Theoretical Phonology: Suprasegmental Phonology

Vowels. An introduction

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Outline

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Vowels IPA

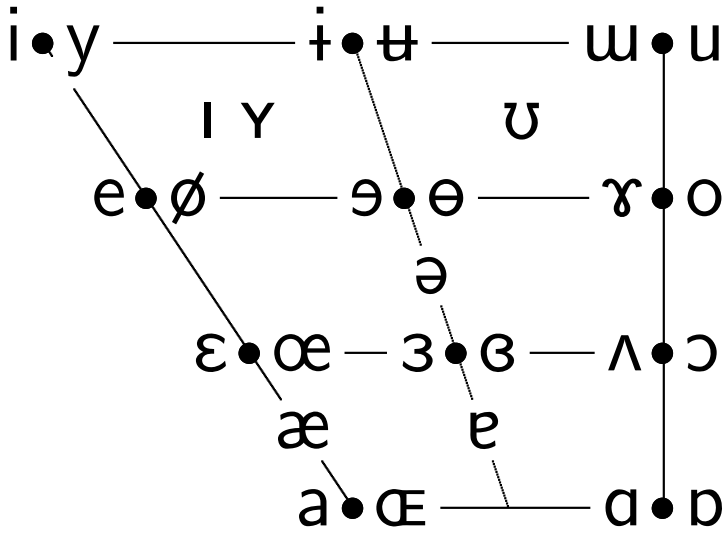

Figure: Vowel. Where symbols appear in pairs, the one to the right represents *a rounded vowel.*

