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A sociophonetic account of morphophonemic variation in Palestinian Arabic

William M. Cotter

*Department of Linguistics and School of Anthropology, The University of Arizona, Tucson, AZ;
williamcotter@email.arizona.edu*

This study presents findings from sociolinguistic fieldwork on Palestinian Arabic conducted in the Gaza Strip. The sample includes 15 speakers who are indigenous residents of Gaza City, representing three age groups and both genders. Linear mixed effects analyses are presented on the vowel raising of the Arabic feminine gender marker, a word final vocalic morpheme. The traditional dialect of Gaza City is reported to realize this morpheme consistently as [a] (Bergsträßer 1915), with all other Levantine city dialects raising the feminine ending to [ɛ, e] or [i] except after back consonants (Al-Wer 2007). Results indicate robust sociophonetic variation in the realization of this vowel across age generations. In comparison to the elderly generation in the sample, younger speakers realize this vowel significantly lower and backer in their casual speech. These results reflect what appears to be a change in progress happening across generations in the traditional dialect of Gaza City as a result of dialect contact happening in the Gaza Strip between speakers of difference varieties of Palestinian Arabic.



1. INTRODUCTION

This study provides a sociophonetic account of vocalic variation in Palestinian Arabic, investigating the linguistic outcomes of dialect contact and refugee migration taking place across the Middle East. Specifically, I examine the variable phonetic realization of the Arabic feminine gender marker; a word final vocalic morpheme realized in Standard Arabic as [a], but one that is realized variably in spoken varieties as [a, ε, e, i] (Al-Wer 2007).

This vowel is examined in the casual speech of 15 Palestinians who were born and raised in Gaza City. Gaza City Arabic is a unique site to investigate sociophonetic variation due to the wider geopolitical situation in the region which has contributed to the complex demographic makeup of the coastal territory. As a result of the Israel-Palestine conflict, today roughly 80% of the population of the Gaza Strip are of a refugee background from other areas in historic Palestine. These refugees were forced to flee their homes in the period surrounding the creation of the state of Israel in 1948 (see Pappe 2006) and have experienced roughly seven decades of dialect contact within the communities in which they now live. For the indigenous residents of Gaza City, this means that their traditional variety of Arabic has been in contact with numerous other Palestinian varieties of Arabic over the past seven decades. Before presenting the results of this acoustic analysis of vocalic variation in the speech of these Gaza City residents, I begin with an explanation of the phonological conditioning that constrains this variation.

2. THE FEMININE GENDER MARKER

Raising of the feminine gender marker is a characteristic feature of Levantine (Syria, Jordan, Lebanon, Israel, Palestine), and especially urban, varieties of Arabic. This form of vowel raising is a notable feature of the varieties spoken in the major Levantine capitals, including Amman (Al-Wer 2007), Beirut (Naïm 2007), Damascus (Lentin 2007), and Jerusalem (Rosenhouse 2007). The process typically manifests in Levantine Arabic in the vowel of the feminine gender marker raising from [a] to [ε,e], or even as high as [i] in the far north of historic Palestine and into Lebanon.

While the extent to which a dialect exhibits this type of vowel raising varies, the process of vowel raising in this morpheme is phonologically conditioned (Grotzfeld 1980; Levin 1994; Versteegh 2001). Earlier research (see Al-Wer 2007: 68; Grotzfeld 1980: 181; Levin 1994: 44–45) has suggested that the following general rules act on the raising of this vowel across Levantine varieties of Arabic:

1. The default phonetic realization of the feminine ending is -e – the ‘raised’ variant.
 - helwe – ‘pretty’ (raising)
 - maglu:be – ‘Maqluba (a traditional dish)’ (raising)
2. The realization is -a in the following cases:
 - a. after ‘back’ consonants (i.e. pharyngeal, glottal, ‘emphatic’/ pharyngealized, post-velar)
 - ḏ̣ʒa:mʕa – ‘university’ (no raising)
 - sija:ħa – ‘tourism’ (no raising)
 - b. after r, but only if preceding the r there is no high front vowel. This applies for both words that have a synchronic i(:) vowel before r or, in some cases, if there is a historic i vowel preceding r which has been deleted.
 - kbi:ra ~ kbi:re ‘big (f)’ (variable raising)
 - filist^ʕi:nijja ~ filist^ʕi:nijje ‘Palestinian’ (variable raising)
 - saja:ra ‘car’ (no raising)

