

Week 7: Phonology

Study Guide

In this part of the course, we're covering the study of sounds in language. There are two fields of linguistics devoted to studying the sound systems of language:

- (1) **Phonetics (last week)**: the study of the parts of the discrete combinatorial system. What are the sounds of human language? And how do we produce these with our anatomy?
- (2) **Phonology (this week)**: the study of the rules for combining these parts. What are the sound systems of human language?

Language is not just individual sounds. When we know a language, we know how its sounds work together as a system. In **Phonology**, we consider the answer to questions like:

- Can any sounds appear in any order in a word?
- Are sounds always produced exactly the same way?
- How do we perceive and categorize the sounds?
- Do sounds influence each other when they occur together?

Phonotactic constraints

We know that languages "sound different" from each other. What are the restrictions languages have on the kinds of sounds and sound sequences possible?

- (1) **Phonetic inventories** - languages produce different sounds (when we described different consonants and vowels last week, we described different phonetic inventories).
- (2) **Phonotactic constraints** - languages can also sound very different, even if they have similar phonetic inventories due to the rules governing which sounds sequences are possible.
 - (a) **Constraints on sound combinations** - which particular sounds are permitted to occur together or in certain positions.
 - (b) **Constraints on syllable types** - languages generally prefer syllables made up of a consonant (C) first, then a vowel (V), but there is wide variation in permitted syllable structures.

Phonemes and Allophones

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.

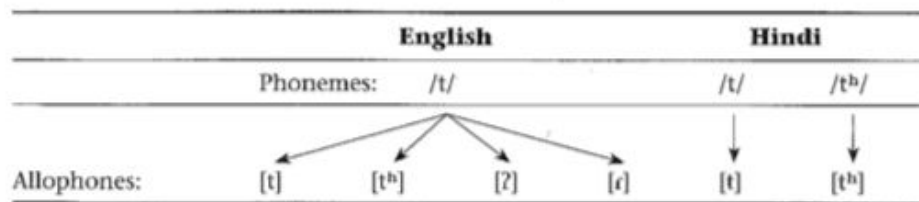
- (1) **Phoneme** - A set of speech sounds that are perceived to be variants of the same sound, written with slashes: /t/
- (2) **Allophone** - Each member of a particular phoneme set, written with square brackets: for /t/ → [t], [tʰ], [r], [ʔ]

For example, in English, in stop [stap], top [tap], little [lɪrɪ], and kitten [kɪʔn], the sounds [t], [tʰ], [r], [ʔ] are all allophones of the same phoneme /t/. We **systematically ignore** the articulatory differences (because they aren't relevant to our system) and perceive them all the same /t/.

Phonetic environments

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 consider the **distribution** of the sounds involved.

- (1) **Contrastive distribution (phonemic)** - sounds occur in the same phonetic environment, and using one rather than the other changes the meaning of the word. You can identify sounds in contrastive distribution with **minimal pairs**.
- (2) **Complementary distribution (allophonic)** - sounds do not occur in the same phonetic environment — their distributions complement each other and their distributions will be predictable.
- (3) **Free variation** - sounds occur in the same phonetic environments, but do not change the meaning of the word



Phonological Rules

Phonemes and **allophones** are different levels of structure in language — phonemes are the abstract mental entities and phones are the physical events. The mapping between phonemic and phonetic elements can be described using **phonological rules**.

- (1) **Writing rules** - We can state our observations in descriptive terms (e.g. our English example from class: “vowels become nasal when they come before a nasal consonant”). But linguists have a shorthand way of formalizing such rules.
 - (a) $/X/ \rightarrow [Y] / C_D$ where ‘X’ is the sound affected by the rule, ‘Y’ is the result of the application of the rule, and ‘C_D’ is the environment in which the rule applies. In this **conditioning environment**, C comes before the sound affected by the rule and D comes after.
 - (b) Our example from class becomes: $/vowel/ \rightarrow [nasal] / _ [nasal\ consonant]$
- (2) **Natural classes** - Are there principled reasons that sounds have similar patterning? Or is this just random chance? To answer this question, we can ask about the articulatory description of the sounds. A natural class is a group of sounds in a language that share one or more articulatory or auditory properties **to the exclusion of all other sounds in that language**.
 - (a) Example: In English, both /t/ and /d/ can be flapped [ɾ]. We can notice that /t/ is a voiceless alveolar stop and /d/ is a voiced alveolar stop; and also that they are the only oral alveolar stops in English. So, we have the **natural class** of alveolar (oral) stops.
 - (b) Beyond individual sounds - natural classes in groups of sounds
 - (i) **Sibilants** - segments with a high-pitched, hissing quality [s, ʃ, tʃ, z, ʒ, dʒ]
 - (ii) **Labial** - to refer to all of our bilabials and labiodentals [p, b, m, w, f, v]
 - (iii) **Obstruents** - obstruction of airflow (stops, fricatives, and affricates)
 - (iv) **Sonorants** - relatively open airflow (nasals, liquids, glides, and vowels)

- (3) **Types of rules** - In addition to whether they apply to natural classes, we can also classify according to the kind of process they involve.
- (a) **Assimilation** - become more like a neighbor with respect to some phonetic property (e.g. in English, alveolar nasal assimilates to the place of articulation of the following consonant).
 - (i) **Palatalization** - assimilation in which consonant becomes like a neighbor palatal.
 - (ii) **Vowel harmony** - long-distance assimilation in which all of the vowels “harmonize” or agree in some property like rounding or backness.
 - (b) **Dissimilation** - two close or adjacent sounds become less similar with respect to some property by changing one or both sounds.
 - (c) **Insertion** - a segment not present at the phonemic level is added to the phonetic form of a word
 - (d) **Deletion** - eliminate a sound that was present at the phonemic level (common on unstressed syllables in casual speech).
 - (e) **Metathesis** - change the order of the sounds (usually to make them easier to pronounce or understand)
 - (f) **Strengthening** (fortition) - make sounds stronger (e.g. English aspiration).
 - (g) **Weakening** (lenition) - make sounds weaker (e.g. flapping in English).

