

PROSODY IN CONTACT: POLAR QUESTIONS IN CYPRIOT VARIETIES OF GREEK AND TURKISH

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ABSTRACT

Cypriot varieties of Greek (CYG) and Turkish (CYT) have been in close contact for many centuries, leading to mutual influence (e.g. lexical borrowings), despite belonging to different language families, and being typologically distinct. Little empirical research has been conducted on prosodic influence between contact languages. Some analyses of CYT polar questions report similarities with CYG, but do not give quantitative results. Using quantitative modelling of intonational contours, we compare CYG polar questions with those in CYT (geographically close), and with those in Athenian Greek (ATG) (phylogenetically close). We confirm previous research showing CYG questions are phonologically very similar to ATG, albeit with phonetic differences. We also find these patterns in CYG speakers' L2 English. We then compare CYT questions with those in Istanbul Turkish (IST) and find, in contrast, both Greek-like variants (presumably due to contact with CYG), and more Turkish-like variants, with distribution likely conditioned by sociolinguistic factors.

Keywords: Cypriot Greek, Cypriot Turkish, intonation, polar questions, convergence

1. INTRODUCTION

Within the area of contact linguistics, research on prosodic contact has received relatively less attention than other aspects of language, especially where intonation is concerned. This is partly due to certain challenges particular to prosody, rendering it arguably more elusive to analysis, e.g. lack of orthographic representation, which in turn means lack of historical textual evidence, and until recently a lack of quantitative methods for capturing more gradient properties of intonational contours.

However, recent methodological advances mean that we can derive more robust forms of evidence that ongoing language contact results in intonational variation and change in varieties spoken in multilingual societies. Contact may result in either phonological or phonetic prosodic transfer [1], influencing the category of phonological tonal events

(pitch accents and edge tones) or their phonetic realization. For example, [2] show the influence of Italian early-peak H tone alignment on Buenos Aires Spanish, and [3] shows contact effects of Quechua on Cuzco Spanish. [4] report novel patterns arising from contact between Basque and Spanish. [5] documents codeswitching in the polar questions (PQs) of German-Turkish bilinguals, and [6] report that speakers of Asia Minor Greek exhibit a blend of Greek-like and Turkish-like patterns in continuation rise utterances.

1.1. Cyprus as a prosodic melting pot?

The linguistic picture in contemporary Cyprus is dense and complex, resulting from multiple linguistic contact situations owing to a combination of geo-political factors both of considerable historical depth (e.g. Ottoman, Venetian, British rule, settlement of Maronites, Armenians) and pertaining to recent times (internal population displacement around the events of 1974). In addition to Cypriot varieties of Greek and Turkish, which each exist in a diglossic relationship with standard varieties, there are long-standing minority communities of Cypriot Arabic, Western Armenian and Kurbetcha, and high proficiency in English. As such it makes an ideal case study for investigating the existence and dynamics of prosodic convergence within a multilingual society.

1.2. Polar questions in Greek vs Turkish varieties

We focus on PQs because despite notable differences between ATG (nucleus L* plus H-L% edge tones) and IST (nucleus H* plus either L-L% or L-H% edge tones, though reports for the latter vary and more research is needed), impressionistic accounts [7] report similarities between CYG and CYT.

A further distinguishing feature is the use of the question particle {mI} in IST. According to [7: 72], this attaches to the question focus, and if there is no specific focus, post-clitically to the finite verb (normally phrase-final). [8: 161] states that, where the particle is used, the intonation is identical to that of statements (both use an L tone finally). When the particle is final, “the verb in front of the {mI} particle has the highest tone. However, the [position of] the

question particle [...] can change depending on the focus word, and the highest tone moves from verb to focus word.” [9] adds that there is only a fall (i.e. L tone) on the particle if post-focal, and otherwise there is a rise. CYT PQs are reported as differing from IST, in both intonation and reduced use of the question particle [7], but empirical research is scant.

ATG and CYG PQs are reported to have the same structure, L* NPA, H- L% but a difference in the alignment of the H phrase accent when focus is early in the phrase, in which case the ATG H aligns with the last stressed syllable but the CYG one aligns with the final two syllables (for ATG: [10-13]; for CYG: [14-17]).

The ATG PQ tune also transfers into L2 English PQs by ATG intermediate learners ([18]) who produce the full set of Greek tonal events, including tonal alignment, speech rate, pitch span and pitch level. We expect similar transfer in L2 English PQs by CYG speakers. In this paper we compare PQs produced by speakers of ATG, CYG, L2 English produced by CYG speakers, IST and CYT.