Based on the limited descriptive information available on Gaza City Arabic (Bergsträßer 1915; Salonen 1979, 1980), the traditional dialect of Gaza City is reported to realize this vowel as [a]. The texts

published by Salonen (1979, 1980) do actually contain some instances of variable raising of this vowel from [a ~ e], particularly in pausal forms (de Jong 2000: 537). However, de Jong (2000) has rightfully called into question the validity of Salonen's texts given that the speakers interviewed were actually from village areas outside of Gaza City, and not the city itself. Additionally, neighboring varieties of Arabic in the Naqab desert region have also been reported to raise this vowel (Shawarbah 2012: 88). However, on the whole, Gaza City Arabic is considered by dialectologists to be a predominantly non-raising variety for this particular feature. This makes Gaza City Arabic somewhat unique within urban Palestinian varieties of Arabic, which typically realize this vowel invariably as [e] (Horesh 2000, Shahin 2007).

3. THE STUDY

The data analyzed in this study comes from sociolinguistic interviews that were conducted in Gaza City in 2013. The interviews were open-ended and semi-structured, with topics of conversation ranging from family histories and experiences with the political situation in Gaza, to Palestinian cultural practices or culinary tradition. In all cases the interviews were carried out by the author, who is a nonnative but proficient speaker of Palestinian Arabic, with the help of undergraduate research assistants from a local university in Gaza City.

Figure 1. Map of historic Palestine¹



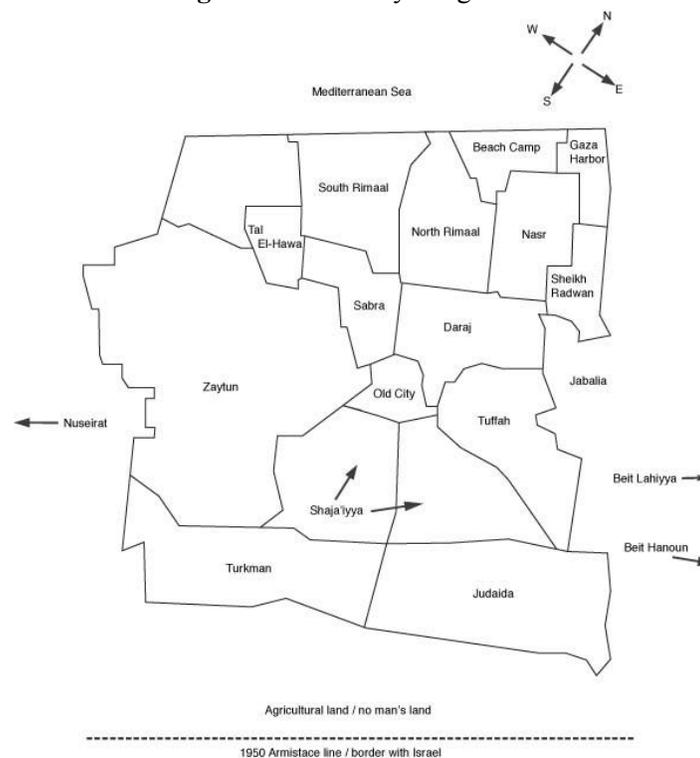
Interviews were typically conducted in the homes of speakers or in common areas within the community. Recordings were made using a Zoom H5 as the primary audio recorder with an Olympus VN-713PC as a backup recording unit. Interviews were conducted with both Audio-Technica ATR3350

¹ This map reproduced with the permission of the Applied Research Institute of Jerusalem.

and Sennheiser ME-2 lavalier microphones and a Sennheiser EW112 wireless recording unit. With each interview, an attempt was made to capture at least thirty minutes of casual speech from each speaker in the sample. However, due to the nature of the fieldwork, interviews ranged from as little as twenty minutes to as long as an hour and a half.