Vowel Production

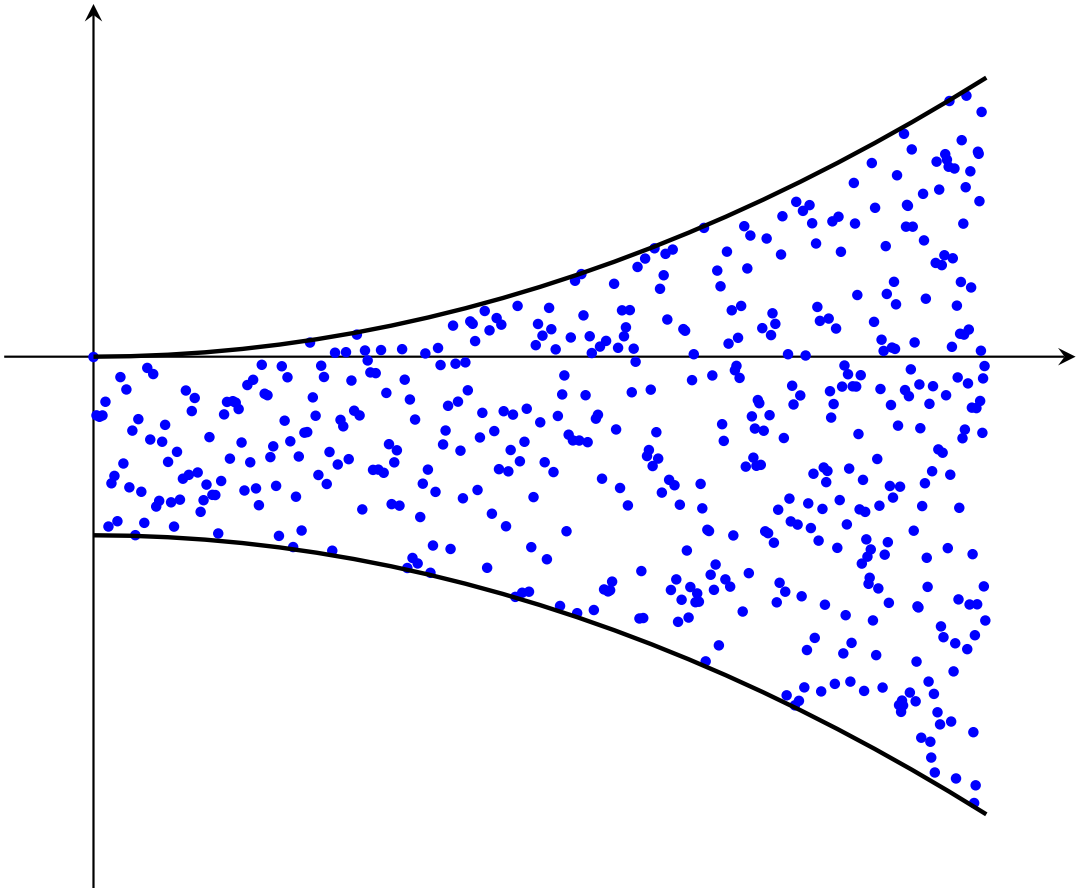

Figure: Mouth as a funnel.

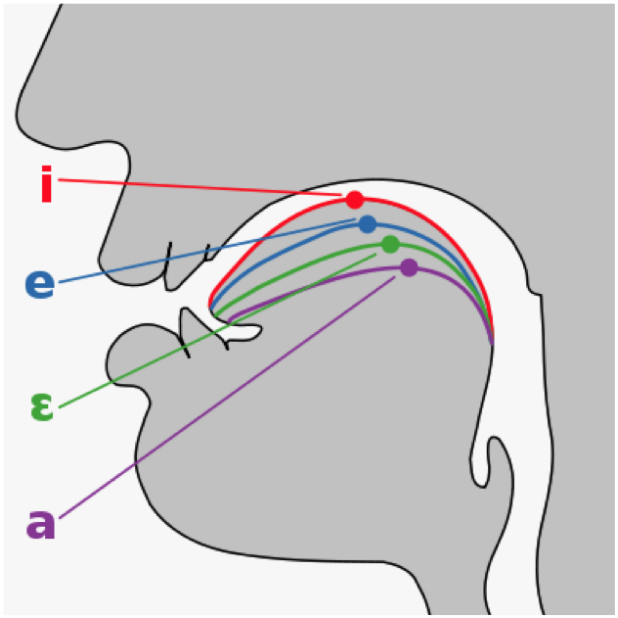

Figure: Tongue Positions.

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Vowel Production

- Vowel height: High (Close)-Middle-Low (Open)
- Vowel location: Front-Central-Back
- Lip position: Spread-Neutral-Rounded

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Vowel Height and Vowel Location

- *High* vs. *Low* vowels.[1]
- Vowel height refers to the vertical position of the tongue relative to either the roof of the mouth or the aperture of the jaw. However, according to Ladefoged Vowel High is more an acoustic property rather than an articulatory property.

[1] The IPA uses the terms CLOSE vs. OPEN vowels respectively.

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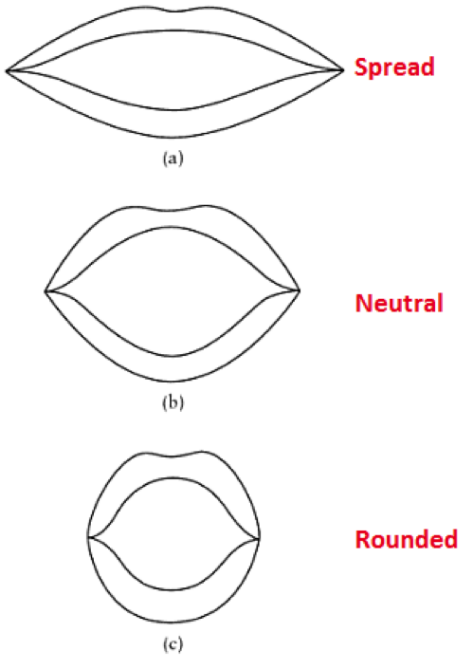
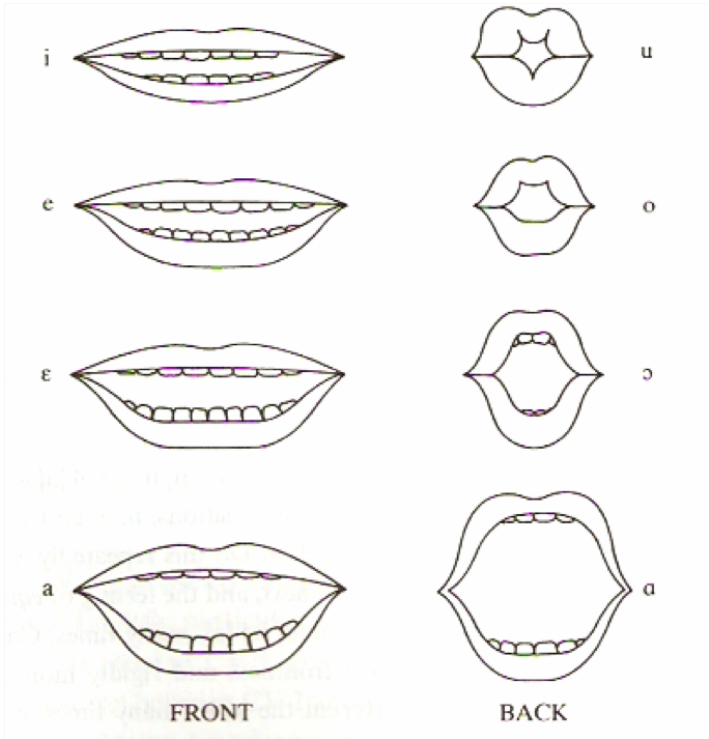
Lip Position





