

TUTORIAL
5.9

Phonology 2

This tutorial continues to look at the principles of phonology. We will also be doing some basic phonological analysis exercises.

Introduction

In the last tutorial we discussed allophones. We gave an example of the same three sounds in English, Korean and Thai to show how these languages vary phonemically - how in these three languages the phonemes and their allophones are grouped differently. We could also say that the *allophonic rules* are different in these three languages.

Allophonic rules

Another example of a phonemic difference between two languages is with [l] and the *rhotic*, or 'r' sound - in English [ɹ] and Japanese [ɾ]. In English these two sounds are separate phonemes: *law* and *raw*, *lot* and *rot* are minimal pairs. But in Japanese these two sounds are allophones of a single phoneme. If you look at the following examples of Japanese words with these two sounds, you can see a pattern of where each particular allophone occurs:

<i>lan</i> 'a kind of flower'	<i>nara</i> 'if'
<i>lika</i> 'science'	<i>amari</i> 'extra'
<i>lusu</i> 'absence'	<i>sore</i> 'that'
<i>lekishi</i> 'history'	<i>naru</i> 'to ring'
<i>loku</i> 'six'	<i>iro</i> 'colour'

You will see that [l] only occurs at the beginning of a word, never in the middle; [ɹ] occurs in the middle of a word, and never at the beginning.

In English the two sounds divide up into phonemes like this:

/l/ [l]
/r/ [ɹ]

In Japanese they divide up into phonemes like this:



Allophonic variation like this can be expressed as rules (really principles). If you look again at the Japanese set of words above, you can see that [l] and [r] are allophones of a single phoneme (there are no minimal pairs), and each sound only occurs in a specific environment - they are in complementary distribution, or don't occur in the same places.

Now let's look at some similar data (a set of words) from Korean. Let's look at the sounds [l] and [r] in this data. Do they contrast or are they in complementary distribution? If they are in complementary distribution, we need to write a rule describing the complementary distribution.

1	[kal]	that'll go	2	[silkwa]	fruit
3	[kʌnʌl]	shade	4	[tʌlcʰaŋ]	window
5	[mul]	water	6	[əlmana]	how much
7	[pal]	leg	8	[irumi]	name
9	[pʰal]	arm	10	[kiri]	road
11	[səul]	Seoul	12	[kʰrem]	then
13	[tatʌl]	all of them	14	[kəriro]	to the street
15	[ilkop]	seven	16	[saram]	person
17	[ipalsa]	barber	18	[uri]	we
19	[onʌlppam]	tonight	20	[jəram]	summer
21	[pulpʰjən]	discomfort			

If we check the data first for minimal pairs, we don't find any. So, that means we don't have a contrast in the sounds. Remember that if there are minimal pairs, that means the sounds distinguish meaning and are separate phonemes. These two sounds then, are not separate phonemes. (Note: this is just an example, so the data is limited. If you were doing actual phonological analysis in a language, you would work with the whole language as a resource, not a restricted amount of data like this.)

Seeing we didn't find minimal pairs, we should now look for complementary environments. If we look at each word in the data, we can see that it doesn't matter what comes before these two sounds – both always follow vowels. What does matter is what comes *after* the sounds – if there is a vowel after it, this phoneme has the allophone [r], but if there is a consonant after it, or if it is at the end of a word (i.e. there is nothing after it), it has the allophone [l]. We have found a pattern in the way the sounds work together - complementary distribution. We can express this complementary distribution by a rule:

$$\begin{array}{lcl} /l/ & \rightarrow & [r] \quad / \quad _V \\ & & [l] \quad / \quad \text{elsewhere} \end{array}$$

Phonological rules like this are written in a specific way. On the left is the phoneme /l/ in slashes. Slashes are used to go around phonemes. The arrows mean ‘becomes’, or ‘turns into’ or ‘is pronounced as’. Then the two allophones, [r] and [l] are in square brackets. Square brackets are used for phones (speech sounds). In phonology they are used for allophones, because allophones are just ways of pronouncing a phoneme. Then there is a slash, and what follows each slash is the *environment* for that allophone. The first environment is $_V$. The line shows where the sound goes. V means ‘vowel’. So that environment means ‘when the sound appears before a vowel’. The second environment is ‘elsewhere’. This means that this allophone occurs in a few different other environments – anywhere except the specific environment where you get [r] (before a vowel).

