CRAZY LITTLE THING CALLED /r/: UNLOCKING THE MYSTERIES OF THE HEBREW RHOTIC

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Introduction: What is the phonetic nature of the Hebrew /r/? The answer to this question varies, with disagreement regarding both place and manner of articulation. Descriptions range from alveolar trills (Gottstein 1948), a velar fricatives (Blanc 1964), uvular fricatives (Bolozky 1978), to uvular trills (Laufer 1992) and more. Schwarzwald (1981:82) addresses the articulation of gutturals and rhotics by youngsters whose parents' mother tongue is Arabic, claiming that in these cases it varies from an alveolar trill (typical of many Arabic dialects) to a uvular fricative, trill, plosive or even flap. Bolozky and Kreitman's (2007) ultrasound analyses show the rhotic is indeed uvular, and the acoustic analyses suggest it's an approximant with varying degrees of frication.
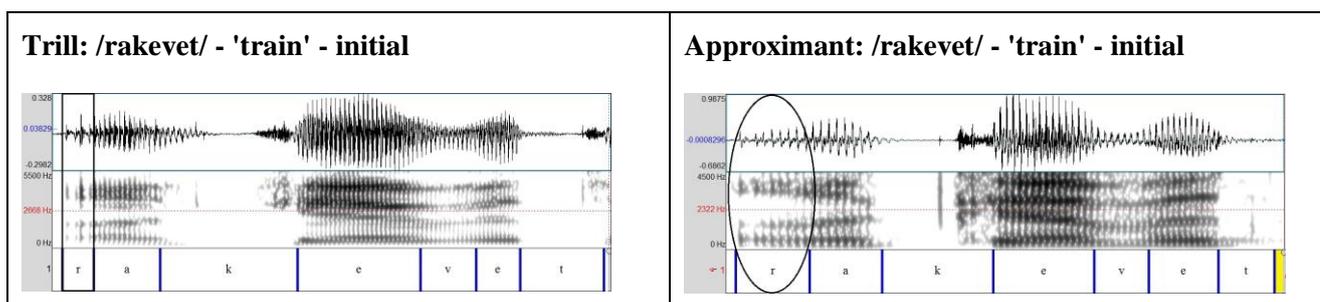
Rhotics form a heterogeneous group from the phonetic point of view, exhibiting a various of manners and places of articulation. In different languages, we find fricatives (e.g. French), trills (e.g. Arabic), taps (e.g. Japanese), approximants and even 'r-colored' vowels (English), or even combinations of features of several of these categories (Ladefoged & Maddieson 1996: 217). So what is the Hebrew rhotic? Trill, flap, plosive (!), fricative, aspiration, rhotacized vowel, approximant?
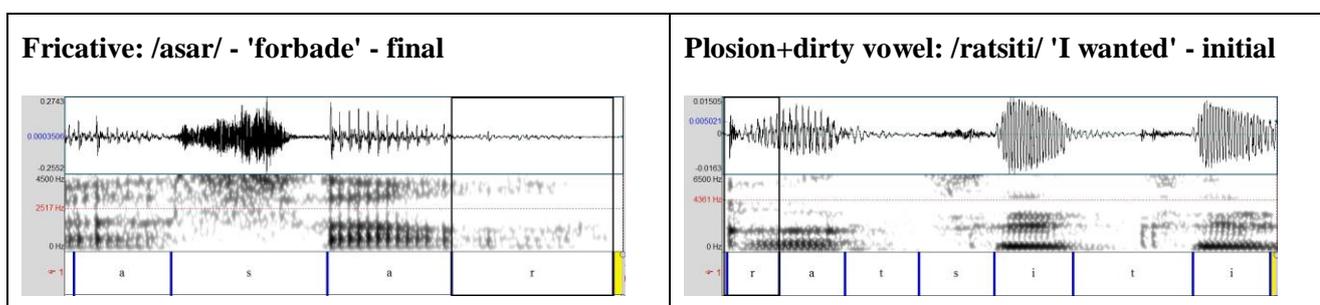
The present study resolves the apparent controversy. We discuss the acoustics of the Hebrew rhotic, and their far-reaching phonological implications. This study is the first of its kind ever conducted both in scope (number of speakers, amount of acoustically analysed data) and factors controlled for (gender – see also Schwarzwald 1981, prosodic factors). Most earlier studies are mainly impressionistic descriptions of the articulatory nature of the rhotic devoid of any considerable acoustic analysis, and none are concerned with allophonic variation and the role of prosody in this variation. An understanding of the rhotic's phonetic nature is essential in order to explain the phonology of the Hebrew rhotic.

Methodology: The data analysed in our ongoing study of Hebrew rhotics consist of productions elicited from native speakers with rhotics in different prosodic positions: phrase initial (/#__a/), phrase medial (/a___a/) and phrase final (/a___#/). All the rhotics (and the adjacent phones) were inspected using PRAAT (Boersma and Weenink 2013). The two authors analysed the data independently.

Findings: While the data are varied (both inter-speaker and intra-speaker variation), our ongoing investigation suggests that certain patterns emerge. The following summarises our preliminary investigation of female speakers:

Position	Description
Initial	Very varied: uvular trill, voiced fricative, approximant, dirty vowel, plosive (!)
Medial	Almost invariably an approximant, no frication, often differing only in amplitude from adjacent vowels
Final	Between a dirty vowel (some frication or trilling) and a voiceless aspirated segment

Trill: /rakevet/ - 'train' - initial

Approximant: /rakevet/ - 'train' - initial

Fricative: /asar/ - 'forbade' - final	**Plosion+dirty vowel: /ratsiti/ 'I wanted' - initial**

Conclusion and discussion: Strangely, all of the above seemingly contradictory previous analyses of the Hebrew /r/ were correct in identifying *some* of the rhotic surface forms. However, they were all lacking in that they did not address the variation. The precise phonetic (both acoustic and articulatory) nature of the Hebrew rhotic is a lot more context dependent than previously thought. Ranging from approximants to trills, from voiced fricative to voiceless aspirated forms, from plosives to dirty vowels, and combinations thereof, exactly what the Hebrew /r/ is depends on prosodic position and even speaker-specific preferences. Preliminary investigation also shows gender-based variation, with males displaying considerably less variation, primarily producing approximants (i.e. they are more "conservative" than females, (see Schwarzwald 1981)).

Consequences: The phonetic behaviour of the Hebrew rhotic will lead us to a better understanding of its phonology. For example, the complexity of its acquisition – the acquisition of the Hebrew rhotic (and rhotics in general) is notoriously slow (Ben-David 2001:56), as the rhotic is the about the last consonant to be acquired by speakers. In addition, it is the most difficult consonant for L2 speakers to master in Hebrew. In adaptation, Cohen (2011, 2013) discusses phonological phenomena in loanword adaptation. Rhotics undergo a variety of phonological processes in syllable coda position (e.g. psuedo-reduplication, metathesis in loanwords).

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