[a] Catford 2001

Cardinal Vowels

Sir Daniel Jones

Daniel Jones, a phonetician at University College, London (UCL), devised the system of cardinal vowels for the description of vowels. The oral tradition of learning and perfecting one s cardinal vowels initiated by Jones is still strong among phoneticians who are trained in the British tradition.

Cardinal Vowels

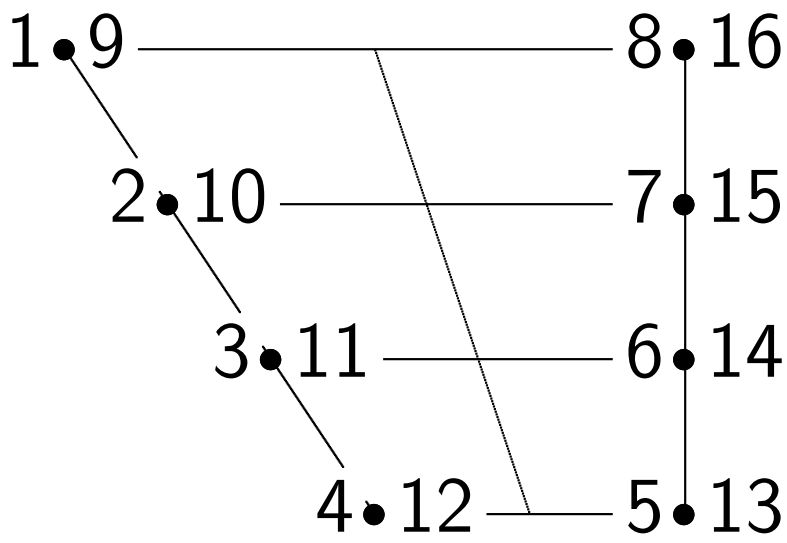


Figure: The cardinal vowel diagram.

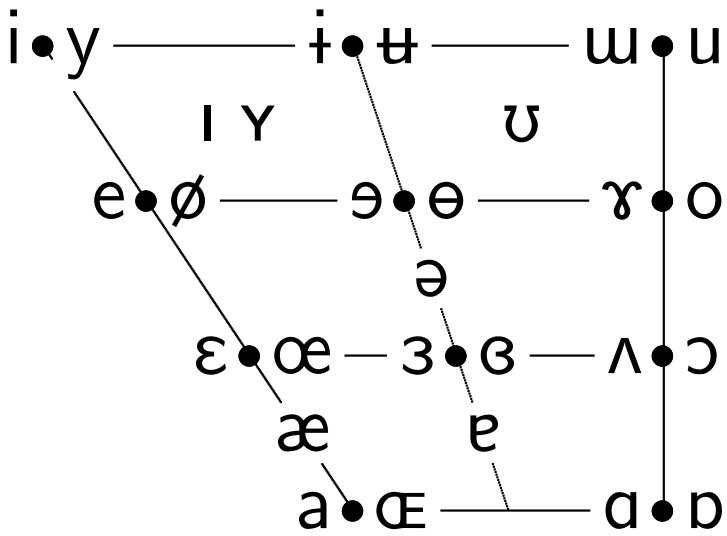


Figure: Vowel. Where symbols appear in pairs, the one to the right represents *a rounded vowel.*

