

INTD0112

Introduction to Linguistics

Lecture #8
Sept 30th, 2009

Announcements

- Just a reminder: HW2 due on Friday in my mailbox or by e-mail by 12:30pm. Delay policy applies.
- First talk in the linguistics series is next Wednesday. There's a five-point of extra credit for writing a one-page report on the talk.
- Thai tongue twisters:
<http://learn-thai-podcast.com/blog/learn-thai-lessons/learn-thai-lesson-tongue-twisters-pronunciation-training/>

Phonology

Phonology

- While phonetics studies how speech sounds are articulated, what their physical properties are, and how they are perceived, phonology studies the organization of speech sounds in a particular language.
- As it turns out, while two or more languages may have the same sounds, no two languages organize their sound inventories in the same way.

[s] and [ʃ] in Japanese vs. English

- In both English and Japanese we hear the sounds [s] and [ʃ]:
Japanese: [ʃimasu] “do”
English: [slæʃ] “slash”
- In English, however, the two sounds can distinguish meaning, e.g.,
[ʃor] “shore” vs. [sor] “sore”
- The occurrence of each sound is thus **unpredictable** in English.

[s] and [ʃ] in Japanese vs. English

- By contrast, in Japanese, we do not find pairs where [s] and [ʃ] create a difference in meaning. Consider these Japanese words:
[ʃimasu] “do” [higaʃi] “east”
[sensei] “teacher” [san] “three”
- Can you make a guess where each of [s] and [ʃ] occurs?

Phonology

- Phonology addresses these questions:
- Which sounds are predictable in a particular language?
- What is the phonetic context that allows us to predict the occurrence of these sounds?
- How can we “formalize” speakers’ phonological knowledge in rule notation?
- We discuss this today.

Subconscious phonological knowledge

- Native speakers of a particular language typically treat certain sounds as being the same, even when they are phonetically different, e.g.,
 - the [l] in *lay* and *play*
 - the [t] in *top* and *stop*
- But other sounds are considered to be distinct:
 - the [l] and the [r] in *light* and *right*
 - the [p] and the [b] in *pan* and *ban*

Phonemes vs. allophones

- Phonologists explain the difference by invoking a distinction between **phonemes** and **allophones**.
- A phoneme is a meaning-distinguishing sound, whereas an allophone is a phonetic variant of a particular phoneme.

Minimal pairs

- But how do we know if two sounds are two separate phonemes, or are simply phonetic variants of the same phoneme?
- Answer: **Minimal pairs**.
- A minimal pair is a set of two words that have the same sounds in all positions except one.

Phonemes or allophones?

- So, bearing this in mind, let’s go back and look at the examples we discussed earlier.
- Based on the minimal pair *light* and *right*, are the [l] and [r] phonemes or allophones in English?
- Based on the minimal pair *pan* and *ban*, are the [p] and [b] phonemes or allophones in English?

Phonemes or allophones?

- Based on the minimal pair *shore* and *sore* (remember spelling is irrelevant to phonology), are the [s] and [ʃ] phonemes or allophones in English?
- How about these further minimal pairs?
 - seat* and *sit*
 - fool* and *full*
 - sip* and *zip*
 - leaf* and *leave*

Phonemes or allophones?

- Now, let's consider the following minimal pairs:
 - tar*: [tʰaɪ] vs. *[taɪ]
 - star*: [staɪ] vs. *[stʰaɪ]
- Now, here's the question: Are the two sounds [tʰ] and [t] phonemes or allophones in English?
- Since [tʰ] and [t] are **not contrastive** in English, they are two allophones of the same phoneme, which we might represent here as /t/.
(Notice the slash, rather than the square bracket, notation.)

Phonemes or allophones?

- Let's consider another example:
play: [p] vs. [pʰ]
- Here's the question: Are [p] and [pʰ] phonemes or allophones in English?
- Right. Since they are not contrastive, then they are allophones of the same phoneme, which we may represent here as /p/.

Phonemes or allophones?

- How about nasal vowels in English? Are they phonemes or allophones?
- First, let's try to find (or construct) a couple of minimal pairs:
 - pin* [pʰiɲ] vs. *[pʰɪn]
 - pit* [pʰɪt] vs. *[pʰɪ̃t]
- Is the contrast here phonemic or allophonic?

So, how do languages differ, then?

- One reason why human languages differ in their sound inventory is that what is considered a phoneme in one language is an allophone in another, and what is an allophone in one language is a phoneme in another.
- So, for example, the aspiration variation is allophonic in English, but not in Thai. Consider these data from Thai:

[paa] "forest"	[pʰaa] "to split"
[tam] "to pound"	[tʰam] "to do"
[kat] "to bite"	[kʰat] "to interrupt"

So, how do languages differ, then?

- Now, consider nasal vowels in French:
gars [ga] "lad" *gant* [gã] "glove"
- Are they phonemes or allophones?
- How about Akan, a Ghanaian language?

[ka] "bite"	[kã] "speak"
[tu] "pull"	[tũ] "den"
[pam] "sew"	[pãm] "confederate"

Distribution: contrastive vs. complementary

- From all these examples, you should've noticed that different allophones occur in different environments, that is, where one of them occurs, the other doesn't, and vice versa, which is not the case with phonemes.
- We say that allophones occur in **complementary distribution**, whereas phonemes occur in **contrastive distribution**. And this is one main distinction between a phoneme and an allophone.

