

Native English Speakers and Arabic Pharyngealization Contrasts

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Introduction

- Contrasts between Arabic nonpharyngealized and pharyngealized consonants are manifested acoustically primarily on adjacent vowels
 - Vowels adjacent to pharyngealized consonants have lower F2 values than vowels adjacent to nonpharyngealized consonants (e.g. Boxberger 1981; Al-Masri & Jongman 2004)
 - The vowel in /ta:/ may be perceived by native English listeners as closer to English /æ/ and the vowel in /tʰa:/ as closer to English /a/
 - Some Arabic language texts encourage learners to listen to adjacent vowels when determining whether or not consonants are pharyngealized (e.g. Brustad, Al-Batal & Al-Tonsi, 1995)
- The present study investigated the contributions of several cues, such as those relevant to English vowel contrasts, in native English listeners' ability to discriminate pharyngealization contrasts

Arabic Pharyngealization Contrasts

Pharyngealization Contrasts

Vowel Inventory

/t/-/tʰ/, /d/-/dʰ/, /ð/-/ðʰ/ /s/-/sʰ/ /a/, /a:/, /i/, /i:/, /u/, /u:/

Research Questions

- General Question: Do native English listeners exploit their sensitivity to English front-back vowel contrasts to detect Arabic pharyngealization contrasts?
 - What vowels do native English listeners perceive following pharyngealized and non-pharyngealized consonants?
 - Does whether or not native English listeners perceive different English vowels for a given Arabic vowel in pharyngealized vs. non-pharyngealized consonant contexts correspond to greater discrimination of that contrast?

Perception Study

- 13 native English speakers, age 18 and above
- Two tasks: Vowel identification and AXB discrimination

Acknowledgments

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Vowel Identification Task

- Stimuli:** 2 different tokens of each of 24 words—CV(C) syllables—produced by each of 2 native Arabic (NA) talkers and repeated three times in random order (N=72)
- Summary of C1, V1 (and C2) inventories and words:

C1	V1	C2	Tokens
/t/			/ta/, /tʰa/, /da/, /dʰa/, /tak/, /tʰak/, /dak/, /dʰak/
/tʰ/	/a/		/ti/, /tʰi/, /di/, /dʰi/, /tik/, /tʰik/, /dik/, /dʰik/
/d/	/i/	/k/	/tu/, /tʰu/, /du/, /dʰu/, /tuk/, /tʰuk/, /duk/, /dʰuk/
/dʰ/	/u/		

- Procedure:** Participants heard tokens presented in isolation (one at a time) and judged which of the following vowels each token contained: /a/, /æ/, /i/, /ɪ/, /e/, /u/, /ʊ/, /o/ (choices determined via a pilot study)
- Results:** More differences in V identification for /a/ (Figures 1-2) and /i/ (Figures 3-4) than for /t/-/tʰ/ stimuli are similar

Figure 1: da(k)



Figure 2: dʰa(k)



Figure 3: du(k)



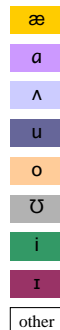
Figure 4: dʰu(k)



Figure 5: di(k)



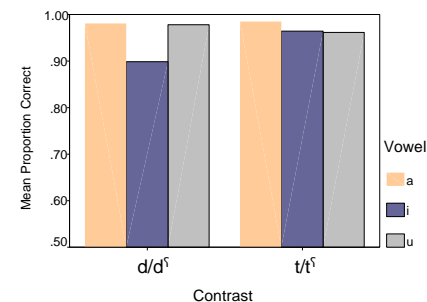
Figure 6: dʰi(k)



AXB Discrimination Task

- Stimuli:** Identical to Vowel Identification task
- Procedure:** Participants heard three tokens (A, X, and B) and decided whether X is more similar to A or B (e.g., /ta:-/ta:/-/tʰa:/, /ti:k/-/tʰi:k/-/tʰi:k/)
- Results:** No main effect of talker (p=.460); main effect of consonant (t/tʰ vs. d/dʰ; p=.012); main effect of vowel (p=.000); significant interaction of consonant

Figure 7: Mean Proportion Correct for d/dʰ and t/tʰ by Vowel



- Effect of vowel is significant for d/dʰ (p<.001) but marginal t/tʰ (p=.052)
- For d/dʰ:
 - /a/ (.98) vs. /i/ (.90): p<.001
 - /a/ (.98) vs. /u/ (.98): p=.752
 - /i/ (.90) vs. /u/ (.98): p<.002

Conclusion

- Native English listeners exploit their sensitivity to English front-back vowel contrasts to detect Arabic pharyngealization contrasts

References

Al-Masri, M., and Jongman, A. (2004). Acoustic correlates of emphasis in Jordanian Arabic: Preliminary results. In Agwuele, A., W. Warren, and S-H. Park (Eds.), *Proceedings of the 2003 Texas Linguistics Society Conference*, 96-106. Somerville : Cascadia Press.
 Boxberger, L. (1981). Acoustic characteristics of Arabic pharyngeal and pharyngealized consonants. In *Kansas Working Papers in Linguistics* 6.
 Brustad, Al-Batal & Al-Tonsi. 1995. *Alif Baa: Introduction to Arabic Letters and Sounds*. Washington, D.C.: Georgetown University Press.