# Introduction
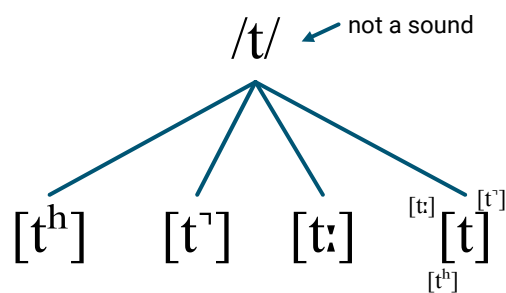
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## Concerning Phonemes

/fʌnalʌdʒi/

- phonology
  - phonemes
    - abstract entities
    - set of sounds
  - phonetics
    - phones

/t/ ← not a sound

$[t^h]$  $[t^˥]$  $[tː]$  $[t]$

[tː] [t˥]

[tʰ]

Hand: Noedelhap/iStock/Thinkstock

## Concerning Phonemes

Phonemic Representations

Represents what native speakers know about the speech sounds they utter.



Hand: Noedelhap/iStock/Thinkstock; Hockey player: University of Waterloo

## Psychological Reality of Phonemes

Sounds

[pʰ], [kʰ], [pˀ], [æː], etc

Literacy
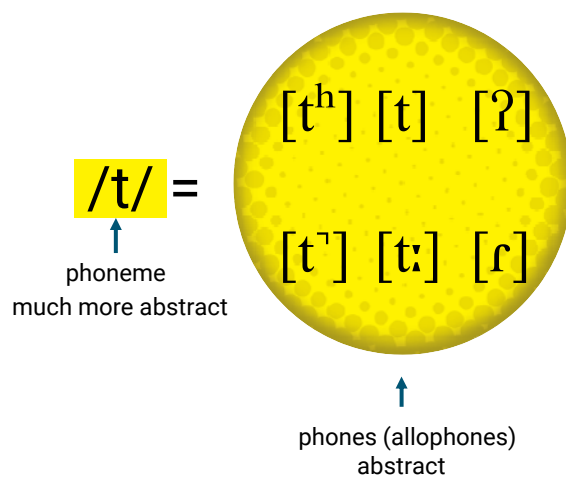
- words
- syllables
- phonemes
- ~~allophones~~

Accents

| "Havana, Cuba" | |
|---|---|
| Spanish | English |
| [hʌβænʌ kuβʌ] | [hʌvænʌ kʰjubʌ] |

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# Phones, Phonemes, and Allophones

## The Phoneme /t/

/t/ =

[tʰ] [t] [ʔ]

[t˺] [tː] [ɾ]

phoneme
much more abstract

phones (allophones)
abstract

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## Some Definitions

Phone

    A speech sound.

Phoneme

    A set of related speech sounds.

Allophone

    A member of a set of related speech sounds (i.e. an allophone is a member of a phoneme).

## Phones

Phone

- A speech sound
- A noise systematically exploited by communities of language users to construct signifiers
- A concrete thing, not an abstract thing
- Language independent
- Watch for the brackets



Table: wenchiawang/iStock/Thinkstock

## Phonemes and Minimal Pairs

Phoneme

- A set of related speech sounds
- A mental entity, not an acoustic entity
- An abstract notion, not a concrete notion
- Language dependent
- Watch for the slashes
- Represented by one of the allophones (the least predictable, most basic one), but not pronounceable
- A critical diagnostic: the minimal pair

**Minimal Pairs:**

| | |
|---|---|
| pill | hill |
| till | chill |
| kill | Jill |
| bill | will |
| dill | mill |
| gill | rill |
| fill | Lil |
| sill | nil |
| shill | |

Hand: Noedelhap/iStock/Thinkstock

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## Allophones and Complementary Distribution

Allophone

- A member of a set of related speech sounds (i.e. an allophone is a member of a phoneme)
- Does not make sense except terms of some specific phoneme
- There is no such thing as "an allophone", only "an allophone of a phoneme"
- [tʰ] is not "an allophone", it is "an allophone of /t/ in English"
- A critical diagnostic: complementary distribution

e.g.    kʰill    lit˺ ← this will never happen at the start of a word

this will never happen at the end of a word → not phonetically similar enough

[pʰil] [spill] [lip˺]

complementary distribution
phonetically similar

- Phonetic similarity + mutually exclusive neighborhoods

Hand: Noedelhap/iStock/Thinkstock

# Distribution Rules

Predictable
$$[p^{h}il] \rightarrow [p^{h}] \ = \ /\#\_\_\_\_$$
$$[lip^{\urcorner}] \rightarrow [p^{\urcorner}] \ = \ / \ \_\_\_\_\#$$

"Elsewhere"
"Basic"
/p/
"Least Predictable"
$$[spill] \rightarrow [p] \ = \ /C\_\_\_\_$$
$$hippo \rightarrow \qquad /V\_\_\_\_$$
$$hippo \rightarrow \qquad /\_\_\_\_V$$

| | |
|---|---|
| | Environmental Slash |
| # | Word Boundary |
| ___ | Location of Phone |
| C | Consonant |
| V | Vowel |

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# Analyzing Phonological Data

