

**TUTORIAL**  
**5.8**

# Phonology 1

This tutorial introduces the area of phonology - *the organization of speech sounds*. We will look at what phonology is, and explain how it can help us as we work in other languages.

## Introduction

Phonology is the study of how sounds are organised and used in languages. The *phonological system* of a language includes:

- an inventory of sounds and their features, and
- rules which specify how sounds interact with each other.

Phonology is just one of several aspects of language. It is related to other aspects such as phonetics, morphology, syntax, and pragmatics. We have already covered an introduction to phonetics - below you can see the basic differences between phonetics and phonology.

### Phonetics ...

Is the basis for phonological analysis.

Analyses the production of all human speech sounds, regardless of language.

### Phonology ...

Is the basis for further work in morphology, syntax, discourse, and orthography design.

Analyses the sound patterns of a particular language by

- determining which phonetic sounds are significant, and
- explaining how these sounds are interpreted by the native speaker.

The goal for us here is to give you a basic understanding of the *principles* of phonology. If you eventually become the primary person developing a writing system in an unwritten language, it would be helpful for you to do further study at that time with that particular language in focus. At the end of our phonology introduction here, you will understand what phonology is, and you will understand more about how languages work.

## Phonemes

Every language has a set of sounds that function as distinct sounds, and can distinguish meaning. These are called phonemes.

For example, in English [p] and [b] are *functionally* separate - they are distinct sounds that can indicate a different meaning when either one or the other is used. We can see they distinguish meaning because *pack* and *back* are two separate words with separate meanings. So are *cap* and *cab*, or *lap* and *lab*. The only way we can tell these pairs of words apart is by the sounds /p/ and /b/. We call this a *minimal pair*. A minimal pair is two words that differ in only one sound. In the Cashunahua language (Peru), a minimal pair is the two words [taka] 'liver' and [daka] 'to rest', because the only sounds that differ are the /t/ and /d/.

But there are some separate sounds in English that are not phonemes, like [p] and [p<sup>h</sup>] (aspirated [p]). These are distinctly different sounds, but they are not *functionally* separate in English because they don't distinguish meaning. We can use either one in a word and the meaning doesn't change - [pæk] and [p<sup>h</sup>æk] would both be heard as ways of saying *pack*. In some other languages these same two sounds do distinguish meaning.

So, we say that in English [p] and [b] *contrast*, but that [p] and [p<sup>h</sup>] *don't contrast*. For sounds to contrast they need to be *separate sounds*, and also they need to *distinguish meaning*.

English has a set of sounds that contrast - but other languages have *different* contrasts. In Ata [ɹ] and [l] don't contrast, so they are not functionally separate: you can say *ialugu* or *iarugu* and it is the same word with the same meaning. In Warlpiri [p] and [b] don't contrast, so they are not functionally separate: you could say *Warlpiri* or *Warlbiri*.

In Thai [p] and [p<sup>h</sup>] do contrast, so they are functionally separate: *pa* 'forest' and *pha* 'split' are separate words - they're a minimal pair.

So, as we said, sounds that are functionally distinct in a language are *phonemes*.

In English /p/ and /b/ are separate phonemes, but [p] and [p<sup>h</sup>] are not.

In Ata [ɹ] and [l] are not separate phonemes.

In Warlpiri [p] and [b] are not separate phonemes.

In Thai /p/ and /p<sup>h</sup>/ are separate phonemes.

Notice that when we write symbols for sounds (or phones), we write them between brackets: [b], [j], [o], but when we write the symbols for phonemes, we write them between slashes: /b/, /j/, /o/.

### Phoneme inventory

Every language has a set of phonemes, or *phoneme inventory*. This is simply the set of functionally distinct sounds of the language.

Languages differ from each other in which possible speech sounds they use, and many languages have sounds that aren't used in English (clicks, velar fricatives, etc). English also has some sounds that are rare in other languages, like our affricates ([tʃ] in *church* and [dʒ] in *judge*) and dental fricatives (like [θ] in *thick* and [ð] in *this*).

But languages also differ on how many phonemes they have. English has 44 phonemes. You can download and read the chart of English phonemes - available on the website.

Rotokas (Bougainville) and Mura (Brazil) each have 11 phonemes (Rotokas has 6 consonants and five vowels, Mura has 8 consonants and 3 vowels). The !Xū language (a Khoisan language of southern Africa) has 141 distinct phonemes: 95 consonants (including 48 different clicks), 24 simple vowels and 22 diphthongs. You can see four of the !Xū phonemes (clicks) demonstrated here: <http://youtu.be/Nz44WiTVJww>

The way we find the phoneme inventory of a language is by studying the way the sounds are used and organised - phonology.

## Contrast and complementary distribution

The concepts of *contrast* and *complementary distribution* are central to phonology - the analysis of sounds.

