Advanced Phonetics and Phonology

1302741

Lecture (4)

MORE ON PHONEMES
Phonemic Analysis and Writing

- the English phoneme /eɪ/ can be spelled in quite a few ways: say /seɪ/, Abe /eɪb/, main /meɪn/, beige /beɪʒ/, reggae /rɛɡɛɪ/, H /eɪtʃ/.

- the conscious intuitions of speakers about sounds tend to be heavily influenced by their knowledge of spelling – after all.
spoken language is far older than writing, it is acquired first and with greater ease by children, and it is the common property of our species, rather than of just an educated subset of it.
We can ask: is it legitimate to suppose that speakers actually produce and perceive language (at an unconscious level) in terms of phonemes?

1. Audibility of fine distinctions
2. The notion of “same sound”
3. Foreign accents and transfer
The auditory processing apparatus is “tuned” through experience to be able to extract precisely those phonetic distinctions that are phonemic in the perceiver’s own language.
The Psychological Reality of the Phoneme
Audibility of fine distinctions

- **Bengali**: dental stops (tongue tip touches upper teeth) contrast with alveolar stops (tongue tip touches alveolar ridge):

<table>
<thead>
<tr>
<th>Bengali</th>
<th>[تان]</th>
<th>‘(vocal) tune’</th>
<th>[تان]</th>
<th>‘pull!’</th>
</tr>
</thead>
<tbody>
<tr>
<td>[سات]</td>
<td>‘seven’</td>
<td>[سات]</td>
<td>‘sixty’</td>
<td></td>
</tr>
<tr>
<td>[دان]</td>
<td>‘donation’</td>
<td>[دان]</td>
<td>‘right (hand)’</td>
<td></td>
</tr>
<tr>
<td>[دين]</td>
<td>‘day’</td>
<td>[ديم]</td>
<td>‘egg’</td>
<td></td>
</tr>
</tbody>
</table>

- **English**: dental stops (tongue tip touches upper teeth) **do not** contrast with alveolar stops:

<table>
<thead>
<tr>
<th>English</th>
<th>/ئىثٞ/</th>
<th>[ئىثٞ]</th>
<th>eighth</th>
<th>/ئىث دًا/</th>
<th>[ئىث دًا]</th>
<th>ate the…</th>
</tr>
</thead>
<tbody>
<tr>
<td>/وٍد ٌوٍد</td>
<td>[وٍد ٌوٍد]</td>
<td>would think</td>
<td>/سد دًا/</td>
<td>[سد دٍس]</td>
<td>said this</td>
<td></td>
</tr>
<tr>
<td>/تان</td>
<td>[تان]</td>
<td>tenth</td>
<td>/ين دًا/</td>
<td>[ين دًا]</td>
<td>in the…</td>
<td></td>
</tr>
</tbody>
</table>
The Psychological Reality of the Phoneme
Audibility of fine distinctions

- A native speaker of English is more likely to be unable to hear the dental/alveolar distinction in Bengali because her native language does not have a phonemic contrast between alveolars and dentals.

- The contrastiveness of two phonetically similar sounds leads speakers of a language or dialect that has the contrast to focus their perceptual attention on the contrasting sounds, and fail to hear other distinctions.
The Psychological Reality of the Phoneme
Audibility of fine distinctions

• to elicit new data from a native speaker by a non-native speaker, it is likely to have trouble in hearing the finer phonemic distinctions that do not occur in the one’s own language.

• In such cases, you can often improve the quality of your data by having your consultant help you listen, using the method of **keywords**.
The Psychological Reality of the Phoneme

The notion of “same sound”

• Groups of mutually non-distinctive sounds are grouped together into categories, that is, the phonemes.

• Linguists have found that speakers usually believe that two allophones of the same phoneme are the “same sound,” despite the phonetic difference between them.

• The vowel in ten and Ted

Vowel Nasalization

[+vowel] → [+nasal] / ___ [+nasal]

A vowel is realized as nasalized when it precedes a nasal consonant.
The Psychological Reality of the Phoneme

The notion of “same sound”

- The application of the rule of the nasalisation of the vowel in *ten* and *Ted* is shown below:

  \[
  \begin{array}{ccc}
  \text{ten} & \text{Ted} \\
  /tɛn/ & /tɛd/ \\
  \text{ê} & \text{—} \\
  [tɛn] & [tɛd] \\
  \text{underlying forms} & \text{Vowel Nasalization} & \text{surface forms}
  \end{array}
  \]
The Psychological Reality of the Phoneme
The notion of “same sound”

- However, minimal pairs show that in French, nasal vowels are phonemically distinct from oral vowels.

\[
\begin{align*}
[mɛ] & \quad \text{‘but’} & \quad \text{vs.} & \quad [mẽ] & \quad \text{‘hand’} \\
[tɛɛ] & \quad \text{‘very’} & \quad \text{vs.} & \quad [tɛɛ] & \quad \text{‘train’}
\end{align*}
\]

- For French speakers, it is plain that [ɛ] and [ê] are different sounds.

