INTONATION IN CONTACT: ASIA MINOR GREEK AND TURKISH

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ABSTRACT

This study is part of a larger project [3] which investigates the implications of historical contact of Greek with Italian and Turkish for intonation change in Greek regional varieties. Here we compare the yes-no question tune and the continuation rise tune in Standard Athenian Modern Greek (Athenian), Asia Minor Greek (AMG) and Turkish. The speakers of the latter two varieties cohabited and interacted in the Anatolian peninsula from the 11th century until 1923, when 1.5 million Anatolian Greeks were forced to migrate to Greece under the Convention Concerning the Exchange of Greek and Turkish Populations. Today second and third generation descendants of AMG speakers can still be found in Greece. These speakers, whose intonation patterns are examined here, are no longer in contact with Turkish. Our analyses reveal the influence of Turkish on the intonation patterns of the question and continuation rise tunes in AMG.

Keywords: Intonation; language contact; Greek regional variation; questions; continuation rises.

1. INTRODUCTION

Recent work on bilingualism provides evidence that the intonation of bilingual speakers contains characteristics of both languages they speak. For example, [23] found that terminal rises of bilingual Turkish-German speakers living in Germany are realized with two distinct patterns, one similar to German and the other similar to Turkish. Along the same lines, [19] showed later peak alignment in the intonation of contrastive focus as uttered by Cuzco Spanish speakers in Peru who were in close contact with Quechua, in comparison to Lima Spanish speakers who had less contact with Quechua. The alignment of Cuzco Spanish speakers more closely resembled more the late Quechua alignment pattern, in contrast to that of Lima Spanish speakers which resembled the early Spanish alignment pattern. [9] describes the intonation patterns of early peak alignment in Buenos Aires as a result of convergence between the Spanish and the Italian intonation systems. [17] reports that peak alignment in the speech of Dutch non-native speakers of Greek shows patterns intermediate between the two languages.

The literature supports the idea that ongoing language contact as experienced by bilingual speakers results in intonational variation and change, giving rise to novel patterns which combine elements from both contextual languages. On the other hand, while there is ample evidence of the lasting effects of historical contact on the lexicon, grammar and segments (e.g., [25]), there is scarce evidence regarding whether and how long such effects *on intonation* persist after contact has ceased.

The study in this paper forms part of a broader project investigating the effects of historical contact on intonational variability across regional varieties of Greek which were in contact with Turkish and Italian [3]. Here we concentrate on the comparison between specific intonation patterns in Asia Minor Greek (AMG; more below) and their counterparts in Turkish to discover possible influences of the latter on the former. Standard Modern Greek as spoken in Athens (henceforth Athenian) is used as control.

Our broader question of how language contact influences intonation is addressed by investigating the yes-no (polar) question tune and the continuation rise tune, as used by second generation heritage AMG speakers who are no longer in contact with Turkish.

1.1. Background on Athenian, AMG and Turkish

Athenian is the standard used for public communication, in education and in the media. The variety of Turkish we describe below is the standard dialect as spoken in Istanbul and throughout Western Anatolia as a result of the levelling influence of the standard used in mass media and the Turkish education system since the 1930s ([8]).

AMG used to be spoken in the territory of modern Turkey in a society where Turkish was the dominant language. Asia Minor Greek and Turkish speakers cohabited there for centuries until 1923 when under the Convention Concerning the Exchange of Greek and Turkish Populations, two million people were forcibly displaced: 1.5 million Anatolian Greeks to Greece and half a million Hellenic Turks to Turkey.

This heritage variety survives in villages in northern Greece. Although AMG is an umbrella term for a number of varieties from different regions in Asia Minor ([13]), we refer to it as a single variety, as far as intonation is concerned. Due to a lack of previous research on the intonation of these varieties,

we do not hypothesise any difference between them and allow any differences to emerge from the data.

Currently there are second and third generation speakers of AMG (children and grandchildren of refugees expelled to Greece in 1923) who, unlike their grandparents, no longer have everyday contact with Turkish. The sociolinguistic characteristics of these groups are very complex, because the speakers are bi- or multi-dialectal, using AMG alongside local varieties of Greek as well as Athenian as part of their linguistic repertoire ([13, 14, 26].

2. MATERIALS AND METHODS

Unlike most Autosegmental-Metrical studies of intonation which analyse controlled laboratory speech, we engaged with natural speech corpora containing spontaneous and semi-spontaneous speech. The investigated utterances therefore vary in length, lexical makeup, syntactic structure and speech style, which includes conversations, interviews, TV programs, narratives and map tasks (for details on the data sources see [22]). The sample in the present study was produced by 16 speakers (Athenian: 3 female and 4 male, μ age = 46.2 y; AMG: 5f, μ age = 69.4 y; Turkish: 2f, 2m, μ age = 33.7 y). It comprises 1462 tokens: 668 polars (263 Athenian, 80 AMG, 325 Turkish) and 794 continuation rises (443 Athenian, 209 AMG, 142 Turkish). A continuation rise is defined as a phrase within a declarative utterance which indicates non-finality and ends in a H accent.

