisely, a linguist would describe the distribution of English [ĩ], [æ̃], etc., by stating that the nasalized vowels always and only occur immediately preceding a nasal consonant, as in *bean* and *brand.*

Once we have examined the phonetic environments of any two or more given sounds, we can determine the type of distribution by comparing

the sets of phonetic environments. In this book we will mainly be concerned with two types of distribution—contrastive distribution and complementary distribution—though a third distribution, free variation, will also be introduced in the following section.

Let us consider **contrastive distribution** first. Contrastive distribution is simply a case in which the two sounds occur in the same phonetic environment, and using one rather than the other changes the word that is being said (thus the sounds can also be referred to as contrastive, as above). [p] and [pʰ] in Hindi have a contrastive distribution because when they occur in exactly the same phonetic environment, they give two different words: [pʰəl] 'fruit' and [pəl] 'moment.' As discussed in the previous section, the fact that [p] and [ph] are contrastive in Hindi tells us that these sounds are perceived by native Hindi speakers not as variants of the same sound but as **different** sounds. Thus, [p] is an allophone or phonetic realization of a phoneme /p/, and [ph] is an allophone or phonetic realization of a phoneme /ph/ in Hindi—[p] and [ph] are allophones of **different** phonemes, and we know this because the sounds are in contrastive distribution.

When we look at the distribution of particular sounds in a language, we can determine that two sounds contrast or are in contrastive distribution by identifying a **minimal pair.** A minimal pair is defined as two words (with different meanings) whose pronunciations differ by exactly one aspect of their pronunciation (e.g., by one sound). If you find a minimal pair, you know that the two sounds that differ are contrastive in that language. So, [pʰəl] 'fruit' and [pəl] 'moment' are a minimal pair, showing that [p] and [pʰ] are contrastive in Hindi, as are [pʰəl] 'fruit' and [bəl] 'strength,' showing that [pʰ] and [b] are also contrastive, and thus allophones of different phonemes.

If you try, you can easily think of many minimal pairs in English, or any other language you know well. For example, the minimal pair [tʰim] *team* and [tʰin] *teen* shows that [n] and [m] are contrastive in English, and we have mentioned various others above.

The second type of distribution we need to consider is **complementary distribution.** To understand better what we mean by complementary distribution, think about what the term *complementary* means: two complementary parts of something make up a whole. Forexample, the set of people in your class at any given moment can be divided into the set of people who are younger than 20 years old and the set of people who are 20 years old or older. These two sets of people complement each other. They are mutually exclusive (one person can't simultaneously be both younger and older than 20), but together they make up the whole class. And if your instructor made a rule saying that anyone younger than 20 could only sit in the back of the room and anyone 20 or older could only sit in the front, then an 18-year-old student would never be seen in the front of the room, and a 26-year-old student would never be seen in the back. That is, the 18-year-old and the 26-year-old would never appear in the same part of the room, but both would still be perceived as members of the same class.

So also with sounds: sounds that are in complementary distribution do not occur in the same phonetic environments—instead, their distributions complement each other. As with our example with people above, sound A might occur only at the "front" (or beginning) of a word and sound B only at the "back" (or end) of a word. So, if you look at the set of environments in which sound A occurs and compare it with the set of environments in which sound B occurs, you see that sound A never occurs in one of B's environments, and B never occurs in one of A's environments (just like the 18-year-old never sits in the front of the room and the 26-year-old never sits in the back).

This means that when sounds are in complementary distribution, you will not find a minimal pair. Such sounds are never contrastive with respect to each other; they will not be used in the same phonetic environment to produce words with different meanings. Rather, when sounds are in complementary distribution, it indicates that they are perceived as variants of the same sound, each of which has a particular environment or set of

environments in which it occurs. Thus, sounds that are in complementary distribution are considered to be allophones of the **same** phoneme.

Let us look back at some examples we have seen in English. We mentioned above that nasalized vowels in English always and only occur immediately preceding a nasal consonant. We can see an example of this by looking at the distribution of the sounds [i] and [ĩ] in English, or the **phonetic context** in which each appears.