Quote

Note that between a French, Greek, German, and English [i] there can be noticeable acoustic differences. A precise transcription should capture these differences, which implies that more symbols are needed. Nevertheless, balancing in sounds' representation between precision and economy, phonologists represent only the essential contrasts between sounds.

Diacritics

- v̝ raised with respect to v.
- v̞ lowered with respect to v.
- v̟ fronted with respect to v.
- v̠ retracted with respect to v.
- v̈ centralised with respect to v.
- v̽ mid-centralised with respect to v.

Problems with the Cardinal System

- The cardinal system confuses articulatory and auditory properties.
- The cardinal vowel system suggests that an invariant tongue position exists for each vowel quality this is not the case.
- Recent studies suggest that it is the location of the major constriction formed by the tongue, rather than tongue height it self, which is more direct determinant of perceived vowel quality.
- Clark et al. (2007) suggest that the cardinal vowels are best taken to be auditory qualities rather than articulatory specifications.

Long and Short Vowels

- bid and bead /ɪ - iː/
- good and food /ʊ - uː/
- cad and card /æ- ɑː/
- cod and cord /ɒ - ɔː/
- (for)ward and word /ə - ɜː/

The unit of length is the mora. A short vowel has one mora. A long vowel has two morae.

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Nasalisation

- Oral Vowel. A vowel in which all air escapes through the mouth.
- Nasal Vowel. The velum is lowered, and the air travels through the nasal cavity as well as through the mouth.
- Some languages—e.g., French, Portuguese, Polish etc.—contrast oral and nasal vowels.

Oral and Nasal French Vowels

Vowel	IPA	Word	Gloss	Vowel	IPA	Word	Gloss
/i/	[si]	*si*	*if*	/ɑ̃/	[sɑ̃]	*sans*	*without*
/e/	[fe]	*fée*	*fairy*	/ɔ̃/	[sɔ̃]	*son*	*his*
/ɛ/	[fɛ]	*fait*	*does*	/œ̃/	[bʁœ̃]	*brun*	*brown*
/ɛː/	[fɛːt]	*fête*	*party*	/ɛ̃/	[bʁɛ̃]	*brin*	*sprig*
/ə/	[sə]	*ce*	*this/that*				
/œ/	[sœː]	*sœur*	*sister*				
/ø/	[sø]	*ceux*	*those*				
/y/	[sy]	*su*	*known*				
/u/	[su]	*sous*	*under*				
/o/	[so]	*sot*	*silly*				
/o/	[sɔːʁ]	*sort*	*fate*				
/a/	[sa]	*sa*	*his/her,*				
/ɑ/	[pɑt]	*pâte*	*dough*				

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- Some languages such as North American English, Mandarin Chinese and Quebec French comprise in the phonemic inventory rhotic vowels.

Vowel Systems

All vowel systems have at least two height and two fronting contrasts. Further contrasts are built up from the features length (also known as lax/tense), nasality, and lip rounding (see Lass, (1984, 139-146).

