LING 001
Introduction to Linguistics

Lecture 10

Phonology I

02/23/2020

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Announcements

- Exam 2 is next Monday!
- Deadline for re-grade requests (Exam 1) is coming up fast!

How to do well this week

- **Practice**!
- Try the practice problems and **come to recitation** with questions.
- Get a study buddy!
- Come to office hours if you are struggling with the practice problems

Sounds and sound patterns

- **Phonetics**: What are the sounds of human language?
  - How are those sounds produced?
- **Phonology**: What are the sounds systems of human language?
  - What **differences between sounds** does a language care about?
  - What **rules** does a language use to put those sounds together?
    - Patterns

Ignoring differences

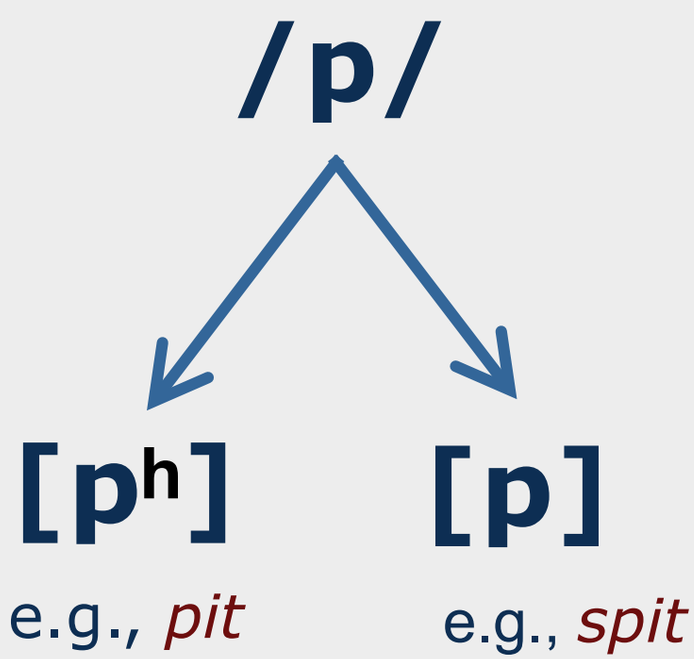
- What does it mean to ask what differences between sounds a language makes?
- Speakers **systematically ignore** certain sound differences
  - We ignore differences that aren't relevant in our language as a system
- English
  - We perceive the **[p]** in these two words as the same:
    - *pit, spit*

One /p/ or two? (English)

- In English, we perceive the **[p]** in *pit*, and *spit* as the same
  - But they are different!
    - ***pit*** [**p**^{h}ɪt] **aspirated** [p] = [**p**^{h}]
    - ***spit*** [**p**ɪt] **unaspirated** [p] = [**p**]
- In English, we hear both of them both as a [p] sound
  - The same goes for [t] (and [t^{h}])
    - ***top*** [**t**^{h}ɑp], ***stop*** [s**t**ɑp]

English: One /p/

- We unconsciously add a puff of air to [p], except when it is preceded by [s]
- We abstract over the details and have one representation: **/p/**



