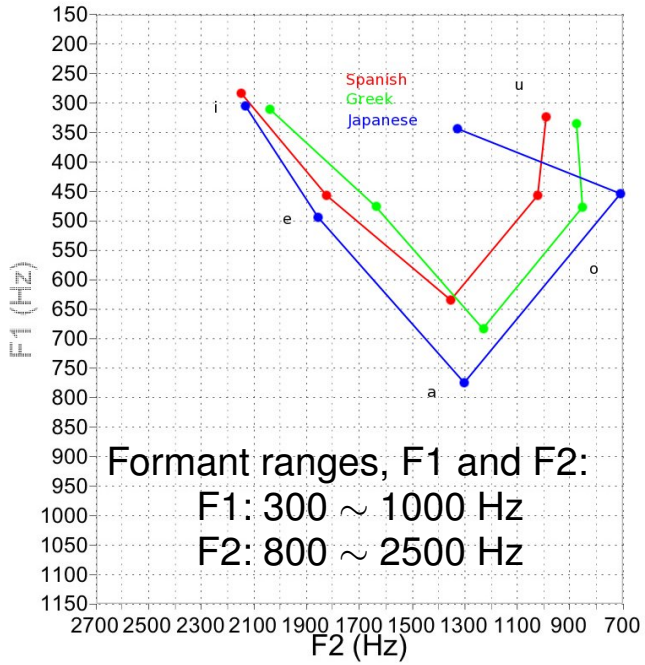
Nasals, approximants, rhotics, and laterals

Cơ sở âm vị học và ngữ âm học

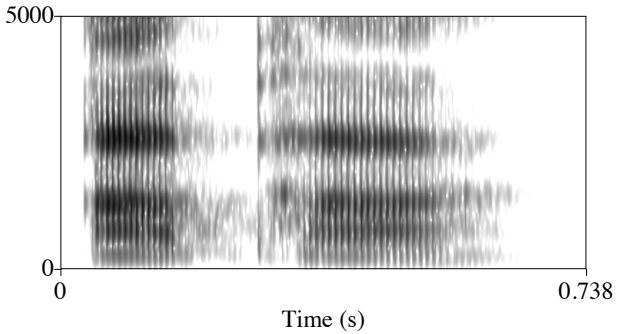
Lecture 15

Vowel chart



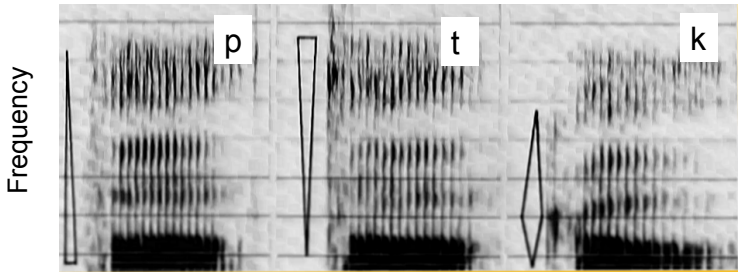
Recap

- Last time we saw that stops consist of both a **closure** (*cấu âm tắc*) and a **burst** (*tiếng nổ*).



Recap

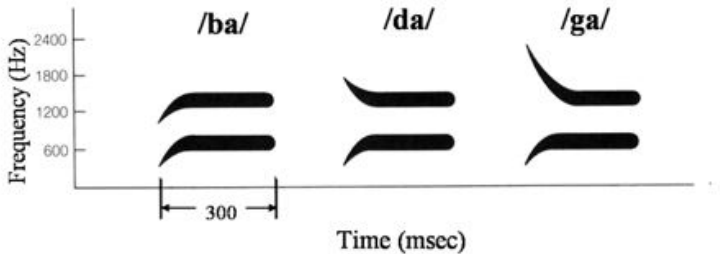
- Voiceless stops can be identified by concentrations of energy (*khu vực năng lượng*) in the release burst.



From Kent & Read (1992), *The Acoustic Analysis of Speech*

Recap

- Voiced stops, on the other hand, were better identified using formant transitions (*chuyển tiếp formant*).

