2aSC15

Sonority of Adjacent Segments in the Perception of Durational Distinctions

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BACKGROUND

Observation: C length contrasts are usually intervocalic. (Thurgood, 1999)

Proposal: C duration is easier to determine in V_V environment, due to the well-defined boundaries between maximally acoustic distinct sounds: Vs and Cs. (Bradley, 2001; Padgett, 2003)

Hypothesis: C duration should also be easier to determine next to **sonorant Cs**: nasals and liquids.

Typological support: Geminates only next to sonorants.

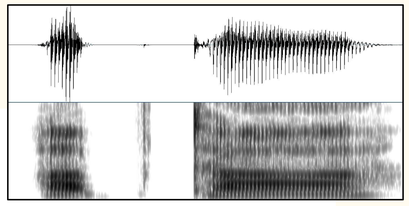
Italian	*soffrire* 'to suffer'
Finnish	*kartta* 'map' Finn.
Cypriot Greek	/shamppu/ 'shampoo'
Hungarian	*talp-pont* 'foot-end'

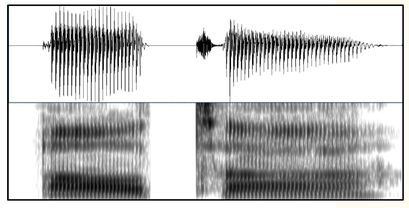
THE STUDY

Research question: Does sonority of the adjacent segments affect the perception of duration distinctions in consonants?
Prediction: Duration distinctions are easier to detect in higher sonority environment: next to **nasals** or **liquids**.

METHODS

Stimuli:
- Male native speaker of AE
- [t] closure = 100/200 ms





Environment	Onset	Coda
Vowel	a.ta	---
Liquid	al.ta	at.la
Nasal	an.ta	at.na
Sibilant fricative	as.ta	at.sa
Non-sibilant fricative	af.ta	at.fa
Stop	ap.ta	at.pa

Participants:
- 14 monolingual native speakers of AE
- Recruited at Purdue University

Procedure:
- An AX discrimination task
- Same (*alta-alta*) and different (*alta-altta*) pairs
- 500 ms ISI, 3 sec for response, 1 sec ITI
- Each pair presented 10 times, equal # same and different
- Total 440 pairs presented
- Overall duration ~ 40 min
- Duration was not mentioned in instructions

same different

ANALYSIS

Dependent Variable: Sensitivity measure - **d'** - calculated for each subject in each condition

d' = The difference between the z-transforms of Hit rate and False Alarm rate in detection of the difference between stimuli.

Independent Variables:
- **Environment Sonority** (sonorant vs. obstruent)
- **Syllable Position** (onset vs. coda)

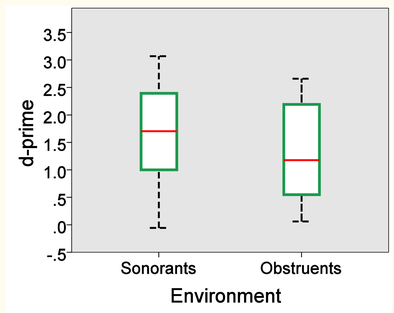
RM ANOVAs

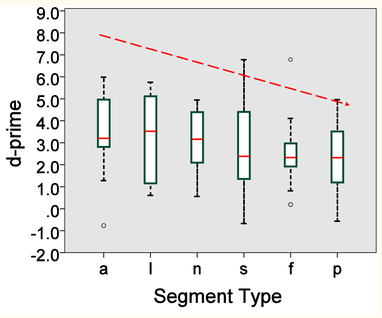
RESULTS

1. Effect of Environment Sonority:
- Collapsing over Syllable Positions and individual segment types

F(1,13)=6.933, p<0.05
- Mean d' (son) = 1.6
- Mean d' (obst) = 1.3

❖ Sensitivity to durational differences is *lower* in *lower sonority environment*: adjacent to **stops** and **fricatives**.





2. Effect of Segment Type:
- Collapsing over Syllable Positions

F(5,65)=3.47, p<0.01

❖ Sensitivity to durational differences *declines* as **sonority** of the adjacent segment *goes down*.

Mean d'	a	l	n	s	f	p
	1.7	1.6	1.5	1.4	1.3	1.1

3. Effects of Sonority and Syllable Position:
- Excluding *ata* stimuli

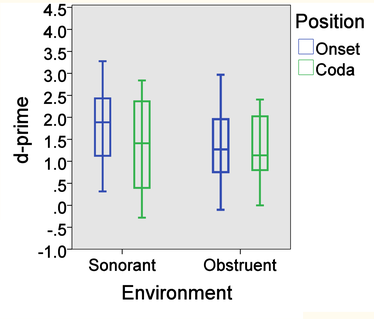
Sonority: F(1,13)=9.386, p<0.01
Position: F(1,13)=7.627, p<0.05

❖ Sensitivity to durational differences is *higher* when the target C is in the **onset position**.

Environment	ONSET	CODA
SONORANT	1.8	1.4
OBSTRUENT	1.4	1.2

Pairwise comparisons:
- [a] > [p], p = 0.005
- [l] > [p], p = 0.086
- [n] > [p], p = 0.059

Post-hoc comparisons:
- Within Sonorants: Onset > Coda, p = 0.058
- Within Onsets: Sonorant > Obstruent, p = 0.034



CONCLUSIONS

Sonority of the adjacent sounds affects listeners' sensitivity to the durational differences in consonants.

- ❖ Sonorants (a, l, n) provide a better environment for determining the duration of the target stop consonant than do obstruents (s, f, p).
- ❖ Sensitivity declines steadily as sonority decreases from vowels to voiceless obstruents.

Syllable position also has an affect on the perceptibility of durational distinctions.

- ❖ Listeners are more sensitive to durational distinctions in onset consonants than in coda consonants.

Durational sensitivity hierarchy: **al.ta >> at.la = ap.ta > at.pa**
1.8 1.4 1.4 1.2

- ➢ The effect of **sonority** could be in part due to *greater intensity differences* between sonorant consonants and the target stop.
- ➢ The effect of **syllable position** may be due to the attentional advantages of the onset position.
  - It is known that other phonetic properties, such as place distinctions in stops, are more perceptible in onset position. (Ohala, 1990; Jun, 2004)

FUTURE DIRECTIONS

To investigate the interaction between the ***sonority of the target consonant*** and the ***sonority of the environment*** in determining the perceptibility of durational distinctions:
- ➢ Are durational distinctions in *sonorant* consonants more perceptible in high sonority environment?

Proposal: Sonorant geminates are less common crosslinguistically due to their high acoustic similarity to vowels which impedes perception of duration. (Podesva, 2000; Kawahara, 2007)

Hypothesis: Durational distinctions in high sonority environment will be easier to perceive in obstruents than in sonorants.

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