Where am I?

- HUL242: **Fundamentals of Language Sciences**
- Phonology **(Lecture-2)**
- Thursday, Jan 23th

Review: Phonemes

- **Phonemes** are distinct sounds in a language, and they have a mental representation in the speaker's mind.

- If **minimal pairs** for the two sounds exist, then they are **distinctive/contrastive** in the language — i.e., there are two different underlying phonemes.

Review: Minimal pair

- **Minimal pairs:** When two words differ in **exactly one sound**.

- Minimal pairs as entire words.

  - Minimal pair for [p] and [b]

    [pæt] ‘pat’

    [bæt] ‘bat’

    The phonological context: #___æt.

  - Minimal pair for [t] and [d]

    [rud] ‘rude’

    [rut] ‘root’

    The phonological context: ru_#.

Note: Near-minimal pair

- Minimal pairs can be entire words. But they **don't have to be**. They can also be smaller phonological contexts.

- A **near**-minimal pair for [b] and [p] *in English* is!
  Drab [dræb]
  Strap [stræp]
  Where the shared phonological context is: ræ___#

Note:

- For near-minimal pairs, it should be established first that the excluded sounds are phonemes.
- It is used when minimal-pair is not found in a language.

Review: Allophones

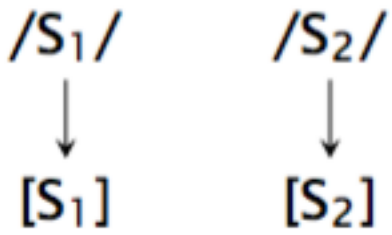
- A phonetic difference between two sounds on the surface does not necessarily mean that there are **underlyingly** different phonemes in the language. They could be **allophones**.

- If no minimal pairs exist for the two sounds, the two sounds are in **complementary distribution**, and there is only **one** underlying sound. The two sounds are called allophones of the underlying sound.

Review: Diagrammatically

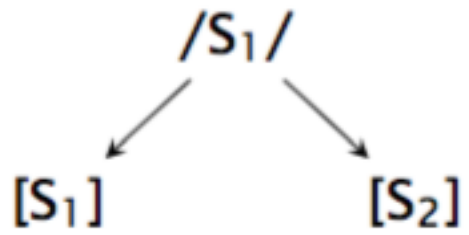
- We have two possible situations when we observe two sounds [S1] and [S2] in a language:

Language-A



Minimal pairs exist

Language-B



No minimal pairs exist

- Notice that words are pronounced in both languages with [S1] and [S2] sounds.

- However, only in one of these languages (Language-A) they are phonemes:/S1/ and /S2/.

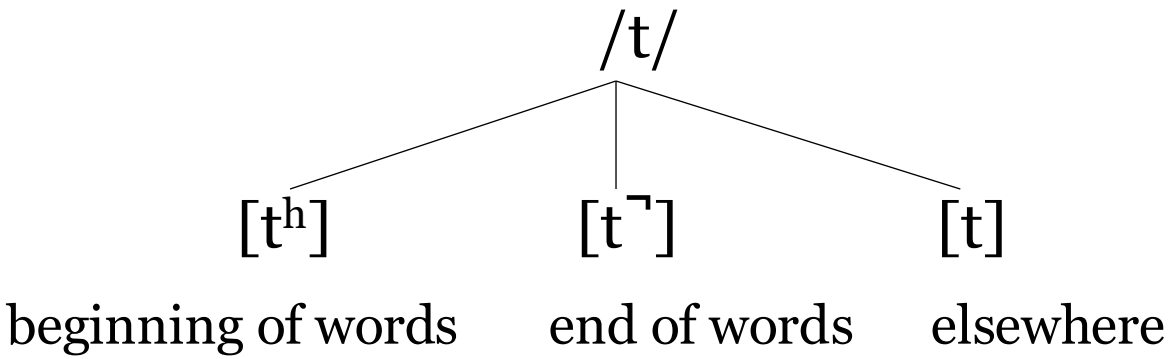
Review: Phonemes and allophones

- Whenever you observe that two or more sounds are in complementary distribution, you have a choice about **which one should be the underlying form/phoneme**.