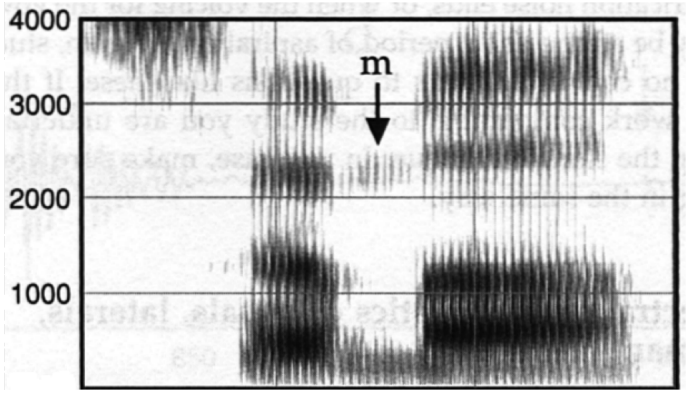


http://www.cns.nyu.edu/~david/courses/perception/lecturenotes/speech/speech.html

Nasals

- Like stops, nasals involve a **vocal tract constriction** (*cấu âm thắt trong đường dẫn âm*)...

simmer

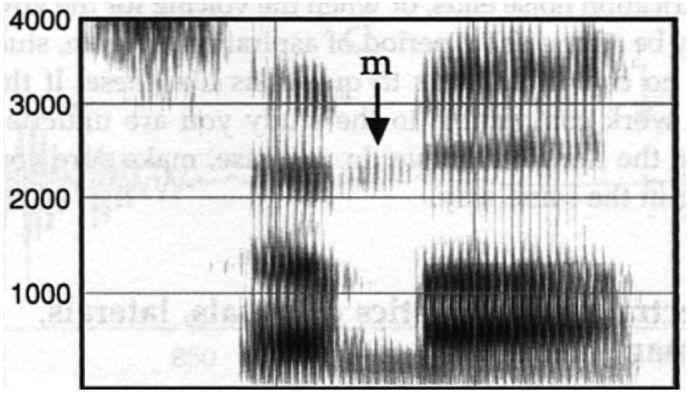


From Ladefoged (2003), *Phonetic Data Analysis*

Nasals

- ...but like vowels, nasals have a **periodic glottal source** (*nguồn thanh hầu có chu kỳ*).

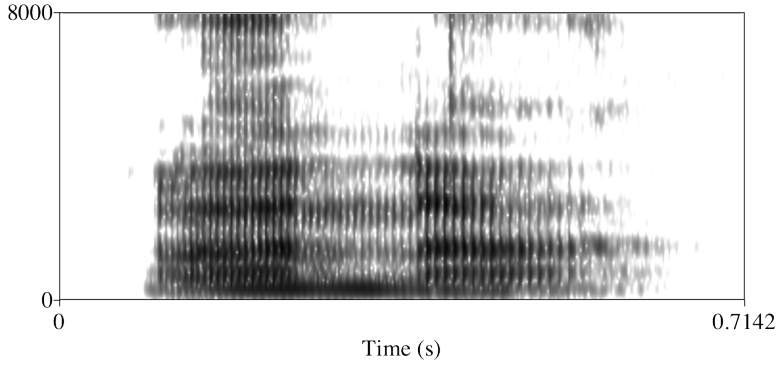
simmer



From Ladefoged (2003), *Phonetic Data Analysis*

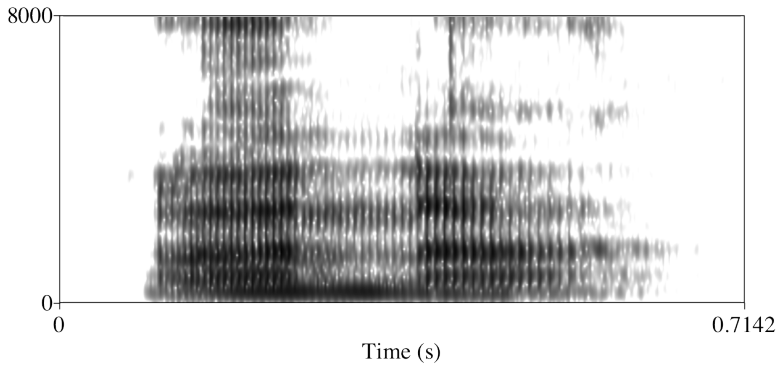
Nasals

- Energy (amplitude) is lower than for vowels – in part because nasal membranes absorb the sound (màng nhầy hút âm thanh).