Phonemic Analysis

A summary of the analysis tips from the reading. See also the helpful flowchart.

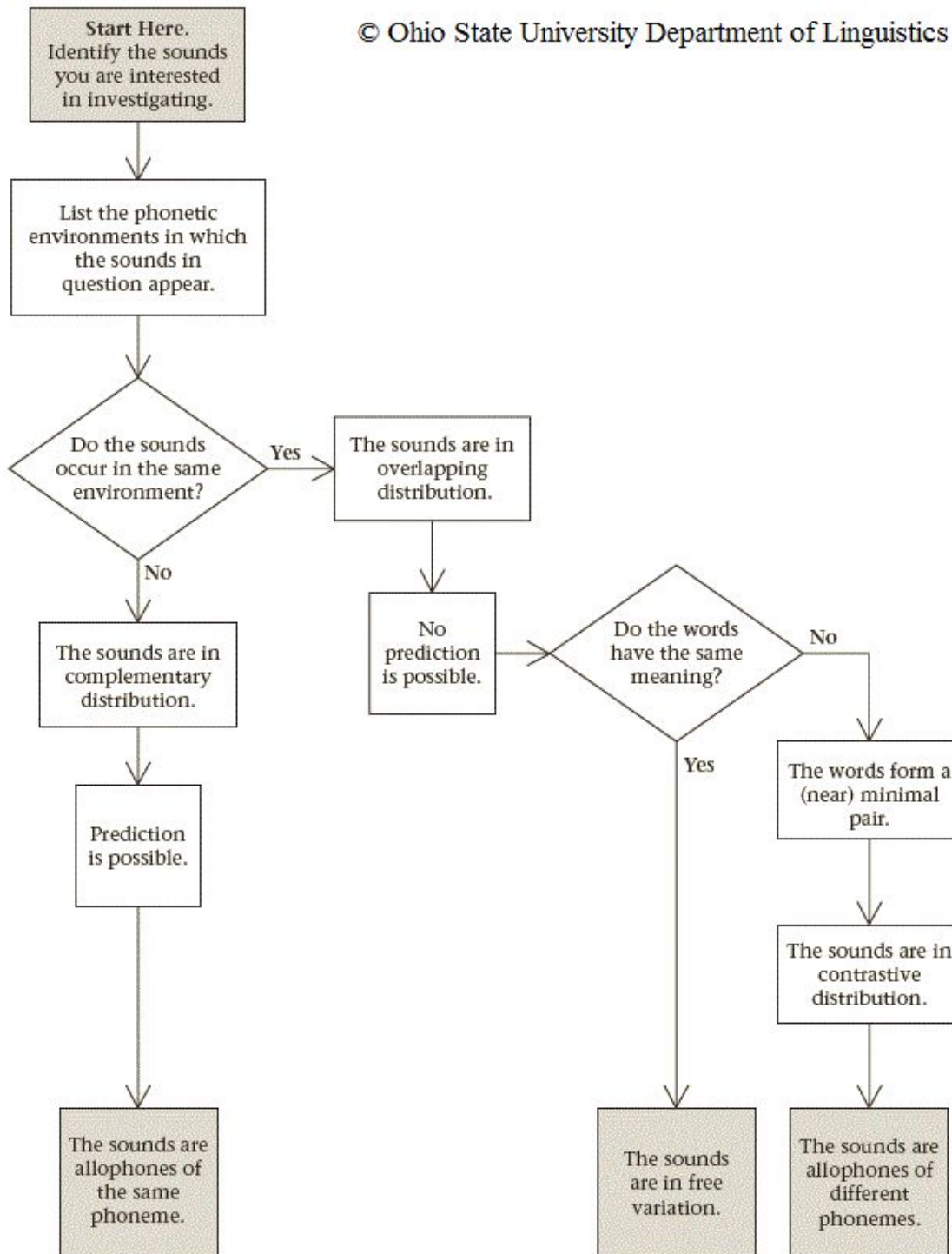
The first question you’ll usually ask is whether sounds are **allophones of the same phoneme (complementary distribution)** or **different phonemes (contrastive distribution)**. You can find out by listing the phonetic environments.

- (1) **If the sounds occur in the same environments**, ask whether there are minimal pairs. If yes, you have a contrastive distribution and the sounds are allophones of different phonemes.
- (2) **If the sounds occur in different environments**, they are in complementary distribution and they are allophones of the same phoneme. You can find a rule!

Finding and stating a phonological rule:

- (1) **Look at the environments to find natural classes.** Can you make any generalizations about the sounds [X] and [Y]? What precedes or follows them? Are they always vowels? Are they always voiced? Etc.
- (2) **Look for complementary gaps in the environment.** Can we predict which sound will appear? E.g. [X] always occurs following voiceless consonants.
- (3) **State a generalization about the distribution of each of the sounds.** In words: [X] appears following voiceless consonants and [Y] appears everywhere else.
- (4) **Determine the identity of the phoneme and its allophones.** The phoneme occurs in the most varied environments (general) and the allophone occurs in the more restricted ones (specific). Now you can write the formal rule: /Y/ → [X] / [voiceless consonants]_

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As always, your ever-present reminder: It is **really important** for you to try the practice questions in order to do well on the next exam.