2. METHOD

2.1. Participants, materials and procedure

We elicited and analysed productions of PQs from the varieties of interest: 7 speakers of Athenian Greek (ATG; 6F, 1M), 7 speakers of Cypriot Greek (CYG; 5F, 2M) from Nicosia, 4 speakers of Cypriot Turkish (CYT; 3F, 1M) from Nicosia, 1 speaker of Istanbul Turkish (IST; F), and English as spoken by 2 of the Cypriot Greek speakers (CYG-Eng; 1F, 1M). Participants were aged 18-30, and completed a detailed sociolinguistic questionnaire eliciting background information.

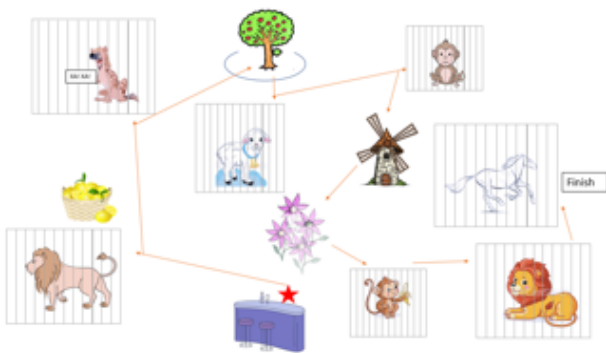


Figure 1: Zoo map.

PQs were elicited through a map task based on the premise that the participant and experimenter (native speakers of their language variety) had lost each other on a visit to the zoo, and were communicating via mobile phone. Both had a map of

the zoo, but only the experimenter’s map showed the orange path (Fig. 1). Participants were instructed to ask yes-no questions to find the experimenter, e.g. “Do I go towards the lion?”.

2.3. Data segmentation and labelling

For each language variety, all instances of PQs were identified, checked for naturalness, orthographically annotated and translated into English by a native speaker (359 tokens in total). Judgments were made on the positioning of the nuclear focus, dividing the extracted PQ phrases into two categories: early and final nuclear focus. Consonants and vowels were segmented and labelled for the nuclear stressed syllable and any post-nuclear syllables. We analysed PQs over a Region of Interest (ROI), from the beginning of the nuclear vowel to the end of the utterance. The same ROI was defined across all language varieties for maximal comparability.

The results revealed two patterns in the CYT PQs, one resembling the Greek pattern and one resembling the Turkish pattern. We labelled these two patterns as CYT-G and CYT-T. Inspection of the questionnaire revealed the two participants with the Turkish-like tune had recently studied in Turkey.

For L2 English, judgments about naturalness and location of focus are more difficult to make, since a) the intended target is not certain, and b) proficiency is variable. Thus, these were examined and agreed upon by a consortium of annotators.

2.4. f_0 modelling, hypotheses and comparisons

For each utterance f_0 was measured every 10 ms using ESPS *get_f0* [19]. 10th-order polynomials $\hat{f}_0 = \sum a_n t^n$ for $n = 0, \dots, 10$, were fitted to f_0 contours using the GNU Octave [20] *polyfit* function; pitch errors were inspected and manually corrected. The shape of f_0 contours in the ROI was modelled as 4th-order polynomials $\hat{f}_0 = \sum a_n t^n$ for $n = 0, \dots, 4$, which were then transformed into orthogonal (Legendre) polynomials $\sum c_n L_n$ (cf. [6]). The five c_n coefficients capture general shape characteristics of the fitted \hat{f}_0 contour: 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 *M*- or *W*-like wave with more than one peak and trough.

The time of the f_0 maximum was determined by root-finding (i.e. calculating when the first differential of the modelled contour equals zero), using the GNU Octave/Matlab function *real(roots(polyder(a)))*. We define *peak alignment* as

the difference between the H peak time and the end of the nuclear vowel.

For the comparison across language varieties, a separate univariate Anova test was used for each of 6 parameters as dependent variable (the alignment of the H peak as well as the shape of f_0 contours in the ROI through the five c_n coefficients) and language as the independent variable with 6 levels, one per language variety.

Our hypotheses were: 1a) CYG questions resemble ATG questions phonologically (i.e., share the L* NPA, H- L% tune) but 1b) differ phonetically in the alignment of the H phrase accent (see 1.2); 2) the CYG question pattern transfers onto the L2 English of CYG speakers; 3) CYG questions influence CYT in: (a) the alignment of the H phrase accent, so the f_0 maximum (i.e., H) will occur *after the end* of the nuclear vowel as in Greek and not *within* the nuclear vowel as in Turkish; and (b) the f_0 shape, revealed mainly through coefficient c_3 : the Greek-like pattern is a trough followed by a peak (i.e., a L* NPA followed by H-L% edge tones) so its c_3 coefficient is expected to be negative, while the Turkish-like pattern is the reverse, so its c_3 coefficient is expected to be positive.