Some other ways to write different environments are:

$_C$ (when the sound appears before a consonant)

$_ \#$ (This symbol in these rules means ‘word boundary’. So this means ‘when the sound appears before a word boundary’ - at the end of a word).

You might wonder, for the rule we wrote for [l] and [r] in Korean, why we didn’t list both the environments where [l] occurs rather than just saying ‘elsewhere’. Something like:

$\rightarrow [l] \quad / \quad _C$

$\rightarrow [l] \quad / \quad _ \#$

We don’t list both of these because they have nothing in common. There is nothing specific about these environments that causes this allophone to occur in those places, it is just simply what you get when that phoneme is anywhere else than before a vowel. The rule we did list is specific - there is something about that environment that means it is where you will *always* get [r]. Whenever there are a few unrelated environments that we can’t generalize about, like where the [l] occurs, we simply say the environment for it is ‘elsewhere’.

Why is phonetics and phonology important?

Let’s take a step back and look at the big picture of why it might be helpful for us to understand language on this level. It is probably obvious to you that in developing a writing system for a language, phonology is important - we need to know which sounds in a language are phonemically significant because those will need a separate symbol in the orthography (writing system) for

people to be able to read their language. But an understanding of the principles of phonetics and phonology will also help to give you insight when you are learning to communicate in another language as well.

Have you ever had the experience of trying to say a word or name in another language, and no matter how many times you repeat it (you think correctly), your friend repeats it back to you and makes you say it again and again - because you are just not saying it *right*? But you can't hear any difference between how he is saying it and how you are saying it.

What might be happening is that the sound you are messing up in his language is not phonemically distinct in English. In other words, it may be a sound that can be said in a variety of ways in English, and it makes no difference to meaning (an allophone of one phoneme) so you don't even notice it. But in his language, these same variations may be separate phonemes - so switching them actually changes the meaning. Your friend feels it is important for you to get it just right when you pronounce it - to make sure the aspiration is there, or the nasalisation, or the lengthening - because to him the sound you are saying is actually an entirely different sound which indicates a different meaning. To him it would sound like someone trying to say the English word *worse* and saying *verse* instead - or saying *ship* instead of *sheep*. So, it is important for you to understand that it isn't just the sounds that are different in another language, but there will be differences in the way the language uses sounds to convey meaning.



Procedure for phonological analysis

We have covered phonology in a simplified way, because it actually gets quite complicated in practice. There are many different possible features of sounds (like voicing, lengthening, nasalisation) that can potentially change phonemes in different environments. Our purpose in this course is to give you a basic idea of the way sounds work differently in different languages and to have a basic understanding of the procedure for phonological analysis - not to be a trained analyst. If you are required in the future to do phonological analysis on a language, you will need to do further study on the full procedure and there are many helpful resources available. Also, you can often find help from others (linguists) who have been, or are working in that language or a related language or dialect.

To give you an idea of what the procedure looks like in practice, we will look at two examples involving vowel length - one example is more complex than the other. When you read these examples, don't worry if you don't understand

everything. It will give you an idea of the *types* of things that can be encountered in phonological analysis and how the process looks.

Vowel Length in Kikuyu

In Kikuyu, vowels can either be pronounced as ‘long’ (in duration) or ‘short’ (in duration).

In IPA, a ‘long’ vowel is written with a colon following it.

[kera] ‘cross over’	[ke:ra] ‘realize’
[daka] ‘beautiful’	[da:ka] ‘play’
[kua] ‘die’	[ku:a] ‘carry’
[dura] ‘spit’	[du:ra] ‘stay’
[kora] ‘find’	[ko:ra] ‘little frog’

Question: In Kikuyu, are the long vowels and short vowels allophones of the same, or different phonemes?

Our first step is to determine if there are minimal pairs for the long vowels and the short vowels. There are! So we stop. We can conclude that in Kikuyu, long vowels and short vowels are allophones of different phonemes.

Vowel Length in English

In English, vowels are also pronounced as either ‘long’ or ‘short’.

‘ride’ [ɹaɪd]	‘right’ [ɹaɪt]	‘rye’ [ɹaɪ]
‘aid’ [eɪd]	‘ate’ [eɪt]	‘bay’ [beɪ]
‘lobe’ [lɔ:wb]	‘lope’ [lɔwp]	‘low’ [lɔw]
‘teethe’ [θi:ð]	‘teeth’ [θiθ]	‘tea’ [θi]
‘save’ [se:jv]	‘safe’ [seɪf]	‘say’ [seɪ]

Question: In English, are the long vowels and short vowels allophones of the same, or different phonemes?