phoneme

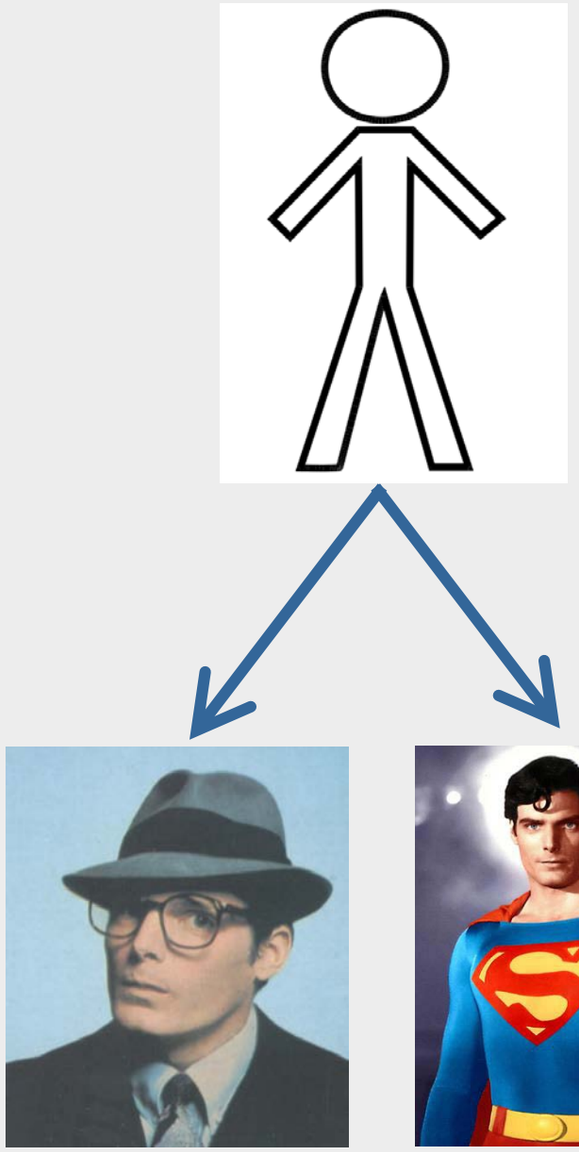
abstract representation

allophones

realizations in contexts

Phonemes vs. allophones

- **Phoneme**: Abstract representation
  - Mental representation
  - Put between slashes **/ /**
- **Allophone**: Rule-based realization
  - How a sound is actually pronounced
  - Put between **[ ]**



One /p/ or two? (Hindi)

- In Hindi, in contrast, speakers perceive [p] and [ph] as different
  - **[pʰəl]** and **[pəl]** are different words in Hindi

[pʰəl] ‘fruit’ **[pəl]** ‘moment’ **[bəl]** ‘strength’

- We say aspiration is **contrastive** (distinctive) in Hindi, since it makes a difference in meaning

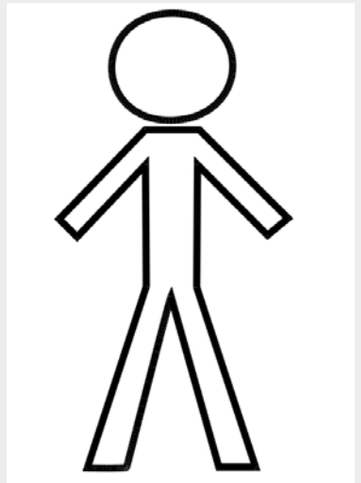
Aspiration in English: Not distinctive

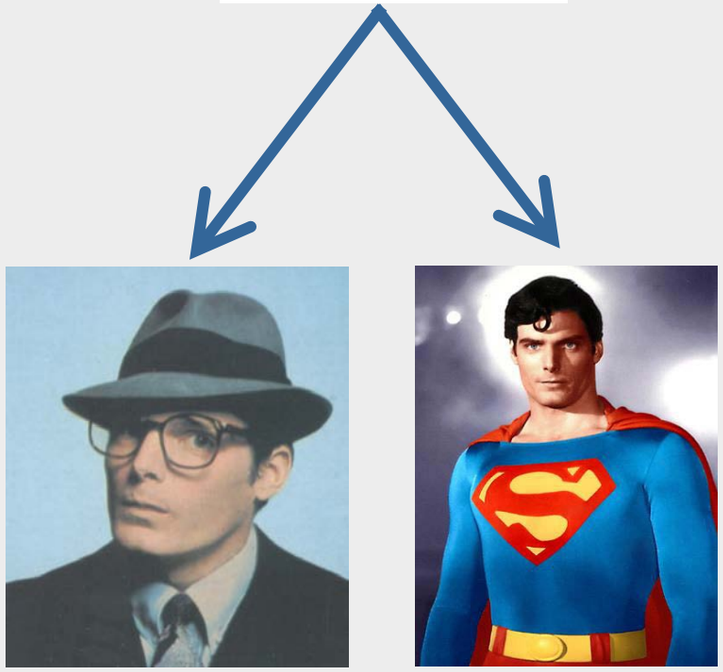
- Note that aspiration is not **distinctive** in English
  - It is not **phonemic** in English
  - Terminology note:
    - For us: ***distinctive*** = ***phonemic*** = ***contrastive***