- One choice often makes more sense than the other, allowing you to **formulate a much simpler rule**.
  - The phoneme will generally be the sound that is found in a **wider variety** of environments, i.e. **unrestricted.**
  - The other sounds will then have a much more **restricted, predictable** distribution, which suggests that they emerge via a phonological process.

Review: Phonemes and Allophones

- There are **no minimal pairs** for [t], [tʰ] and [t˺]. In other words, these sounds are in **complementary distribution**.



- [tʰ] and [t˺] have a restricted or predictable distribution. That is, they are phonetically conditioned. [t] has unrestricted distribution.
  - /t/ the **underlying mental representation,** called Phoneme
  - [tʰ], [t˺], [t] its **realization** in speech, called Allophones

Review: Phonological Analysis

- **Swampy Cree** (an indigenous language spoken in Canada) is a language where [t] and [d] **aren't** distinct sounds/phonemes.

1. [kodak] 'goose'
2. [namwɑt] 'not at all'
3. [adim] 'dog'
4. [tahki] 'often'
5. [nisto] 'three'
6. [mide] 'heart'

Distributional chart

	[t]	[d]
1.		o__a
2.	a:__#	
3.		a__i
4.	#__a	
5.	s__o	
6.		i__e

- **Generalization:**
  - [d] is found between two vowels.

Phonological rules

The form of phonological rules

- A formal representation of empirical generalizations

- Phonological rules have the following form:

$X \rightarrow Y / Z$ (read: 'X becomes Y in context Z')

The phonological rules

- Phonological rules are stated with the following notation:

1. $X \rightarrow Y / A\_B$ *(read: 'X* becomes *Y* in between *A* and *B')*
2. $X \rightarrow Y / \_ B$ *(read: 'X becomes Y when followed by B')*
3. $X \rightarrow Y / B \_$ *(read: 'X becomes Y when preceded by B')*
4. $X \rightarrow Y / \# \_$ *(read: 'X becomes Y at the beginning of words)*
5. $X \rightarrow Y / \_ \#$ *(read: 'X becomes Y* at *the ending of words)*

The nature of phonological rules

- Phonological rules can be specific or general:
  - They can refer to **individual** sounds or
  - They can refer to **natural classes** of sounds.

Some examples: General rules

Spit [spɪt]	Pit [pʰit]
Skip [skɪp]	keep [kʰip]
Stuck [stʌk]	team [tʰɪm]

- **Generalization**:
  - Oral voiceless stops are aspirated at the beginnings of words when followed by a vowel.

- How would you state this in terms of a phonological rule?

$$C[+oral, +stop, -voice] \rightarrow C^{h} [+oral, +stop, -voice]/\#\_V$$

Some examples: Specific rules

- Phonation in Swampy Cree

  1. [kodak] ‘goose’
  2. [namwɑt] ‘not at all’
  3. [adim] ‘dog’
  4. [tahki] ‘often’
  5. [nisto] ‘three’
  6. [mide] ‘heart’

- **Generalization**:
  - [t] becomes [d] between two vowels.

- **Phonological rule**:
  - [t] → [d] / V _ V

Some examples: Specific rules

- Vowel length in English:

[bæk]	[bæːg]
[mɪs]	[mɪːz]
[nɛt]	[nɛːd]

- **Generalization**:
  - Vowels are lengthened before voiced consonants.

- **Phonological Rule**:
  - V → V: / _ C [+voice]

Some examples: Specific rules

- [s] and [t] are not contrastive in Tongan. They are in complementary distribution. Which is the underlying form and why?

