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Vowel Duration and Maltese 'għ'[1]

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1. Introduction

It is well established that historically, the Maltese phoneme inventory included a voiced pharyngeal approximant [ʕ], even though it is no longer present in standard Maltese.[2] Yet, traces of its presence still remain. For example, it is represented in the orthography of modern Maltese as 'għ', e.g. lagħab 'he played'. It is also realized in contemporary Maltese as an increase in the duration of an adjacent vowel, among other phonetic realizations.

However, the extent to which increased vowel duration is observed in all contexts that contained the pharyngeal is controversial. Brame (1972) assumes that an historical 'għ' gave rise to increased vowel duration in all contexts. Puech (1979), on the other hand, shows the situation to be more complex: in some contexts increased duration is observed while in others it is not.

The goal of this paper is two-fold. The first is to report on the results of a pilot study of vowel duration in Maltese carried out in 1997 involving two speakers of Maltese.[3] As we show, the study supports many of Puech's earlier findings in that the extent to which increased duration occurs in the context of an historical [ʕ] is affected by many factors including syllable type, number of syllables in the word, stress, and position

[1] Acknowledgements: We would like to thank the participants at AIDA 1998 in Lija, Malta, and at the first meeting of the Association of Maltese Linguistics 2007 in Bremen, Germany for helpful comments on aspects of this research. Further, we are particularly grateful to Ray Fabri, a member of the M4 Research Project, for his valuable input.

[2] 'għ' is still pronounced in some varieties of Maltese, particularly varieties on the island of Gozo. For example, in Vella (1997) it is noted that the Maltese dialect speaker her analysis is based on is described as speaking in a "highly idiosyncratic manner, involving among other things, vocalization of the consonant ħ as well as, at times, of the consonant għ".

[3] The results were presented at the meeting of the Arabic International Dialectology Association (see Hume & Venditti 1998).

in the word. With the pilot study as a basis, the second goal is to outline a more extensive cross-dialectal follow-up study that is currently underway.

2. Vowel duration and 'għ' in two Maltese dialects

The objective of this study is to examine the duration of vowels that occur adjacent to the context where a pharyngeal consonant was once found and in doing so, determine under what conditions an historical pharyngeal corresponds to increased vowel duration. As noted, the orthography reflects the presence of the historical consonant by means of the digraph 'għ'. For example, in contemporary Maltese 'I played' is written orthographically as *lgħabt* [lʕpt], even though the pharyngeal is no longer pronounced. Since a goal of this project is to examine the potential impact of the historical pharyngeal (i.e.'għ') on vowel duration, we make use of the orthographic forms as a guide to where the consonant once occurred.

2.1 Methods

The subjects in the study are two native speakers of Maltese. Speaker A (male) grew up in Mellieħa while speaker B (female) grew up in Msida.

10 repetitions of 213 monosyllabic and bisyllabic words (including 6 nonsense words) were recorded within the carrier phrase: *għid __ erba' darbiet* "say __ four times". Recordings of the two speakers were made in a sound-attenuated room at the Department of Linguistics, The Ohio State University using a Marantz portable tape recorder with a Shure SM10A head-mounted microphone. Utterances were then digitized on a SUN Sparcstation at 16KHz (16 bit resolution), and analyzed using Entropic Research Labs ESPS Waves+ speech software. The onset and offset time values of the target vowels were logged, and the duration of the vowels was automatically extracted. Data were then submitted to Anova and post hoc Tukey-Kramer statistical analyses.

2.2 Results

Before presenting results concerning vowel duration as it relates to an historical pharyngeal consonant, it is important to point out that, while not represented in the orthography, vowel length is contrastive in Maltese, as illustrated by the forms in (1) and

exemplified in Figures 1a,b for tā́ma vs. tā́mal 'hope; dates'. Note that all tests of significance use $\alpha = .0001$ unless otherwise indicated.

(1) Phonemic length distinction

tā́ma	[tɐ:mɐ]	tā́mal	[tɐmɐl]	'hope; dates'
sā́fi	[sɐ:fi]	sā́fa	[sɐfɐ]	'he is pure; purity'
sā́met	[sɐ:mɛt]	sā́mat	[sɐmɐt]	'she fasted; he scalded'

