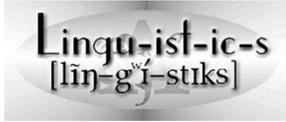


# LNGT0101

## Introduction to Linguistics



Lecture #8  
Oct 5<sup>th</sup>, 2011

## Questions

Any questions on HW2 or otherwise?

2

## Phonology: First piece of the puzzle

- Remember that the first goal of linguistic theory is to answer the following question:  
“What is it that we know when we know a language?”
- The study of phonology is one step towards this goal: It reveals to us the kind of subconscious knowledge that native speakers have about the sound system of their language.

3

## Summary of Monday’s class

- **Phonemes** are meaning-distinguishing sounds. They are abstract entities. They are unpredictable. They stand in contrastive distribution.
- **Allophones** are phonetic variants of the same phoneme. They are the physical sounds we say and hear. They are predictable. They stand in complementary distribution.
- Phonemes become allophones via phonological processes (e.g., aspiration, nasalization, devoicing, etc.). These processes are represented formally as **phonological rules**.

4

## What do we need to do?

- There are two questions we need to answer today:
- First, how do we know if two sounds in a particular language are phonemes or allophones, given a set of data from that language? For this, we follow a **step-by-step** procedure.
- Second, if two sounds turn out to be allophones of the same phoneme, how do we express this fact in terms of a phonological rule? For this, we follow a **formalization** procedure.
- We start with the step-by-step procedure first.

5

## Step-by-step procedure

- **Step 1:** Look for minimal pairs for the two sounds. If they exist, then the two sounds are phonemes. If not, move to Step 2.
- **Step 2:** Determine if the two sounds are in overlapping or complementary distribution (you can use a table for that). If overlapping, then they are most likely phonemes (but we can’t be sure). If complementary, then they are definitely allophones of the same phoneme, in which case we move to Step 3.

6

## Step-by-step procedure

- **Step 3:** Determine which one of the two allophones should be the underlying form (this is the one that typically occurs in the most environments), and which one should be the derived form (this is the one with a more restrictive distribution).
- **Step 4:** Write a formal phonological rule that shows how the derived form is obtained from the underlying form.

7

## Doing phonology problems

- So, let's put this to practice on the phonology problems I gave you on Monday.

8

## Mokilese

### 23. Mokilese

Mokilese is an Austronesian language of the Malayo-Polynesian family, spoken in Micronesia. Examine the distribution of the voiced and voiceless vowel pairs: [i, j] and [u, y] (voiceless vowels have a circle under the phonetic vowel symbol). For each pair, determine whether they are allophones of different phonemes or allophones of the same phoneme. Provide evidence for your answer. If they are allophones of one phoneme, state the contexts in which each sound occurs and decide which sound is the basic sound. Can any generalizations be made? (*Hint:* Refer to natural classes.)

|                |                  |             |                       |
|----------------|------------------|-------------|-----------------------|
| a. [pisan]     | 'full of leaves' | g. [tuduk]  | 'flesh'               |
| b. [dupukda]   | 'bought'         | h. [kaskas] | 'to throw'            |
| c. [puko]      | 'basket'         | i. [poki]   | 'to strike something' |
| d. [kisa]      | 'we two'         | j. [pil]    | 'water'               |
| e. [dypwo]     | 'firewood'       | k. [apid]   | 'outrigger support'   |
| f. [kamwəkiti] | 'to move'        | l. [ludguk] | 'to tackle'           |

9

## Sindhi

### 24. Sindhi

The following data are from Sindhi, an Indo-European language of the Indo-Aryan family, spoken in Pakistan and India. Examine the distribution of the phones [p], [pʰ], and [b]. Determine if the three are allophones of separate phonemes or allophones of the same phoneme. What is your evidence? Is the relationship among the sounds the same as in English? Why or why not?

|            |                 |             |           |
|------------|-----------------|-------------|-----------|
| a. [panu]  | 'leaf'          | g. [taru]   | 'bottom'  |
| b. [vəɖɖu] | 'opportunity'   | h. [kʰato]  | 'sour'    |
| c. [feki]  | 'suspicious'    | i. [bədɖu]  | 'run'     |
| d. [gədo]  | 'dull'          | j. [banu]   | 'forest'  |
| e. [daru]  | 'door'          | k. [bətʃu]  | 'be safe' |
| f. [pʰənu] | 'hood of snake' | l. [dʒəɖɖu] | 'judge'   |

10

## Standard Italian

### 25. Standard Italian

Consider the following data from Standard Italian, an Indo-European language of the Romance family, spoken in Italy. Answer the questions that follow.

