

Intro to Linguistics

Segmental phonology

Recall:

- **phonetics**: the **physical manifestation** of language in sound waves; how these sounds are articulated and perceived
- **phonology**: the **mental representation** of sounds as part of a symbolic cognitive system; how abstract sound categories are manipulated in the processing of language

So phonetics deals with the **physiological and acoustic** parts of the path between speaker and listener, while phonology resides in the **brain**.

Phonemes

phonological elements of a language = basic, distinctive sounds, also called **phonemes**.

Phonemes for a dialect of Standard American English:

- consonants: **p, t, k, b, d, g, f, θ, s, h, v, ð, z, m, n, ŋ, l, r, w, j, č, ǰ, š, ž**
- vowels: **i, u, ɪ, ʊ, ε, ə/ʌ,ɔ, æ, a, eɪ, aɪ, aʊ, oɪ, ou**

"distinctive" = can be used to make **contrasts between different words**. For the **stops**, using **minimal pairs** (words that differ in exactly one sound):

pill till kill bill dill gill

For the **vowels** (for each individual pair of vowels we could come up with a minimal pair):

bead bood bid bade bowed bed bud bad bod bide Boyd
heed who'd hid hood head hawed had hide how'd
jean June jin Jane Jen John join lead
lewd lid laid load lead lad lod loud Lloyd

And for the **nasals**: rum run rung

Allophones.

There are often differences in the way a **phoneme** is pronounced in a specific context. The variant pronunciations are called **allophones** ("other sounds").

When it's important to make this difference:

- we'll use [square brackets] to indicate sounds from a phonetic point of view, i.e. focusing on their physical properties and the details of actual pronunciation;
- and we'll use /slashes/ to indicate sounds from a phonological point of view, i.e. as part of an abstract representation independent of potential differences in the way the sound is pronounced in specific contexts.
- I.e., [] = allophone, / / = phoneme.

A classic example of **sound alternation in English** relates to the [s] found at the beginning of a syllable before a voiceless stop.

spin is basically **pin** with [s] added, but the /p/ in each case is pronounced differently.

- **pin** contains an **aspirated** version of /p/, with a puff of air after the stop is released; [p^h]
- **spin** contains a **plain** /p/, without a puff of air after the stop; this is written just [p]

The same is true for pairs like **pit~spit**, **pot~spot**, **pair~spare**, etc.

A simple statement of this alternation is as follows:

the phoneme /p/ becomes:	allophone [p]	immediately following [s]
	allophone [p ^h]	at the beginning of the word

But the same generalization holds not just for /p/ but for the **other voiceless stops**, /t/ and /k/. Compare these word pairs:

- **top~stop**, **take~stake**, **tie~sty**, etc.
- **kin~skin**, **cope~scope**, **can~scan**, etc.

So more accurately, there's a **single general statement** that covers all these cases, stated in terms of **natural classes**.

voiceless stops are:	unaspirated	immediately following [s]
	aspirated	at the beginning of the word

Distribution of sounds: identifying phonemes and allophones

How do we know that aspirated and unaspirated voiceless stops are not different phonemes? Same way Lois Lane knew Clark Kent was the Superman: **they never appear at the same place in the same time.** = **complementary distribution.**

- **complementary distribution:** never at the same place in the same time, predictable
- **contrastive distribution:** overlapping environments, minimal pairs
- **free variation:** overlapping environments, no change in meaning = not contrastive

Expanding: voiceless stops are aspirated when they occur syllable-initially and are **followed by a stressed vowel** (rápid, rap^híidity); & word-initially regardless of stress (p^hot^háto).

At the beginning of a word, a preceding /s/ prevents the stop from being syllable- or word-initial.

Different stresses cause **alternations**: underlying sound /t/ is pronounced as [t] etc. or [t^h] etc.

rápid [p]	rapíidity [p ^h]
authéntic [t]	authenticity [t ^h]
récord [k]	recórd [k ^h]

This process is **completely unconscious** for most speakers, and often **quite hard to unlearn**.

English speakers who learn a language like French or Spanish impose aspiration according to this rule; but that's wrong for these languages, and sounds foreign.

Similarly, a **French or Spanish speaker learning English** will typically fail to produce aspiration in the right places; this is part of what it means to have a foreign accent.

Aspiration in English is a small example of what **phonological knowledge** consists of:

- it's **learned unconsciously** by children imitating (quite accurately!) the details of the language around them
- it's **systematic**, applying to all words with voiceless stops, not just some random selection
- it's defined in terms of a **natural class** (here "voiceless stops") rather than some arbitrary set of three consonants

The study of phonology is largely the investigation of alternations like this -- what changes occur, what sounds undergo them, and in what contexts.

Example: flapping

A prominent feature of American English affects /t/ and /d/, and is called **flapping**.

A flap is a quick motion with the tongue against the alveolar ridge.

All these English words have **flaps where "t" or "d" is written in the spelling** (relevant dialects).

butter	caddy
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pretty	buddy
little	water

The proper phonetic symbol for a flap is *r* - it's an "r" missing the top left serif.