Gaza City is the largest urban area in the Gaza Strip and the territory's de facto capital. It has a population of roughly half a million residents and has been an important urban center in the Middle East for centuries (Meyer 1907). The indigenous Gazans included in the study are all residents of the Shaja'iyya, Daraj, Rimal, and Zaytun neighborhoods of the city, shown in Figure 2. Shaja'iyya is a particularly interesting area within Gaza City, as it is one of the oldest city neighborhoods and has a long history of stable residence within families, across multiple generations, based on reports from speakers during fieldwork.

Figure 2. Gaza City Neighborhoods²



3.1 Speakers

Out of a larger corpus of 32 speakers of indigenous Gaza City heritage, 15 speakers have been drawn for investigation in the present study. These 15 speakers were chosen to create the most balanced subset out of the 32 total indigenous Gaza City residents who were interviewed. The breakdown of the speakers in this analysis by Age and Gender are presented in Table 1:

² This map was originally created by Aharon Barnea as a result of his fieldwork in Gaza City in the 1970s and published on Semitisches Tonarchiv, the open source archive of Semitic language data. It has been updated and recreated here based on recent fieldwork conducted by the author in Gaza City.

Table 1. Speaker demographic backgrounds by Age and Gender

Age Gender	Male	Female
17-39	3	3
40-64	3	3
65+	2	1
Total		15

For the purposes of this study, Gender has not been considered as a fixed factor in the analysis. Earlier work by the author (Cotter 2013), which investigated variation in this morpheme through auditory coding did consider speaker Gender as a factor but it was statistically non-significant. Because of the uneven distribution of the data, including Gender as a factor leaves too few speakers in some conditions and as a result I have excluded Gender from the analysis.

Speaker Age has been categorized using an emic (Eckert 1997) framework that takes into consideration the social conditions that bear on the community in question. Specifically, those speakers over sixty-five years of age at the time of the fieldwork were born before the creation of the state of Israel in 1948 and the ensuing war that resulted in massive refugee migration into the Gaza Strip from other areas in historic Palestine. The middle aged group in this study, ranging from forty to sixty-four years of age were born after 1948 and before the Yom Kippur War of 1973, with many being born in the period surrounding the Six Day War of 1967 which caused additional refugee migration into Gaza. The youngest generation in the study was born following the 1973 war, with many speakers being born and raised in the periods surrounding the first and second Palestinian uprisings in the late 1980s through early 2000s. For Gaza City Palestinians, this period, and in particular the past two decades of the conflict, have resulted in the increasing isolation of Gaza from the rest of historic Palestine, culminating in the military blockade of the Gaza Strip that began in 2007 (Roy 2004, 2007).

3.2 Data

Based on interviews conducted with these 15 speakers, 525 occurrences of the feminine gender marker were considered for analysis. These 525 tokens occurred in phonological environments where raising of this vocalic morpheme would be expected, based on the conditioning factors discussed above. An attempt was made to locate at least thirty occurrences of the vowel per speaker. However, this was not always possible due to a lack of clear formants in the spectrogram or shortened interviews resulting in less instances of the vowel being present. Additionally, the number of occurrences of a given lexical item that were considered for analysis was limited to three per speaker in an effort to include a variety of naturally occurring items in the analysis. However, in cases where there was a lack of data for a given speaker based on these criteria, additional occurrences were included up to five tokens per lexical item.

These 525 occurrences of the feminine gender marker were marked in Praat (Boersma & Weenink 2016). Clear presence or absence of F2 in the spectrogram was used as the criterion to determine onset and offset of the vowel, and all tokens included in the study were marked in Praat by hand based on this criterion. Following the markup of vowel onset and offset in Praat, a script was written to automatically extract F1 and F2 measurements at 20, 40, 50, 60, and 80 percent of the vowel duration, for a total of 2,625 data points. When running this script, Praat was set to look for five formants within a frequency range of 5,500Hz for female speakers and 5,000Hz for male speakers in the sample. The automatically extracted formant values for 10% of these measurements were hand checked to ensure that the automatic formant extraction conducted in Praat was successful. These tokens were hand measured in Praat, and manual measurements of F1 and F2 frequencies that were within 75Hz of the automatically extracted measurement were considered a match and included in the subsequent statistical analysis.

