LNGT0101
Introduction to Linguistics

Lingu–ist–ic–s
[lɪŋ–gʷɪ̃–stɪks]

Lecture #10
Oct 10th, 2012

Announcements

- Homework assignment 3 is posted on the website. You have till Monday Oct 22nd to turn it in.
- We probably won't have class presentations until after the midterm, unless some topic arises in class discussion leading to one of the Myths.
- The textbook readings.

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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.

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What do you know when you know that English has a /t/ sound?

- Native speakers of English, like most of you are, know that English has one /t/ sound in the words *team, steam, rat*, and *writer*, but at the same time you pronounce each /t/ in a different way: as [tʰ], [t], [t˺], or [ɾ], depending on the phonological context.

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Phonemes vs. allophones

- **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 by **phonological rules**.

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Two main questions in phonological analysis

- **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 the **step-by-step** procedure we discussed on Monday.
- **Second**, if the 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.

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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 draw 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.

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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 typically with a more restrictive distribution).
- **Step 4**: Write a formal phonological rule that shows how the derived form is obtained from the underlying form. We discuss that step today.

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

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Phonological rules

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

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Phonological rule notation

- Abstractly, we can represent this in the following notation: X → Y/ ___ Z
- **Basic definitions**:
  - the '→' means 'changes to';
  - the slash '**/**' means 'in the environment of'; and
  - the '**___**' positions the input in relation to other elements in the phonological environment (e.g., before or after).
- What this rule simply says is "*An input X changes to Y when it occurs before Z.*"

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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 → Y / Z ___

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An example: Vowel nasalization in English vs. Scots Gaelic

- English vowel nasalization:
  "In English, vowels become nasalized before a nasal consonant."
- Formal rule: V → [nasal] / ___ [nasal]
- But now, how about vowel nasalization in Scots Gaelic, where vowels become nasalized after nasal consonants. How do we express that in rule notation?

  V → [nasal] / [nasal] ___

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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 either environment.

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Phonological rule notation

- By convention, we will use "$" to indicate a syllable boundary, and "#" to indicate a word boundary.
- Now, read the following abstract rules.
  - X → Y / $ ___
  - X → Y / ___ $
  - X → Y / ___ #
- Can you figure out what each means?

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Aspiration

- Let's consider the rule for 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

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Challenging the aspiration rule

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

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/l/-devoicing

- Consider now 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/ → [l̥] / $ [voiceless stop] ___
- Now, in which of these words does /l/-devoicing take place?
  place, pile, claim, booklet, meatloaf

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Vowel length in English

- Remember the rule for vowel length in English?
    - "Vowels are lengthened before voiced consonants."
    - bad   [bæːd]   bat   [bæt]
    - leave   [liːv]   leaf   [lif]
- How would the rule look like in formal notation?

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Vowel length in English

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

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Revisiting vowel nasalization

- There is no vowel nasalization in the pronunciation of the word *phonetics* [fənɛtɪks], contrary to our earlier rule:
    - V → [nasal] / ___ [nasal]
- Can you now figure out why?

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Word-final devoicing

- Suppose a language has the following rule:
    - "A voiced stop gets devoiced if it occurs at the end of a word."
- How do we represent this in phonological rule notation?
    - [voiced stop] → [voiceless] / ___ #
- German *Bad* 'bath' is pronounced [baːt].

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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 say?
    - X → Y / ___ (Z) $

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Vowel nasalization 'at a distance'

- Suppose a language has a rule like this one:
    - "Vowels become nasalized before nasal consonants in coda position, even if there is another consonant intervening."
- So, in such a language, the following holds:
    - lam [lãm]   latm [lãtm]
- How do we represent this in phonological rule notation?
    - V → [nasal] / ___ (C) [nasal] $

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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:

$$X \rightarrow Y / \_\_\_ \begin{Bmatrix} Z \\ \# \end{Bmatrix}$$

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

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Deletion

- How about deletion rules? For these, we use the symbol Ø in the output of the rule (i.e., after the arrow). What does the following rule say?

$$C \rightarrow \text{Ø} / \_\_\_ \#$$

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Deletion

- Suppose a language has the following rule:

  "A consonant deletes if it occurs at the end of a word, unless the next word starts with a vowel."