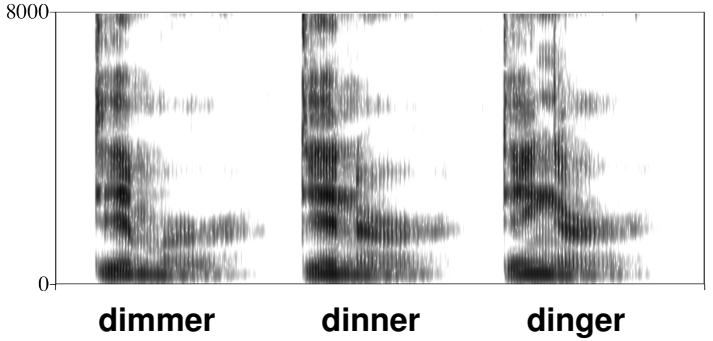
Nasals

- Since the oral tract is completely closed, this effect is enhanced, giving rise to antiformants (*formant yếu*).



Nasals

- Like stops, the crucial information is contained in the formant transitions.
- In practice, the velar nasal is usually the clearest.



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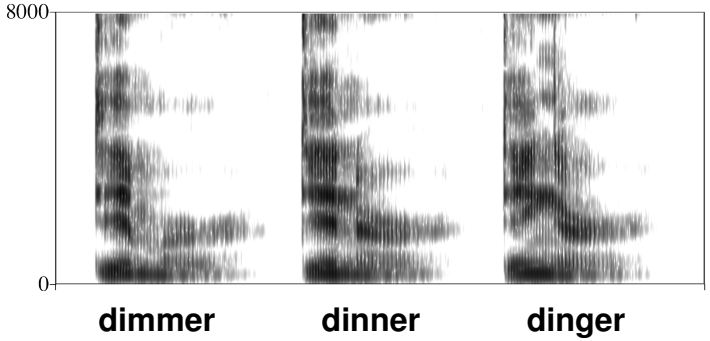
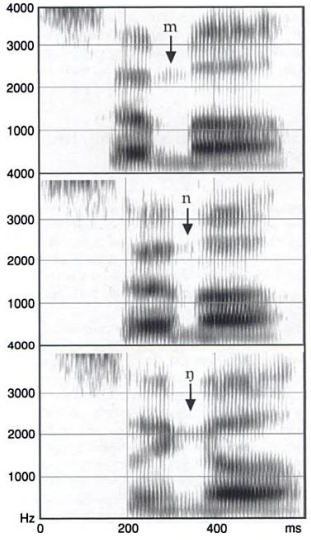


Formant transitions preceding nasals



From Ladefoged (2003), *Phonetic Data Analysis*

⟵ **[m]**: *falling* F2

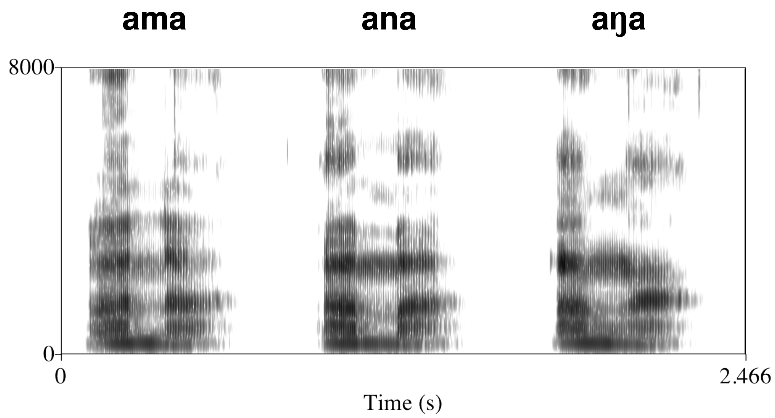
⟵ **[n]**: *level* F2

⟵ **[ŋ]**: *rising* F2

(reverse for transitions following nasals)

Nasals

- F1 tends to be low (250-300Hz) and F2 around 2500Hz. In between (where vowels have F2) there is little energy.



Approximants

- **Vowels** are periodic – complex repeating waves generated by regular vibrations of the vocal folds.
- **Consonants** may have an aperiodic component, but can still be voiced or voiceless
- There are also (largely periodic) segments that lie somewhere in between: approximants.