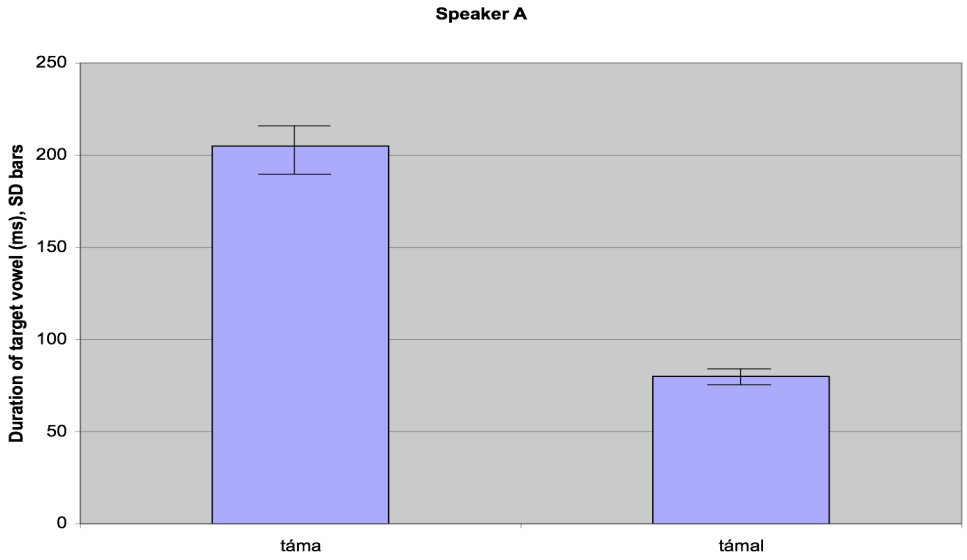

Figure 1a. Contrastive V length: tā́ma [tɐ:mɐ] vs. tā́mal [tɐmɐl]'hope; dates', Speaker A

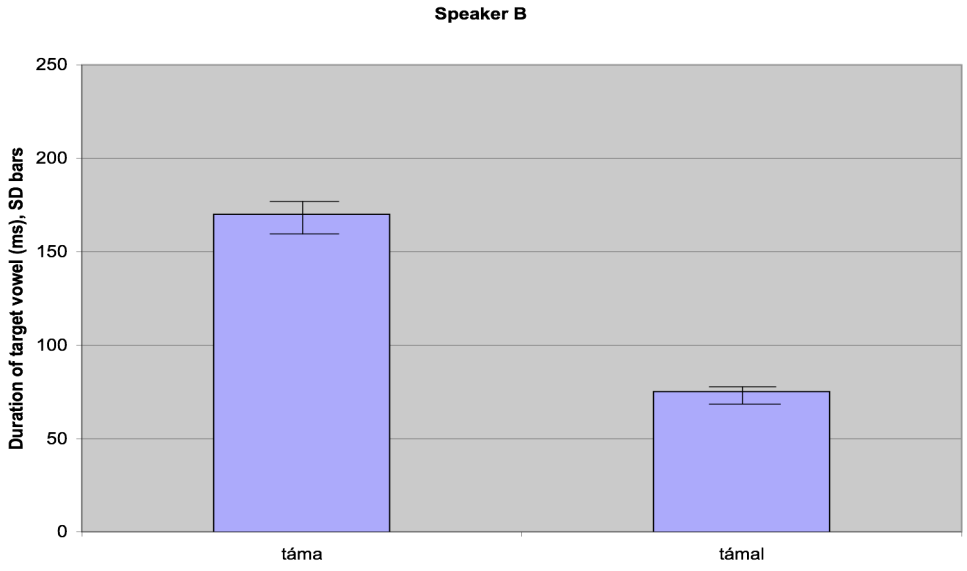

Figure 1b. Contrastive V length: tā́ma [tɐ:mɐ] vs. tā́mal [tɐmɐl]'hope; dates', Speaker B

Vowel duration is also influenced by syllable type and stress. With respect to syllable type, vowels are longer in syllables closed by a simple coda consonant than in those closed by a complex coda, as shown in Figures 2a,b and 3a,b. This holds regardless of whether or not the vowel is adjacent to an orthographic 'għ'. Note also that there is no significant difference in vowel duration between forms written orthographically with two vowels and those with one, all else being equal, e.g. *nagħas* 'he dozed off', *ngħas*, 'drowsiness'.