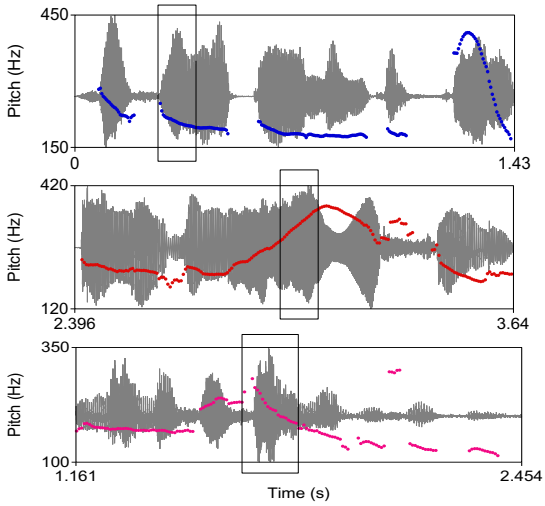
The sound files were transcribed, segmented and prosodically annotated in Praat [8], according to the principles of the Autosegmental-Metrical framework ([15, 21]). The location of the stressed vowel in the nuclear word was annotated and its left boundary was used to delimit a region of interest on which our analysis was carried out (see 2.2).

2.1. Background on the two tunes

Athenian polar questions are distinguished from statements through intonation. There is no morphological marking or a specific word order associated with these questions. The polar question tune in Athenian (Figure 1 top), L* LH- L%, consists of a nuclear trough followed by a combination of edge tones forming a rise-fall movement [2, 5].

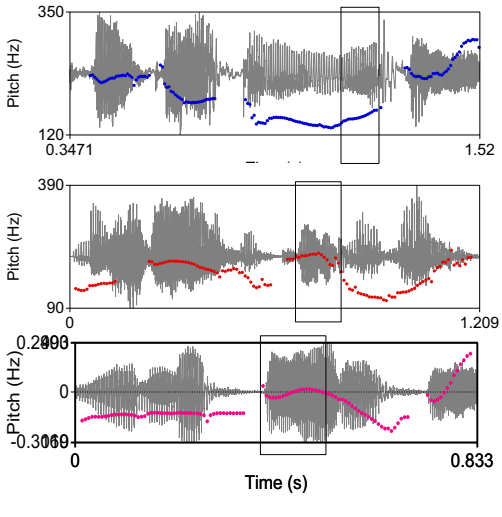
Turkish polar questions (Figure 1 middle) are marked with a question particle, /m/ plus a high vowel which harmonises with the last vowel of the previous word, and ending with person agreement. The /mV/ particle follows the nuclear word, which ends in a peak [10, 24]. Simplifying considerably, the Athenian and Turkish polar question f_0 shape can be described as a peak which occurs *after* the nucleus in Athenian, but *within* the nucleus in Turkish. According to our impressionistic analysis during the data annotation phase, the peak position in AMG (Figure 1 bottom) is frequently similar to that in Turkish.

Figure 1. The polar question tune in the three varieties. The rectangle indicates the nuclear vowel location, transribed in bold. Top: Athenian [θa ˈ**θe**late ˈenaŋ kaˈfe] ‘Would you like a coffee?’. Middle: Turkish [biliˈ**jor** muˈsun] ‘Do you know?’. Bottom: AMG [monaˈ**ʃis** taˈemaθes aˈfta] ‘Did you learn these on your own?’.



In the Athenian continuation rise tune a L* nuclear pitch accent typically aligns with the stressed vowel, followed by an H- phrase accent ([1, 4, 6]; Figure 2 top). In the Turkish continuation rise tune a H*+L nuclear pitch accent is followed by a H- phrase accent ([10, 12, 16, 20]; Figure 2 middle). The f_0 movement is a simple rise in Athenian but a rise-fall-rise in Turkish. Impressionistically, the f_0 movement in AMG is frequently similar to the Turkish pattern.

Figure 2. The continuation rise tune in the three varieties. Top: Athenian [triˈada ˈatoma muˈ**i**pane] ‘Thirty people told me’. Middle: Turkish [maˈsaja oˈ**tur**madan] ‘Before sitting at the table’. Bottom: AMG [eleˈ**fθe**rose] ‘she liberated’. A rectangle indicates the nuclear vowel location, transcribed in bold.



To test the extent to which the AMG polar questions and continuation rises resemble their Athenian and Turkish counterparts we performed a three-way comparison, based on the quantitative analysis of the contours described in 2.2.