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- Acoustically, [j] [w] are very similar to vowels, with striations and formants, but often with less energy
- For this reason they are sometimes called *semivowels*.
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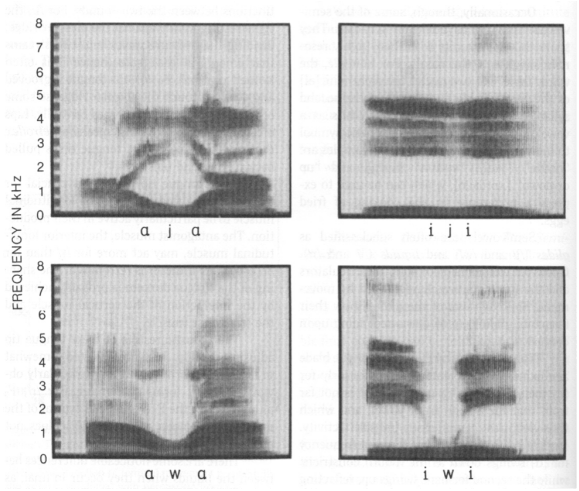
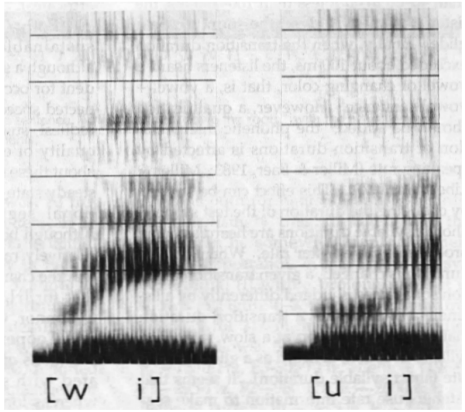


From Borden, Harris, & Raphael (1994)

Approximants

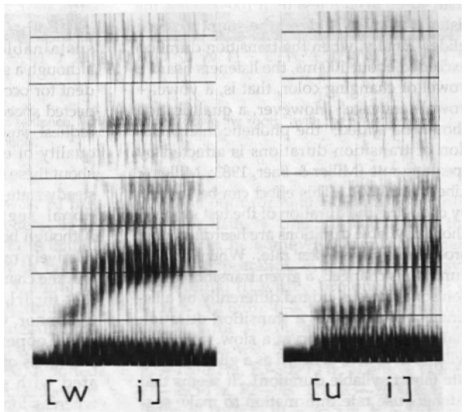
- What constitutes a diphthong vs. a semivowel + a vowel can be controversial...



From Kent & Read (1992), *The Acoustic Analysis of Speech*

Approximants

- [w] and [j] tend to differ from [u] and [i] in that they tend not to have a steady-state portion (*một phần không đổi*).



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Rhotics ('r'-tính)

- The defining acoustic signature of [ɹ] is the third formant (F3) making a steep fall to below 2kHz.
- This effect is referred to as *'r-colouring'* (*r-hoá*).
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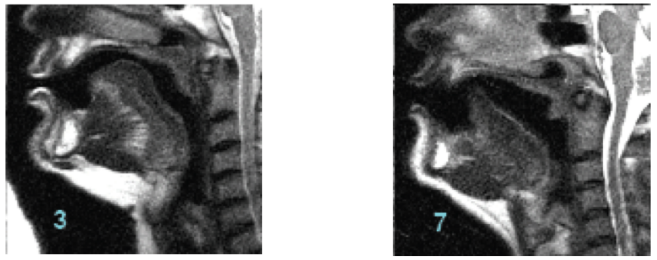
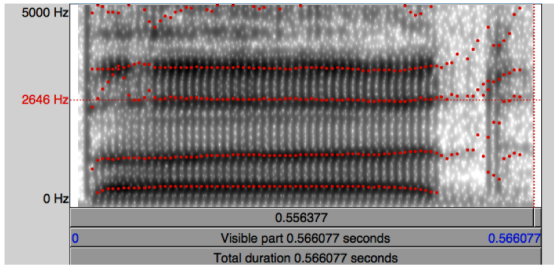
Tongue configuration types of American English /r/ ([ɹ])

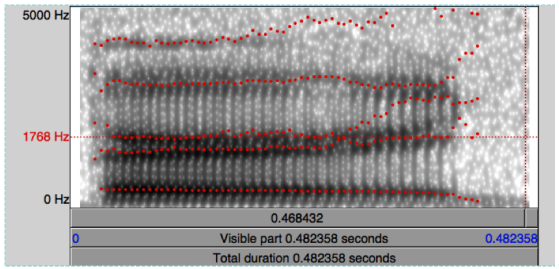


Examples of corresponding American English tongue configuration types for sustained /r/ as identified from MRI by Tiede et al. (2004). Adapted from Tiede et al. (2007), ‘Variability of North American English /r/ Production in Response to Palatal Perturbation’, Haskins Internal Workshop on Speech Production and Motor Control.