- How do we represent this in phonological rule notation?

$$C \rightarrow \text{Ø} / \_\_\_ \# C$$

- French: *les garçons* versus *les amis.*

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Deletion in multiple contexts

- Suppose a language has the following rule:
- "Do not pronounce /r/ if it is followed by a consonant in coda position or if it is word-final."
- How do we represent this in phonological rule notation?

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Deletion in multiple contexts

$$/r/ \rightarrow \text{Ø} / \_\_\_ \begin{Bmatrix} C\$ \\ \# \end{Bmatrix}$$

- RP: *farm* and *dear*

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Epenthesis

- The Ø comes in handy for phonological rules that insert sounds as well. The key difference here is that the Ø 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* is pronounced [milək].
- In rule notation, this would be represented as:

$$\text{Ø} \rightarrow [ə] / [l] \_\_\_ C \$$$

- Predict how speakers of these dialects say *elf* and *milky*?

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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?

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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.
- **Note**: A 'larger number of contexts' does not mean 'a larger number of words in the data.'

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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?

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Revisiting earlier phonology problems

- For practice on phonological rule notation, let's go back to the phonology exercises we did last time in class, and write a phonological rule for each case of allophonic variation in each language.

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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.** [bjaŋka]	'white'
e. [dʒɛnte]	'people'		**k.** [aŋke]	'also'
f. [sapone]	'soap'		**l.** [faŋgo]	'mud'

    i. Are there any minimal pairs? If so, what are they, and what can you conclude to be true of Italian from those minimal pairs?
    ii. 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.
    iii. 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.

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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.** [durar]	'to last'
e. [laðo]	'side'		**k.** [toldo]	'curtain'
f. [oðio]	'hatred'		**l.** [falda]	'skirt'

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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. ([ɫ] represents a velarized [l], [sʲ] a palatalized alveolar fricative, and [mʲ] a palatalized voiced bilabial nasal.)

a.	[atəm]	'atom'	**f.**	[upɑɫ]	'he fell'
b.	[dva]	'two'	**g.**	[dɑɫ]	'he gave'
c.	[dar]	'gift'	**h.**	[pɑːɫkə]	'stick'
d.	[masʲ]	'ointment'	**i.**	[ukrɑɫə]	'she stole'
e.	[mʲatə]	'mint'	**j.**	[brɑɫ]	'he took'

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Korean

29. Korean

Korean is a "language isolate," meaning that it is not linguistically related to other languages. It is spoken in Korea. In the following Korean words, you will find the sounds [s] and [ʃ]. Determine whether the sounds [s] and [ʃ] are allophones of the same phoneme or separate phonemes. If the sounds are allophones of the same phoneme, give the basic and derived allophones and the environment in which the derived allophone occurs.

a.	[ʃi]	'poem'	**j.**	[saɫ]	'flesh'
b.	[miʃin]	'superstition'	**k.**	[kasu]	'singer'
c.	[ʃinmun]	'newspaper'	**l.**	[sanmun]	'prose'
d.	[tʰaksaɲʃige]	'table clock'	**m.**	[kasəl]	'hypothesis'
e.	[ʃilsu]	'mistake'	**n.**	[miso]	'smile'
f.	[oʃip]	'fifty'	**o.**	[susek]	'search'
g.	[paɲʃik]	'method'	**p.**	[tapsa]	'exploration'
h.	[kaɲʃik]	'snack'	**q.**	[so]	'cow'
i.	[kaʃi]	'thorn'			

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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, i̥] and [u, u̥] (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.	[pi̥san]	'full of leaves'	**g.**	[uduk]	'flesh'
b.	[dupu̥kda]	'bought'	**h.**	[kaskas]	'to throw'
c.	[pu̥ko]	'basket'	**i.**	[poki]	'to strike something'
d.	[ki̥sa]	'we two'	**j.**	[pil]	'water'
e.	[su̥pwo]	'firewood'	**k.**	[apid]	'outrigger support'
f.	[kamwɔki̥ti]	'to move'	**l.**	[ludʒuk]	'to tackle'

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Next class agenda

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

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