

Teen production and perception of dialectal Arabic speech rate

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Abstract

This study investigates the effect of native dialect on speech rate as produced and perceived by teenage speakers of three dialects of Arabic: Saudi, Syrian, and Egyptian. Fifteen participants reproduced ten Arabic sentences in their native dialect. The results of a production experiment show that, unlike Egyptian speakers, Saudi and Syrian speakers exhibit a high similarity in their speech rate. In a perception experiment, fifteen Saudi, Syrian, and Egyptian participants rated the tempo of their own dialect as well as the other two dialects on a 7-point scale. The findings reveal that the high similarity in the speech rate produced by Saudi and Syrian speakers does not entail a similarity in their perceived speech rates.

Keywords: dialectal Arabic, speech rate, production, perception, teens.

Introduction

Previous research has explored the interrelationships between speech rate, age, and language/dialect across different dimensions. For instance, Robb et al. (2004) found that adult New Zealanders have higher speech rates than adult British and American speakers. This is at odds with the results of a later study, however, in which American children demonstrated faster speaking rates than New Zealander *children* (Robb and Gillon, 2007). Dialectal speech rate variations are not limited to dialects that exhibit substantial differences; rather, closely related dialects may also show notably incommensurate speech rates. For example, Jacewicz et al. (2009) found significantly higher articulation rates for Wisconsin speakers compared to North Carolina speakers.

When it comes to Arabic, speech rate in general has yet to receive adequate attention in the literature, but in particular there is a veritable lack of studies on Arabic speech rate as produced by *teenagers*. Therefore, the current two experiments supply *preliminary data* on speech rate as produced and perceived by teen speakers of three Arabic dialects. Specifically, we investigate the effect of *native dialect* on speech rate as produced and perceived by *teenage* speakers of Saudi, Syrian, and Egyptian Arabic, attempting to address two research questions: (1) To what extent is speech rate similar or dissimilar across the three distinct Arabic dialects under investigation? (2) How does a speaker of a given dialect's own speech rate impact her perceived speech rate of the other two dialects?

Production experiment

Methodology

The stimuli used in this experiment were ten seven-word Modern Standard Arabic (MSA) sentences (M of syll/sentence= 21.1, SD = 3.75). While most of the sentences were constructed by the experimenters, some were adopted from external sources. Fifteen female Egyptian, Syrian, and Saudi teen speakers participated in this experiment. Each participant was met individually and instructed to read each sentence and reproduce it in the participant's dialect at a normal speech rate while being recorded. The participants were encouraged to reproduce the same sentence multiple times whenever they had the urge to do so.

Results

As shown in Table 1, the Egyptian participants were found to have a higher speech rate (M = 6.7 syll/s, SD = 0.95) than the Saudi and Syrian participants who themselves share a similar speech rate (M = 5.8 syll/s, SD = 0.73 and M = 5.7 syll/s, SD = 1.01, respectively). A repeated-measures ANOVA test revealed a statistically significant difference (F [2, 8]= 7.852, p = 0.01) attributed to the effect of Arabic dialects on speech rate. A post-hoc analysis test revealed statistically significant differences between Egyptian and Saudi dialects (p = 0.01), as well as between Syrian and Egyptian (p = 0.04). There was no statistically significant difference between Saudi and Syrian dialects (p = 0.6).

Table 1. Speech rate (syll/s) for Egyptian, Saudi, and Syrian dialects.

Dialect	Egyptian	Saudi	Syrian
Mean (SD)	6.7 (0.95)	5.8 (0.73)	5.7 (1.01)

Perception experiment

In the first experiment we established a baseline for speech rate in the three dialects under investigation. In the second experiment, we sought to understand how participants perceive speech rate in their own dialects as well as in the other two dialects, following the methodology detailed below.