### Contrast

We mentioned contrast already above - and said that when sounds are functionally different they are said to *contrast*. Let's look at some more examples of contrast in English.

*pack* /pæk/ vs. *back* /bæk/

*Pack* and *back* have quite different meanings, but the only difference between these two words is that one begins with /p/ and the other with /b/. These two sounds therefore *contrast* in English. This means they're functionally separate sounds, or separate phonemes in English.

*Pack* and *back* are therefore a *minimal pair* for /p/ and /b/, because they demonstrate that /p/ and /b/ are separate phonemes (they might not be in some other languages, but they are in English.)

In the same way, we can see that /t/ and /d/ are separate phonemes in English, and so are /k/ and /g/, because we can find minimal pairs for these sounds also:

*tie* /taɪ/ vs. *die* /daɪ/  
*grab* /gɹæb/ vs. *crab* /kɹæb/

With each pair above, the only difference between them is *voicing*: one is voiced, the other is voiceless. So, we can see that the feature of voicing is distinctive in English, at least for plosives. Adding voicing to one sound in a word can change the meaning. If we look at some other sounds, it turns out that voicing is distinctive for affricates and fricatives too:

*chore* /tʃɔ/ vs. *jaw* /dʒɔ/  
*fat* /fæt/ vs. *vat* /væt/  
*thigh* /θaɪ/ vs. *thy* /ðaɪ/  
*sap* /sæp/ vs. *zap* /zæp/  
*meshes* /mɛʃəz/ vs. *measures* /mɛʒəz/

In the same way that voicing is distinctive in English, the feature of nasalisation is also contrastive in English. Look at these examples:

*ban* /bæn/ vs. *man* /mæn/  
*debt* /dɛt/ vs. *net* /nɛt/  
*log* /lɒg/ vs. *long* /lɒŋ/

These minimal pairs show that /m/ and /b/ are separate phonemes - so are /n/ and /d/ - and /ŋ/ and /g/.

### **Complementary distribution**

As we said, English has 44 phonemes - but it actually has at least 51 different speech sounds. That is because some different speech sounds are not *functionally* separate. In other words switching them won't distinguish meaning.

We used the example before of [p] and [p<sup>h</sup>] which are phonetically different speech sounds and both occur in English, but they don't make a difference for meaning in English. Because they are not functionally separate, we say they are functionally part of a *single phoneme*.

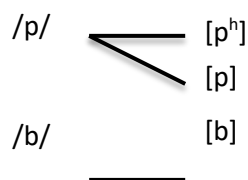
These sounds that are part of one phoneme are called *allophones* of one phoneme. Usually allophones occur in different contexts, or *environments*. Let's look at some examples -

In English [p] and [p<sup>h</sup>] are allophones of a single phoneme:

[p<sup>h</sup>]      [p<sup>h</sup>]      [p<sup>h</sup>]      [p]      [p]      [p]      [p]  
 'person    pa'ternal    com'puter    'spot    con'spire    'stupid    'sleep

It is the same phoneme, but we could say that it changes depending on the environment it is in. Notice in the examples above that we get [p<sup>h</sup>] as the first sound in the first syllable of a word, and as the first sound in a syllable that isn't first but is stressed. [p] occurs everywhere else (the end of a syllable; the beginning of a syllable after /s/; the first sound in an unstressed syllable which is not the first syllable in a word).

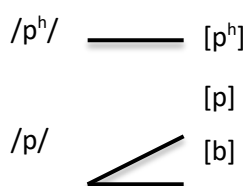
So, in English the three *sounds*, [p<sup>h</sup>], [p] and [b] divide up into *phonemes* like this:



The natural reaction of a native English speaker is to say "OK, but so what? Of course they're just different ways of saying 'p'." But... that just means it seems natural to English speakers that [p] and [p<sup>h</sup>] are just different ways of saying what is functionally a single phoneme. Unlike /p/ and /b/, where they of course seem like functionally different sounds. But that all only seems natural because we are *English* speakers. There is nothing about these three sounds that inherently makes them divide up that way. That's just how it works in English.

Korean also has the three sounds [p], [p<sup>h</sup>] and [b]. But in Korean, /p/ and /p<sup>h</sup>/ make a difference for meaning: /**p**ul/ 'fire' vs. /**p**<sup>h</sup>ul/ 'grass'. So /p/ and /p<sup>h</sup>/ are separate phonemes in Korean.

But also in Korean, [p] and [b] belong together: [**p**əp] 'law' and [**m**u**b**əp] 'lawlessness'. In Korean [p] and [b] are allophones - part of the same phoneme. You get [p] at the beginning of a word and [b] between vowels. So, in Korean the three sounds [p], [p<sup>h</sup>] and [b] divide up into phonemes like this:



In Thai it's a different story again. Thai also has the three sounds [p], [p<sup>h</sup>] and [b]. But in Thai, all three make a difference for meaning: /paa/ 'forest' vs. /p<sup>h</sup>aa/ 'split' vs. /baa/ 'shoulder'.