[fata]	'shelf'	[sisi]	'grand'
[motu]	'island'	[mosimosi]	'to drizzle'
[motomoto]	'unripe'	[fesi]	'to break'
[movete]	'to come apart'		

Chart

[s]	[t]
#_[i]	[a]_[a]
[i]_[i]	[o]_[u]
[o]_[i]	[o]_[o]
[e]_[i]	[e]_[e]

- [t] occurs around all kinds of vowels, while [s] only occurs before [i].
- So, our phonological rule looks like this:

$$[t] \rightarrow [s] \; / \; \_ \; [i].$$

- This is a very simple rule. A rule changing [s] to [t] would be way more complicated because [t] occurs in more contexts than [s].

Some examples: Specific rules

- [p] and [b] are not contrastive in Micmac. They are in complementary distribution. So, which is the underlying form?

[pis]	'flea'	[sipsulk]	'to cause trembling'
[sabus]	'pierced'	[tibol]	'it falls'
[talsip]	'when'	[sebai]	'to hunt'
[walpok]	'pool'	[alispei]	'to b e wet'
[ababo]	'thread'	[pabi]	'play'
[kalibu]	'caribou'	[apsem]	'to warm'

Chart

[p]	[b]
#_[i]	[a]_[u]
[i]_#	[a]_[a]
[l]_[o]	[a]_[o]
[i]_[s]	[i]_[u]
[s]_[e]	[i]_[o]
#_[a]	[e]_[a]
[a]_[s]	[a]_[i]

- [b] is restricted. It only shows up between vowels

  Rule: [p] → [b] / V _ V

- This is a very simple rule. A rule changing [b] to [p] would be way more complicated because [p] occurs in more contexts than [b].

Phoneme and Allophones: English, Mapudungun, and Bangla

Practice: English [n]

- [n] in English sometimes has a **dental** place of articulation — [n̪] in IPA:

[noː]	'know'	[tɛn̪θ]	'tenth'
[ənɔj]	'annoy'	[mʌn̪θ]	'month'
[ʌnjən]	'onion'	[pæn̪θər]	'panther'
[nʌn]	'nun'	[krəsæn̪θəməm]	'chrysanthemum'

Some questions:

- Which is the **underlying** phoneme?

  [n]: it occurs in many **more environments** than [n̪].

- Generalization:

  Alveolar [n] becomes dental [n̪] when followed by dental [θ].

- Phonological rule:

$$[n] \rightarrow [\underline{n}] \; / \; \_ \; [\theta]$$

Mapudungun Nasal

- Mapudungun has both alveolar [n] and dental [n̪].

[mənа]	‘a lot’	[mən̪a]	‘maternal cousin’
[kɯla]	‘three’	[kɯl̪a]	‘tree’
[mət̪a]	‘animal horn’	[tun]	‘to grasp’

- A question:

➢ Is the [n n̪] distinction contrastive in Mapudungun?

Yes. We have a **minimal pair** as [məna] and [mən̪ə].

English [t] and [d]

- ‘[t] and [d]’ also in English sometimes have a **dental** place of articulation

[eːt̪θ]	‘eighth’
[wʊd̪θiŋk]	‘would think’

- [t] and [t̪], and [d] and [d̪] are also in **complementary distribution** in English.

[t] → [t̪]/_ [θ]

[d] → [d̪]/_ [θ]

Bangla ‘dentals’

- Distribution of [t] and [t̪] in Bangla

[t̪an]	‘(vocal) tune’	[tan]	‘pull!’
[sat̪]	‘seven’	[sat]	‘sixty’

- A question:

➢ Is the [t t̪] distinction contrastive in Bangla?

Yes. We have **minimal pairs.**

[t̪an] vs. [tan]

[sat̪] vs. [sat]

Summing up

- English [n n̪], [t t̪], are [d d̪], are **not contrastive**:
  - No minimal pairs exist.
  - The appearance of [n̪], [t̪], are [d̪], are **conditioned** by their phonological context (so their appearance is 100% predictable).

- Bangla [t t̪] and [d d̪] and Mapudungun [n n̪] are contrastive:
  - Minimal pairs exist.
  - Whether you see one or the other has nothing to do with the phonological context. Instead, it corresponds to differences in meaning.

