

INTRODUCTION

Italian displays a reduced vowel inventory in unstressed syllables:

stressed vowel system:	i	e	E	a	O	o	u
unstressed vowel system:	i	“E”	a	“O”	u		

Goal of this research: to study the nature of the "archiphonemes"

/E O/ deriving from unstressed mid V neutralization:

Lindblom 1963: unstressed Vs, being shorter, are not fully articulated.

Bertinetto 1981: duration is the main cue of the unstressed/stressed distinction in Italian.

⇒ We expect mid V neutralization to be an instance of partial neutralization due to phonetic V reduction in unstressed syllables.

- Is this a case of complete or partial neutralization?
- What is the nature of /E O/? How do they differ from /E O/ and /e o/? Is their realization different depending on the context in which they occur?

EXPERIMENT 1

HYPOTHESIS

If this is a case of partial neutralization, /E O/ deriving from stressed /E O/ must differ both from /E O/ deriving from stressed /e o/, and /E O/ that do not alternate with stressed segments.

DESIGN

- Italian feminine diminutive suffix: -'ina
- Affixation causes stress shift and mid vowel neutralization:
e.g. ['mOra] [mO'rina]
- Use pairs of proper name and diminutive form (nonsense words respecting Italian phonotactic and morphological constraints):

<u>Proper Name</u>	<u>Diminutive Form</u> (= “little X”)
/tEti/	/tE'tina/
/teti/	/tE'tina/
/tOti/	/tO'tina/
/toti/	/tO'tina/
/tE'tira/	/tEti'rina/
/tO'tira/	/tOti'rina/

(in the last two pairs /E O/ do not alternate with stressed phones)

- Embedded in carrier sentence pairs:

X 'kanta “X sings” X-'ina 'kanta “Little X sings”

SUBJECTS AND METHODS

- Two female and two male native Italian speakers (MB = the author), explicitly instructed to treat the pairs as proper name + diminutive form.
- Read the list (randomized, with fillers) seven times.
- Data digitized at a 10 kHz sampling rate, analyzed using Kay Elemetrics CSL.
- F1, F2 and F3 values measured by LPC for six tokens of each relevant category.

RESULTS

INSERT XPI PLOTS HERE

Almost perfect overlap between /E O/ deriving from /E O/, /E O/ deriving from /e o/, and non-alternating /E O/.

Confirmed by statistical analysis:

- Difference between F1 and F2 values of each /E O/ category is not significant for any speaker.
- In most cases, differences between types still not significant at $p \leq .5$.
- In more than one case, differences still not significant at $p \leq .9$.
- No consistent trend among speakers.

⇒ The partial neutralization hypothesis is not supported.

EXPERIMENT 2

HYPOTHESIS 1

The realization of pre-tonic /E O/ is influenced by the nature of following stressed vowel; the realization of post-tonic /E O/ is influenced by the nature of the preceding stressed vowel.

HYPOTHESIS 2

The realization of /E O/ in pre-tonic and post-tonic position differs.

HYPOTHESIS 3

Italian speakers consider /E O/ as instances of /e o/, rather than /E O/. Thus, /E O/ should be closer to /e o/ than to /E O/.

DESIGN

- Use nonsense words in which /E O/ are immediately preceded or followed by each of the Italians stressed vowels; words with stressed mid vowels also added:

Pre-Tonic

Post-Tonic

Stressed

/tE'tika/	/tO'tika/	/'itE/	/'itO/	/'tEta/
/tE'teka/	/tO'teka/	/'etE/	/'etO/	/'tOta/
/tE'tEka/	/tO'tEka/	/'EtE/	/'EtO/	/'teta/
/tE'taka/	/tO'taka/	/'atE/	/'atO/	/'tota/
/tE'tOka/	/tO'tOka/	/'OtE/	/'OtO/	
/tE'toka/	/tO'toka/	/'otE/	/'otO/	
/tE'tuka/	/tO'tuka/	/'utE/	/'utO/	

- Words with pre-tonic /E O/ or stressed mid vowels embedded in the carrier sentence:

X 'kanta “X sings”

- Words with post-tonic /E O/ embedded in the carrier sentence:

X tar'dava “X was late”

SUBJECTS AND METHODS

- Two female and two male native Italian speakers, explicitly instructed to treat the nonsense words as proper names.
- Seven repetitions of the list (randomized, with fillers).
- A/D conversion and acoustic analysis as in Experiment 1

RESULTS

TESTING HP 1: INFLUENCE OF THE STRESSED VOWEL ON /E O/

The following patterns emerged (only statistically significant patterns followed by at least two speakers are considered):

Post-Tonic /E/

Speakers RG, SR: /E/ is lower after the stressed high vowels /i u/.