3. ANALYSIS AND RESULTS

Figure 2 gives representative examples of PQs as produced by speakers of the six varieties under investigation. Red boxes show the location of the nuclear stressed vowel. In addition, the black boxes for the two examples in the top row highlight the phonetic difference between ATG and CYG.

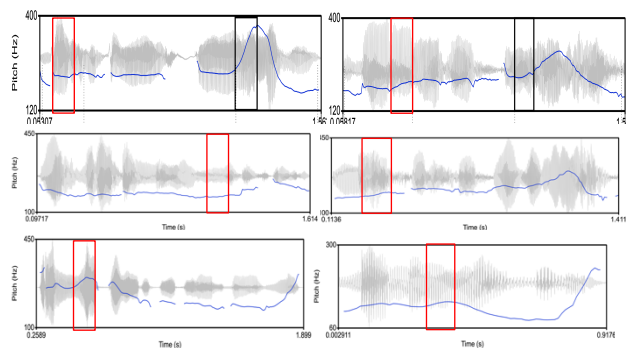


Figure 2: Examples of PQs for top: ATG, CYG middle: CYT-G, CYG-Eng; bottom: IST, CYT-T

ATG	CYG
Mporo na pao sto algo? <i>Can I go to the horse?</i>	Mporo na pao sto alon? <i>Can I go to the horse?</i>

CYT-G	CYG-E
Zizzirodan maymuna gidecem? <i>Should I go to the monkey from the cricket?</i>	Now can I go to the mill?
IST	CYT-T
Ayıya doğru bir yol var mı? <i>Is there a way to the bear?</i>	Maymunun yanında mın? <i>Are you next to the monkey?</i>

Table 1: Utterances shown in Figure 2.

Comparisons between ATG and CYG confirmed hypothesis 1a), that ATG and CYG share the L* NPA and H-L% edge tones, and 1b) have different alignment of the H phrase accent, which falls later in CYG (see Fig. 2 top panel; $F(1, 222) = 4.2, p = 0.042$). The results also suggest differences between ATG and CYG in the placement of focus, with CYG (and CYG-Eng) opting more commonly for final focus, and early focus being more common in ATG (ATG: 79 early and 28 final focus tokens vs. CYG: 28 early and 98 late tokens).

Figure 3 illustrates this phonological similarity between ATG and CYG: the L* for both these varieties of Greek occurs *within* the nuclear vowel (i.e., before the end of the stressed vowel, indicated by zero on the vertical axis) and the H- phrase accent occurs *after* the nuclear vowel (i.e., after the end of the stressed vowel indicated by zero on the horizontal axis). Note that in some tokens the H occurs before the end of the stressed vowel in Fig. 3. These correspond to words with final stress where all tones (L*, H-, L%) are crowded within the same vowel, due to lack of further segmental material.

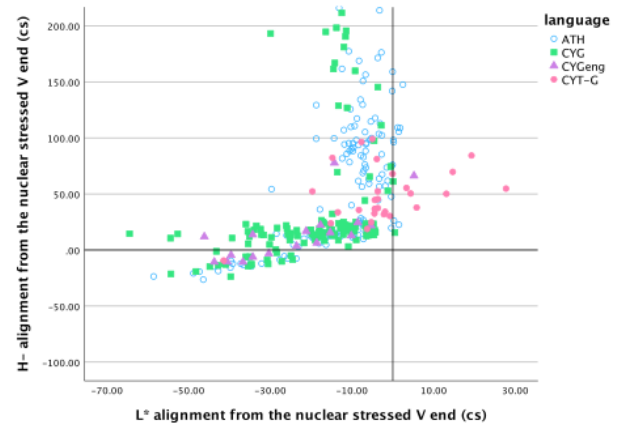


Figure 3: The alignment of the L* nuclear pitch accent and of the H- phrase accent, both in relation to the end of the nuclear vowel (indicated by 0).

In support of hypothesis 2, the results also show transfer of the Greek pattern to L2 English for CYG speakers (i.e., no difference in the tone alignment or shape), see Fig. 3.