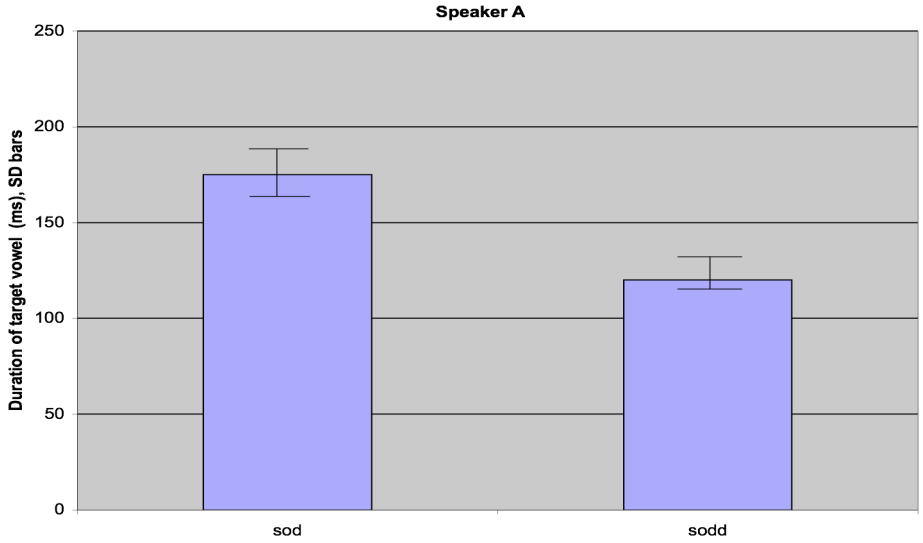

Figure 2a. sod [sɔːt] vs. sodd [sɔtt] 'firm; he plugged', Speaker A

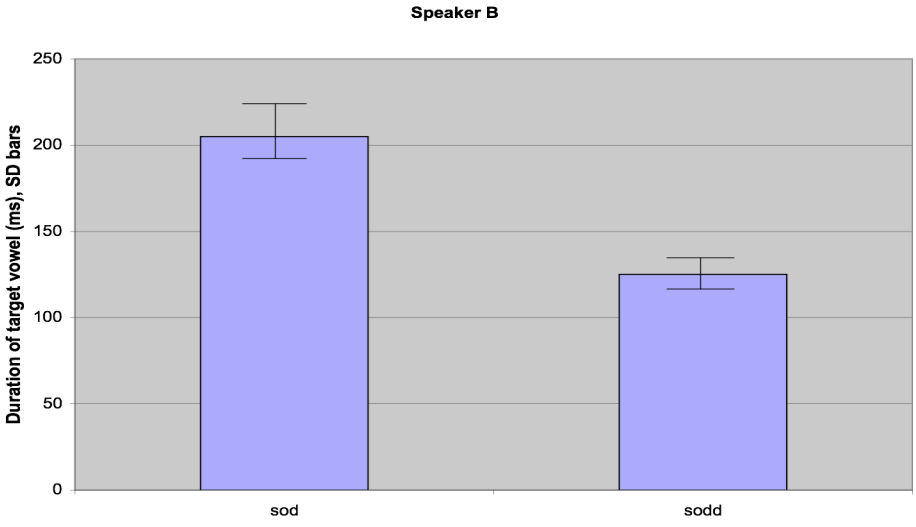

Figure 2b. sod [sɔːt] vs. sodd [sɔtt] 'firm; he plugged', Speaker B

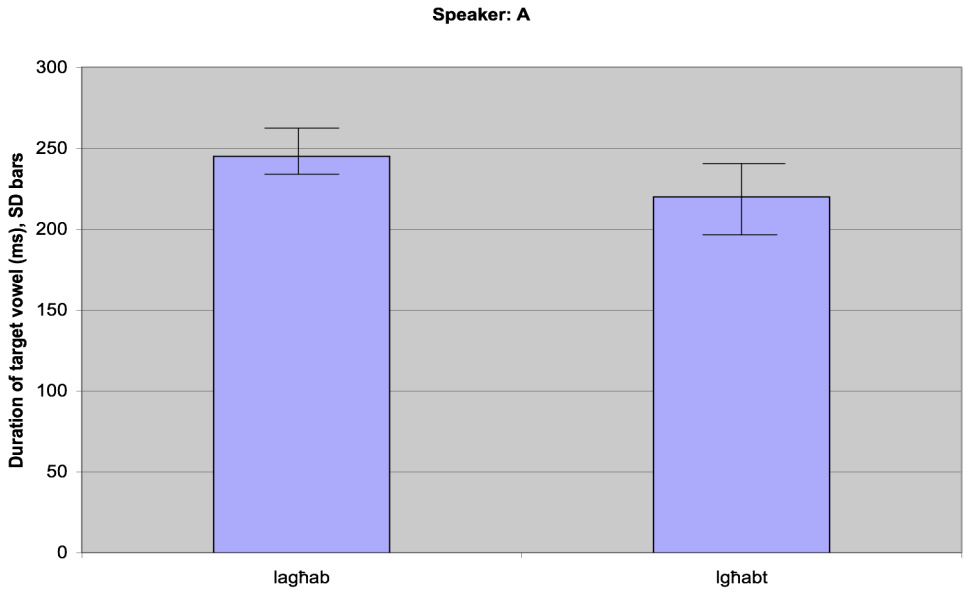

Figure 3a. lagħab [lɐ:p] vs. lgħabt [lɐpt] 'he played; I played', Speaker A

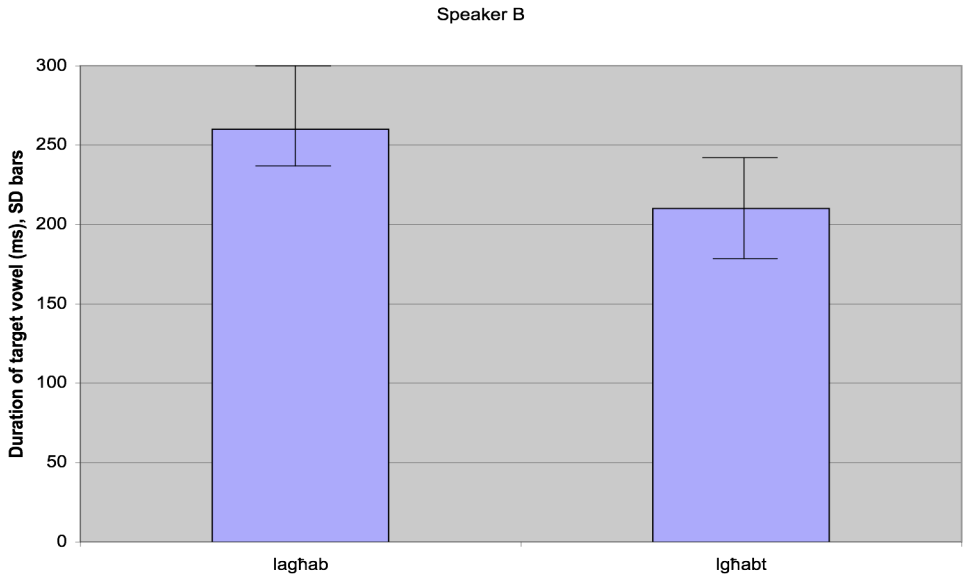

Figure 3b. lagħab [lɐ:p] vs. lgħabt [lɐpt] 'he played; I played', Speaker B