- If we pronounce **spot** as **[spʰɑt]**, it does not make a new word
  - It just sounds like a slightly odd pronunciation of spot
    - Same goes for *pot* pronounced as **[pɑt]** (rather than [pʰɑt])

Finding the phonemes

- We never actually hear phonemes—they are abstract representations
- So how do we know what the phonemes of a language are?
- One trick: find **minimal pairs**





Finding minimal pairs

- **Minimal pair:**
  - Two words with different meanings
  - Identical in IPA, except for one sound, which occurs in the same place in each word
- Don’t forget: “a word” for us is the IPA of a word
  - **Orthography doesn’t matter** for finding minimal pairs
  - Only **sound matters**

Our first minimal pair

- [kɪt] *kit* vs. [bɪt] *bit*
- Where is the "one sound" that differs in these two words?
- Look at the articulatory description of each sound

[kɪt]	**[bɪt]**
[k]: **voiceless velar** stop	[b]: **voiced bilabial** stop
[ɪ]: high front vowel	[ɪ]: high front vowel
[t]: voiceless alveolar stop	[t]: voiceless alveolar stop

— [k] and [b] are separate phonemes in English

[pɪt] *pit* vs. [bɪt] *bit*

- How minimal is this pair?
  - Where is the "one sound" that differs between the two words?
  - And how can we characterize that sound difference?

[pɪt]	**[bɪt]**
[p]: **voiceless** bilabial stop	[b]: **voiced** bilabial stop
[ɪ]: high front vowel	[ɪ]: high front vowel
[t]: voiceless alveolar stop	[t]: voiceless alveolar stop

- [p] and [b] are separate phonemes in English
- **voicing** is distinctive/contrastive/phonemic for English stops

How will you be asked on the exam?

Exam practice 1

Standard Italian

Consider the following data from Standard Italian, an Indo-European language of the Romance family, spoken in Italy. Answer the questions that follow.

a.	[tinta]	'dye'	**g.**	[tiŋgo]	'I dye'
b.	[tɛnda]	'tent'	**h.**	[tɛŋgo]	'I keep'
c.	[dantsa]	'dance'	**i.**	[fuŋgo]	'mushroom'
d.	[neɾo]	'black'	**j.**	[bjaŋka]	'white'
e.	[ʤɛnte]	'people'	**k.**	[aŋke]	'also'
f.	[sapone]	'soap'	**l.**	[faŋgo]	'mud'

Are there any minimal pairs?

If so, what are they, and what can you conclude to be true of Italian from those minimal pairs?

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A non-minimal pair in English

- Is [t^h] a phoneme in English?
- Can we make a minimal pair with it?
  - **[t^hɑp]**: is this a word in English?
    - Yes!
  - **[tɑp]**: is this a different word, does it mean something other than *top*?
    - No, we have not made a new word
    - We've just done a slightly funny pronunciation of the word *top*

Nasalization: one [ɑ] or two?

- In English, the [ɑ] in *Tom* gets nasalized compared to the [ɑ] in *Todd*
  - Nasalized [ɑ]: **[ɑ̃]**
  - Nasalization is **not contrastive in English**
    - We can't make a new word by nasalizing a vowel (or by not nasalizing it)
      - E.g. pronounce *Tom* as [tɑ̃m]
- French: **/bo/** "beautiful" vs. **/bõ/** "good"
  - Nasalization is **contrastive in French**

Allophones are predictable

- **Allophones** are **rule-governed**
  - The appearance of [ɑ] vs. [ɑ̃] is determined by **rules**
    - Rules that native speakers are unconscious of
- One of the **goals** of phonological research is to determine:
  - What the phonemes and allophones of a language are
  - What the unconscious rules for allophones are