- to a rough approximation, if two phones are allophones of the same phoneme, a speaker of the language in question will feel that they are the same sound.
The Psychological Reality of the Phoneme

The notion of “same sound”

• once speakers have been made aware of the existence of speech sounds in their language, they will naturally tend to consider allophones of the same phoneme as counting as the same sound.
The Psychological Reality of the Phoneme
Foreign accents and transfer

• speakers internalize rules that derive the various allophones in their appropriate environments.

• careful inspection of the performance of second language learners shows that the deviations between the goal and what is achieved are *systematic*; and can usually be attributed to the phonology, including the phonological rules, of one’s native language.

• The phenomenon of mispronunciations in a second language in ways attributable to the phonology of the first language is called **transfer**.
The Psychological Reality of the Phoneme
Foreign accents and transfer

**Transfer**: consider phonology as specifying the set of things that are pronounceable in a given language.

This set consists of the legal sequences of phonemes, realized as the appropriate allophones for their context.

anything outside this (very large) set will necessarily involve one of three properties:

1. an illegal phoneme
2. an illegal sequence of phonemes
3. an impossible distribution of allophones.
The Psychological Reality of the Phoneme
Foreign accents and transfer

- E.g: The German proper name Gödel is phonetically ['gœːdəl]
- Many English dialects tend to pronounce Gödel as girdle
- French thé ‘tea’ is phonetically [tɛ].
- Most English speakers speak a dialect in which the monophthong [e] does not occur; the diphthong [eɪ] occurs instead.
- These speakers must fight the tendency to substitute their own [eɪ] for French [e]; less conspicuously, they need to suppress their own native alveolar [t] and use dental [t̪] instead.
The Psychological Reality of the Phoneme

Foreign accents and transfer

• E.g: French *tante* ‘aunt’ [tãːt] has a nasalized vowel alien to the English phoneme inventory.

• In an English accent, this usually comes out [tãːnt], where [ŋ] is a particularly short [n].

• The derivation (that is, in English) here seems to be something like:

/tant/ underlying form: choice of native phonemes

ā Nasalization (p. 50): [+vowel] → [+nasal] / ___ [+nasal]

ñ Nasal Consonant Shortening: [+consonant] → [+short] / ___ [+consonant] [−voice]

[tãːnt] surface form
The Criterion of Phonetic Similarity

- in English, the sounds [h] and [ŋ]
- [h] occurs at the beginnings of words and before stressed vowels.
- The sound [ŋ] occurs at the ends of words, before consonants, and (at least in the dialects we will consider) between vowels of which the second is stressless.
The Criterion of Phonetic Similarity

• in English, the sounds [h] and [ŋ] do not contrast.

• Given the phonological patterning of English, there is no way that they could distinguish words from each other, because they occur in entirely different contexts.

• ...then, are [h] and [ŋ] allophones of the same phoneme?

• When two sounds are allophones of the same phoneme, they will be felt by native speakers to be the same sound.
The Criterion of Phonetic Similarity

• phonemes cannot be established purely on *distributional grounds*; rather, if we are to posit that two sounds are allophones of a single phoneme, they must be related to each other *phonetically* in some way.

• it seems that we must impose some criterion of *phonetic similarity* on analyses: the allophones of a single phoneme should resemble one another to a particular degree.

• It is possible that during language change, new phonemes might be created when two allophones drift apart too far to count any more as variants of the same basic linguistic unit.
Contour segments and the segment/sequence problem

- Sounds like diphthongs ([ай]), affricates ([ʧ]), and prenasalized stops (mƅ) are often called **contour segments**: they have two phonetic qualities in sequence, but are often treated phonologically as a single sound.