Rhoticization

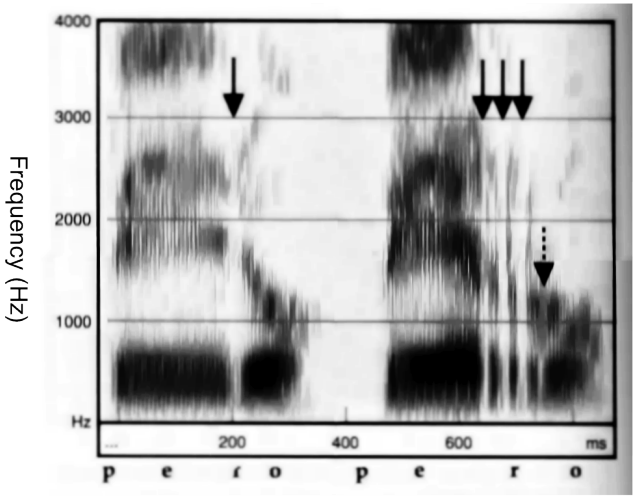


ɜː



ɜˠː

Taps (*âm vỗ*) and trills (*âm rung*)

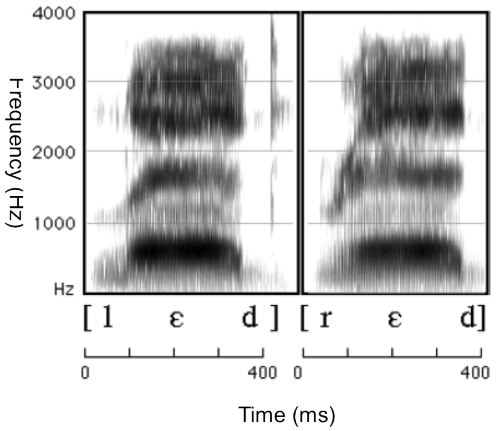


Time

From Ladefoged (2003), *Phonetic Data Analysis*

Where F3 is useful

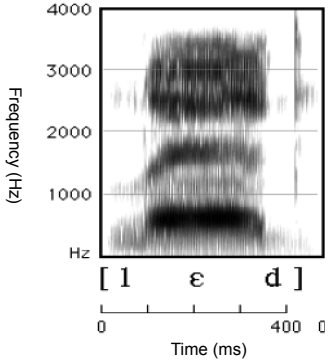
- [ɹ]: characterised by low F2 and especially low F3.



From Ladefoged (2006), *A Course In Phonetics*

Lateral approximants

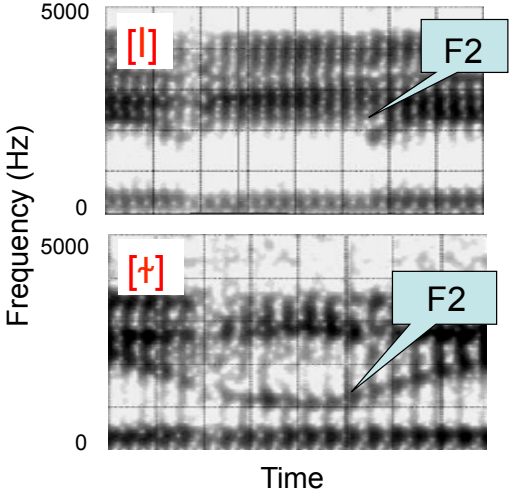
- [l]: faint formants at a) low frequency and b) about 1000-1500 and 2500-3000 Hz, followed by abrupt change in amplitude when the tongue tip breaks away.



