Word-initial geminates in Maltese
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Word-initial geminates in Maltese are pervasive in Semitic and non-Semitic verbal forms. In Semitic verbs such as ssabbar (‘to be consoled’) and ttallab (‘to beg’), gemination occurs as a morphological process within the root-and-pattern templatic system. Non-Semitic verbs do not usually fit the templatic system, however, the first consonant is geminated: pparkja (‘to park’) and ffirma (‘to sign’). It is claimed that geminate consonants cannot occur word or syllable initially because in such a position they are preceded by an inserted vowel of [i]-like quality (Azzopardi 1981; Mifsud 1995; Hoberman and Aronoff 2007). This insertion casts doubt on whether word-initial geminates are genuinely word-initial. Geminates, like in Arabic (Watson 2007), can also be derived from the definite article ‘il-’, which regressively assimilates to following coronals (il-belt ‘the city’, ix-xemx ‘the sun’).

Method: In this study we investigated the occurrence of the inserted vowel [i] before lexical and assimilated geminates (c.f. Table 1). Target words contained a coronal obstruent (/dd tt ss ḟ f zz/) in initial position. Target words were presented after the nasal /m/ in the carrier phrase: Qalilhom target word erba’ darbiet (‘he told them target word four times’). Ten speakers of Maltese (6 males, 4 females) were recorded in a soundproof room at the University of Malta. 20 target words were each repeated 7 times (total number of tokens: 1400).

Table 1: Speech material.

<table>
<thead>
<tr>
<th>Singleton</th>
<th>Lexical Geminate</th>
<th>Assimilated Geminate</th>
</tr>
</thead>
<tbody>
<tr>
<td>dahhal ‘to insert’</td>
<td>ddahhal ‘to be inserted’</td>
<td>id-dahla ‘the entrance’</td>
</tr>
<tr>
<td>tallab ‘to ask’</td>
<td>ttallab ‘to beg’</td>
<td>it-talba ‘the prayer’</td>
</tr>
<tr>
<td>sabbar ‘to console’</td>
<td>ssabbar ‘to be comforted’</td>
<td>is-sabar ‘the patience’</td>
</tr>
<tr>
<td>xahham ‘to fatten’</td>
<td>xxahham ‘to become fat’</td>
<td>ix-xaham ‘the fat’</td>
</tr>
<tr>
<td>żarrat ‘to fray’</td>
<td>żżarrat ‘to be frayed’</td>
<td>iż-żarda ‘the loose threads’</td>
</tr>
</tbody>
</table>

Results: In terms of duration, geminates were significantly longer than singletons (singleton to geminate ratio: 1:1.6). Only before geminates (as opposed to singletons) there are clear vowel formants between the nasal /m/ and this geminate consonant. The vocalic insertion before geminates were present in 96% of the data (in 1008 out of 1050 tokens), equally present in lexical and assimilated geminates. The mean duration of the inserted vowel was comparable across the different geminate types (before lexical geminates (ẍ=49ms, sd=12) and before assimilated geminates (ẍ=51ms, sd=12). The status of the inserted [i] in the case of assimilated geminates is controversial: whether it is part of the article or not in its underlying representation is debated (Comrie 1980, Borg and Azzopardi-Alexander 1997). Crucially in 4 out of 10 speakers, the epenthetic vowel was itself preceded by a glottal stop, this was subject to within-speaker variation. The glottal stop is only produced before the inserted vowel. The glottal stop is part of the phoneme inventory of Maltese such as in qal ‘he said’ [ʔel]. However, the minimal pair [ʔel] and [el] ‘ghal ‘for’ is being lost, as onsetless words are increasingly being preceded by a glottal stop.
Discussion: Word-initial geminates in Maltese require a syllable nucleus (inserted [i]), so that the first half of the geminate can function as a coda and the second half as an onset to the following syllable. Some speakers employ a further syllabification process: they glottalise before the inserted vowel, which might serve as an onset of the first syllable. Glottal stop insertion is a process found in a variety of Arabic dialects, such as: Classical Arabic and Quranic Arabic, where a glottal stop is inserted before words beginning with a vowel to avoid onsetless word-initial syllables (McCarthy 2005, Gadoua 2000, Haddad 2006). This study shows that word-initial geminates are structurally similar to word-medial geminates, in that they undergo a process of resyllabification.

References
Studies in the Linguistic Sciences 10 (2) pp. 25-37.
Watson, J. (2007). The phonology and morphology of Arabic. OUP.