- One sound or two?... in Polish

\[ [tʃi] \quad \text{trzy} \quad \text{‘three’} \]

\[ [tʃi] \quad \text{czy} \quad \text{‘if, whether’} \]
Other Problems in Phonemicization

• One sound or two?... in Polish

\[\text{[tʃi]}\] \(\text{trzy} \) ‘three’
\[\text{[tʃi]}\] \(\text{czy} \) ‘if, whether’

• \([\text{tʃ}]\) and \([\text{tʃ}]\) are phonetically different; in particular, \([\text{tʃ}]\) is noticeably longer than \([\text{tʃ}]\). The affricate \([\text{tʃ}]\) must be analyzed as a single segmental unit in Polish,

• otherwise we could not express the contrast between monosegmental \([\text{tʃ}]\) and bisegmental \([\text{tʃ}]\).
Borrowed sounds

• When a borrowed sound is used for the very first time by a single speaker, it cannot count as a phoneme of the language.

• But with time, borrowed words come to be used by larger numbers of speakers.

• In Japanese as it was spoken not long ago, the sound [ɸ] (voiceless bilabial fricative) was plainly an allophone of /h/.

• [ɸ] occurred only in the environment / ___ u, and was in complementary distribution with [h], which occurred in most other environments and thus was the elsewhere allophone.
Other Problems in Phonemicization

Borrowed sounds

- As Japanese has evolved under the influence of English and other foreign languages, [ɸ] has extended its usage: it is the usual way to approximate a foreign [f] sound.

\[
\begin{align*}
\text{before /a/: } & \quad [\text{φaityo}] \text{ ‘fight’, } [\text{φaŋ}] \text{ ‘fan’} \\
\text{before /e/: } & \quad [\text{φesutibaru}] \text{ ‘festival’, } [\text{φeruto}] \text{ ‘felt’} \\
\text{before /i/: } & \quad [\text{suφinkusu}] \text{ ‘sphinx’, } [\text{φirumu}] \text{ ‘film’} \\
\text{before /o/: } & \quad [\text{jiφon}] \text{ ‘chiffon’, } [\text{φo:ku}] \text{ ‘fork’}
\end{align*}
\]

(vs. [haiku] ‘type of poetry’)  
(vs. [hema] ‘blunder’)  
(see footnote)  
(vs. [hoŋ] ‘book’)

- [ɸ] has promoted from allophone to phoneme status.

- the crucial question is whether such words really can be considered authenticated words of contemporary Japanese
Free Variation

- In phonology, **free variation** takes two forms:

  1. One is the phenomenon of **phonological doublets**, in which one word happens to have two different phonemic forms. E.g. *envelope* [ˈɛnvəˌloʊp] or [ˈanvəˌloʊp].
Free Variation

- In phonology, **free variation** takes two forms:

2. when a single phonemic representation gives rise to more than one phonetic form; this is called **free variation**. E.g. [æ] and [ã] found in the speech of many Americans.

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>lap</td>
<td>/læp/</td>
<td>[læp]</td>
<td>man</td>
</tr>
<tr>
<td>pal</td>
<td>/pæl/</td>
<td>[pæl]</td>
<td>Spanish</td>
</tr>
<tr>
<td>pack</td>
<td>/pæk/</td>
<td>[pæk]</td>
<td>dance</td>
</tr>
<tr>
<td>lab</td>
<td>/læb/</td>
<td>[læb]</td>
<td>flannel</td>
</tr>
</tbody>
</table>
Free Variation

- An appropriate analysis, then, would be as follows. We set up /æ/ as the basic form of the phoneme, and include the following (optional) rule for diphthongization.

/æ/ Diphthongization (preliminary)
æ → ɛə / __ n

The phoneme /æ/ is realized as [ɛə] when it precedes /n/.

ban:  /bæn/    underlying form
     ɓẹn    /æ/ Diphthongization
     bẹn    Vowel Nasalization
     [bẹn]  surface form
An appropriate analysis, then, would be as follows. We set up /æ/ as the basic form of the phoneme, and include the following (optional) rule for diphthongization.