Hypothesis 3 was also supported, as the influence of CYG on CYT PQ patterns was quantitatively established, while in addition the importance of sociolinguistic factors was brought to light. Notably, two of the four speakers (indicated as CYT-T, orange squares in Figure 4) produced questions with a Turkish-like tune, while the remaining two (CYT-G) produced Greek-like questions (pink circles in Figure 4). We note also that when speakers produce the Turkish-like tune, the question particle is optional, but when they use the Greek-like tune, the particle is never used. These patterns in CYG-Eng and CYT-G, constitute evidence for *phonetic* transfer; with regard to *phonological* interpretation, further investigation will be needed, e.g. through perceptual experiments.

As can be seen in Figure 4, both the alignment of the H tone ($F(5, 353) = 6.9, p < 0.001$) and the f_0 shape, as shown through coefficient c_3 ($F(5, 353) = 23.2, p < 0.001$), contribute towards the differentiation between the language varieties. As the nuclear vowel aligns with a trough in ATG but with a peak in IST, the H tone aligns *after* the end of this vowel in the Greek-like tune (CYT-G), indicated by 0 in the y-axis in Figure 4, but *before* it in the Turkish-like tune (CYT-T). The varieties displaying the Greek-like pattern (ATG, CYG, CYG-Eng, CYT-G) have a negative c_3 coefficient in the x-axis, i.e. the trough precedes the peak, while those with the Turkish-like pattern (IST, CYT-T) have a positive one, that is, the peak of the contour precedes the trough.

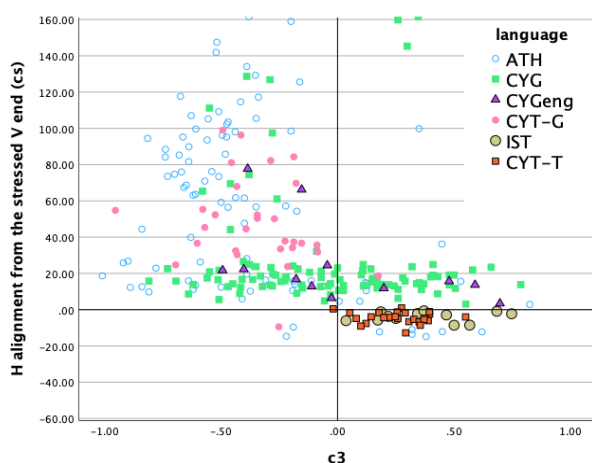


Figure 4: Coefficient c_3 plotted against H tone alignment (time lag from the end of the nuclear vowel, indicated by 0 in the y-axis, to the H peak).

4. DISCUSSION AND NEXT STEPS

The results confirm previous findings that CYG PQ intonation is *phonologically* the same as ATG, but with different *phonetic* alignment (evident when focus is early in the phrase). These properties of CYG are also transferred into some speakers' productions of L2 English.

The study also reveals, for the small sample analysed so far, a bimodal distribution of contour types for CYT, with some tokens showing Turkish-like intonation, and others showing Greek-like intonation (at least phonetically). The presence of such Greek-like structures points strongly to some degree of prosodic convergence on the island, in line with [7]. Further data will enable us to determine how far such productions resemble CYG with regard to their precise phonetic *alignment*, and where they sit in the wider range of Greek and Turkish varieties under examination. This will help establish the nature of the outcome of contact on the island, and whether we can identify a cluster of innovations that are intermediate between the two 'source' languages. This in turn raises questions about the phonological status of these variants and their sociolinguistic distribution, to be investigated through perceptual experimentation. An important factor in analysing this will be to compare closely with non-Cypriot varieties of Turkish.

A further step will be to deepen this investigation with a larger pool of CYT speakers, including older speakers (who may have been less exposed to non-Cypriot varieties of Turkish), and speakers in other parts of northern Cyprus (e.g. Morphou and Kyrenia, where many displaced CYT-speakers from the south settled). Further investigation of CYG will also incorporate older speakers and geographical variation, with particular focus on the city and area around Paphos, where impressionistic accounts report distinct intonation and where many displaced CYG-speakers from northern Cyprus settled. Further evaluation of the nature of convergence will be conducted through perceptual testing and comparison with a third axis of contact, namely with Cypriot Arabic, an endangered language showing extensive influence of CYG, and examination of other intonational patterns such as continuation rises.

Finally, this study forms part of a larger project digitally mapping prosodic convergence in the wider linguistic area of the Eastern Mediterranean (<https://mappingprosody.phon.ox.ac.uk/>) and the extent to which historical and contemporary migrations help shape prosody.

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