

Phonetic variability of the Greek rhotic sound

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Cross-linguistically, rhotics exhibit considerable phonetic variety (Lindau 1985, Inouye 1995, Ladefoged and Maddieson 1996). In the Greek literature there is no consensus yet on the nature of the rhotic. Older phonological studies assume it is a trill (Babiniotis 1985, Philippaki-Warbuton 1992, Nespor 1996). More recent phonetic studies describe it as a tap (Arvaniti 1999, Nicolaidis 2001), but even in these studies low-level details of phonetic implementation are glossed over, not providing much information on the duration and spectral characteristics of the rhotic in different contexts, which have been found to affect its realization across languages (cf Recasens 1991, Recasens et al 1993). As a result, much of the phonetic variability of this segment is ignored. The present paper reports on a systematic, acoustic study of the Greek rhotic sound.

The duration and spectral characteristics of the rhotic sound were investigated in two experiments. In the first experiment the phonetic context was intervocalic position (VrV): 15 Greek words were selected with the same vowel flanking the consonant. The parameters that varied were vowel quality (a, e, i, o, u), prosodic position of r (word-initial or medial) and stress (in stressed or unstressed syllable). The target words were embedded in the sentence *I leksi ___ ine apli* 'The word ___ is simple'. Six speakers repeated the experimental sentences six times each. In the second experiment the phonetic context was Cr and rC clusters that varied with respect to segmental makeup of C (p, t, k, b, d, g) and quality of flanking vowels (i, a, u). Thirty six words varying along these parameters were embedded in the sentence *O oros ___ silavizete efkola* 'The term ___ is easily syllabified'. Five speakers repeated the experimental sentences three times each.

Overall, the results indicate that the rhotic most often produced in Greek is the tap (64% of the tokens). Alongside this tendency, there was also a great amount of variability found, even within different repetitions of the same word and by the same speaker. In addition to complete closure (tap), there were tokens produced with complete weakening/lack of constriction, i.e., an approximant segment (34%), as well as intermediate degrees of constriction resulting in frication. This type of gradient production correlated with duration: Shortening in the time domain correlated with weakening in constriction.

In addition, the results revealed that the tap was phonetically realized in a different way when it occurred in consonant clusters. Specifically, there was systematic insertion of an epenthetic, extremely short vowel between the rhotic and the stop (cf. Navarro Tomás 1918, Quillis 1993, Bradley and Schmeiser 2003, for a similar process in Spanish). The quality of this vowel was sometimes similar to the quality of the nuclear vowel adjacent to the tap, sometimes more centralized (schwa). This process can be seen as a response to the pressure for perceptibility: the brief tap constriction is not easy to perceive next to a stop and a brief vowel makes it more distinguishable. Such processes have led, over time, to reanalysis of /CərV/ to /CVrV/ and lexicalization of the appearance of the epenthetic vowel.

In summary, the detailed phonetic examination of the Greek rhotic sound has revealed that speakers fine-tune the phonetic implementation of a segment as a response to pressures in the domains of time, perceptibility, and production. Such details are important for the better understanding of processes that shape the phonological systems of languages.