For most speakers, in the right context a **phonological /t/** will end up sounding phonetically just like a **phonological /d/**, since both become a flap [*r*] (voiced), as these *homophones* show:

latter	ladder
matter	madder
mettle	meddle
betting	bedding
outty (belly button)	Audi (car)

And the answer in this exchange is therefore **ambiguous**:

-- Do you want the ladder or the chair? -- Give me the [*lærr*].

Of course, /t/ and /d/ don't always end up as flaps: **minimal pairs** illustrate.

hit	hid
tin	din
tear	dare
melting	melding
attain	A Dane

What context causes flapping to occur? There are two conditions:

1. The /t/ or /d/ has to be **between vowels** (this includes a syllabic [*r*] or [*l*])
 - o so not in **hit, melting**
2. The following vowel has to be **unstressed**.
 - o so not in **tin, attain**

If you compare the list of homophones (with flapping) vs. minimal pairs (without flapping), you'll see that **only the homophones satisfy both these conditions**.

The **same basic word** (or word root, or morpheme) can change. This includes adding a **vowel**:

sit [<i>t</i>]	sitting, sitter [<i>r</i>]
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spot [t]	spotty [ɾ]
mad [d]	madder, maddest [ɾ]
bird [d]	birdy [ɾ]

As well as moving the **stress** (primary ´ or secondary `):

atómic [tʰ]	átom [ɾ]
computación [tʰ]	compúter [ɾ]
pragmatism [tʰ]	pragmático [ɾ]
addictive [d]	áddict [ɾ]
edición [d]	édit [ɾ]

Borrowed a new words are subject to these patterns too:

tofu [tʰ]	(Japanese [t])
tortilla [tʰ], [tʰ]	(Spanish [t], [t])
coyote [kʰ], [ɾ]	(Spanish [k], [t])
condor [kʰ]	(Spanish/Quechua [k])
panache [pʰ]	(French [p])

So aspiration and flapping are not learned in **individual words** (such as flapped **latter**), but are part of what we know about **the language**.

There are other allophones of the phoneme /t/: [t] [ʔ] [ɾ] [tʰ]

When these sounds occur in other languages, they may be distinct phonemes:

Korean [tʰal] *arm* [tal] *foot* (contrastive distribution)

Also: sounds that are distinct phonemes in English, might be allophones in another language

Korean /t/: [tal] *arm* [mandu] *dumpling* (complementary distribution)

Phonological processes

Phonemic form => phonological processes => phonetic form.

These processes generally operate with **natural classes** of sounds.

For instance, the different pronunciations of the plural suffix "s" (phonetics lectures) involve:

- **Insertion of vowel** after sibilants: churches, judges, kisses, guises
- **Assimilation in voicing** after all other sounds: picks, pigs

Assimilation

e.g. alveolar stops assimilate in place of articulation to the following consonant

I can see, I can bake, I can go

Dissimilation

e.g. Middle English *purpre* --> Modern English *purple*

Insertion

e.g. a voiceless stop between a nasal and a voiceless fricative: hamster, dance;

also /j/ insertion after initial alveolar consonants and before high vowels: few, puny, ?news

Deletion

e.g. /h/ may be deleted from unstressed syllables: He handed her his hat;

also /r/ is deleted after a vowel in some dialects: /ka/, /yad/

Exchange = Metathesis

e.g. Old English *thridda* --> Modern English *third*; acsian vs ascian (Old English)

Strengthening = Fortition

e.g. aspiration rule above

Weakening = Lenition

e.g. flapping rule above

Fronting

e.g. velar to alveolar nasal ("g"-dropping): running

Other

e.g. prenasal [ɪ] lowering in the South, parts of Midwest, and parts of the West of the US

Multiple processes

- Raising diphthong /aɪ/: followed by a voiceless consonant, it is "raised" so the first part is more like the first vowel of mother than that of father.

regular diphthong at the end of a word, or before a voiced consonant

Ø, b, d, v, z, ð, m, n, l, r, ʃ, ʒ

tie, jibe, hide, live, rise, tithe, time, line, tile, tire, oblige,

raised diphthong before a voiceless consonant

p, t, k, f, s ...

hype, white, bike, life, ice ...

- This distinction between [aɪ] and raised [əɪ] is there even when the voicing distinction is eliminated by flapping. So if a speaker has raising in **write**, this is maintained in **writer**, while **rider** will have [aɪ] just like **ride**.

So: while flapping eliminates the distinction in consonants, the words still do not rhyme.

Most speakers think the difference lies in the consonants. In the pronunciation, it's in the vowels.

- The reason why speakers "hear" the difference in the consonants is because
 - on an abstract level in their minds, the words are represented as /raɪ tər/ and /raɪ dər/, with the difference localized in the consonant.
 - raising of /aɪ/ in the former, & flapping in both are subsequent & unconscious.

How does raising keep working when the conditioning factor on raising - voicing on the following consonant - has been obliterated?

Raising the /aɪ/ in *writer* on analogy to *write*, where the conditioning factor is still intact?? NO

Speakers apply **phonological rules to these representations in some order**, so that the output of one rule can be the input to another:

- *writer*

/raɪ tər/ --> raising --> /rəɪ tər/ --> flapping --> /rəɪ rər/

- *rider*

/raɪ dər/ --> raising /raɪ dər/ --> flapping --> /raɪ rər/