What does emphatic lengthening tell us about binary length distinctions?

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WHAT IS BINARY?

Why do linguists—and others—care?

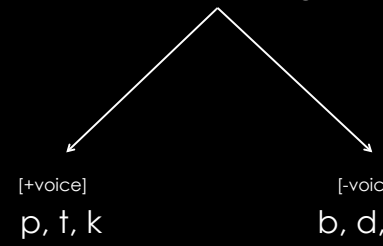
Ferdinand de Saussure

- Binary oppositions are "the means by which units of language have value or meaning; each unit is defined against what it is not" (Fogarty 2005)

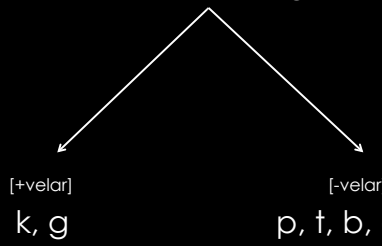
Roman Jakobson

- "The binary opposition is the child's first logical operation" (Jakobson and Halle, 1956:47)

English Stop Consonants



English Stop Consonants



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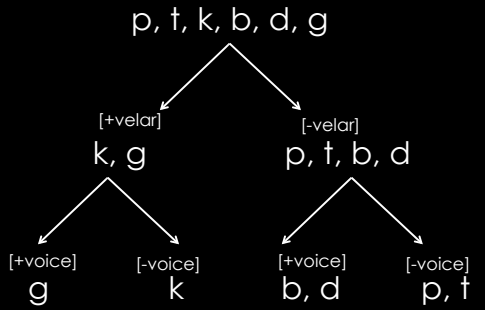
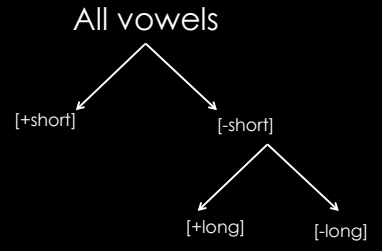


No trickery allowed



Binary duration contrasts

- Vowel length
  - Japanese:

obasan	"aunt"		obaasan	"old lady"
ki	"tree"		kii	"key"
se	"height"		see	"gender"
o	"tail"		oo	"king"
fu	"gluten"		fuu	"seal"

- Consonant length:

Japanese	saka	"hill"	sakka	"author"
Italian	fato	"fate"	fatto	"fact"

Estonian: an exception?

- sata "hundred"
- saata "send!"
- saaata "to get"

- "Faced with a three-way surface contrast, a blatant *prima facie* insult to the phonological number *two*" a number of authors have sought ways to say "this doesn't count" (Prince 1980).

Why are length contasts binary?

- Option 1: phonology just *is* binary
- Option 2: it's hard to produce greater (e.g. ternary, quaternary…) distinctions
- Option 3: it's hard to perceive more fine-grained distinctions

Emphatic lengthening

- That lecture was *so* boring

soo

sooo

soooo

sooooo

Emphatic lengthening in Japanese

- Adjectives lengthen their stem-final vowel to show emphasis
- ita + i = itai
  pain *adj.* *painful*
  stem *suffix* *adjective*

Emphatic lengthening in Japanese

Japanese orthography	Transcription	Condition	Gloss
a. いたい	[itai]	no emphasis	'painful'
b. いたーい	[itaai]	level 1 emphasis	'painful' (emphatic)
c. いたーーい	[itaaai]	level 2 emphasis	'painful' (very emphatic)
d いたーーーい	[itaaaai]	level 3 emphasis	'painful' (very very emphatic)
e. いたーーーーい	[itaaaaai]	level 4 emphasis	'painful' (very * 3 emphatic)
f. いたーーーーーい	[itaaaaaai]	level 5 emphasis	'painful' (very * 4 emphatic)

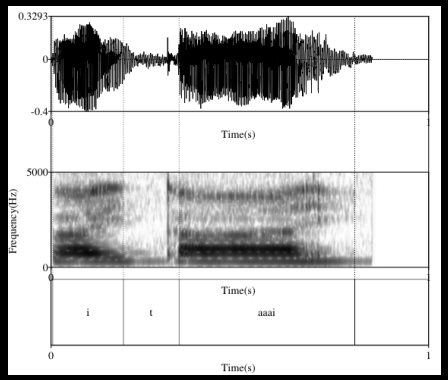
Procedure

- 7 female native Japanese speakers
- Shown stimuli in carrier sentences, 10 repetitions, randomized

