Perceptual evidence of Modern Greek voiced stops as phonological categories

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Abstract

The phonological status of voiced stops in Modern Greek (MG) remains unclear. Research shows that listeners typically discriminate native phonological contrasts without difficulty. We report MG listeners show excellent discrimination of MG bilateral [p]-[b] and coronal [t]-[d] stop voicing contrasts, significantly better than their discrimination of nonnative Australian English (AE) [p']-[p] and [t']-[t]. We interpret the results as evidence for the phonological status of MG voiced stops /b, d/ and thus of MG stop voicing contrasts.

Index Terms: speech perception, Greek, stop voicing.

1. Introduction

Voiced stops, such as [b, d], occur phonetically in MG, and may be prenasalised [mb, nd] in some contexts. Despite their occurrence, the phonological status of MG voiced stops remains unclear [1]. There is no dispute over the phonological status of MG voiceless stops, which are typically described as short-lag voice onset time (VOT) [2], e.g. [p, t], although their production may vary from partially voiced to voiceless [3]. The variability of stop voicing in MG is of interest to phonetic and phonological theories. Despite longstanding debate on the topic, MG listeners’ perception of cross-language stop voicing has been insufficiently investigated to address the unusual phonetic and phonological status of MG stop voicing.

If MG voiced stops have full phonological status, i.e., are contrastive with voiceless stops, MG listeners should easily identify MG stops produced with voice lead [b, d] versus short-lag [p, t], and discrimination will be excellent. Unlike MG, in initial position AE voiced stops have short-lag VOT, ([p, t]) and voiceless stops are long-lag aspirated, ([p', t']). If MG voiced and voiceless stops are not contrastive, we may expect discrimination of MG and AE to be similar. The Perceptual Assimilation Model [4] predicts that MGs will perceptually assimilate AE [p, t] (short-lag) as good exemplars of MG [p, t] and AE [p', t'] (long-lag) as poor exemplars of MG [p, t], resulting in category-goodness (CG) difference assimilations and moderately good discrimination.

2. Method

Two AE and two MG speakers produced native bilabial and coronal stops in /Ca/ context. MGs (N = 21) completed AXB discrimination (16 randomised trials per voicing contrast) and forced-choice identification (ID) with ratings (1 “very unusual” to 7 “native”). The latter task, tokens were presented once for identification and again for rating.

3. Results and Discussion

MGs showed consistent ID of MG [p, b, t, d] as /p, b, t, d/, respectively. All MG stops were rated above 6, near the native ideal, as would be expected for native phonological categories. As predicted, both AE voiced and voiceless stops were assimilated to MG voiceless categories (Table 1). AE /b, p/ showed a significant goodness difference (t(19) = 3.083, p < .001), and AE /d, t/ showed a significant difference in categorisation (t(19) = 6.321, p = .006). Other identifications of AE [t] were ‘d’ (37.50%), or prenasalised ‘nd/nt’.

Table 1. Category label, % identification and mean goodness rating for each phoneme (1 “very unusual” to 7 “native”).

<table>
<thead>
<tr>
<th>Stimulus</th>
<th>AE /p/</th>
<th>AE /b/</th>
<th>AE /t/</th>
<th>AE /d/</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID %</td>
<td>p 100</td>
<td>b 95.00</td>
<td>t 93.64</td>
<td>d 9.375</td>
</tr>
<tr>
<td>Rating</td>
<td>3.73</td>
<td>4.36</td>
<td>3.91</td>
<td>3.97</td>
</tr>
</tbody>
</table>

Supporting the phonological status of MG voiced stops, the MG contrasts were discriminated more accurately than the AE contrasts, F(1,20) = 24.277, p < .001, η² = .548. Discrimination was excellent (>90%) for MG, and moderate for AE (/p/ vs /b/ = 73.21%; /t/ vs /d/ = 75%) (Figure 1), the latter reflecting CG assimilations to native MG voiceless stops.

Figure 1. Mean % correct discriminations per contrast. Standard error bars are displayed.

4. Conclusions

Results suggest that MG listeners perceive native [b, d] as phonological categories, i.e. /b, d/, contrasting with voiceless /p, t/. MG phonology also constrains their discrimination of nonnative AE stops. Future research will use word-medial stops to assess context effects on MG stop voicing perception.

5. References