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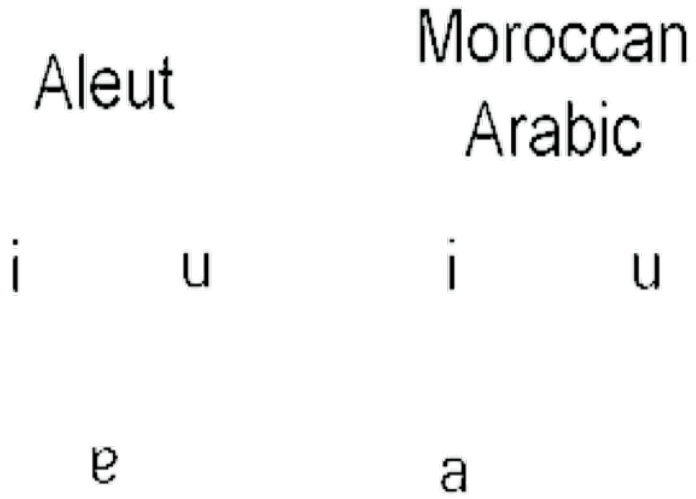
HIGH-LOW SYSTEMS: NO length Contrast



- Languages with minimal vowel systems typically have three vowel phonemes: one high front, one high back, and one low vowel with no length contrast.
- There is a maximum dispersal of vowel quality towards the far corners of the vowel space

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HIGH-LOW SYSTEMS: length contrast

Alaskan Eskimo

i	u	i:	u:
e		e:	

Some languages are based on this basic system but have in addition the added dimension of vowel length.

HIGH-MID-LOW SYSTEMS: NO length contrast

HIGH-MID-LOW SYSTEMS: Length Contrast

Hawaiin

i	u	iː	uː
ɛ	o	ɛː	oː
ɐ		ɐː	

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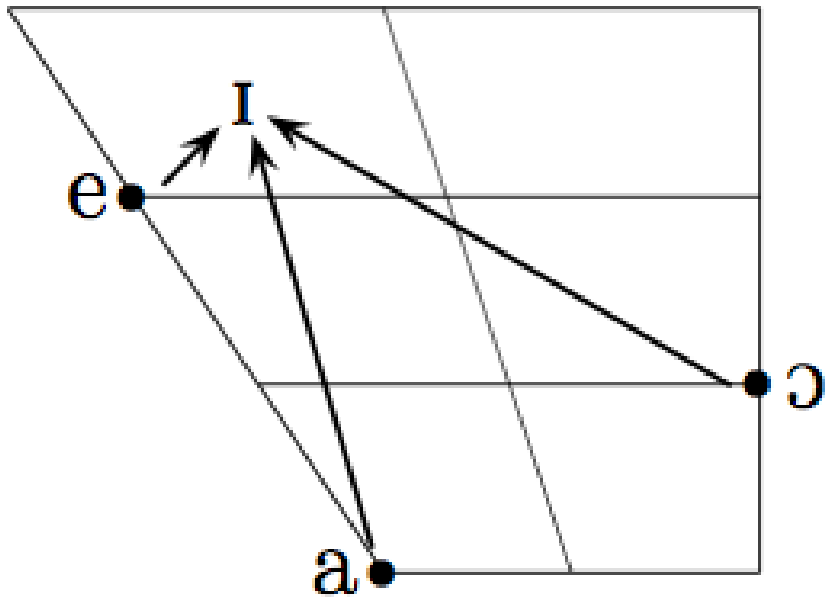
Diphthongs

- A diphthong are two adjacent vowel sounds that occur in the same syllable. In other words it is a vowel with two different qualities.
- To transcribe diphthongs in IPA, we use two vowel symbols and optionally the non syllabic diacritic.

Falling and Rising Diphthongs

- Falling or descending diphthongs: they start with a vowel quality of higher prominence and end in a semivowel of lower prominence, like [aɪ̯]
- Rising or ascending diphthongs: they begin with a less prominent semivowel and end with a more prominent full vowel as in [ja].