(6 adjectives * 6 emphasis levels * 10 blocks)

A speaker's production of "too", level 5 emphasis

An example…

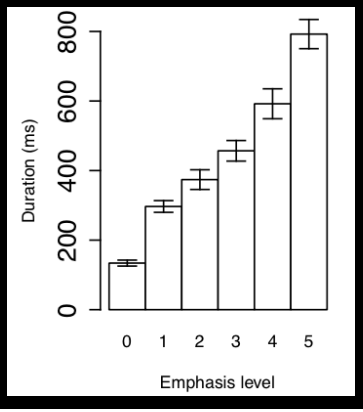


A speaker's production of "itai", level 2 emphasis

Stats

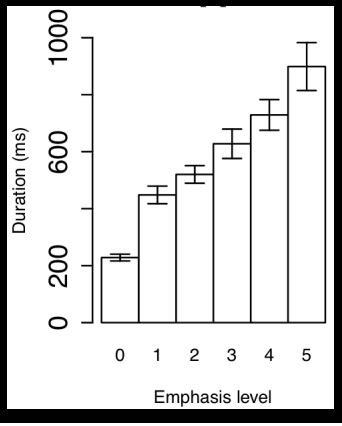
- No pairwise comparisons, to avoid Type I error:
  - 6 emphasis levels * 7 speakers (* 3 vowel types)
- Post-hoc linear regressions
- 95% CI error bars

The 'best' speaker



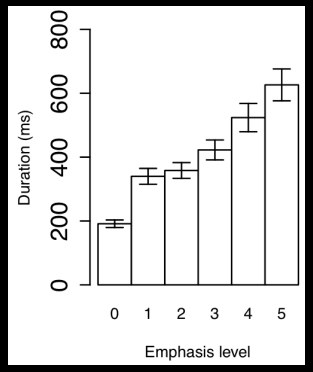
r =. 89

Second best



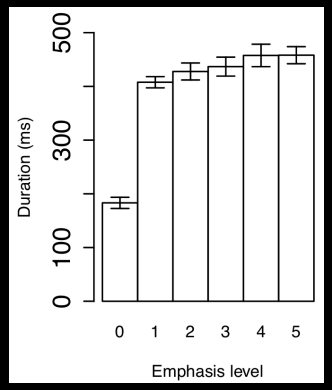
r =. 81

More average



r =. 76

The worst…



r =. 41

Some things to notice…

- The "worst" speakers had the smallest *range* (533 ms for the worst vs. 975 ms for the best)
- All speakers showed a qualitative, binary distinction between no-emphasis and level 1

But…

- Japanese has a binary duration contrast
  - Does that make them better?
  - Does that make them more binary?

Experiment 2: English

- 7 target *intensifier* words:
  - *very*
  - *too*
  - *way*
  - *super*
  - *mad*
  - *Really*
- Placed in a carrier sentence:
  - That guy is <u>soooo</u> creepy

Emphasis levels

- 6 levels of emphasis, based on orthography:

No emphasis	so
Level 1	soo
Level 2	sooo
Level 3	soooo
Level 4	sooooo
Level 5	soooooo

Procedure

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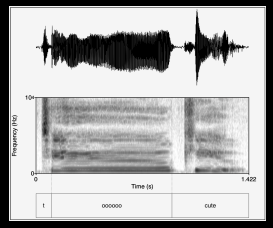
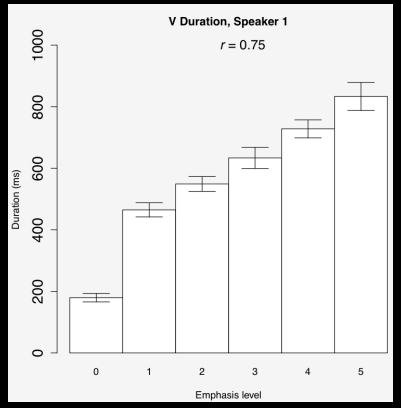


A speaker's production of "too", level 5 emphasis

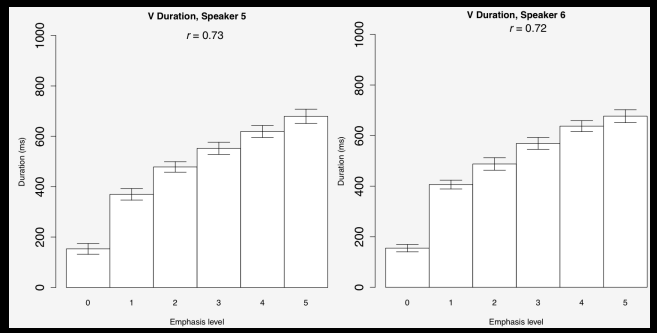
Results

- All speakers show correlation significant to $p < 0.001$ between emphasis level and duration