First, we need to determine if there are minimal pairs for the long vowels and the short vowels. It turns out that there are not any minimal pairs for any short and long vowels. So, we go on to determine if there is a phonological rule that can relate the long and short vowels to the same phoneme.

OK, now how do we find out if there is such a rule? The process is not ‘cut-and-dried’, but, it can be broken down into four sub-steps. Our search is actually logical, and if we follow the steps we will get to the correct answer. We want to determine which of the following statements is true:

1. There’s a rule that requires long vowels to be pronounced as short in some environment.

OR

2. There's a rule that requires short vowels to be pronounced as long in some environment.

Some reasoning:

If (1) were true, then...there would be some environment where we only find short vowels (and no long vowels).

If (2) were true, then...there would be some environment where we only find long vowels (and no short vowels).

An Analogy

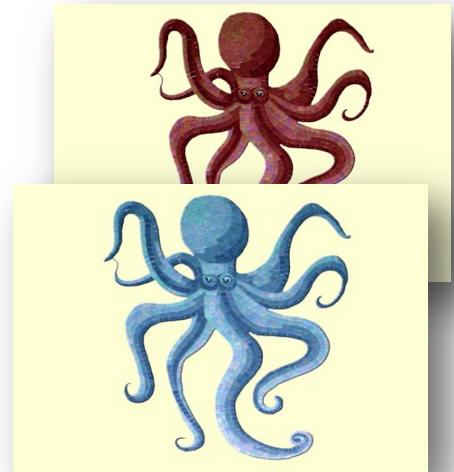
Suppose there are two kinds of creatures:

- The brown octopus, that sometimes turns blue.
- The blue octopus, that sometimes turns brown.

How could we tell if we had a brown octopus or a blue octopus?

We could watch it for a while, and see whether:

- There is some particular occasion when it becomes blue (e.g. when it is alarmed), or
- There is some particular occasion when it becomes brown (e.g. when it is defending itself).



If there is some occasion when it's always blue... then it's actually a brown octopus, but there is some rule that turns it into a blue octopus sometimes.
 If there is some occasion when it's always brown... then it's actually a blue octopus, but there is some rule that turns it brown in particular circumstances.

So, getting back to our problem of long and short vowels in English - we want to see which of these is true:

There is some environment where you *only* find short vowels.

If so, then there is a rule which turns long vowels into short vowels there.

OR

There is some environment where you *only* find long vowels.

If so, then there is a rule which turns short vowels into long vowels there.

We are going to figure out which of these is true by following four steps:

Step 1:

Determine the *environments* of the two phones (short vowels and long vowels).

We want to make up four lists:

- The phones that precede a long vowel

- The phones that follow a long vowel
- The phones that precede a short vowel
- The phones that follow a short vowel

'ride' [ɹa:jd]	'right' [ɹaɪt]	'rye' [ɹaɪ]
'aid' [e:jd]	'ate' [ejt]	'bay' [beɪ]
'lobe' [lo:wb]	'lope' [lowp]	'low' [low]
'teethe' [thi:ð]	'teeth' [thiθ]	'tea' [thi]
'save' [se:jv]	'safe' [seɪf]	'say' [seɪ]

The phones that precede a long vowel are: [ɹ] # [l] [th] [s]

The phones that follow a long vowel are: [d] [b] [ð] [v] [j] [w]

The phones that precede a short vowel are: [ɹ] # [l] [th] [s] [b]

The phones that follow a short vowel are: [t] [p] [θ] [f] # [j] [w]

Step 2:

For each environment, look for any *commonalities* between the sounds in question. We want to make up four lists:

- Similarities between the phones that precede a long vowel
- Similarities between the phones that follow a long vowel
- Similarities between the phones that precede a short vowel
- Similarities between the phones that follow a short vowel

Note: No phones share anything in common with '#'.

The phones that precede a long vowel: [ɹ] [l] [th] [s] - **Nothing in common**

The phones that follow a long vowel: [d] [b] [ð] [v] [j] [w] - **All are voiced!**

The phones that precede a short vowel: [ɹ] [l] [th] [s] [b] - **Nothing in common**

The phones that follow a short vowel: [t] [p] [θ] [f] [j] [w] - **Nothing in common**

Step 3:

See if any of the *environments are unique* to a particular allophone. For each phone (long vowel or short vowel)...look at those environments for [X] where the sounds share something in common...check whether the corresponding environment for [Y] can have those properties...if not, then that environment is *unique to [X]*!