From Ladefoged (2006), *A Course In Phonetics*

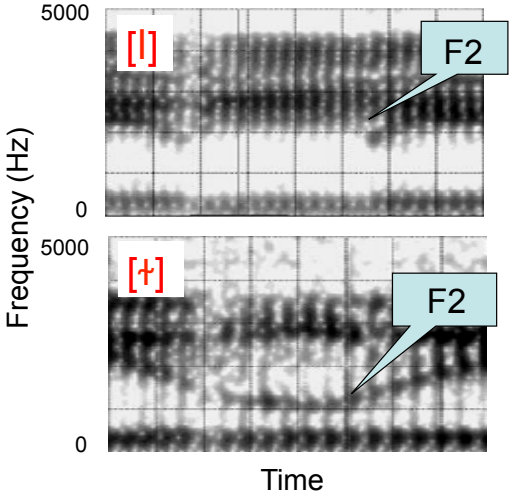
Clear vs. dark [l]

- Catalonian (clear, top) vs. Mallorcan (dark, bottom) /l/s



Recasens & Espinosa (2005), 'Articulatory, positional and coarticulatory characteristics for clear /l/ and dark /l/: evidence from two Catalan dialects', *JIPA* 35(1), 1-25.

Clear vs. dark [l]



- Allophones in many English dialects: dark /l/ in coda ('feel'), clear /l/ in onset ('leaf')
- In Newcastle English, initial /l/ is light; in Leeds, initial /l/ is dark (Carter & Local, 2007)
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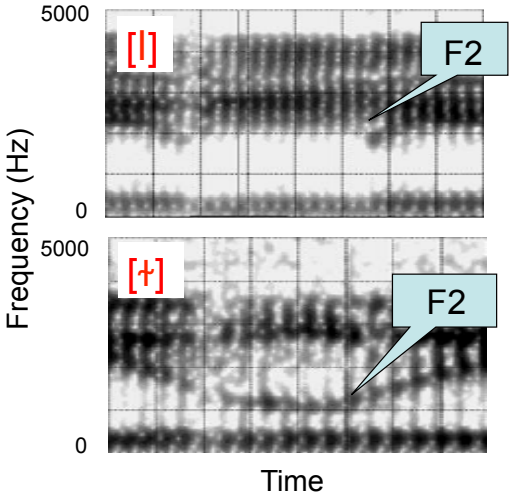

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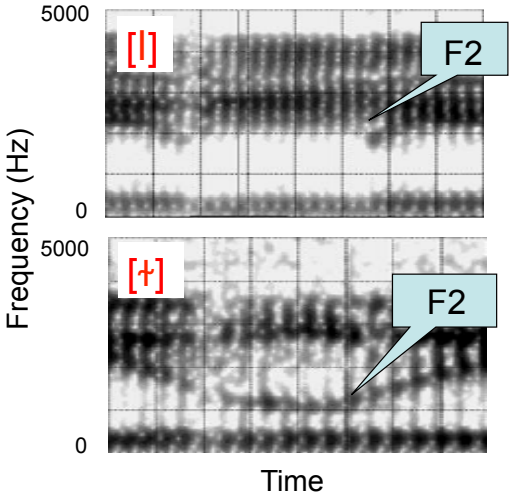

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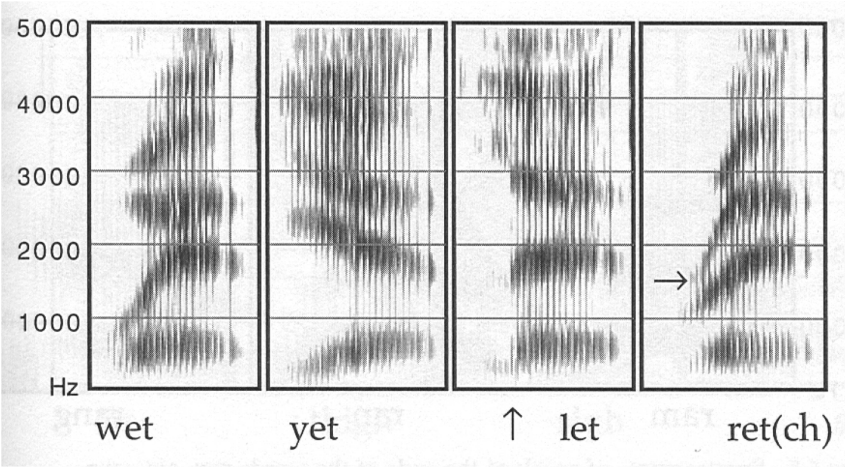

- What distinguishes these approximants?

Spectrogram practice