Finding the rule

- It turns out that the alternation between [ɑ̃] and [ɑ] happens with all vowels in English
- How do we find the rule?
- Look at the **environments** each allophone occurs in

Oral Vowel		**Nasal Vowel**	
rush	[**ɹʌʃ**]	rum	[**ɹʌ̃m**]
cab	[**kæb**]	can	[**kæ̃n**]
rag	[**ɹæg**]	rang	[**ɹæ̃ŋ**]
ship	[**ʃɪp**]	shin	[**ʃɪ̃n**]
yacht	[**jɑt**]	yawn	[**jɑ̃n**]
hole	[**hol**]	home	[**hõm**]

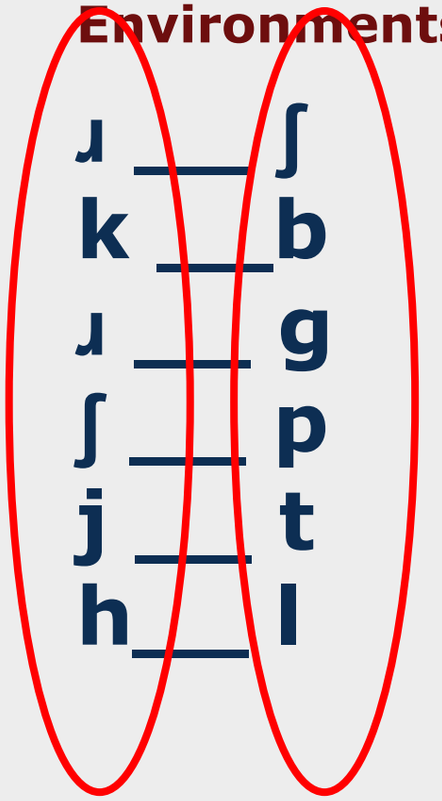
Environments

- The environment of a sound: the sounds before it and after it
- Go through these carefully
  - Look at the sounds **before** the V
  - Look at the sounds **after** the V

Oral V

[ɹʌʃ]
[kæb]
[ɹæg]
[ʃɪp]
[jɑt]
[hol]

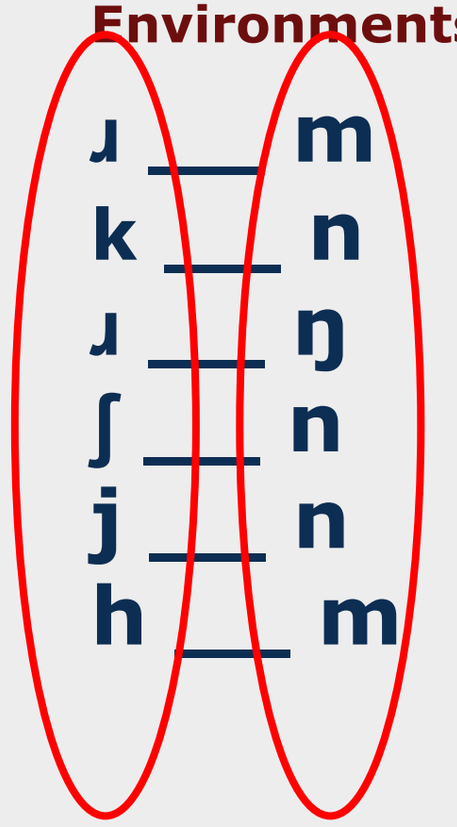
Oral Environments



Nasal V

[ɹʌ̃m]
[kæ̃n]
[ɹæ̃ŋ]
[ʃɪn]
[jɑ̃n]
[hõm]