Speakers VM, RG, SR: /E/ is more front after front vowels.

Pre-Tonic /E/

All Speakers: /E/ is higher before the stressed high vowels /i u/.

All Speakers: /E/ is more front before the stressed high front vowel /i/.

Post-Tonic /O/

Speakers RG, SR: /O/ is lower after stressed /i e u/.

Speakers SG, RG: /O/ is more front after stressed /i/.

Speakers SG, RG, SR: /O/ is more back after stressed /o/.

Pre-Tonic /O/

All Speakers: /O/ is higher before the stressed high vowels /i u/.

Speakers SG, RG: /O/ is more back before the stressed back vowels /O o u/.

⇒ HP1 is confirmed: stressed vowels influence the realization of /E O/.

RG and SR show an interesting anti-assimilation effect in the realization of post-tonic /E O/: /E/ is lower after the stressed high vowels /i u/; /O/ is lower after stressed /i e u/.

Canepari 1992, on the basis of careful impressionistic observations, described exactly the same anti-assimilatory pattern.

TESTING HP2: EFFECTS OF PRE- AND POST- TONIC CONTEXTS ON /E O/

The realizations of /E O/ in the following pairs were compared:

/tE'taka/ vs. /'atE/

/tO'taka/ vs. /'atO/

Pre- vs. Post-Tonic /E/

- F1 difference not significant for any speaker (null hypothesis still tenable at $p \leq .15$).

- F2 difference significant only for SG ($p=.0012$; F2 value of pre-tonic /E/ significantly higher than the one of post-tonic /E/).
- F2 difference not significant for other speakers (null hypothesis still tenable at $p\leq.2$).

Pre- vs. Post-Tonic /O/

- F1 difference not significant for any speaker (null hypothesis still tenable at $p\leq.65$).
- F2 difference not significant for any speaker.

⇒ The pre-tonic vs. post-tonic context does not affect the realization of /O/. For three speakers, this is also true with respect to /E/, while for the remaining speaker pre-tonic /E/ is more front than post-tonic /E/. HP2 is not supported.

TESTING HP3: COMPARISON OF /E O/ TO /E O/ AND /e o/

- For all speakers, three tokens of /O/ before /'a/ and three tokens of /O/ after /'a/ were randomly selected, to form a single /O/ category.
- Same procedure was adopted w.r.t. /E/ for the three speakers who do not distinguish pre- and post-tonic /E/; for SG, the two /E/ categories were kept separate.
- The /E/ and /O/ samples compared to stressed /E O/ and /e o/.

INSERT XP2 PLOTS HERE

/E O/ are very close to /e o/ on the height dimension, even if they are consistently more centralized.

Confirmed by statistical analysis:

- F1 difference between /E/ and /e/ not significant for any speaker (for three speakers, the null hypothesis is tenable at $p\leq.45$).
- F2 difference between /E/ and /e/ significant for all speakers ($p<.001$): /e/ has higher F2.
- F1 difference between /E/ and /E/ significant for all speakers ($p<.001$).
- F1 difference between /O/ and /o/ significant for SG ($p<.05$): /o/ has higher F1.

- F1 difference between /O/ and /o/ is not significant for other speakers.
- F2 difference between /O/ and /o/ is significant for all speakers ($p < .0001$): /o/ has lower F2.
- F1 difference between /O/ and /O/ is significant for all speakers ($p < .001$).

⇒ HP3 is confirmed: /E O/ are closer to /e o/ than to /E O/.

CONCLUSION

We expected mid vowel neutralization to be an instance of partial neutralization due to phonetic vowel reduction in unstressed syllables. The results of Experiment 1 falsify our hypothesis, and suggest that mid vowel neutralization is rather a systematic phonological pattern.

The archiphonemes /E O/, occurring in unstressed syllables, are mid-high vowels consistently more central than /e o/.

The realization of /E O/ is subject to various contextual influences. In particular, two speakers show an interesting anti-assimilatory pattern in the realization of post-tonic /E O/, which goes beyond trivial coarticulatory effects, and may have to be treated as a phonological process.

REFERENCES

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