Phonemes are abstract entities

- So, phonemes are meaning-distinguishing sounds, whereas allophones are phonetic variants of the same phoneme that occur in specific contexts.
- Notice that this means that phonemes are actually **abstract** entities in your head rather than actual sounds that come out of your mouth. Such physical sounds are allophones, the concrete manifestations of the abstract phonemes.

Phonemes are abstract entities

- The psychological existence of phonemes can be noticed in native speakers' slips of the tongue, e.g., *key chain* [ki tʃejn] may come out as [tʃi kejn], but never as [ti kʃejn].
- This shows that [tʃ] is stored in the mind as a single unit, just as [k] is.

Note on transcription

- Remember the distinction between broad phonetic transcription and narrow phonetic transcription? We can now understand this better in terms of phonemic vs. phonetic transcription.
- In phonemic transcription, only phonemes are transcribed. In phonetic transcription, the allophones of each phoneme are transcribed.

Steps for solving phonology problems

- Given two sounds and a set of data, the task is to determine if the two sounds are separate phonemes or allophones of the same phoneme. To do that, we proceed methodically.

Minimal pairs?

- Step 1:
See if there are any **minimal pairs** in the data where the two sounds in question are in **contrastive** distribution. If yes, then the two sounds are phonemes. If not, then proceed to step 2.

Overlapping or complementary?

- Step 2:
Find out if the two sounds are in overlapping or in complementary distribution.
 - If **overlapping**, then the two sounds are in free variation, hence allophones of the same phoneme.
 - If **complementary**, then the sounds are allophones of the same phoneme, in which case state the phonological environments in which each allophone occurs and then move to step 3.

Which is underlying, and which is derived?

- Step 3:

Once you determine the environments in which each sound occurs, it is time to determine which one is the underlying form and which one is derived. In most cases, the sound that appears in more environments can be taken to represent the underlying phoneme.

Write a rule!

- Step 4:

Now, you are in a position to write a phonological rule that shows the process whereby the allophones are derived from the underlying phoneme.

Some phonology problems

- Consider the following Finnish words:

- | | |
|------------------------|-------------------------|
| 1. [kudot] “failures” | 2. [katot] “roofs” |
| 3. [kate] “cover” | 4. [kade] “envious” |
| 5. [madon] “of a worm” | 6. [ratas] “wheel” |
| 7. [maton] “of a rug” | 8. [radon] “of a track” |

- Question: Are [t] and [d] two different phonemes or two allophones of the same phoneme in Finnish?

Some phonology problems

- Now, consider these Tagalog words:

1. [datiŋ] “to arrive”	6. [dara?iŋ] “will complain”
2. [dami] “amount”	7. [marumi] “dirty”
3. [dumi] “dirt”	8. [marami] “dirty”
4. [daratiŋ] “will arrive”	9. [da?iŋ] “to complain”
5. [mandurukot] “pickpocket”	10. [mandukot] “to go pickpocketing”

- Question: Are [d] and [r] phonemes or allophones?

Some phonology problems

- Sindhi.
- Italian.
- Spanish.
- Russian.

Summary

- Phonemes** are meaning-distinguishing sounds. They are unpredictable. They are abstract entities.
- Allophones** are phonetic variants of the same phoneme. They are predictable. They are the physical sounds we produce.
- Phonemes become allophones via phonological processes, which are represented formally as **phonological rules**. We discuss these on Monday.

Formalizing our phonological knowledge

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**.

Phonological rule notation

- Abstractly, we can represent this in the following notation:
$$X \rightarrow Y / _ _ Z$$
- **Basic definitions:** the “ \rightarrow ” 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.

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?
- Well, a simple change will get us the required result:

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

Phonological rule notation

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

Phonological rule notation

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

$$X \rightarrow Y / \sigma _ _$$

$$X \rightarrow Y / _ _ \#$$

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?
- **Brackets** will do the trick. Consider this rule. What does it mean?

$$X \rightarrow Y / _ (Z) \sigma$$

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:

$$X \rightarrow Y / _ \left\{ \begin{array}{l} Z \\ \# \end{array} \right\}$$

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

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

[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?

$$/l/ \rightarrow [l̥] / \sigma [\text{voiceless stop}] _$$

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?

$$[\text{voiceless stop}] \rightarrow [\text{aspirated}] / \sigma _$$

Vowel nasalization

- Now, vowel nasalization:
“In English, vowels become nasalized when they are followed by a nasal consonant.”
- Rule notation:
 $V \rightarrow [\text{nasal}] / _ [\text{nasal}]$
- Ok, but how about vowel nasalization in Scots Gaelic? Remember the rule?

Deletion

- How about deletion rules?
- For these, we use the symbol \emptyset in the output of the rule (i.e., after the arrow).
- For example, English speakers delete the [ə] in an open syllable when it is followed by a stressed syllable, as in *police* [pɒlɪs].
- How do we represent this in rule notation?

$[ə] \rightarrow \emptyset / C_0 _ \sigma C_0 V_{\text{stressed}}$

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:
 $\emptyset \rightarrow [ə] / [l] _ C \sigma$

So, which one 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?

So, which one 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.

So, which one 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?

Next class agenda

- Phonological rules and some phonology problems.
- Morphology: Chapter 3.