See if any environments are unique to a particular allophone:

The phones that precede a long vowel: [ɹ] # [l] [th] [s] - **Nothing in common**

The phones that follow a long vowel: [d] [b] [ð] [v] [j] [w] - **All are voiced!**

The phones that precede a short vowel: [ɹ] # [l] [th] [s] [b] - **None in common**

The phones that follow a short vowel: [t] [p] [θ] [f] # [j] [w] - **None in common**

Now look at the corresponding environments for the other phone. See if they can share those properties too.

The phones that follow a long vowel: [d] [b] [ð] [v] [j] [w] - **All are voiced!**

The phones that follow a short vowel: [t] [p] [θ] [f] # [j] [w] - **None in common**

Only long vowels can precede voiced Consonants!

Step 4:

If there is an environment unique to one phone, write out the rule that would limit that phone to that environment. Remember our logic from earlier:

- If there is some environment where you only find short vowels...then there is a rule that turns long vowels into short vowels there.
- If there is some environment where you only find long vowels...then there is a rule that turns short vowels into long vowels there.

Rule of Thumb:

If there are two allophones [X] and [Y], and only [X] appears in environment Z, the rule is: *“/Y/ is pronounced as [X] in Z”*.

Our Question: In English, are the long vowels and short vowels allophones of the same or different phonemes?

The Answer:

They are allophones of the same phoneme (namely, short vowels).

The phonological rule that relates them is the following:

“In English, a short vowel is pronounced as a long vowel when preceding a voiced consonant.”

/ V / → [V:] / _Voiced-C

“A short V is pronounced as a long V when preceding a voiced C”

Summary of the procedure

Suppose you want to determine whether two phones ([X] and [Y]) in some language are allophones of the same (or different) phonemes. If there are not minimal pairs for [X] and [Y], determine if there is a phonological rule that can relate [X] and [Y] to the same phoneme.

Step 1:

Determine the environments of the two phones.

Step 2:

For each environment, look for any commonalities between the sounds in question.

Step 3:

See if any environments are unique to a particular allophone.

Step 4:

If there is an environment unique to one phone, write out the rule that would limit that phone to that environment.



ACTIVITIES

Phonology 2

1. Take note of any long vowels in English that you read or hear in conversations. Confirm that they are always followed by voiced consonants. Another way to express this phonological rule of English (that only long vowels can precede voiced consonants) would be to say that *native speakers usually lengthen the vowel before voiced consonants*. Try the exercise below to see this phenomenon working. Read each pair of words out loud. The second word in each pair has a voiced consonant after the vowel, so as a native speaker of English, you will naturally lengthen the vowel sound before it.

branch / flange, march / charge, pinch / binge,

leaf / leave, moat / mowed, wrote / road

2. Use the four steps in the procedure we learned above to determine whether the two phones in each language below are allophones of the same (or different) phonemes. Write the phonological rule for each one. (answers on the next page).

Sierra Nahuat (Mexico) - compare [t] and [tʰ]

[tetʰ] *stone*

[tagol] *corn*

[kitoka] *he chases it*

[tʃonti] *hair*

[epatʰ] *skunk*

[sinitʰ] *leaf*

Agarabi (PNG) - compare [p] and [f]

[pane] *hornbill*

[pon] *pig*

Mianmin (PNG)

- compare [k] and [kʰ]

[uktem] *ask*

[kwam] *club*

[skʰilon] *foot*

[kʰakʰet] *finger*

[neekʰ] *friend*

[kwen] *insect*

[biksa] *picture*

[tohpe] *knife*
 [wompon] *design*
 [warufah] *village*
 [yafo] *fill*
 [anafin] *in the bamboo*

Answers

Phonological rules:

Sierra Nahuat (Mexico) - compare [t] and [t^h]
 [t^h] / _ # (is word final) / [t] elsewhere.

Agarabi (PNG) - compare [p] and [f]
 /p/ → [f] / V_ V
 [p] becomes [f] when it is between two vowels.

Mianmin (PNG) - compare [k] and [k^h]
 /k^h/ → [k] / _ C
 [k^h] becomes [k] when it precedes a consonant.