Nasal Environments

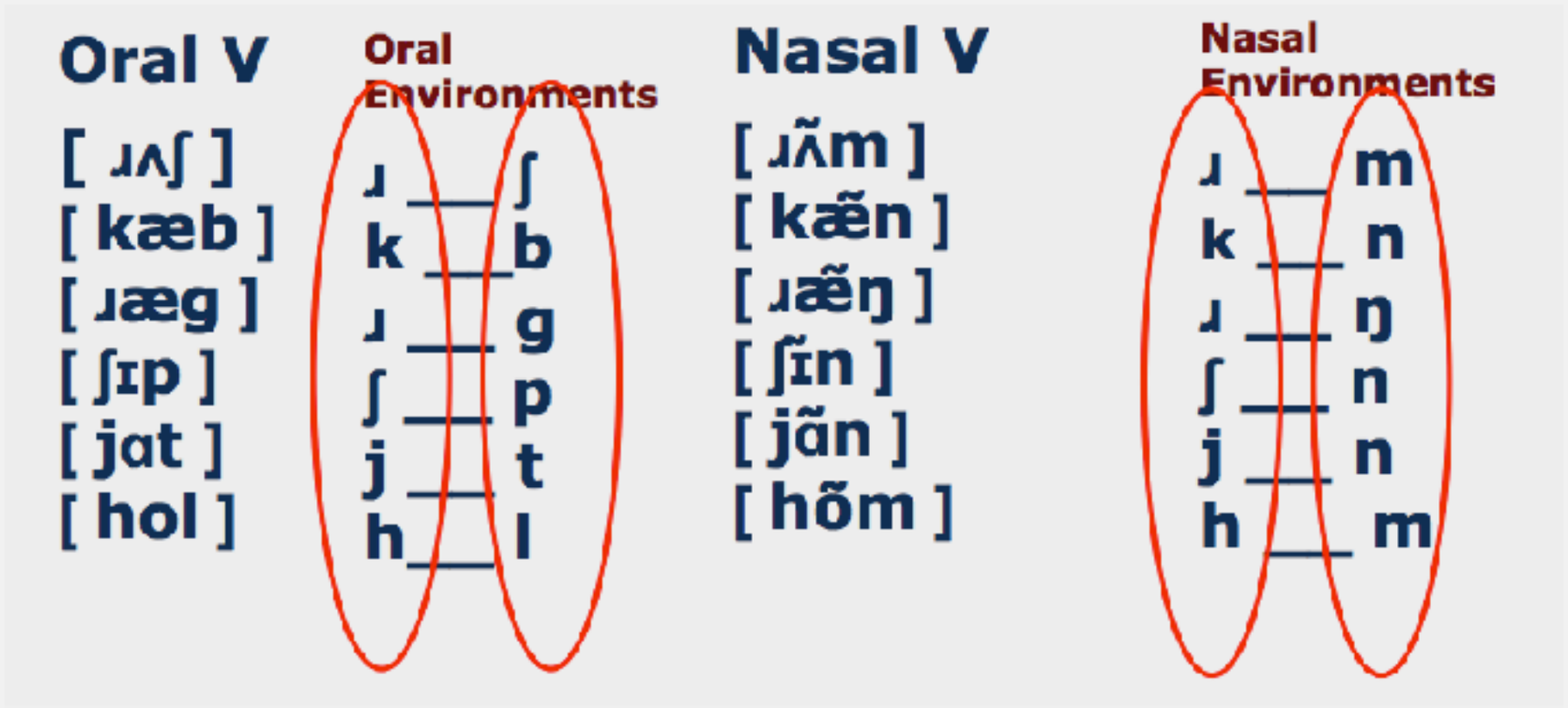


What do you notice?

CONSONANTS (PULMONIC) © 2018 IPA

	Bilabial	Labiodental	Dental	Alveolar	Postalveolar	Retroflex	Palatal	Velar	Uvular	Pharyngeal	Glottal
Plosive	p b			t d		ʈ ɖ	c ɟ	k g	q ɢ		ʔ
Nasal	m	ɱ		n		ɳ	ɲ	ŋ	ɴ		
Trill	ʙ			r					ʀ		
Tap or Flap		ⱱ		ɾ		ɽ					
Fricative	ɸ β	f v	θ ð	s z	ʃ ʒ	ʂ ʐ	ç ʝ	x ɣ	χ ʁ	ħ ʕ	h ɦ
Lateral fricative				ɬ ɮ							
Approximant		ʋ		ɹ		ɻ	j	ɰ			
Lateral approximant				l		ɭ	ʎ	ʟ			

Symbols to the right in a cell are voiced, to the left are voiceless. Shaded areas denote articulations judged impossible.