/æ/ Diphthongization (preliminary)
æ → eæ / ___ n

The phoneme /æ/ is realized as [ɛæ] when it precedes /n/.

ban: /bæn/ underlying form
     bɛən  /æ/ Diphthongization
     bɛ̃n  Vowel Nasalization
     [bɛ̃n] surface form
Free Variation

- An appropriate analysis, then, would be as follows. We set up /æ/ as the basic form of the phoneme, and include the following (optional) rule for diphthongization.

\[
/æ/ \text{ Diphthongization (preliminary)} \\
æ \rightarrow \varepsilon \varepsilon / \_ \_ n \\
The \text{phoneme } /æ/ \text{ is realized as } [\varepsilon \varepsilon] \text{ when it precedes } /n/. \\
\]

- **ban:** /bæn/ underlying form
  - bən /æ/ Diphthongization
  - bēn Vowel Nasalization
  - [bēn] surface form
Free Variation

- An appropriate analysis, then, would be as follows. We set up /æ/ as the basic form of the phoneme, and include the following (optional) rule for diphthongization.

\[
/æ/ \text{ Diphthongization (revised)} \\
æ \rightarrow \varepsilon \varepsilon / \_ \_ n \quad (\text{optional}) \\
The \text{phoneme } /æ/ \text{ may be realized as } [\varepsilon \varepsilon] \text{ when it precedes } /n/.
\]

*ban*:  
\[
/\text{bæn}/ \quad \text{underlying form} \\
\text{bæn} \quad /æ/ \text{ Diphthongization} \\
\text{bən} \quad \text{Vowel Nasalization} \\
[bən] \quad \text{surface form}
\]
An appropriate analysis, then, would be as follows. We set up /æ/ as the basic form of the phoneme, and include the following (optional) rule for diphthongization.

```
<table>
<thead>
<tr>
<th>lap</th>
<th>ban</th>
<th>underlying forms</th>
</tr>
</thead>
<tbody>
<tr>
<td>/læp/</td>
<td>/bæn/</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bən</td>
<td></td>
</tr>
<tr>
<td></td>
<td>bən</td>
<td></td>
</tr>
<tr>
<td>[læp]</td>
<td>[bən]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>[bən]</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>/æ/ Diphthongization (optional)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vowel Nasalization</td>
</tr>
<tr>
<td></td>
<td></td>
<td>surface forms</td>
</tr>
</tbody>
</table>
```
Free Variation

- Not all phonological rules are optional like diphthongization or tapping. Vowel Nasalization, and alveolar dentailization for instance, are obligatory.

- The same rule can be optional in one dialect of a language and obligatory in a closely related dialect; this is true, for instance, of both Tapping and /æ/ Diphthongization.
Free Variation

- When a language has an optional rule, it is often the case that the choice of whether to apply the rule or not is determined by the style of speech.

- A typical pattern is that in *solemn or careful speech*, application of an optional rule is suppressed, whereas in casual or rapid speech, it will apply.
Free Variation

- the linguist is seldom in a good position to get the speaker to say each variant – usually the speaker will say the one that is appropriate for the social context (namely, elicitation), and the other variant(s) will go undetected.
Contextually Limited Contrasts and Phonotactics

- sometimes a rule can apply in a limited environment or context
- Toba Batak example – final voiced stops are devoiced (final obstruent devoicing is common in many languages so watch out for this in data!!!)

| [pinoppar] | ‘descendant’       | [sukkup]   | ‘adequate’     |
| [bian]     | ‘dog’              | [hotop]    | ‘fast’         |
| [dukkar]   | ‘let out’          | [dohot]    | ‘with’         |
| [ruak]     | ‘palm wine’        | [surat]    | ‘letter’       |
| [korea]    | ‘Korea’            | [rappok]   | ‘steal’        |
| [garut]    | (name of town in Indonesia) | [halak] | ‘man’ |

- we have a phonological contrast of voicing, but it is a contextually limited contrast.
Contextually Limited Contrasts and Phonotactics

- A full description of Toba Batak must include a characterization not just of the contrasting phonemes, but also a characterization of where the contrast is allowed.

  as a **rule**: [+stop, +voiced] → [-voice] / ___ #

  *Stops are devoiced at the end of a word*

  as a **constraint**: *[+stop, +voiced] / ___ #

  *It is illegal to have a voiced stop in word-final position.*

- Some use both constraints and rules, others use one or the other.

- Phonotactic constraints are those that allow certain segments in certain environments or sequences
Contextually Limited Contrasts and Phonotactics

Contrasts with zero

\[ C \rightarrow \emptyset / C \_\_ \# \]

\[ *CC / \_\_ \# \]

- In comparing these two approaches, we see one possible objection to the rule-based theory: it often forces us to make arbitrary analytic decisions.

- Trouble with constraint is why is the last consonant deleted rather than the first?

- It is perhaps not so bad to have two possible analyses available, when both of them happen to work.
/ ðɪ end əv lektʃə fɔː: /