

## Phonology II

FSEM CORE S119: Language as Human Nature

Fall 2025

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### Warm-up

1. Talk to the person next to you about what superpower you'd like to have.
2. What is the symbol for a labio-dental voiced fricative? What sound differs from [g] only in having a lowered velum?

### Logistics

- First report (i.e., assignment) posted on the course website
  - Due Friday September 12 at 11:59PM on Gradescope

### Learning Objectives

- Identify simple phonological rules
- Articulate the difference between phonemes and allophones
- Describe the logic behind the determination of allophones

*Summary:* We cover the basics of phonological representations, distinguishing between universal and language specific properties of phonological systems. Along the way, we start building intuitions for phonological rules and the distribution of sounds.

## Basic Phonological Representations

IN BUILDING TOWARDS THE IPA, we have been (implicitly) working with a certain level of representation. So far we have considered **segments** or **phones** which are a constellation of articulatory gestures (jaw movements, lip shape, tongue placement, glottis state, etc). These are the basic unit of spoken language. While the specific constellation of gestures may vary by person or language, **segments** represent universal sound categories.<sup>1</sup> That is, the [p] in English is the same [p] (at a level of description) in Korean.

<sup>1</sup> American English 'r' has differing gesture constellations depending on the speaker despite sounding the same to English speakers (see [Mielke et al., 2016](#)).

However the distribution of sounds differs in each language. To help us understand this, we need to introduce two new technical terms to our toolkit, **phonemes** and **allophones**. We will work through a process together to help ground the concepts before returning to their definition.

### Aspiration in English

#### Question

Give the **phonetic transcription**, that is the IPA ‘translation’ of the sounds, for the consonants in Table 1.

BASED ON WHAT WE LEARNED LAST CLASS, there are only 5 consonants above. However, the stops actually sound different depending on the word they are in.

In English, voiceless stops can vary based on **aspiration**. Aspiration, denoted in IPA with a superscript h (as in [t<sup>h</sup>]), is a strong burst of air that is released in producing the segment.

#### Question

Return to your transcriptions in Table 1. Note which stops have aspiration.

### English Aspiration Rule

PART OF OUR KNOWLEDGE OF ENGLISH must include knowledge of where aspiration should go, otherwise how are we producing it above? The question we are faced with is did we memorize these facts for each word?

#### Question

Consider Table 2, say the following fake words and determine where aspiration is/isn't.

word	trans	word	trans	word	trans
'torble'	[t <sup>h</sup> ]	'corble'	[k <sup>h</sup> ]	'porble'	[p <sup>h</sup> ]
'stib'	[t]	'skib'	[k]	'spib'	[p]
'ort'	[t]	'ork'	[k]	'orp'	[p]

The discussion of aspiration draws from Seth Cable's wonderful Introduction to Linguistic Theory materials taught at University of Massachusetts Amherst.

word	trans	word	trans	word	trans
'top'		'cop'		'pop'	
'stool'		'school'		'spool'	
'eat'		'eke'		'eep'	

Table 1: Some basic words with voiceless stops in English

word	trans	word	trans	word	trans
'torble'		'corble'		'porble'	
'stib'		'skib'		'spib'	
'ort'		'ork'		'orp'	

Table 2: Some basic words with voiceless stops in English

## *Implications of Phonological Rules*

THE VARIATION IN ASPIRATION IS **predictable**. This fact allows us to begin making interesting claims about the mental representation of segments in English.

### Question

Suppose we worked from a principle of simplicity; the human mind only stores information that is essential. What would that have us predict about the mental representation of voiceless stops in English?

We will follow a convention in linguistics of marking the representation of phones/segments in memory with angled brackets (/.../) and the representation of phones/segments we pronounce with square brackets ([...]).

### Question

Based on our discussion here, what do you think speech production looks like, at an abstract level?

We are now ready to give definitions for the two key terms at the beginning:

- **Phoneme:** The sound as represented in memory
- **Allophone:** The sound as actually produced by a speaker

In other words, a sound [X] is an **allophone** of /Y/ if [X] is one of the ways that speakers pronounce (or realize) /Y/.

### Question

What are the allophones of /t/ in English?

The reading gave an example from Hindi demonstrating that aspiration can be **contrastive**, meaning aspirated voiceless stops are not allophones of the same phonemes as unaspirated voiceless stops in at least one language. There are also, of course, different phonemes in English that are allophones of same phoneme in another language. For example, [l] and [ɾ] in Japanese.

## Identifying Phonemes

HOW DO WE IDENTIFY PHONEMES IN A LANGUAGE? In your reading you were introduced to the term **minimal pairs**, where we find two different words that differ only in the allophones of interest. This is the empirical evidence commonly used to establish allophonic relationships. Let's unpack the logic that helps us go from minimal pairs to believing two sounds are allophones of different phonemes.

- In Thai, the following facts hold:
  - [tam] 'to pound' [t<sup>h</sup>am] 'to do'
- If [t] and [t<sup>h</sup>] were allophones of the same phoneme in Thai
  - There would be a rule that we could use to state where you would use [t] and [t<sup>h</sup>]
  - Since [t<sup>h</sup>am] is a word, this rule would entail that in this environment (that is before [am] at the beginning of a word), [t<sup>h</sup>] should be realized (i.e., pronounced)
  - But [tam] is also a word, which entails that in the same environment [t] should surface (i.e., be pronounced)
  - That's a contradiction. One rule can't require both a [t<sup>h</sup>] and a [t] in the same environment
- Thus, there isn't a rule in Thai which determines the use of [t] and [t<sup>h</sup>]
- Thus, [t] and [t<sup>h</sup>] are allophones of two different phonemes (/t/ and /t<sup>h</sup>/)

If [X] and [Y] are allophones of different phonemes, then they are **contrastive** (or they **contrast**). If [X] and [Y] are allophones of the same phoneme we say they are in **complementary distribution**.<sup>2</sup>

### Question

What implications does contrastive vs. non-contrastive allophones have on perception (e.g., what you hear)?

<sup>2</sup> Two phonemes can still be allophones of different phonemes and be in complementary distribution. That is, we don't have a 'if and only if' situation. Complementary distribution is only necessary for being allophones of the same phoneme, not sufficient. We will dig into this later. Two people can never be in the same room together, but still be different people (maybe they hate one another).

## Practice Problems

1. English is an Indo-European language spoken by more than 1 billion people. In American English, are [ɛj] and [ej] allophones of one phoneme or are they allophones of different phonemes? Consider the data below.

[sejv] "save"	[mejz] "maze"	[ɛjk] "ache"
[mɛjt] "mate"	[hejg] "Haig"	[ejb] "Abe"
[sɛjf] "safe"	[ejgdʒ] "age"	[mejd] "made"
[ɛjtʃ] "H"	[mɛjs] "mace"	[ɛpe] "ape"

2. Korean is a Koreanic language spoken by roughly 81 million people. In Korean, are [ɾ] and [l] allophones of one phoneme or are they allophones of different phonemes? Consider the data below.

[ɾubi] "ruby"	[pal] "arm"	[ilgop] "seven"
[mul] "water"	[saram] "person"	[ratio] "radio"
[kiri] "road"	[seul] "Seoul"	[ibalsa] "barber"

## References

Mielke, J., Baker, A., and Archangeli, D. (2016). Individual-level contact limits phonological complexity: Evidence from bunched and retroflex /r/. *Language*, 92(1):101–140.

## Before Next Class

- Please read and complete the pre-class quiz for Tuesday
- At least look at the first report to make sure you understand what is going on in it