Finding the phoneme

- We looked at sounds following the vowel, and noticed that nasalized V are all followed by a nasal C
  - Nasal C: __m, __n, __ŋ
- How do we know what the phoneme is?
  - The **phoneme** occurs in the most **varied** environments; it's like the default
  - The **allophone** occurs in more **specific** environments
    - Such as… before a nasal consonant!

Writing the rule

- The more varied case: oral vowels
- The more specific case: nasalized vowels
  - Nasal C: __m, __n, __ŋ
- Write the rule in words:
  - What happens to the general case so that it becomes the specific one?
- **"Vowels become nasal** when they come before a nasal consonant"
- **/vowel/ → [nasal] / ___ [nasal consonant]**
- Alternately: /V/ → [+nasal] / __ C[+nasal]

Reading phonological rules, 1

- /vowel/ → [nasal] / ___ [nasal consonant]
  - The part **before** the arrow: the **kind of sound** that changes
  - In this rule, it's vowels

Reading phonological rules, 2

- /vowel/ → [nasal] / ___ [nasal consonant]
  - The **arrow**: "becomes"

Reading phonological rules, 3

- /vowel/ → [nasal] / ___ [nasal consonant]
  - The part **after** the arrow: the **change** that the sound undergoes
  - In this rule, it's a vowel becomes nasal

Reading phonological rules, 4

- /vowel/ → [nasal] / ___ [nasal consonant]
  - When does the change happen?
  - The slash signals that the environment for the change is coming up next!

Reading phonological rules, 5

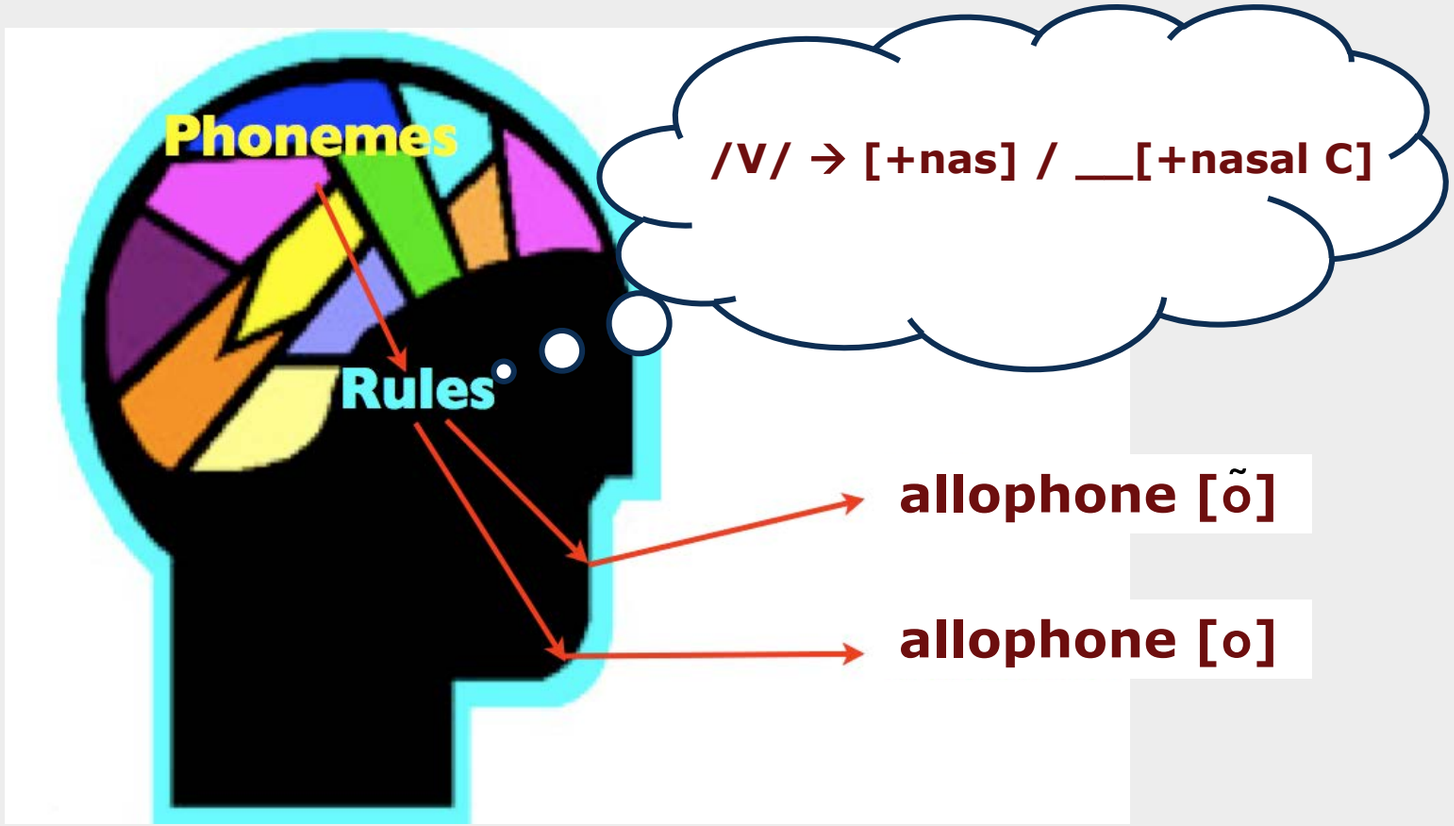
- /vowel/ → [nasal] / ___ [nasal consonant]
  - After the slash: the **environment** that conditions the change
  - **Underlining** stands in for the position of the element that undergoes the change