All else being equal, vowels are also longer in open syllables than in closed syllables, as shown in the word-initial vowels in Figures 4a,b. While not tested in this pilot study, similar patterns are predicted for 'għ'-less words. (Syllable divisions are indicated with a period separating two syllables.)

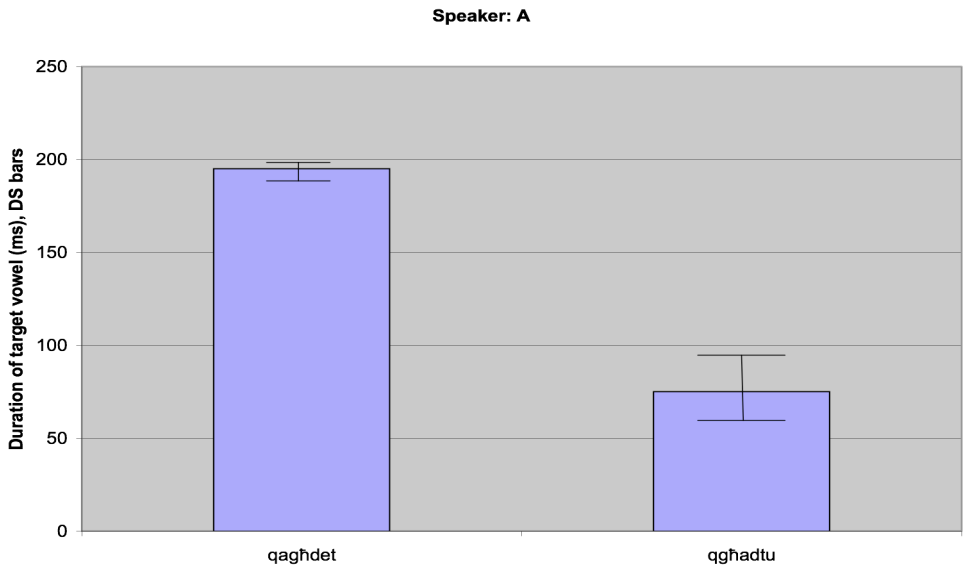

Figure 4a. qagħ.det [ʔɐ:.dɛt] vs. qgħad.tu [ʔɐt.tu] 'she stayed; you (pl.) stayed', Speaker A

