

# Phonemes, Allophones, and the International Phonetic Alphabet



Primitives of linguistic description and foundations of linguistic theory.

# Phones and Phonemes

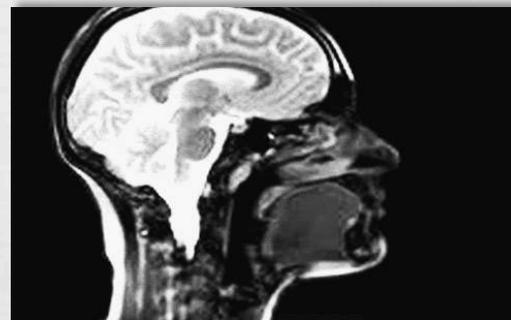
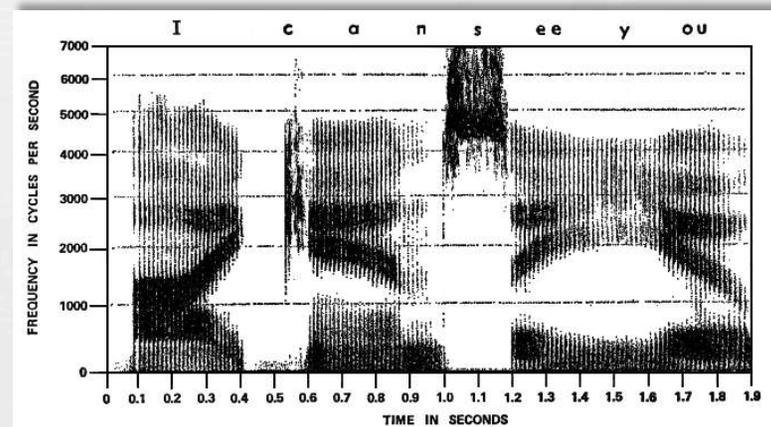


Basic phonology.

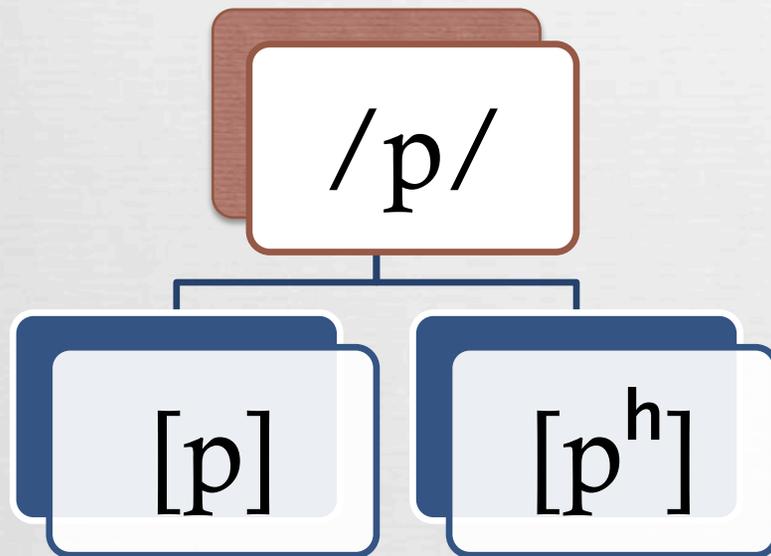
# Phones are “Physical” Sounds



- ⌘ A **phone** is a speech sound that is physically distinguishable from other speech sounds.
- ⌘ A pairing of...
  - ⌘ **Acoustic** signal
  - ⌘ **Articulatory** pattern
- ⌘ Problematic, since acoustic and articulatory categories are, by nature, fuzzy.
- ⌘ **Transcriptions of phones using IPA vary considerably.**



# Phonemes are “Functional” Sounds



- ☞ Phonemes are the sounds that can make lexical/morphemic distinctions.
- ☞ Really, phonemes are sets of sounds (phones).
  - ☞ Phones belonging to a phoneme are called “allophones” of the phoneme.
  - ☞ The distributions of allophones of the same phoneme are non-overlapping (complementary).

# Complementary Distribution



- ↻ The phones [p<sup>h</sup>], [p], and [p<sup>ˀ</sup>] are allophones of the same phoneme (called /p/ by convention).
  - ↻ [p<sup>h</sup>] occurs word-initially and in the onset of stressed syllables.
    - ↻ [p<sup>h</sup>ɪt] ‘pit’
    - ↻ [əp<sup>h</sup>laɪ] ‘apply’
  - ↻ [p<sup>ˀ</sup>] occurs word-finally.
    - ↻ [t<sup>h</sup>ɪp<sup>ˀ</sup>] ‘tip’
  - ↻ [p] occurs elsewhere.
    - ↻ [spɪt] ‘spit’
    - ↻ [læps] ‘lapse’

# Contrastive Distribution



- ❧ **Contrastive distribution**—when the distribution of two phones ( $p_1$  and  $p_2$ ) overlap.
  - ❧ If  $p_1$  and  $p_2$  are in contrastive distribution, two words or morphemes can be distinguished only by the fact that one has  $p_1$  where the other has  $p_2$ .
  - ❧ Phones  $p_1$  and  $p_2$  must belong to different phonemes.
- ❧ If distributions of  $p_1$  and  $p_2$  do not overlap, they can, they *may* be allophones of the same phoneme.

# Rules of Thumb



- ❧ If two “sounds” can distinguish two words (as with *pin*, *tin*, and *kin*), these sounds are (members of) separate phonemes.
  - ❧ They are sets of phones with **overlapping distributions** (contrasting distributions).
  - ❧ Each phoneme is conventionally called after the allophone with the least restricted distribution.
  
- ❧ If two sounds (phones) never occur in the same environment (with **non-overlapping distributions**), this is a necessary (but not sufficient) criterion for them to be allophones of the same phoneme.
  - ❧ When two such sounds are **phonetically similar**, often overlaps with **percept of identity**.

# Phonemes are Language Specific



- ❧ The phones [p] and [p<sup>h</sup>] belong to one phoneme in American English (and most kinds of English).
- ❧ In many languages, they are phonemically distinct:
  - ❧ Mandarin Chinese
    - ❧ 并 [piŋ] ‘merge’
    - ❧ 聘 [p<sup>h</sup>iŋ] ‘engage’
  - ❧ Korean
  - ❧ Hindi
  - ❧ Hmong

# Some Complications



How symbolic representations of speech sounds are beautiful lies.

# Symbols versus Signals



## Phonemics

- ☞ Discrete categories
- ☞ Classical logic
- ☞ Independent of phonetic substance
- ☞ Invariance with a category
- ☞ Implies [h] and [ŋ] are allophones of /ŋ/.

## Speech production and perception

- ☞ Fuzzy “clouds”
- ☞ Probabilistic processes
- ☞ Nothing but phonetic substance
- ☞ Variance in every category
- ☞ Suggest no relationship between [h] and [ŋ].

# Problems in Phonemic Perception



- ❧ The phones [p] and [p<sup>h</sup>] only sound the same to English speakers when they occur in different environments.
- ❧ At the beginning of a word, [p<sup>h</sup>] sounds like /p/.
- ❧ However, [p] sounds like /b/.
- ❧ Why is this the case?

# Discovering a Phonemic Inventory



- ∞ Steps descriptive linguists often follow to discover the phonemes of a language (working with native speaker).
  1. Transcribe a word list (incl. audio recordings).
  2. Transcribe a text (incl. audio recordings).
  3. List environments of phones.
  4. Find clusters of phonetically-similar phones occurring in complementary distribution.
  5. Test these clusters for perceived identity with native speaker consultant.