(5)		
	dean	[dĩn]
	deed	[did]
	lean	[lĩn]
	leap	[lip]
	mean	[mĩn]
	mere	[miɹ]
	team	[tĩm]
	seat	[sit]
	scream	[skɹĩm]
	see	[si]

If we analyze the sets of phonetic environments where [i] and [ĩ] occur here (more detail on how to do this will be presented File 3.5.2), we can summarize their distributions as follows: [i] appears before the sounds [d, p, ɹ, t] and at the end of a word; [ĩ] appears before [n, m]. Furthermore, [i] never appears before [m, n], and [ĩ] never appears before [d, p, ɹ, t] or at the end of the word. Their distributions are therefore complementary, which means that they do not contrast in English. We thus can say that the sounds [i] and [ĩ] are allophones of the same phoneme /i/.

Consider another linguistic example mentioned above: the distribution of the English sounds [p] and [p^h], as seen in (6).

(6)		
	spat	[spæt]
	spool	[spul]
	speak	[spik]

pat	[pʰæt]
pool	[pʰul]
peek	[pʰik]

As you can see, there are no minimal pairs involving a [p]–[pʰ] contrast, and [p] and [pʰ] do not occur in the same phonetic environments. We can summarize their distributions as: [p] occurs after [s] but never word-initially, and [pʰ] occurs word-initially but never after [s]. Since these sounds appear in different phonetic environments, there can be no pair of words composed of identical strings of sounds except that one has [p] and the other has [pʰ] (e.g., saying [spʰɑt] does not give a different word; it's just an odd pronunciation of *spot*). The sounds [p] and [pʰ] are in complementary distribution in English and are therefore allophones of a single phoneme /p/.

For both of these phonemes, we can also see that the appearance of their allophones in any specific context is predictable. For example, for any of the many other words with /i/ in English not listed in (5), we can predict that the allophone [ĩ] (and never [i]) will appear before [m] or [n] (e.g., *gleam, seen*), and that [i] (and never [Ĩ]) will occur before other sounds (e.g., *tree, reek*). Similarly, we can predict that the allophone [pʰ] (but never [p]) will occur at the beginning of any word not listed in (6), such as *pot* or *pin.*[2] Similarly, we can predict that [p] (but never [pʰ]) will follow [s] in other words, such as *spot* and *spin.*

We find complementary distribution of sounds in other languages too, of course. For example, in Section 3.2.1, we saw that the sounds [k] and [g] in Kikamba have a different distribution from what is found in English. They are in contrastive distribution in English (as evidenced by the minimal pair *back–bag*), which means that they are allophones of separate phonemes /k/ and /g/. But in Kikamba, we described the distribution as follows: [g] only occurs immediately after the velar nasal [ŋ], while [k] can occur at the beginning of a word or in the middle of a word between vowels, but never after [ŋ]. The two sounds are therefore in complementary distribution in Kikamba, indicating that they are allophones of the same phoneme /k/, or

are both the same sound to speakers of Kikamba. We will see many more examples of sounds in contrastive and complementary distribution throughout the rest of this chapter, and in File 3.5, we will discuss how to analyze data sets in other languages in order to determine the relationships of particular sounds.

We can summarize the difference between sounds that are contrastive and thus allophones of different phonemes (e.g., [p] and [ph] in Hindi, or [k] and [g] in English) and sounds that are in complementary distribution and thus allophones of the same phoneme (e.g., [p] and [ph] in English, or [k] and [g] in Kikamba) as shown in (7).

(7)

Distribution	**Contrastive**	**Complementary**
How you can tell	Sounds occur in the same environments, and using one instead of the other gives two different words; minimal pairs	Sounds never occur in the same environment, and using one instead of the other does not produce a different word; no minimal pairs
Predictability of distribution	Distribution cannot be predicted	Distribution can be predicted based on the specific phonetic context
Relation to phonemes	Allophones of **different** phonemes	Allophones of the **same** phoneme

Long Description

3.2.4 Free Variation

Most phonological distributions can be described as either contrastive or complementary. Remember that the hallmark of a contrastive distribution is that the two sounds can occur in the same phonetic environments but will produce different words. The hallmark of acomplementary distribution is that the two sounds will not occur in the same environments but can be predicted to occur in specific phonetic contexts.