2.2. Modelling of f_0

For each utterance f_0 was measured every 10 ms using ESPS *get_f0*. 10th-order polynomials $\hat{f_0} = \Sigma a_n t^n$ were fitted to f_0 contours using the GNU Octave [18] *polyfit* function; pitch errors were inspected and manually corrected. f_0 maxima and minima were calculated from the roots of the derivative $d\hat{f_0}/dt$.

Across the three language varieties and the two tunes, the same region of interest was defined for the subsequent analysis for maximal comparability, extending from the left boundary of the stressed vowel in the nuclear word until the utterance end.

The shape of f_0 contours in the region of interest was modelled as a 4th-order orthogonal (Legendre) polynomial (cf. [11]). The five coefficients of the resulting 4th-order polynomial which was fitted to the f_0 contours can model their shape characteristics: from lowest to highest, c_0 is the average f_0 height of the contour; c_1 is its slope; c_2 models the shape as a parabola, concave up (or down if the sign is negative); c_3 models the shape as an N-like wave with a peak followed by a trough (or the reverse if the sign is negative); and c_4 models the shape as a more complex wave with more than one peak and trough. The values of the coefficients for each of the tunes were used for statistical comparisons across the three language varieties using t-tests. In addition, the alignment of the polar question peak was compared across the language varieties, expressed as the distance of the peak from the left boundary of the nuclear vowel.

Our hypotheses, informed by an impressionistic analysis of the annotated AMG tokens explained in 2.1 are the following. In polar questions we expect that an influence of Turkish on AMG will be revealed through the alignment of the peak with the stressed vowel. If AMG resembles Turkish, the peak, which is part of the nuclear pitch accent, is expected to occur within the nuclear vowel, while the peak in Athenian polar questions, which is part of the edge tones, is expected later than the nuclear vowel. In continuation rises, we expect an influence of Turkish on AMG to be revealed through similarity in the cubic coefficient, because across the three varieties the most complex f_0 movement involves a rise-fall-rise. Moreover, we expect the trough in Athenian, the nuclear accent, to occur near the nuclear vowel but the trough in AMG and Turkish, which is part of the edge tones, to occur later than the nuclear vowel.

3. RESULTS

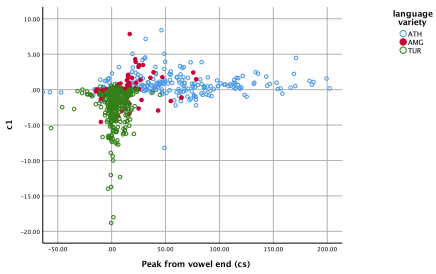
Overall, the comparisons among the three varieties revealed similarities between AMG and Turkish both in f_0 shape and in alignment characteristics. The results on the polar question f_0 shape and alignment parameters are presented in 3.1 and the continuation rise tune results in 3.2. Only comparisons of interest will be reported below for reasons of space.

3.1. Polar question tune

Figure 3 indicates that AMG lies between Turkish and Athenian in the patterns of peak alignment and slope of the f_0 shape. Peak alignment was expressed as the distance of the peak time (which was calculated analytically through the f_0 modelling) from the end of the nuclear vowel in centiseconds. The statistical alignment comparison revealed significant differences among the three varieties (Ath-AMG, $t(320)=10.50$, $p<.000$; Ath-Tur, $t(260)=13.87$, $p<.000$; AMG-Tur, $t(90)=4.78$, $p<.000$). Nonetheless, a closer look suggests that the AMG alignment resembles Turkish more than Athenian. In Athenian the peak occurred on average 650 ms after the end of the nuclear vowel, displaying large variability (σ =700). In Turkish and in AMG the peak aligned much closer to the vowel (μ =28 ms, σ =119; μ =134 ms, σ =184, respectively), indicating that the f_0 rise which culminates in the peak occurs within the nuclear vowel for these two varieties, while for Athenian it occurs well after the end of the vowel.

Similarly, although the statistical comparison of the linear coefficient, c_1, revealed significant differences among the three varieties (Ath-AMG, $t(153)=4.65$, $p<.000$; Ath-Tur, $t(422)=11.81$, $p<.000$; AMG-Tur, $t(389)=7.97$, $p<.000$;), examination of the mean c_1 coefficient values suggests that AMG resembles Turkish more than Athenian. The slope in Athenian is positive in the region of interest (μ =.88, σ =2.2), indicating a rise from the nuclear low trough to the final peak, but it is negative in Turkish and AMG (μ =−3.49, σ =6.2; μ =−.28, σ =1.8; respectively) indicating a fall from an earlier peak.