So /b/, /p/ and /p<sup>h</sup>/ are all separate phonemes in Thai, and the three sounds divide up into phonemes like this:

/p <sup>h</sup> /		[p <sup>h</sup> ]
/p/		[p]
/b/		[b]



## ACTIVITIES

### Phonology 1

1. Read - *The 44 Sounds (Phonemes) of English Chart* at the end of this PDF
2. The following sets of minimal pairs show that English /b/ and /p/ contrast in initial, medial and final positions: pit / bit, rapid / rabid, cap / cab. Find similar sets of minimal pairs for each pair of consonants given below.

/k/ and /g/

/s/ and /ʃ/

/m/ and /n/

/b/ and /m/

/tʃ/ and /dʒ/

/l/ and /ɹ/

/p/ and /f/

/s/ and /z/

*(possible answers on the next page)*

3. Look at each of the lists of words below (from different languages). For each list, choose the set of minimal pairs that show the sounds given contrast in that language. For example, in the first list of Cambodian words, the minimal pair is [t<sup>h</sup>ae] and [tae] because the only difference in these two words is the initial sound: [t] and [t<sup>h</sup>].

**Cambodian**

- compare [t] and [tʰ]
- [tʰou] *vase*
- [tʰae] *to care for*
- [taem] *stamp*
- [tae] *but*
- [zae] *at*
- [taa] *grandfather*

**Tidore** (Indonesia)

- compare [k] and [g]
- [gasi] *salt*
- [kam] *village*
- [sako] *neck*
- [kora] *to lie*
- [sago] *to split*
- [paka] *to walk*
- [gam] *water container*

**Sarangani Sangire** (Philippines)

- compare [i] and [i̯]
- [ke] *salt*
- [ki̯] *village*
- [dai] *neck*
- [bika] *to lie*
- [ki] *to split*
- [losi̯] *to walk*

**Toolì** (Nth. Philippines)

- compare [t] and [d]
- [kut] *we*
- [tuh] *there*
- [telem] *sharp*
- [kuda] *horse*
- [delem] *foot of hill*
- [duh] *that*

**Quechua** (Peru)

- compare [i] and [e]
- compare [o] and [u]
- [keru] *pole*
- [kuka] *cocaine*
- [koru] *hunchback*
- [kiru] *tooth*
- [hokta] *six*
- [peka] *head*
- [tika] *adobe*
- [hukta] *one*
- [tuku] *owl*
- [kuru] *warm*

(answers for this exercise on the next page)

**Answers:****Minimal pairs (English):**

- /k/and /g/ - *come / gum, ankle / angle, back / bag*
- /s/and /ʃ/ - *see / she, fist / fished, lease / leash*
- /m/and /n/ - *mitt / knit, simmer / sinner, am / an*
- /b/and /m/ - *bat / mat, grabber / grammar, cab / cam*
- /tʃ/and /dʒ/ - *chunk / junk, etching / edging, lunch / lunge*
- /l/and /ɹ/ - *lip / rip, alive / arrive, call / core*
- /p/and /f/ - *pit / fit, copy / coffee, leap / leaf*
- /s/and /z/ - *Sue / zoo, buses / buzzes, peace / peas*

**Minimal pairs (other languages):**

Cambodian:

[t<sup>h</sup>ae] *to care for* / [tae] *but*

Tidore:

[kam] *village* / [gam] *water container*

Sarangani Sangire:

[ki] *village* / [ki] *to split*

Toolì:

[telem] *sharp* / [delem] *foot of hill*

Quechua:

[i] *and* [e]: [keru] *pole* / [kiru] *tooth*[o] *and* [u]: [hokta] *six* / [hukta] *one*



# 44 PHONEMES OF ENGLISH

CONSONANTS			VOWELS		
1	/p/	pig	25	/a/	apple
2	/b/	bus	26	/e/	egg
3	/t/	tiger	27	/i/	igloo
4	/d/	doll	28	/o/	octopus
5	/k/	king	29	/u/	umbrella
6	/g/	go	30	/oo/	book
7	/s/	sun	31	/ā/	plane
8	/z/	zebra	32	/ē/	bee
9	/f/	fish	33	/ī/	pie
10	/v/	violin	34	/ō/	open
11	/th/	thank	35	/ū/	music
12	/th/	this	36	/ōō/	moon
13	/h/	hat	37	/air/	chair
14	/m/	meet	38	/ēr/	deer
15	/n/	no	39	/ar/	car
16	/ng/	ring	40	/our/	four
17	/l/	like	41	/er/	bird
18	/r/	read	42	/au/	saw
19	/w/	watch	43	/ow/	cow
20	/y/	yell	44	/oi/	boy
21	/sh/	shy			
22	/ch/	chat			
23	/j/	jet			
24	/zh/	vision			