Note:

Like Bangla and Mapudungun, English speakers also say [t̪], [d̪] and [n̪]. But they can't use these dental sounds to create new words.

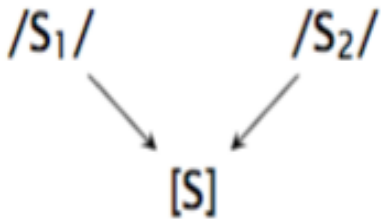
What we have seen so far

- So far, we've seen two kinds of situations:
  - When minimal pairs for two sounds exist in a given language, those sounds are **contrastive** in that language.
  - When no minimal pairs exist, the two sounds are **not contrastive**. Even though they are pronounced differently, they are underlyingly **the same sound**!

- Repeating our two possible situations when we observe two sounds [S1] and [S2] in a language:

Neutralization

- Another kind of process ends up **obscuring** underlying distinctions (rather than creating distinctions from the same underlying sound)!
- As a diagram, that would look something like this:



- So, two underlyingly different forms could end up pronounced in **exactly the same way**. This kind of process is called **neutralization**.

Korean

- Consider some data from Korean (the [ɨ] sound is a high central tense vowel).

- Here, we're going to focus on the final positions in words.

[otʃiŋətʃət̚]	'squid pickle'
[otʃiŋətʃən̚]	'squid pancake'
[nuɾɨnpap̚]	'scorched rice'
[nuɾɨnpam̚]	'scorched chestnut'
[tʃakɨnpak̚]	'small gourd'
[tʃakɨnpaŋ̚]	'small room'

- Stops and nasals with the same place of articulation are contrastive.

A twist

- Now, let's see what happens in larger phrases. What do you notice?

[otʃiŋətʃən nɛmsɛka]	'the smell of squid pickle'
[otʃiŋətʃən nɛmsɛka]	'the smell of squid pancake'
[nuɾinpam məkəpwanni]	'Have you tried scorched rice?'
[nuɾinpam məkəpwanni]	'Have you tried scorched chestnut?'
[tʃakɨnpaŋ nɛmsɛka]	'the smell of a small gourd'
[tʃakɨnpaŋ nɛmsɛka]	'the smell of a small room'

Writing a rule

- Here is the pattern, summed up:

[otʃiŋətʃət]	[otʃiŋətʃən nɛmsɛka]
[otʃiŋətʃən]	[otʃiŋətʃən nɛmsɛka]
[nuɾɨnpap]	[nuɾɨnpam məkəpwanni]
[nuɾɨnpam]	[nuɾɨnpam məkəpwanni]
[tʃakɨnpak]	[tʃakɨnpaŋ nɛmsɛka]
[tʃakɨnpaŋ]	[tʃakɨnpaŋ nɛmsɛka]

- [t], [p], and [k] have changed (respectively) to [n], [m], and [ŋ]!

- What is the phonological rule that underlies this pattern?

$$\text{C}[\text{+stop}]_{\text{-voice}} \longrightarrow \text{C}\begin{bmatrix}\text{+nasal}\\ \text{+voiced}\end{bmatrix} / \_\_\ [\text{+nasal}]$$

German

- Consider some German data.

Plural		*Singular*	
Bäder [ˈbɛːdɐ]	‘Baths’	*Bad* [baːt]	‘Bath’
Raube [ˈʁaʊ̯bə]	‘robberies’	*Raub* [ʁaʊ̯p]	‘robbery’

Infinitive		Imperative	
reden [ˈʁeːdn̩]	‘to talk’	*red* [ʁeːt]	talk!
sagen [ˈzaːgn̩]	‘to say’	*sag* [zaːk]	say!

- Generalization:
  - The final voiced consonant becomes voiceless (Devoicing of final consonants).
- Phonological rule:
  - C[+voiced] → C[-voiced]/_ #

Next Class

- Syllable (read section 4)
- Features (read section 5)
- More on Phonological Processes