|             |          |             |            |
|-------------|----------|-------------|------------|
| a. [tinta]  | 'dye'    | g. [tiŋgo]  | 'I dye'    |
| b. [tenda]  | 'tent'   | h. [teŋgo]  | 'I keep'   |
| c. [dantsa] | 'dance'  | i. [fuŋgo]  | 'mushroom' |
| d. [nero]   | 'black'  | j. [bjəŋka] | 'white'    |
| e. [dʒente] | 'people' | k. [aŋke]   | 'also'     |
| f. [sapone] | 'soap'   | l. [faŋgo]  | 'mud'      |

- Are there any minimal pairs? If so, what are they, and what can you conclude to be true of Italian from those minimal pairs?
- State the phonetic environments in which the sounds [n] and [ŋ] appear. Identify any natural classes of sounds that appear in the environments you've provided.
- Given what you know about the distribution of sounds and the environments you listed in (ii), are [n] and [ŋ] in complementary or contrastive distribution? Please explain your answer.

11

## Standard Spanish

### 26. Standard Spanish

Standard Spanish is an Indo-European language of the Romance family. Examine the phones [d] and [ð]. Determine whether they are allophones of one phoneme or of separate phonemes. If they are allophones of one phoneme, identify the type of distribution. If they are in complementary distribution, state a rule that describes the distribution. If [d] and [ð] are allophones of separate phonemes, give minimal pairs that prove this.

|            |           |             |           |
|------------|-----------|-------------|-----------|
| a. [drama] | 'drama'   | g. [komiða] | 'food'    |
| b. [dolor] | 'pain'    | h. [anda]   | 'scram'   |
| c. [dime]  | 'tell me' | i. [sweldo] | 'salary'  |
| d. [kaða]  | 'each'    | j. [duraɾ]  | 'to last' |
| e. [laða]  | 'side'    | k. [toldo]  | 'curtain' |
| f. [oða]   | 'hatred'  | l. [falda]  | 'skirt'   |

12

## Russian

### 27. Russian

Russian is an Indo-European language of the Slavic family, spoken in Russia. Determine from the following Russian data whether [a] and [ɑ] complement each other as allophones of the same phoneme or whether they are in contrast as allophones of separate phonemes. If they are allophones of separate phonemes, provide evidence for your claim. If they are in complementary distribution, pick one allophone as the basic sound, and give the conditioning phonetic contexts for its allophones. ([ɨ] represents a velarized [i], [ɤ] a palatalized alveolar fricative, and [mʲ] a palatalized voiced bilabial nasal.)

|            |            |             |             |
|------------|------------|-------------|-------------|
| a. [atəm]  | 'atom'     | f. [upaɨ]   | 'he fell'   |
| b. [dva]   | 'two'      | g. [dat]    | 'he gave'   |
| c. [dar]   | 'gift'     | h. [pa:tkə] | 'stick'     |
| d. [masʲ]  | 'ointment' | i. [ukraɨə] | 'she stole' |
| e. [mʲatə] | 'mint'     | j. [braɨ]   | 'he took'   |

13

## Tojolabal

### 32. Tojolabal

Tojolabal is a Mayan language of the Kanjobalan-Chujean family, spoken in Mexico. Determine whether plain [k] and glottalized [kʰ] are allophones of a single phoneme, in free variation, or in contrast. Support your answer with specific examples. (*Hint: Don't forget that near-minimal pairs can be as convincing as minimal pairs.*)

|             |                |              |                     |
|-------------|----------------|--------------|---------------------|
| a. [kisim]  | 'my beard'     | g. [sak]     | 'white'             |
| b. [tʰak'a] | 'chop it down' | h. [kʰiʃin]  | 'warm'              |
| c. [koktiɨ] | 'our feet'     | i. [skutʃu]  | 'he is carrying it' |
| d. [kʰak]   | 'flea'         | j. [kʰuztes] | 'to dress'          |
| e. [pʰakan] | 'hanging'      | k. [snika]   | 'he stirred it'     |
| f. [kʰaʔem] | 'sugar cane'   | l. [zakʰ]    | 'read'              |

14

The formalization procedure:  
Representing our phonological  
knowledge in the form of rules

15

## Phonological rules

- Informally speaking, a phonological rule takes an underlying form as **input**, **operates** on it, and derives a surface form as **output**. The operation of the rule, however, is subject to a main restriction: it has to occur in a certain phonological **environment**.

16

## Phonological rule notation

- Abstractly, we can represent this in the following notation:  
$$X \rightarrow Y / \_ Z$$
- Basic definitions:** the '→' means 'changes to'; the slash '/' means 'in the environment of'; and the '\_\_\_' positions the input in the environment (that is, before or after the relevant segments that determine the phonological change).
- What this rule simply says is that an input X is changed to Y when it occurs before Z.