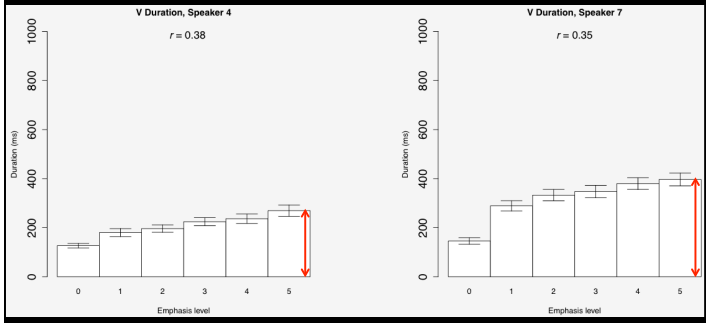
The star pupil



Next best



Bottom of the class



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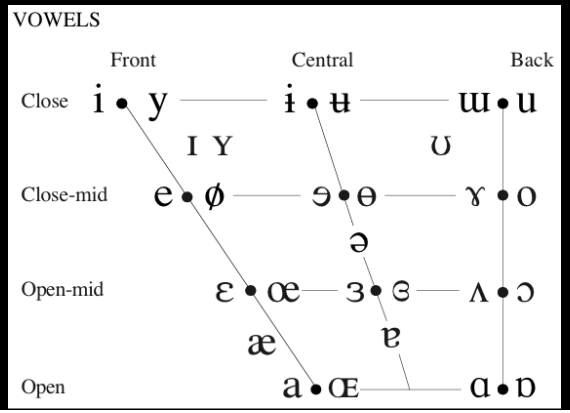
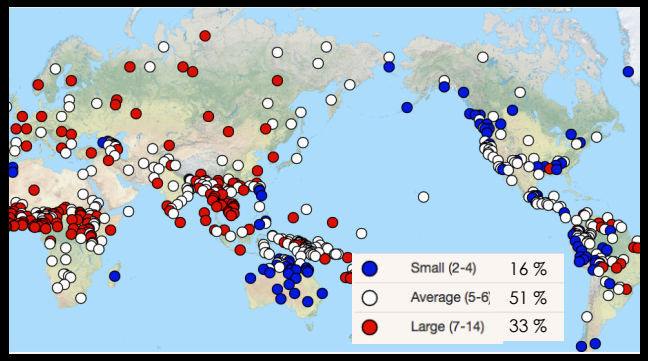
And now, a detour…

Vowels of the world

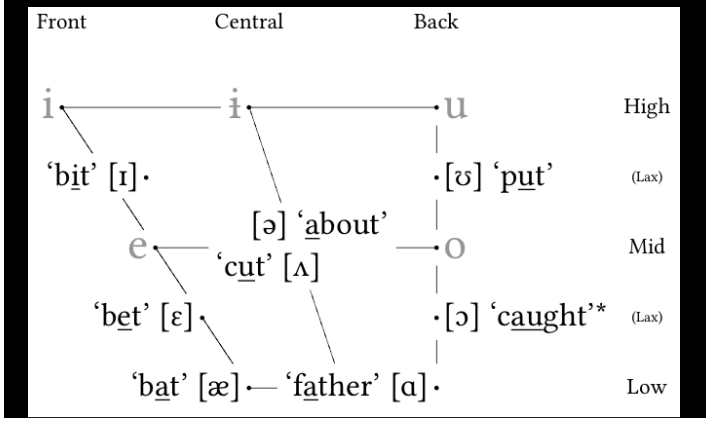


Vowel inventory size



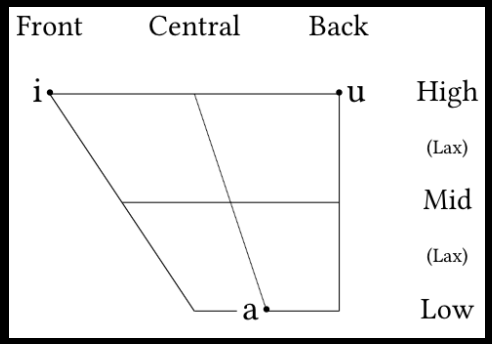
From World Atlas of Language Structures (wals.info)