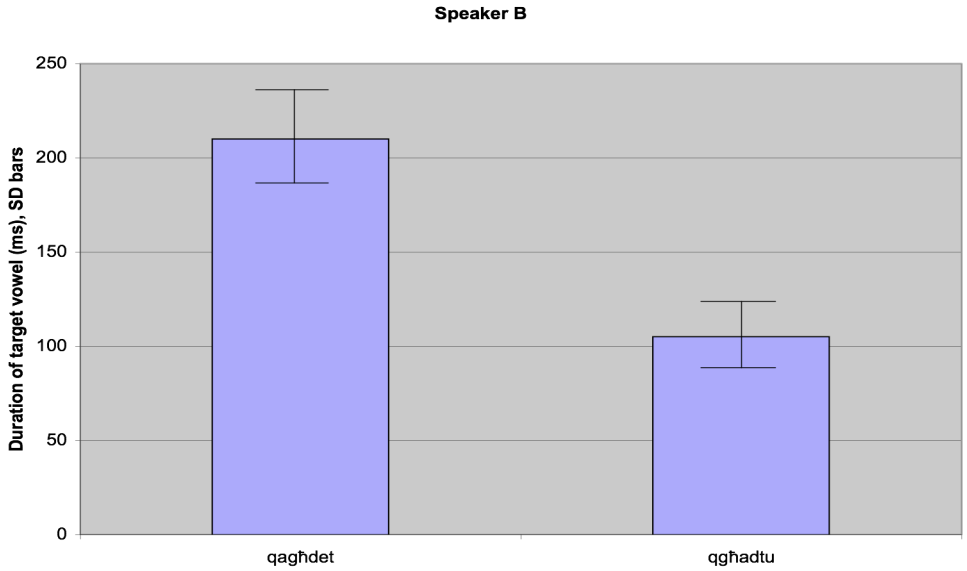

Figure 4b. qagħ.det [ʔɐ:.dɛt] vs. qgħad.tu [ʔɐt.tu] 'she stayed; you (pl.) stayed', Speaker B

For vowels occurring adjacent to an orthographic 'għ', a difference in stress consistently results in a difference in vowel duration regardless of syllable type, as shown in (2) and illustrated in Figures 5a,b and 6a,b: an 'għ'-context vowel in a stressed syllable is significantly longer than a corresponding vowel in an unstressed syllable.

(2) Stressed and unstressed vowels adjacent to orthographic 'għ': durational differences

Syllable Type	*Vowel Duration*		*Gloss*
	Longer	Shorter	
Closed Syllable	tgħám.mar	tgħam.mír	'you live; furnishing'
	tgħák.kes	tgħak.kís	'you oppress; oppression'
Open Syllable	tágħ.sar	tagħ.sír	'you wring out; wringing out'
	tágħ.fas	tagħ.fís	'you squeeze; squeezing'

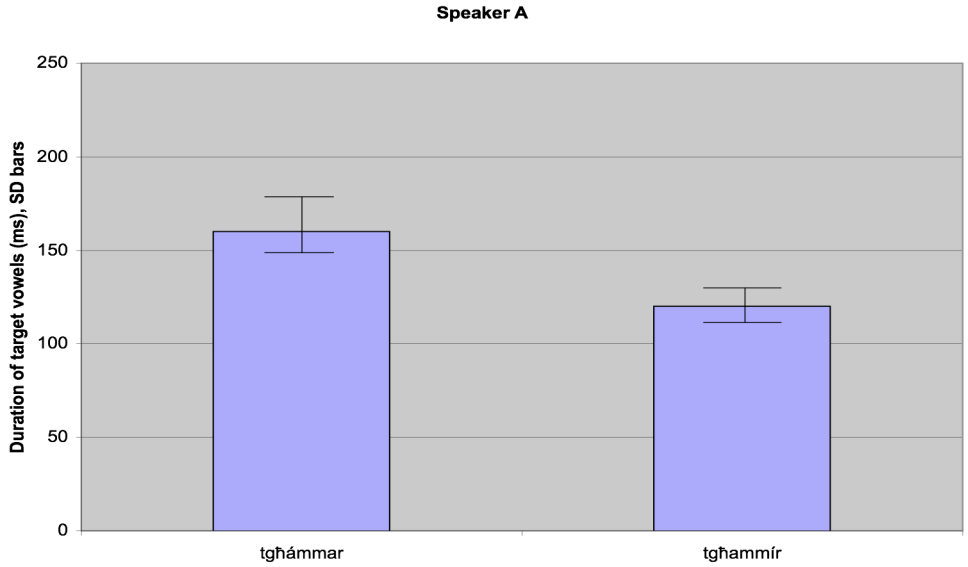

Figure 5a: tgħám.mar [tɐ:mmɐr] , tgħam.mír [tɐmmí:r] 'you live; furnishing', Speaker A