English Rising to [ɪ] Diaphthongs (RP)



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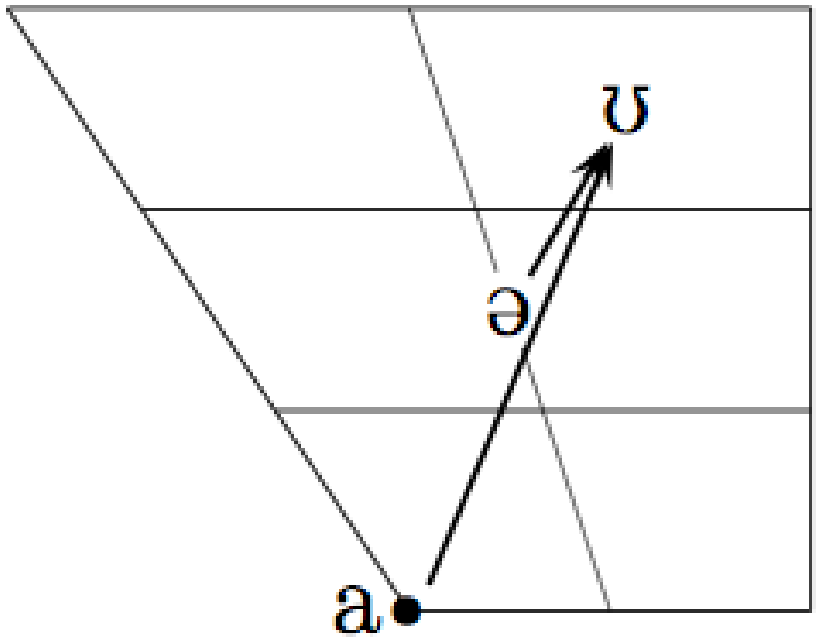
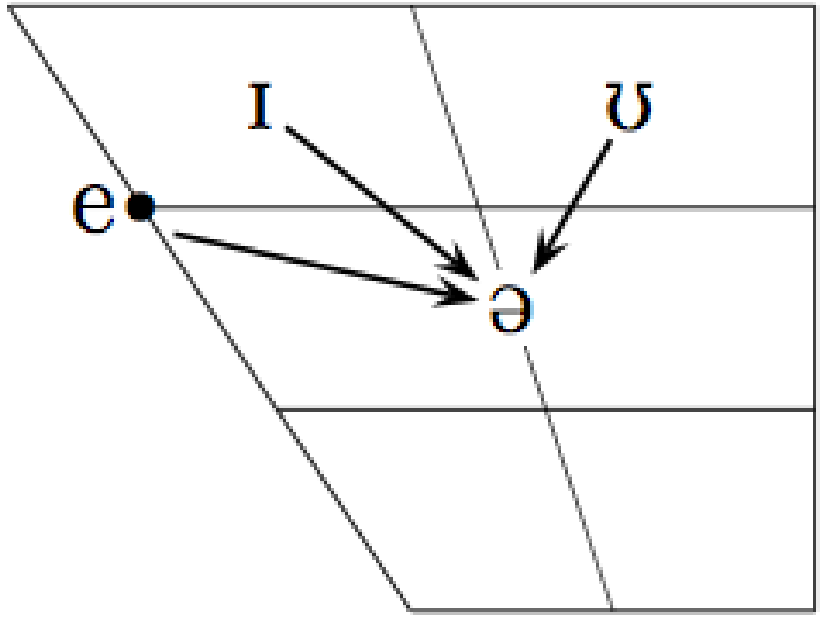
English Rising to [ʊ] Diaphthongs (RP)



Closing, Opening, and Centering

- Closing Diphthongs. the second vowel quality is more close than the first as in [ai].
- Opening Diphthongs. The second vowel quality is more open as in [ia].
- Centering diphthongs. The second vowel quality is a more central vowel quality, such as [ɪə̯].

English Centring Diphthongs (RP)



