Perception of Moroccan Arabic geminates by native English speakers

Bożena Pająk
University of California, San Diego
bpajak@ling.ucsd.edu http://idiom.ucsd.edu/~bpajak

Summary

Typologically most common geminates are word-medial and intervocalic. Experimental evidence is provided showing that both non-medial word position and adjacency to consonants contribute to lower perceptibility of the geminate/singleton contrast. Furthermore, it is shown that while previous exposure to this type of contrast helps with its perception, the same pattern remains: non-medial word position and adjacency to consonants correlate with lower perceptibility.

Background

Geminates:

long consonants
1.5-3 times as long as singletons
(Ladefoged & Maddieson 1996)

Many languages use consonant length contrastively:

[bel**ll**o] vs. [bel**l**o]	'beautiful' / 'I bleat'	(*Italian*)
[tak**kk**a] vs. [tak**k**a-]	'fireplace' / 'back'	(*Finnish*)

Geminates & context:

Two dimensions:

Word position

medial
[tang**g**al] 'date' *Taba*
(Bowden 2001: 39)

initial
[**pp**efto] 'I fall' *Cypriot Greek*
(Arvaniti 2001: 23)

final
[ʔi**mm**] 'mother' *Palestinian Arabic*
(Abu Salim 1980: 6)

Adjacent segments

intervocalic
[fa**tt**o] 'fact' *Italian*
(Loporcaro 1996: 125)

single vowel-adjacent
[ə**nn**] 'food' *Hindi*
(Arun 1961: 6)

non-vowel-adjacent
[**tt**lata] 'Tuesday' *Moroccan Arabic*
(Heath 1987: 38)

Context & typology:

Cross-linguistically, the most common geminates are word-medial intervocalic.
(Thurgood 1993)

Proposal

Typological distribution of geminates is shaped (among other factors) **by their perceptual saliency.**

Factors that diminish the perceptibility of geminates:

- non-medial word position
- adjacency to consonants (vs. vowels)

Hypothesis: Listeners are sensitive to the context in which the geminate/singleton contrast occurs: the contrast perceptibility is better in medial than in non-medial word position, and better in intervocalic than in non-intervocalic environment.

Experiment 1

Participants with NO previous exposure to a gem/sing contrast

Method:

Stimuli

- Built by crossing the factors of *word position* (medial or initial) and *following segment* (vowel or consonant):

Word position	Following segment: V	Following segment: C
medial	[assa]~[asa] [azza]~[aza]	[assta]~[asta] [azzda]~[azda]
initial	[ssa]~[sa] [zza]~[za]	[ssta]~[sta] [zzda]~[zda]

- Recorded by a native Moroccan Arabic speaker, where these sequences are phonotactically legal.

Design

- AX discrimination task:

Measuring sensitivity to the geminate-singleton contrast in 4 conditions: medial+V, medial+C, initial+V, initial+C.
Participants listened to 'same' (e.g., [assa]~[assa]) and 'different' (e.g., [assa]~[asa]) word pairs.

- Each participant heard 24 repetitions of each test condition.

Participants

- 80 native speakers of English with no previous exposure to a language with the geminate/singleton contrast.

Measurements:

- A-prime score calculated for each participant and each condition

A-prime:
non-parametric analog of d-prime
measures sensitivity to a given contrast
(roughly) yields scores from 0 to 1
0 – no sensitivity, 1 – perfect sensitivity

Results:

- Significant main effects of:
  - word position [F(1,79)=28.4; p<.001]
  - following segment [F(1,79)=60.7; p<.001]
  - voicing [F(1,79)=5.2; p<.05]
- The geminate/singleton contrast more easily perceptible:
  - in medial than in initial word position;
  - in vowel-adjacent than in consonant-adjacent environment.
- In consonant-adjacent environment, word position only mattered for voiceless but not for voiced tokens (influence from English?).