Methodology

Ten sentences per dialect were selected from the 150 recordings supplied by the participants in the production experiment, making up a total of thirty trials. Among the thirty trials, each sentence appeared only once per dialect; that is, each sentence featured three dialectal versions. A different group of fifteen female Egyptian, Syrian, and Saudi teen speakers served as raters to judge the speech rate of the amplitude-normalized stimuli in the three dialects. It was necessary to match the age, gender, and education level of the participants in

the second experiment to those in the first in order to avoid any mismatch effects on speech rate perception. The raters were presented (online) with thirty randomly ordered auditory sentences and asked to rate the tempo of each using a 7-point rating scale (1= extremely slow, 4= normal, 7= extremely fast).

Results

The Egyptian dialect tends to be perceived as faster than both Syrian and Saudi dialects, especially by the Saudi participants (*Median*= 6). The Egyptian dialect received a rating of fast in 78% of the responses and did not receive a rating of extremely slow at all across all stimuli and participants. The Saudi dialect is perceived as slightly slower than Egyptian and Syrian by the Egyptian and Syrian participants (*Median*= 3.5). None of the stimuli in the Saudi dialect were rated as extremely fast, and only 19% of the responses were rated as slightly fast, with most ratings clustered on the left side of the scale (from extremely slow to normal). The speech rate of the Syrian dialect was perceived as normal by speakers of all three dialects, including the Syrian participants themselves. One consistent observation across the three dialects is that the participants each perceive their own dialects as normal (*Median*= 4). A repeated-measures Generalized Linear Model indicated speech dialect as a statistically significant predictor of the perceived speech rate, Wald $\chi^2(2)$ = 116.247, p = .0001. Participant dialect is also a statistically significant predictor of the perceived speech rate, Wald $\chi^2(2)$ = 42.250, p =.0001. The two predictors show a statistically significant interaction effect, Wald $\chi^2(4)$ = 35.093, p = .0001.

Discussion and conclusion

The results of the production experiment show that Egyptian speakers are indeed faster speakers than are Saudi and Syrian speakers. The present results are consistent with previous findings regarding the effect of dialect on speech rate. For instance, Robb et al., 2004 offers evidence that New Zealand English speakers have faster speaking and articulation rates than do speakers of other English varieties. Leemann and Siebenhaar (2007) also examined speech rate in Swiss German dialects from two regions and found that Valais speakers demonstrate a higher speaking rate than that of Bernese speakers. Similarly, Leemann et al. (2014) found that speakers from Zurich have a higher speech rate than speakers from Bern. The speech rate recorded in this study is not comparable to the recorded speech rate for Jordanian speakers in Damhoureye et al. (2020) due to differences in units of measurement; Damhoureye and colleagues calculated speech rate using words while the present study measures in syllable per second. The speech rate of Egyptian in the present study is slightly higher than that previously recorded for Moroccan (average= 5.0 syll/s) in Vaane (1982) although it is still within the reported range (4.6-7.0) (Gósy, 1991) as the speech rate of Egyptian here is 6.7 syll/s. However, despite differences in participant gender and age, the speech rates for both Saudi (5.8

syll/s) and Syrian (5.7 syll/s) speakers are extremely similar to the average reported by Vaane (1982) for Moroccan (5.0 syll/s).

The findings of the perception experiment indicate that participant judgments of speech rate were affected by the dialect of the stimuli presented to them. Specifically, the Egyptian dialect, which was determined to be faster than the other two dialects in the production study, was perceived as a “fast” dialect. The current findings provide a preliminary investigation into the production and perception of speech rate for female Saudi, Syrian, and Egyptian female teens. These findings support further research on Arabic speech rate and are especially relevant to speech pathologists and dialectal Arabic teachers who work with Arabic-speaking youth. Future studies may include other dialectal Arabic varieties, increase the sample size, collect a larger amount of data, and control for syllable complexity (i.e., segment rate) in both methodology and an analysis of results, as this has been shown to be an important factor (e.g., Plug and Smith, 2021) in speech rate perception.

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