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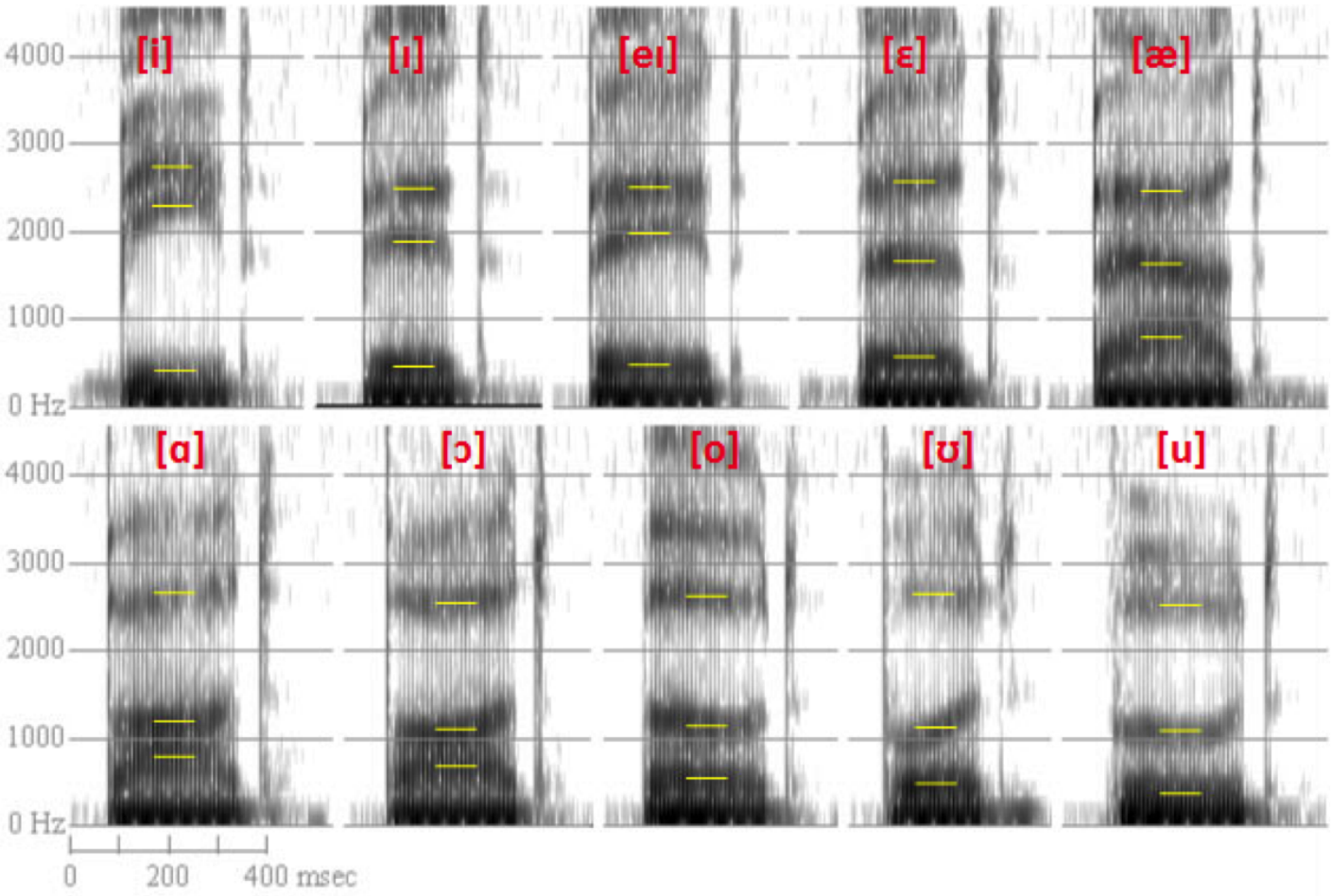
Formant (resonance) system

- high-low value of F1 (related to tongue body height).
- high-low value of F2 (related to tongue body front-back).

Vowel Formants



Wide band spectrograms of the vowels of American English in a /b__d/ context.

Top row, left to right: [i, ɪ, eɪ, ɛ, æ].

