

**Individual speakers’ behaviors (in descending order of correlation)**

- Speaker 1: Clear 6-way distinction, with the largest jump between no emphasis and level 1.
- Speaker 5: Clear 6-way distinction, with the largest jump between no emphasis and level 1.
- Speaker 6: Clear 6-way distinction, with the largest jump between no emphasis and level 1.
- Speaker 8: Less clear 6-way distinction, with the largest jump between no emphasis and level 1.
- Speaker 3: Large jump between no emphasis and level 1, and an evident distinction between levels 1 and 2, but with less clear differentiation between levels 2, 3, and 4.
- Speaker 2: Large jump between no emphasis and level 1, and an evident distinction between levels 1 and 2, and 4 and 5, but with less clear differentiation between levels 2, 3, and 4.
- Speaker 4: Very little overall differentiation, but with the largest jump between no emphasis and level 1. Note the relatively compressed duration range used by this speaker as compared to the others.
- Speaker 7: Very little overall differentiation, but with the largest jump between no emphasis and level 1. Note the relatively compressed duration range used by this speaker as compared to the others.

**Perception study**

From three speakers, three items from the production study with good correlations were selected as stimuli. 24 native speakers of English were first told that English makes use of lengthening to express emphasis, then were presented with tokens from the production experiment (3 speakers \* 3 items \* 6 levels of emphasis). Listeners judged the “emphasis level” of each token. The stimuli were blocked by speaker and item.

*Table 1: Listeners’ responses to stimuli with different emphasis levels. Shaded cells represent correct responses. The underlined responses were the most frequent response for each stimulus type.*

		Stimuli					
		0	1	2	3	4	5
Listeners’ Responses	0	<u>42.75</u>	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	<u>33.19</u>	<u>35.11</u>	32.93	26.57	21.37
	4	2.94	19.97	26.10	<u>34.42</u>	<u>36.62</u>	<u>38.23</u>
	5	0.98	6.85	11.83	18.41	28.38	34.16

We observe that the listeners’ performance was fairly poor overall. Only in the non-emphasis and level 4 emphasis conditions did the most frequent responses match with the correct responses. In the other emphasis conditions, listeners tended to choose either 3rd level emphasis or 4th level emphasis most often. It therefore seems safe to conclude that different levels of emphatically lengthened vowels are hard to perceive.

**References:**

Kawahara, S. and Braver, A. (in press). Durational properties of emphatic consonants in Japanese. JIPA, 44(3).  
 Kawahara, S. and Braver, A. (2013). The phonetics of emphatic vowel lengthening in Japanese. Open Journal of Modern Linguistics, 3(2):141–148.  
 Ladefoged, P. and Maddieson, I. (1996). The Sounds of the World’s Languages. Blackwell Publishers, Oxford.

# The Phonetics of Emphatic Vowel Lengthening in English

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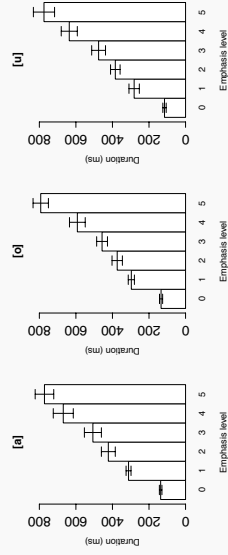
Phonology 2014 :: MIT :: 19-21 September, 2014

## Introduction

Duration-based lexical vowel contrasts tend to be binary (Ladefoged and Maddieson 1996).

Kawahara and Braver (2013, in press) showed that Japanese speakers can produce up to 6-way durational distinctions to show varying levels of emphasis.

Sample results (Kawahara and Braver 2013):



**Question:** Can English speakers, with no lexical length contrast, produce such 6-way distinctions?

## Experimental stimuli

7 target intensifier words, which can be lengthened to show emphasis, in carrier sentences. E.g.:

*That guy is so creepy*

Also: *very, too, way, super, mad, really*

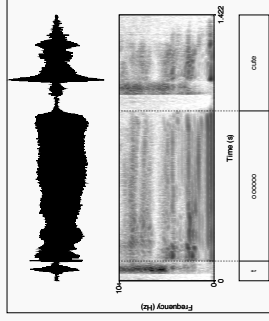
Each target word had 5 degrees of emphasis, plus one no-emphasis condition:

No Emphasis	so
Level 1	sooooo
Level 2	soooo
Level 3	soooooo
Level 4	sooooooo
Level 5	soooooooo

## Method

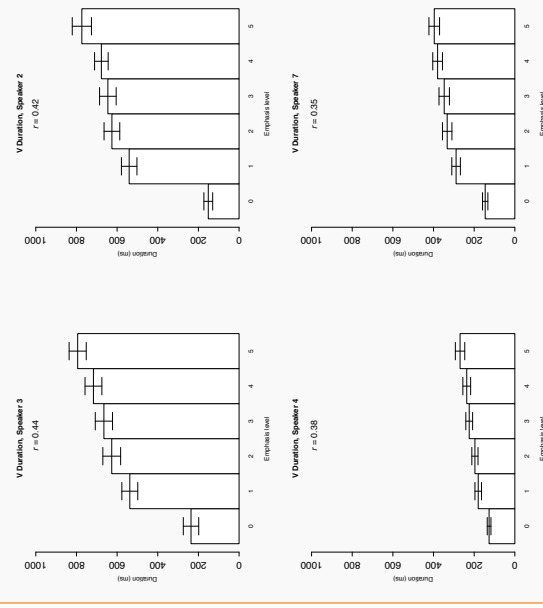
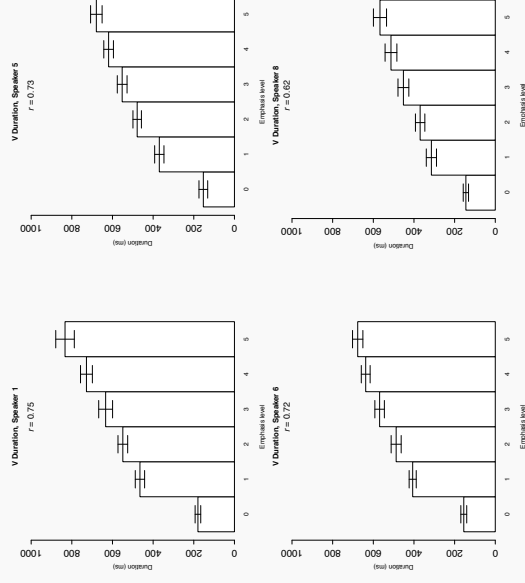
Stimuli were read 10 times (randomized) by 8 female native English speakers.

Duration measurement procedure for too (level 5):



## Results

Speakers ordered by correlation between emphasis level and duration (high to low):



All correlations significant to  $p < 0.001$ .

All speakers showed the greatest distinction between levels 0 and 1.

## Discussion

Even though English (unlike Japanese) lacks a duration-based lexical contrast, some speakers (1, 5, 6, 8) made 6-way durational distinctions to express degrees of emphasis, much like the Japanese speakers in Kawahara and Braver (2013). Both English and Japanese speakers all made a large distinction between levels 0 and 1.

Follow-up study: English listeners were unable to accurately categorize emphasis level, though tended to correctly identify the no emphasis condition.