- With respect to the triggering feature, [nasal consonant]

- In this case, the element that undergoes the change (the vowel) occurs **before** the nasal consonant that triggers the change

Knowledge of the rule

- English speakers **unconsciously** know the following rule:
- /vowel/ → [nasal] / ___ [nasal consonant]
  - "a vowel will become nasal when it's before a nasal (consonant)"



Distribution of allophones

- Complementary distribution
  - Two sounds are in **complementary distribution** if they never occur in the same phonetic environment
- Oral and nasal vowel variants are in complementary distribution
  - Superman and Clark Kent:
    - You don’t ever see Clark Kent flying in the sky (an environment)
    - You don’t ever see Superman on a date with Lois Lane (another environment)

Non-related sounds

- The allophones we have seen are closely related to each other, phonetically
- Non-related sounds may be in complementary distribution, strictly speaking
  - But they are not allophones
- Consider: **/h/** and **/ŋ/** (in English)
  - **/h/** is always word-initial; **/ŋ/** is never word-initial
  - They are in complementary distribution
  - But they are **not** related by a phonological rule
  - This is because /h/ and /ŋ/ are not phonetically related

Exam practice 2

Standard Spanish

Standard Spanish is an Indo-European language of the Romance family. Examine the phones [d] and [ð]. Determine whether they are allophones of one phoneme or of separate phonemes. If they are allophones of one phoneme, identify the type of distribution. If they are in complementary distribution, state a rule that describes the distribution. If [d] and [ð] are allophones of separate phonemes, give minimal pairs that prove this.

a.	[dɾenar]	'to drain'	**g.**	[duða]	'doubt'
b.	[dentɾo]	'within'	**h.**	[bendito]	'blessed'
c.	[dia]	'day'	**i.**	[laðear]	'to tilt'
d.	[aðonde]	'where'	**j.**	[aldea]	'village'
e.	[ajuða]	'help'	**k.**	[deðo]	'finger'
f.	[iðioma]	'language'	**l.**	[toldo]	'canopy'

Are they allophones of one phoneme or of separate phonemes?

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If they are allophones of one phoneme, identify the type of distribution.
(**complementary** or **contrastive**)

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If complementary, state the rule that describes the distribution.

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If allophones of separate phonemes, give minimal pairs that prove this.