Vowels of American English



The simplest vowel system

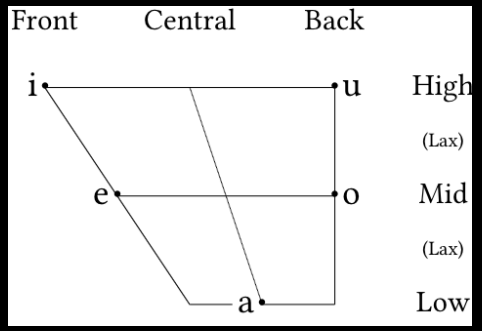
Inuktitut, Yidiɲ



Always [i, a, u].

The default: 5 vowels

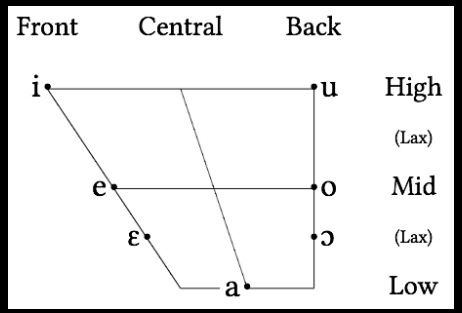
Spanish, Japanese



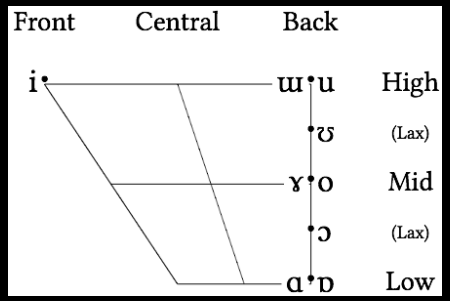
Usually [a, i, e, o, u] or their [+lax] counterparts

7 vowel system

Italian, Yoruba



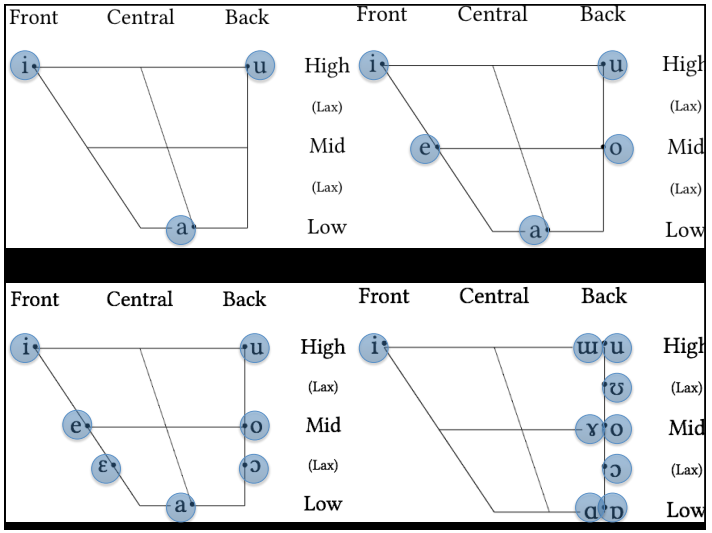
An improbable vowel system



The vowel dispersion principle

Most vowel systems tend to be evenly distributed in terms of perceptual space

(Lindblom 1986)



So…

- Vowel *quality* is diffuse throughout perceptual space
- So is vowel *length*
- Like vowel quality, it's a general trend, not a universal

Experiment 3: English listeners

- 24 native English speakers
- Did not participate in previous study

Stimuli

- Tokens selected from "top" 3 English speakers
- 3 speakers * 3 items * 6 emphasis levels
- Blocked by speaker, randomized within blocks

Confusion matrix

		Level of Stimulus					
		0	1	2	3	4	5
Listeners' response	0	**42.75**	1.39	0.14	0.14	0.25	0.24
	1	35.69	10.06	5.80	2.92	1.18	1.21
	2	12.21	28.50	20.98	11.17	6.81	4.41
	3	5.44	**33.19**	**35.11**	32.93	26.57	21.37
	4	2.94	19.97	26.10	**34.42**	**36.62**	**38.23**
	5	0.98	6.85	11.83	18.41	28.38	34.16

% response per stimulus level