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Vowel Formants

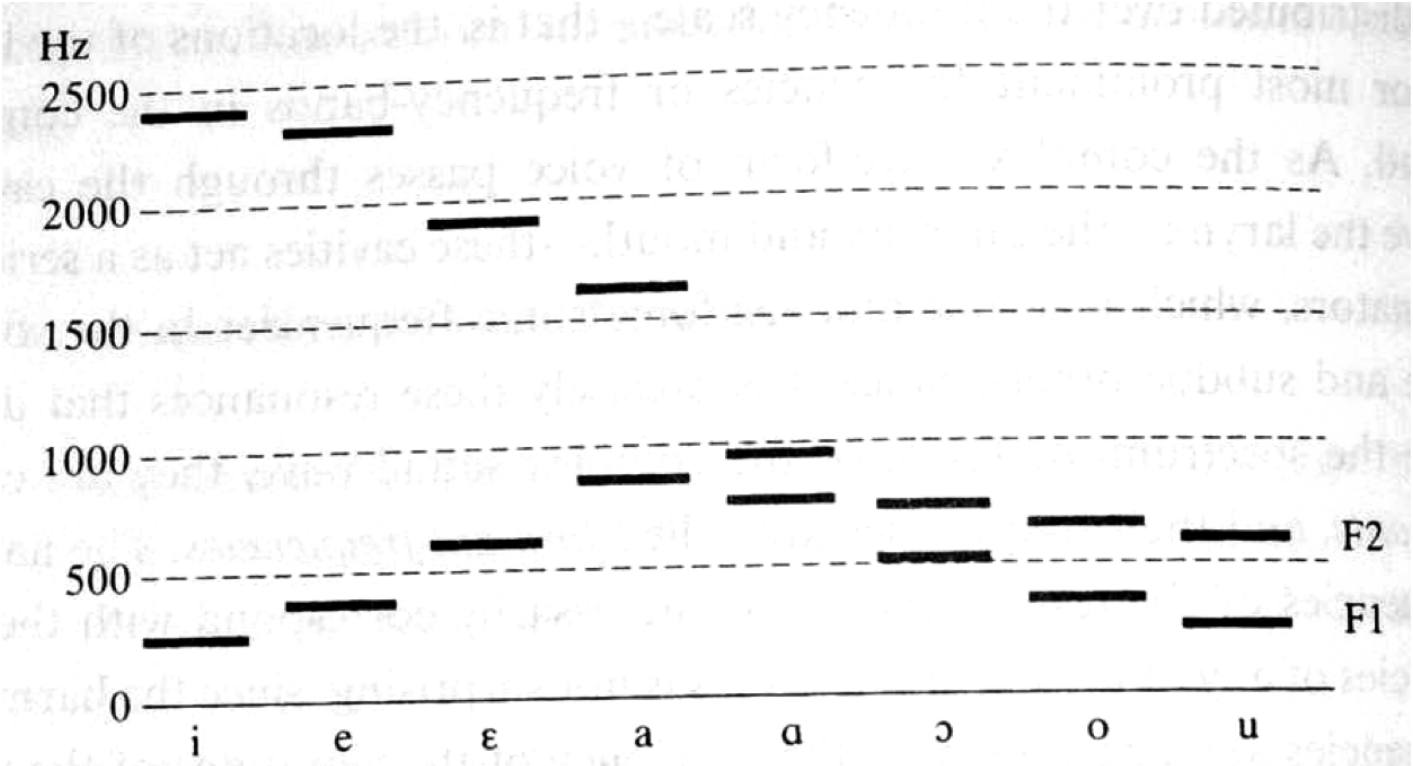

Fig. 44 First and second formants of Cardinal Vowels

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English Vowels

	b__d	IPA		b__d	IPA
1	bead	iː	11	booed	uː
2	bid	ɪ	12	bud	ʌ
3	bayed	eɪ	13	bird	ɜː
4	bed	ɛ	14	bide	aɪ
5	bad	æ	15	bowed	aʊ
6	bard	ɑː	16	Boyd	ɔɪ
7	bod(y)	ɒ	17	beer	ɪə
8	bawd	ɔː	18	bare	ɛə
9	budd(hist)	ʊ	19	byre	aə
10	bode	əʊ	20	boor	ʊə

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Summary

- Vowel Production
- Vowel height: High (Close)-Middle-Low (Open) Vowel location: Front-Central-Back
- Lip position: Spread-Neutral-Rounded
- Cardinal Vowels
- Long and Short Vowels
- Nasality
- Rhotacization
- Vowel Systems
- Monophthongs vs. diphthongs

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For Further Reading I

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For Further Reading II

Laver, J. (1994).
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