Since Gender was not going to be included as a factor in this study, and in order to be able to generalize across speakers, a straightforward normalization procedure to control for physiological

differences resulting from varied vocal tract lengths was employed. The data was normalized based on following formula.

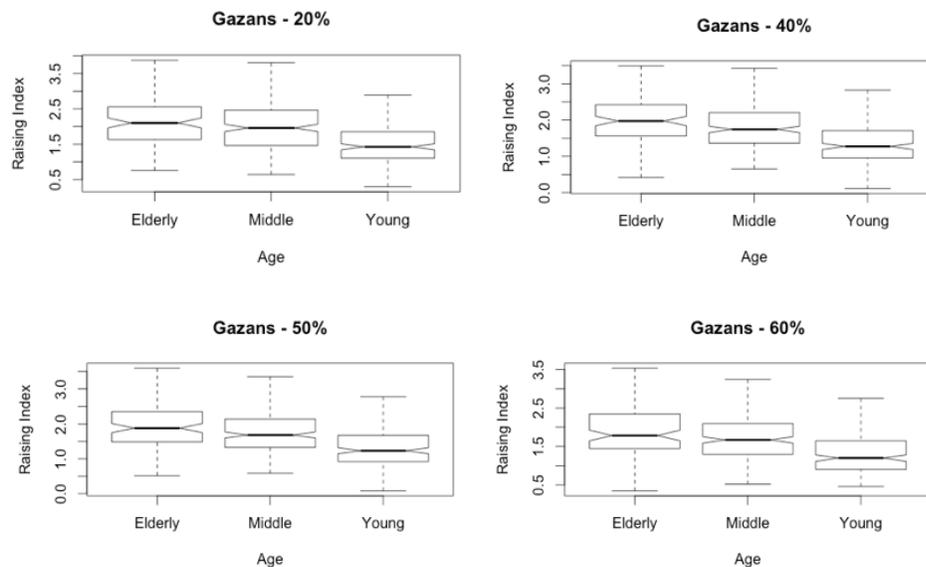
$$Nscore = (F2-F1)/F1$$

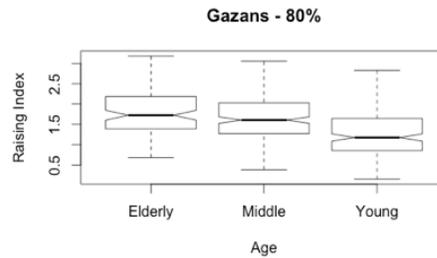
F1 and F2 values for a given token are expressed relative to the F1 value of that token. As a result, differences in F1, as an indicator of vocal tract length, act as a normalizing anchor for the token. This formula provides a normalized score (Nscore) for each token, from each speaker in the study. In evaluating these scores, a vowel in the area of [ə] would have an Nscore value close to 1, reflecting the relatively equal distance between F1 and F2 for this vowel. Values greater than 1 reflect fronting and raising of the vowel, whereas values less than 1 reflect backing of the vowel. Additionally, any Nscore values greater than 3 were hand checked to ensure that Praat was returning accurate measurements. The Nscores were treated as the dependent variable in the linear mixed effects models discussed below.

4. RESULTS

Separate linear mixed effects models were constructed for each of the five time points (20, 40, 50, 60, 80%) throughout the duration of the vowel. Random- and fixed-effect coefficients were estimated in R using the *lmer* function of the *lme4* package. P values were obtained using R's *lmerTest* package. The normalized Nscore was treated as the dependent variable in each statistical run, with Age as a fixed factor in the analysis. Speaker and Segment Word, the lexical item containing the feminine gender marker, were also specified with random intercepts in each model. Given that all of the factors in the analysis were between subjects and between items, no random slopes were necessary (Barr et al 2013, 260). The data from all five time points, grouped by age, appears in Figure 3 below:

Figure 3. Nscore distribution for Gaza City Palestinians by Age at 20, 40, 50, 60, and 80% vowel duration





In constructing the linear mixed effects models, “Elderly” was considered the reference level for the Age factor. Contrast coding was utilized to construct additional models that considered Middle and Young as the reference levels for Age, however as I describe below the results of these models indicate that the significant difference between Age generations is between Elderly and Young speakers. Looking at the models, presented in Table 2, a pattern emerges from the data. Across all five time points the data reflects that Young indigenous Gazans show a statistically significant tendency for the vowel of the feminine gender marker to be realized lower and backer than its realization for Elderly Gazans. However, no significant differences in the realization of the vowel are apparent between the Elderly and Middle, or Middle and Young generations of indigenous Gazans.