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## English Data for Vowel Nazalization

| non-nazalized vowels | nazalized vowels |
|---|---|
| [bæt]  (bat) | [bæ̃n]  (ban) |
| [gɑt]  (got) | [gɑ̃n]  (gone) |
| [bɛt]  (bet) | [bɛ̃n]  (Ben) |
| [lɑk]  (lock) | [lɑ̃ŋ]  (long) |
| [rɪp]  (rip) | [rɪ̃m]  (rim) |
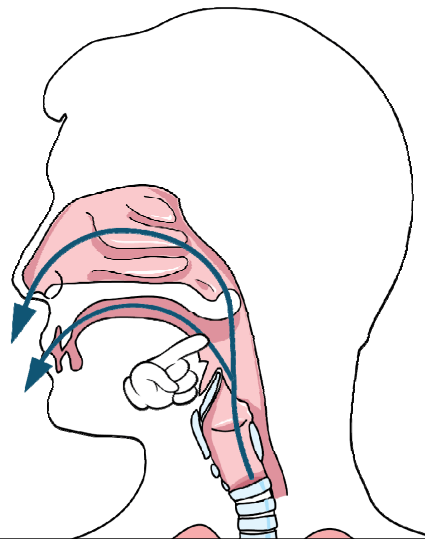
Head: LifeArt Super Anatomy Collections 1-9. Williams & Wilkins 1998;
Hand: Noedelhap/iStock/Thinkstock

## English Data for Vowel Length

| non-nazalized vowels | nazalized vowels | non-nasalized long vowels |
|---|---|---|
| [bæt] (bat) | [bæ̃n] (ban) | [bæːd] (bad) |
| [gɑt] (got) | [gɑ̃n] (gone) | [gɑːd] (god) |
| [bɛt] (bet) | [bɛ̃n] (Ben) | [bɛːd] (bed) |
| [mʌk] (muck) | | [mʌːg] (mug) |
| [lɑk] (lock) | [lɑ̃ŋ] (long) | [lɑːg] (log) |
| [rɪp] (rip) | [rɪ̃m] (rim) | [rɪːb] (rib) |

Ĩ

ː
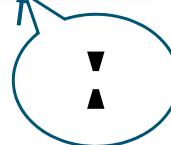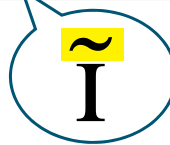
Hand: Noedelhap/iStock/Thinkstock

## English Vowel Allophones

[æ]  [æː]  [æ̃]

[ɑ]  [ɑː]  [ɑ̃]

[ɛ]  [ɛː]  [ɛ̃]

[ʌ]  [ʌː]  [ʌ̃]

[ɪ]  [ɪː]  [ɪ̃]

etc…

i.e., V, Vː, Ṽ

/V/     [Vː] /____[voice]

[V] /____[nasal]

[V] / elsewhere

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## Vowel Length in Yap

Yap has minimal pairs.

/ɪ/, /ɪː/, /u/, /uː/, /e/, /eː/ are phonemes in Yap.

| [θɪs] (to topple) | [θɪːs] ( a post) |
|---|---|
| [pul] (to gather) | [puːl] (moon) |
| [ʔer] (near you) | [ʔeːr] (lagoon part) |

i.e., [V], [Vː]
/V/, /Vː/

## Vowel Length in Korean

Korean has minimal pairs

And it has near-minimal pairs

/i/, /iː/, /e/, /eː/, /u/, /uː/ are phonemes in Korean

| [il] (day) | [iːls] (word) |
|---|---|
| [seda] (to count) | [seːda] (strong) |
| [kul] (near you) | [kuːl] (tunnel) |

i.e., [V], [Vː]
/V/, /Vː/

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# Discriminating Phonemes/Allophones

## Spanish vs. English Speech Sounds

Phoneme

  Easy to hear

    Phonemic distinctions

Allophone

  Hard to hear

    Allophones of the same phoneme

[ð] [ɾ] [d]

similar sounding phone

voiceless bilabial stop → [p]

aspirated voiceless bilabial stop → [pʰ]

unreleased voiceless bilabial stop → [p̚]

Man listening: Iskander Saputra/iStock/Gettyimages

## Spanish vs. English Speech Sounds

Phoneme

    Easy to hear

Allophone

    Hard to hear

| English | | Spanish | |
|---------|------|---------|-------|
| soda | [soɾə] | toro | [toɾo] |
| dough | [do] | donde | [dɑnde] |
| though | [ðo] | todos | [toðos] |

Hand: Noedelhap/iStock/Thinkstock

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## Spanish vs. English Speech Sounds

Phoneme

    Easy to hear

Allophone

    Hard to hear

| English | | Spanish | |
|---------|---------|---------|---------|
| easy | hard | easy | hard |
| [d] vs. [ð] | [d] vs. [ɾ] | [d] vs. [ɾ] | [d] vs. [ð] |
| [ɾ] vs. [ð] | | [ð] vs. [ɾ] | |

**soda**　[soɾə]

Hand: Noedelhap/iStock/Thinkstock

# Spanish vs. English Speech Sounds

Phoneme

    Easy to hear

Allophone

    Hard to hear

| English | | Spanish | |
|---|---|---|---|
| easy | hard | easy | hard |
| [d] vs. [ð] | [d] vs. [ɾ] | [d] vs. [ɾ] | [d] vs. [ð] |
| [ɾ] vs. [ð] | | [ð] vs. [ɾ] | |

Allophones of the same phoneme

Allophones of the same phoneme

Hand: Noedelhap/iStock/Thinkstock

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# Spanish vs. English Speech Sounds

Phoneme

    Easy to hear

Allophone

    Hard to hear

| English | | Spanish | |
|---|---|---|---|
| /d/ | [ɾ] [d] | /d/ | [ð] [d] |
| /ð/ | [ð] | /r/ | [ɾ] [r] |

Hand: Noedelhap/iStock/Thinkstock

# Review

## Review

/fʌnɑlʌdʒi/

Phones, allophones, phonemes

- Complementary distribution
- Minimal pairs
- Hard/easy to hear