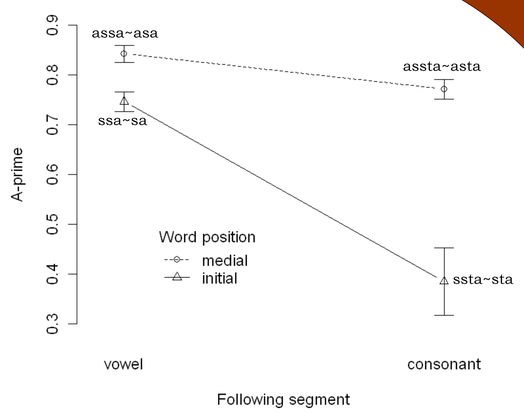

Figure 1. Voiceless tokens

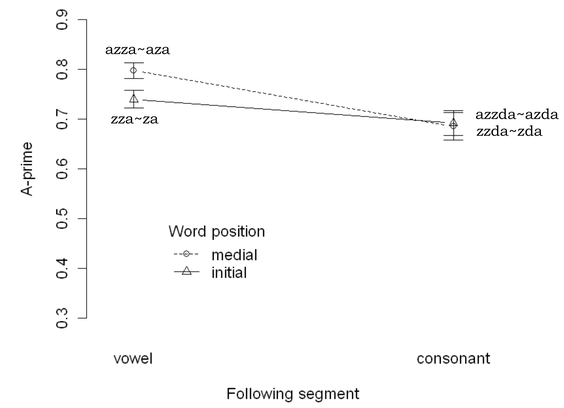

Figure 2. Voiced tokens

Experiment 2

Participants with previous exposure to a gem/sing contrast

Method:

The same as in experiment 1.

Participants

- 40 native speakers of English with varied previous exposure to a language that uses geminate consonants contrastively (not Moroccan Arabic).
  - Exposure through family or school.
  - Languages: Arabic (Egyptian, Jordanian, Modern Standard, Syrian), Armenian, Farsi, German, Gujarati, Hebrew, Hindi/Urdu, Ilokano, Italian, Japanese, Korean, Punjabi, Russian, Tamil.

Results:

- Significant main effects of:
  - word position [F(1,79)=28.4; p<.001]
  - following segment [F(1,79)=60.7; p<.001]
- The pattern of responses the same as in exp 1: better perceptibility in medial than in initial word position, and in vowel-adjacent than in consonant-adjacent environment (fig. 3).
- But, overall performance better than in exp 1, especially for participants with previous exposure to consonant-adjacent and initial geminates (fig. 4).

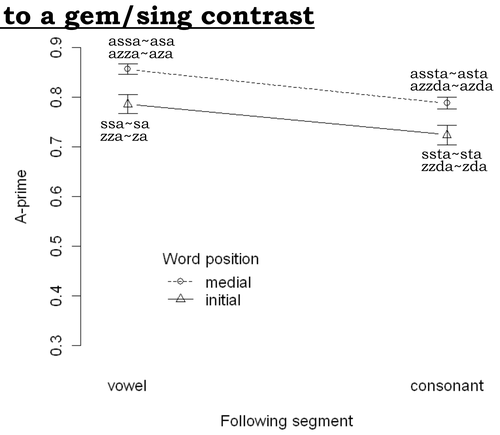

Figure 3. Participants w/previous exposure to geminates.

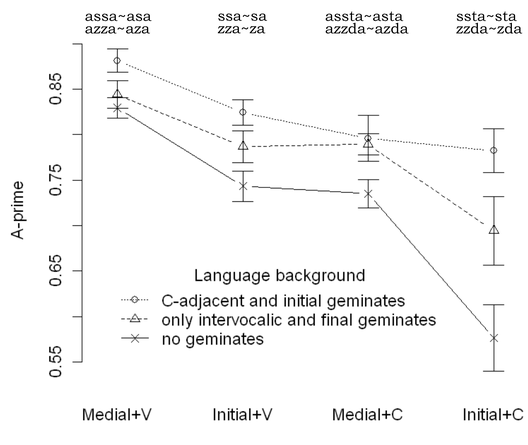

Figure 4. Comparison by language background (from experiments 1 and 2).

Conclusion

- Non-medial word position and consonant-adjacency make the geminates perceptually less salient, as demonstrated by native speakers of English listening to Moroccan Arabic nonce words. This result is consistent with typology.
- Previous exposure to similar contrasts aids in perception, but it does not override the general pattern of perceptibility.