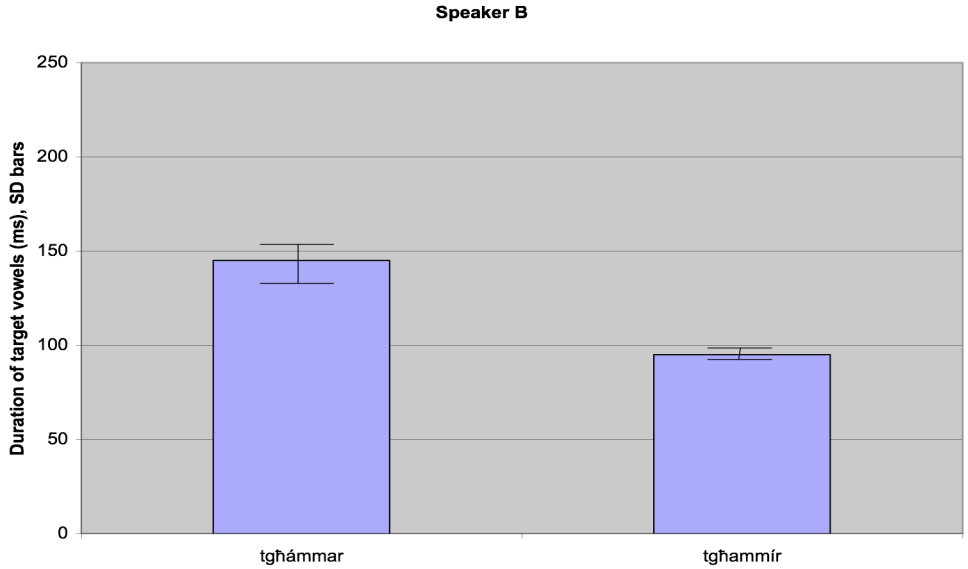

Figure 5b: tgħám.mar [tɐ:mmɐr], tgħam.mír [tɐmmí:r] 'you live; furnishing', Speaker B

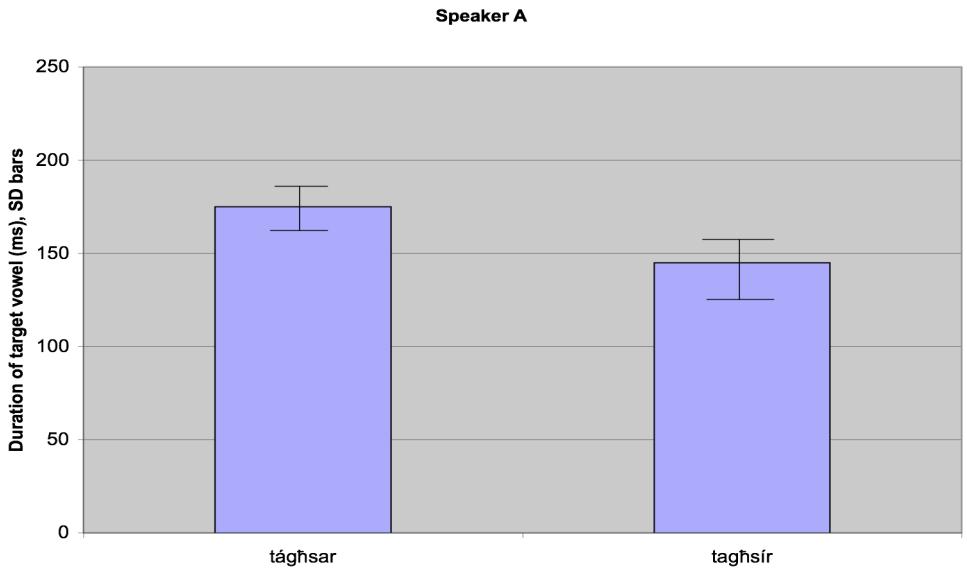

Figure 6a: tágħ.sar [tɐ:sar] vs. tagħ.sír [tɐsi:r] ‘you wring out; wringing out’, Speaker A

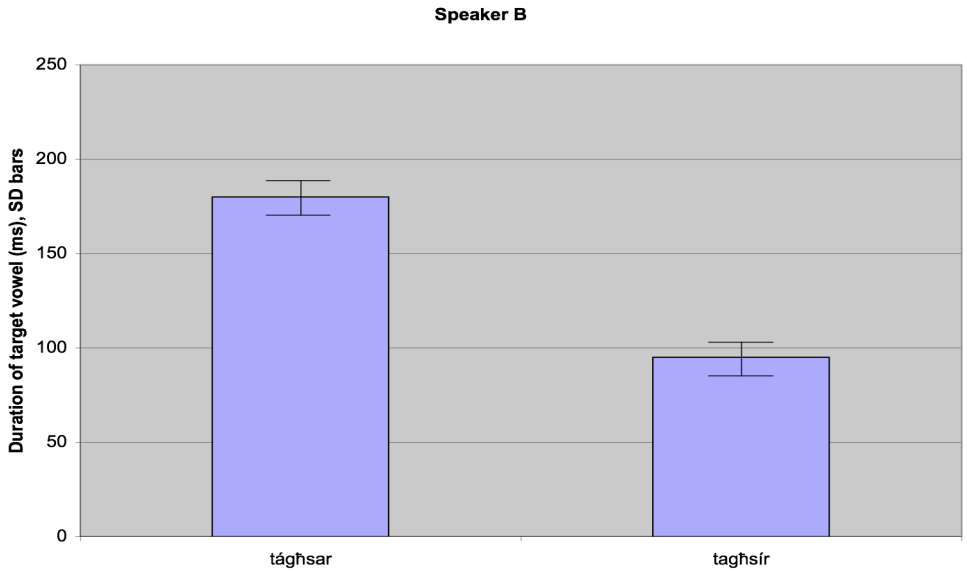

Figure 6b: tágħ.sar [tɐ:sar] vs. tagħ.sír [tɐsi:r] ‘you wring out; wringing out’, Speaker B