Table 2: Summary of fixed factor effects on the normalization index across the five time points of vowel duration, with reference level Elderly (Age). Signif. codes: 0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

	Nscore20	Nscore40	Nscore50	Nscore60	Nscore80
	Est.: 2.3212	Est.: 2.1860	Est.: 2.1082	Est.: 2.0086	Est.: 1.9233
	Error: 0.1200	Error: 0.1173	Error: 0.1111	Error: 0.1120	Error: 0.1145
(Intercept)	t-value: 19.344	t-value: 18.633	t-value: 18.983	t-value: 17.931	t-value: 16.799
	Sig. ***				
	Est.: -0.2669	Est.: -0.3023	Est.: -0.2775	Est.: -0.2363	Est.: -0.1702
	Error: 0.1446	Error: 0.1434	Error: 0.1350	Error: 0.1382	Error: 0.1429
Middle	t-value: -1.846	t-value: -2.108	t-value: -2.056	t-value: -1.709	t-value: -1.191
	Sig. .	Sig. .	Sig. .	Sig.	Sig.
	Est.: -0.6107	Est.: -0.6316	Est.: -0.5942	Est.: -0.5160	Est.: -0.4642
Young	Error: 0.1412	Error: 0.1401	Error: 0.1322	Error: 0.1355	Error: 0.1404
	t-value: -4.324	t-value: -4.508	t-value: -4.494	t-value: -3.808	t-value: -3.307
	Sig. ***	Sig. ***	Sig. ***	Sig. **	Sig. **

The intergenerational pattern of lowering and backing that appears to be taking place in the Arabic variety of Gaza City suggests that dialect contact between different varieties of Palestinian Arabic is having an effect on the native dialect of the city. At the same time, that such a clear pattern of change appears to be taking place provides an important follow-up to earlier work on this feature in Gaza City (Cotter 2013) that did not identify the feminine gender marker as a sociolinguistic variable. This earlier work only analyzed the feminine gender marker through the use of auditory coding methods and as a result did not identify the fine-grained phonetic change that is taking place in the dialect.

5. DISCUSSIONS AND CONCLUSION

The results of this study have highlighted that the historical forced migrations that have taken place in the Palestinian community and brought hundreds of thousands of refugees to the Gaza Strip has had an effect

on the dialect of Arabic spoken by indigenous Gaza City Palestinians. In the speech of these indigenous Gazans, over each successive generation the realization of the feminine gender marker is lowering and backing. This pattern of change suggests that the complex demographic situation in Gaza City, with much of the wider population in the coastal territory being refugees from other areas in historic Palestine, is having a detectable effect on the traditional city dialect.

From a descriptive standpoint, one particularly interesting point is that Elderly speakers in the sample show higher degrees of fronting and raising for the feminine gender marker than has been attributed to Gaza City Arabic in earlier research. Classifying Gaza City Arabic as an unquestionably non-raising [a] variety of Arabic would perhaps be tenuous given this phonetic evidence. Regardless of the realization of this vowel in Gaza City Arabic prior to 1948, this more recent data suggests that substantial change has taken place within the native dialect of the city as a result of long-term dialect contact. A major question for future research is whether what appears to be simultaneous patterns of lowering and backing of the feminine gender marker occurs alongside numerous other changes taking place in the dialect. Other sociolinguistic work in Gaza City (Cotter 2016, Cotter and Horesh 2015) has identified at least one other feature, the voiceless uvular stop /q/, with variable realizations that have been stratified along sociolinguistic lines. Additional research could uncover other areas of sociolinguistic interest that may suggest numerous changes taking place simultaneously as a result of the profound degrees of dialect contact happening in Gaza City.

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