In some contexts, however, more than one pronunciation of a given sound may be possible without changing the meaning of the word. In these cases, you may not be able to predict exactly which sound will occur, but the choice does **not** affect the meaning of the word. Consider, for example, the pronunciations of some English words in (8) (note that [p hightone] represents an unreleased voiceless bilabial stop).

(8)				
	leap	[lip]	leap	[lip hightone]
	soap	[soʊp]	soap	[soʊp hightone]
	troop	[tɹup]	troop	[tɹup hightone]
	happy	[hæpi]	—	*[hæp hightonei]

These words show that [p] and [p hightone] both share some of the same phonetic environments; specifically, they can both appear at the ends of words. Unlike the case of English [b] vs. [pʰ], or [m] vs. [n], however, there are no minimal pairs involving these sounds in the language. Why not? Although there are pairs of words in (8) that differ in only one sound, none of these words contrast in meaning. Thus, the choice between [p] and [p hightone] in *leap, soap,* and *troop* does not make a difference in meaning; that is, the sounds are noncontrastive. Rather, they are interchangeable in word-final position. Sounds with this type of patterning are considered to be in **free variation.** To a native speaker, sounds like [p] and [p hightone] that are in free variation are perceived consciously or unconsciously as being the "same" sound. We can conclude that they are allophones of the same phoneme, because they are perceived as the same and do not serve to distinguish the meanings of words.

Both sounds that are in contrastive distribution, like [k] and [g] in English, and sounds that are in free variation, like [p] and [p  hightone] in English, can also be described as being in **overlapping distribution**—they can occur in the same environment(s). Only sounds that are in complementary distribution do not overlap. But while these are two subtypes of the same larger category of overlapping distribution, note that they are quite distinct from each other.

The most important difference is seen in the effect they have on meaning. For example, in English, the sounds [d] and [t] are in overlapping distribution because they can occur in the same phonetic environment, as seen in *lid* [lɪd] and *lit* [lɪt]: both [d] and [t] can occur after [lɪ] at the end of a word. But when they occur in the same environment, they form a minimal pair: we know that [lɪd] and [lɪt] are different words in English. So [d] and [t] are in **contrastive** overlapping distribution, and thus are allophones of different phonemes. We can compare this with the sounds [t] and [t  hightone] in English, which are also in overlapping distribution because both can similarly occur after [lɪ] at the end of a word. But in this case, [lɪt] and [lɪt  hightone] are **not** different words in English; rather, they are two different pronunciations of the word *lit.* So [t] and [t  hightone] are in **noncontrastive** overlapping distribution, and thus are allophones of the same phoneme.

The final point we want to emphasize concerns the difference between free variation and complementary distribution. In both cases, the sounds are in noncontrastive distribution, but the difference is between noncontrastive **overlapping** distribution in the case of free variation vs. noncontrastive **complementary** distribution. For example, both [lɪt] and [lɪt  hightone] are equally natural and valid pronunciations of *lit* for native English speakers, because [t] and [t  hightone] are in free variation. By contrast, [pʰɪt] is the only natural pronunciation of *pit*; while [pɪt] would likely be understood as a pronunciation of *pit* in context, it would sound strange and unnatural to native English speakers, and might be misunderstood. This is because [pʰ] and [p] are in complementary

distribution, and this particular environment is one in which only [p^h] normally occurs.

We can thus extend our table in (7) to include the characteristics of free variation, as shown in (9).

(9)

Distribution	**Contrastive**	**Complementary**	**Free Variation**
How you can tell	Sounds occur in the same environments, and using one instead of the other gives two different words; minimal pairs	Sounds never occur in the same environment, and using one instead of the other does not produce a different word; no minimal pairs	Sounds occur in the same environment, but using one instead of the other does not produce a different word; no minimal pairs
Predictability of distribution	Distribution cannot be predicted	Distribution can be predicted based on the specific phonetic context	Distribution cannot be predicted
Relation to phonemes	Allophones of **different** phonemes	Allophones of the **same** phoneme	Allophones of the **same** phoneme

Long Description

[1]The reasons for this may be manifold, including phonetic similarities, phonological patterning, different pronunciations across language varieties, or spelling.

[2]In point of fact, this is true not just at the beginning of a word but at the beginning of any stressed syllable. That is, in English, [p^h] but not [p] can appear as the first consonant of a stressed syllable.