17

## Phonological rule notation

- Suppose instead that we want to say that X changes to Y *after* (rather than *before*) Z. How do we do that in rule notation?
- Well, a simple change will get us the required result:

$$X \rightarrow Y / Z \_$$

18

## Phonological rule notation

- Suppose further we want to place a certain restriction on the occurrence of the input sound. For example, that it has to occur “syllable-initially” or “at a word boundary.”
- Again, we can come up with two simple notations to indicate this:

19

## Phonological rule notation

- By convention, we will use “\$” to indicate a syllable boundary, and “#” to indicate a word boundary.
- Now, read the following rules. Can you figure out what they mean?

$X \rightarrow Y / \$ \underline{\quad}$

$X \rightarrow Y / \underline{\quad} \#$

20

## Phonological rule notation

- In some cases an element in the environment may be optional. How do we represent that in the notation of our rules?
- **Parentheses** will do the trick. Consider this rule. What does it mean?

$X \rightarrow Y / \underline{\quad} (Z) \#$

21

## Phonological rule notation

- Sometimes we might have more than one context for the application of a rule. How do we indicate that using our rule notation?
- **Braces** come to the rescue, as in this rule:

$X \rightarrow Y / \underline{\quad} \left. \begin{array}{c} \{ Z \\ \# \} \end{array} \right\}$

- The above rule simply means that “X changes to Y **either** before Z **or** at word boundary.”

22

- Ok, so why don't we look at some concrete examples to see how this works?

23

## /l/-devoicing

- Let's start with the rule for /l/ devoicing in English. Informally put, the rule says  
“/l/ gets devoiced when following a syllable-initial voiceless stop.”
- How do we represent this in phonological rule notation?  
 $/l/ \rightarrow [l] / \$ [\text{voiceless stop}] \underline{\quad}$
- Now, in which of these words does /l/-devoicing take place?

*place, pile, claim, booklet, meatloaf*

24

## Aspiration

- How about aspiration of voiceless stops in English?  
“Voiceless stops become aspirated in English when they occur syllable-initially.”
- How do we represent that in formal rule notation in phonology?  
[voiceless stop] → [aspirated] / \$ \_\_\_\_
- Now, in which of these words does aspiration take place?  
*tone, stone, maintain, intimidate*

25

## Challenging the aspiration rule

- But now, consider this:  
Usain Bolt runs [fæstəɪ] than any other human being.
- Why no aspiration here?

26

## Vowel nasalization

- Now, vowel nasalization:  
“In English, vowels become nasalized when they are followed by a nasal consonant.”
- Rule notation:  
V → [nasal] / \_\_\_\_ [nasal]
- How about the word *phonetics* [fənetiks]?
- And how about vowel nasalization in Scots Gaelic? Remember the rule?

27

## Vowel length in English

- Remember the rule for vowel length in English?
- Vowels are lengthened before voiced consonants, but not before voiceless consonants:  
bad [bæ:d]    bat [bæt]  
leave [li:v]    leaf [lif]
- How would the rule look like in formal notation?

28

## Vowel length in English

- But now consider these cases:  
obey [oubeɪ]  
redo [ɪdu]
- Why is there no vowel lengthening here?

29

## Deletion

- How about deletion rules? For these, we use the symbol Ø in the output of the rule (i.e., after the arrow).
- How do we represent this in rule notation?  
C → Ø / \_\_\_\_ # C

30

## Epenthesis

- The  $\emptyset$  comes in handy for phonological rules that insert sounds as well. The key difference here is that the  $\emptyset$  will be in the input to the rule.
- For example, in some English dialects, consonant clusters of [l] and another consonant are not allowed in syllable-final position. Speakers of these dialects, therefore insert a [ə] to fix the syllable, e.g., *milk* [milək].
- In rule notation, this would be represented as:  
 $\emptyset \rightarrow [ə] / [l] \_\_\_ C \$$
- Predict how speakers of these dialects say *elf* and *milky*?

31

## So, which form is derived from the other?

- Question: Given two allophones of one phoneme in the language, how do we decide which one is the underlying form and which one is the surface form? In other words, which one is *derived* from the other?
- As a case in point, we assumed that oral vowels in English get nasalized before nasal consonants. But what would go wrong if we assume instead that nasal vowels get “oralized” before nonnasal consonants?

32

## So, which form is derived from the other?

- The rule of thumb is this: The form that occurs in a larger number of phonetic contexts is most likely to be the underlying form. The form that is restricted in its occurrence to particular contexts is most likely to be a derived form. The underlying form, thus, is typically the *elsewhere* form.

33

## So, which form is derived from the other?

- For example, in English oral vowels occur initially, finally, as well as before nonnasal consonants. Nasal vowels, by contrast, occur only before nasal consonants.
- Conclusion: English vowels are underlyingly oral.
- Can you extend this reasoning to aspiration in English?

34

## Revisiting earlier phonology problems

- For practice on phonological rule notation, go back to the phonology exercises we solved in class, and write a phonological rule for the allophonic variation in the following languages.
- Mokilese
- Italian
- Spanish

35

## Next class agenda

- Morphology: Chapter 3, pp. 76-99.

36