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 \([\text{p}^h]\), \([\text{p}]\), and \([\text{p} \text{̚}]\) are allophones of the same phoneme (called /\text{p}/ by convention).

- \([\text{p}^h]\) occurs word-initially and in the onset of stressed syllables.
  - \([\text{p}^h\text{ɪt}]\) ‘pit’
  - \([\text{əp}^h\text{læɪ]}\) ‘apply’

- \([\text{p} \text{̚}]\) occurs word-finally.
  - \([\text{t}^h\text{ɪp} \text{̚}]\) ‘tip’

- \([\text{p}]\) occurs elsewhere.
  - \([\text{spɪt}]\) ‘spit’
  - \([\text{læps}]\) ‘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 [pʰ] belong to one phoneme in American English (and most kinds of English).
- In many languages, they are phonemically distinct:
  - Mandarin Chinese
    - 并 [pǐŋ] ‘merge’
    - 聘 [pʰǐŋ] ‘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 [pʰ] only sound the same to English speakers when they occur in different environments.
- At the beginning of a word, [pʰ] 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.