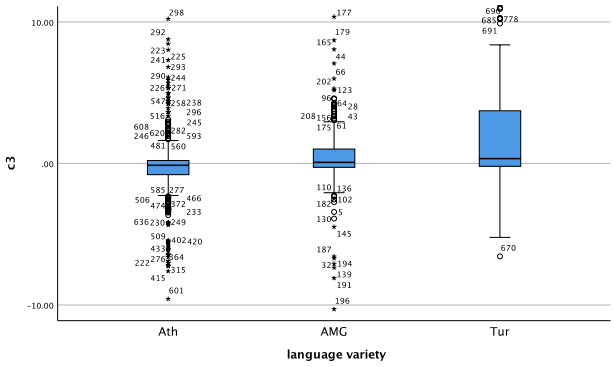
Figure 3. The slope of the f_0 curve in polar questions plotted against the distance between the end of the nuclear vowel and the f_0 peak in the three varieties.



3.2. Continuation rise tune

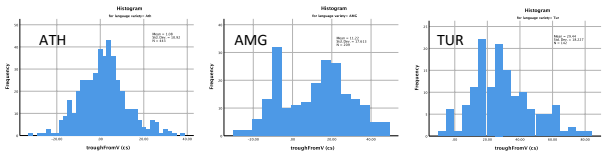
In continuation rises, AMG resembles Turkish more than Athenian in shape, according to the cubic coefficient, c_3. As shown in Figure 4, the cubic coefficient was usually negative in Athenian (μ =−.09, σ =4.38), i.e., the trough of the contour preceded the peak, (the final rise frequently had a short curtailed falling f_0 movement; cf. Figure 2 top). In contrast, the cubic coefficient was positive in Turkish (μ =3.15, σ =6.84) and in AMG (μ =1.08, σ =6.09), that is, the peak of the contour preceded the trough. There were statistically significant differences in the cubic coefficient across all three varieties (Ath-AMG, t(313)= −2.51, p=.012; Ath-Tur, t(179)= −5.3187, p<.000; AMG-Tur, t(279)= −2.89, p=.004).

Figure 4. The coefficient for the cubic term, c_3, for the continuation rise tune in the three varieties.



The patterns in the alignment of the f_0 trough suggest that continuation rise tunes in AMG resemble both Athenian and Turkish. Trough alignment (Figure 5) was expressed as the difference between the trough time (which was calculated analytically through the f_0 modelling) and the start of the nuclear vowel in centiseconds and it was significantly different across the three varieties (Ath-AMG, t(285)= −7.65, p<.000; Ath-Tur, t(175)= −17.56, p<.000; AMG-Tur, t(295)= −9.32, p<.000). The Athenian trough was closely coupled with the nuclear vowel, on average 1.08 cs after its start (σ =10.9) while in Turkish it was quite later (μ = 29.44 cs, σ =18.2). The AMG average (μ =11.22 cs, σ =17.6), a value between Athenian and Turkish seems to arise (according to impressionistic analysis during the annotation phase) from code switching, as the AMG speakers used the Athenian and the Turkish continuation tune in turn. This trend is also suggested by the histogram in Figure 5 which shows a bimodal distribution for AMG.

Figure 5. The distance between the start of the nuclear vowel (zero point on the x-axis) and the trough in continuation rises in the three varieties.



4. DISCUSSION

The results confirm the differences in shape and alignment between Athenian and Turkish in both continuation rises and polars. In both tunes the nuclear vowel aligns with a trough in Athenian but with a peak in Turkish. Although there was variability in the AMG patterns, in general the results reveal Turkish influences in both tunes. In polar questions the peak alignment is mostly like Turkish, i.e., a rise near the nuclear vowel. In continuation rises the AMG f_0 contour resembles the more complex rise-fall-rise pattern of Turkish than the simple rise of Athenian, as suggested by the cubic coefficient results. The AMG trough was aligned later than in Athenian but earlier than in Turkish. In general, the two tunes in AMG had a variable realisation resembling sometimes the Athenian and sometimes the Turkish intonation patterns. These results suggest that the variability in the intonational patterns observed in AMG can at least in part be accounted for as a result of language contact.

More generally, these results provide further support to previous reports ([19, 23]) that contact between languages from different families (Indo-European and non-Indo-European) which have different grammatical systems in syntax, morphology and more importantly phonology, can influence the intonation systems of the contact variety. Specifics of the intonational phonology and the tune-text alignment seem to be transferred between languages. In addition, our findings suggest that these effects last for a generation after the contact has ceased, showing that intonation, like other aspects of language, is at the same time dynamic and resistant to change.

An interesting further question which we are currently investigating is whether influences of the donor language weaken with time after the contact has ceased. A longitudinal study, currently in progress seeks to discover the retention or loss of contact effects by comparing the intonation patterns in archival recordings dating back to the 1920s with more recent ones (see [22] for details).

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