For vowels that are not adjacent to an orthographic ‘għ’, stress is not a consistent predictor of durational differences but rather depends on speaker and lexical item. As shown in (3) and illustrated in Figures 7 and 8, speaker A (Mellieħa) consistently differentiates between stressed and unstressed vowels while speaker B (Msida) does not.

(3) Stressed and unstressed vowels not adjacent to orthographic ‘għ’: variable results

Longer (if signif.)	*Shorter (if signif.)*	*Speaker A*	*Speaker B*	*Gloss*
bá̲żi	ba̲żár	signif.	signif.	‘base; bazaar’
ká̲nna	ka̲nnól	signif.	n.s.	‘pipe; kind of pastry’
kó̲nna	ko̲nnéss	signif.	n.s.	‘we were; (he is) connected’
ká̲xxa	ka̲xxíer	signif.	n.s.	‘box; cashier’
tó̲ppu	to̲ppóni	signif.	n.s.	‘bun, to oppose’

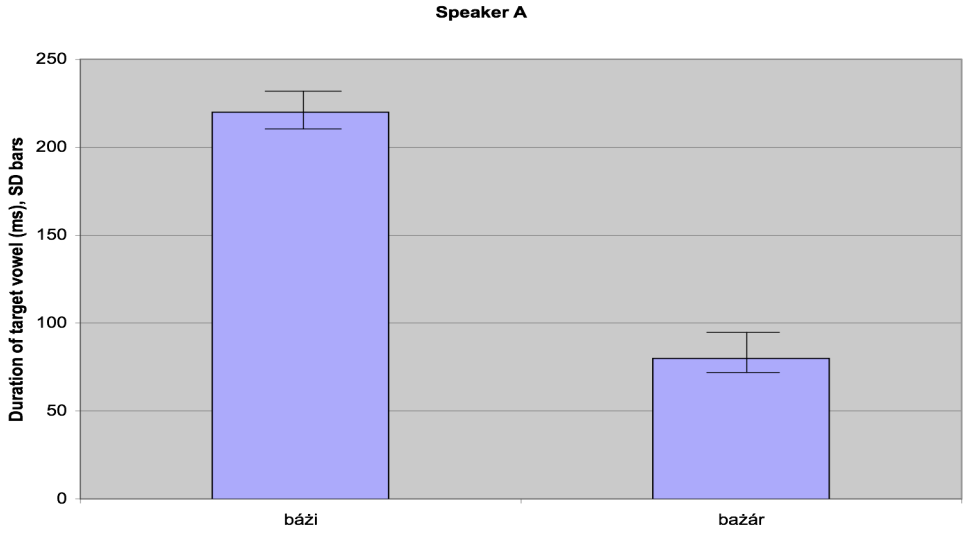

Figure 7a: bá̲żi [bɐ:zi] vs. ba̲żár [bɐzɐr] ‘base; bazaar’, Speaker A

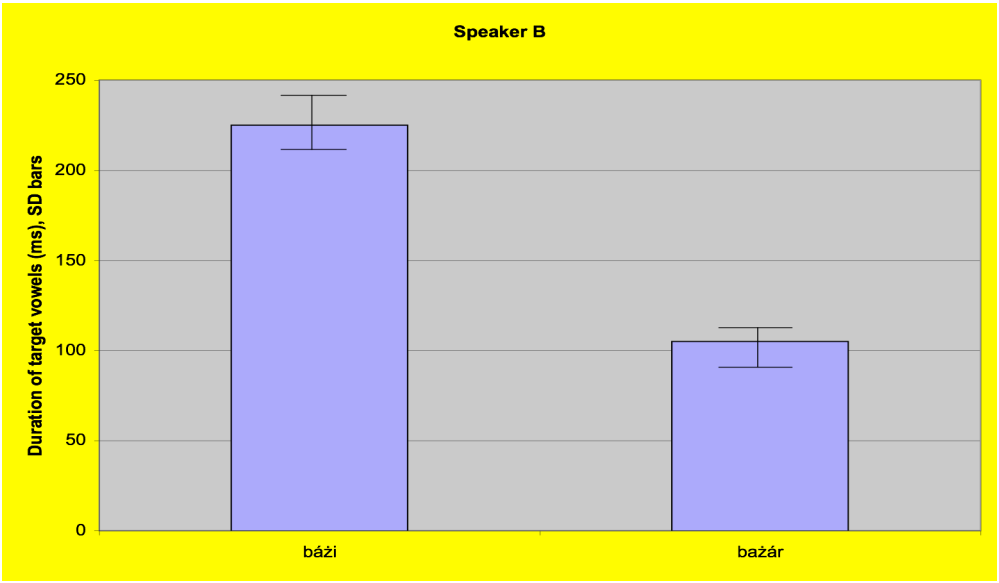

Figure 7b: bá̲żi [bɐ:zi] vs. ba̲żár [bɐzɐr] ‘base; bazaar’, Speaker B

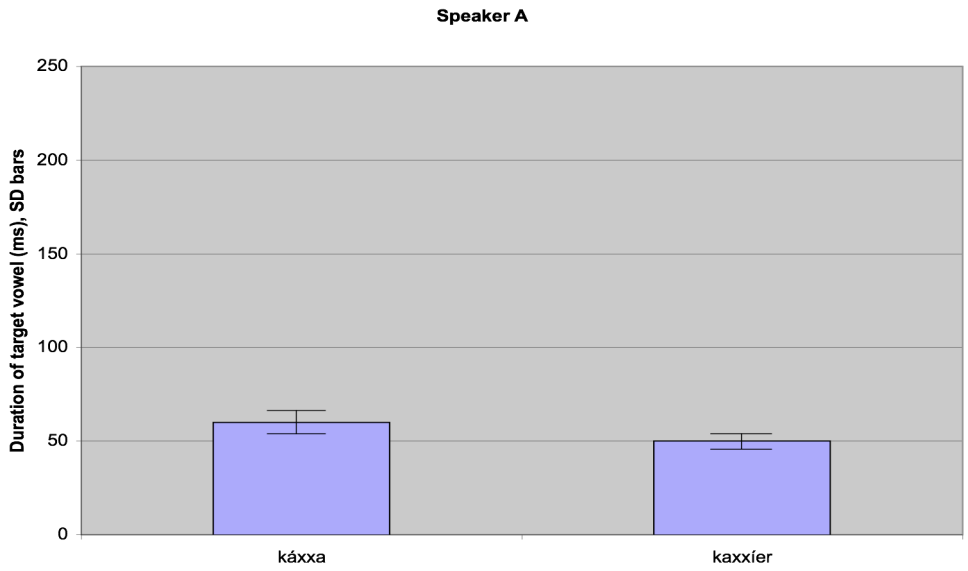

Figure 8a: ká<u>x</u>xa [kɛ́ʃʃɐ] vs. ka<u>x</u>xíer [kɐʃʃɪːr] 'box; cashier', Speaker A

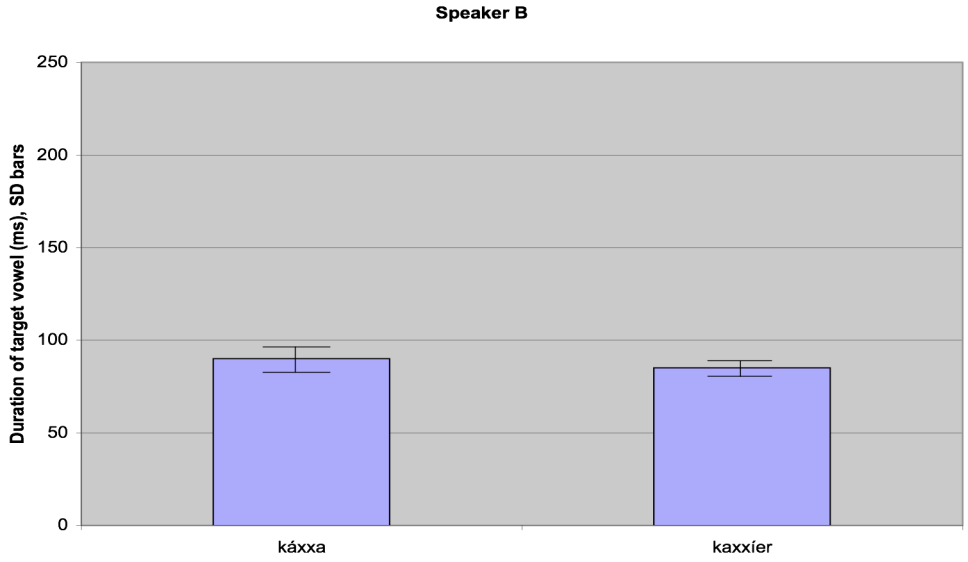

Figure 8b: ká<u>x</u>xa [kɛ́ʃʃɐ] vs. ka<u>x</u>xíer [kɐʃʃɪːr] 'box; cashier', Speaker B

Interestingly, there were also some lexical items for which no significant durational differences were found for either speaker, as shown in (4) and illustrated in Figures 9a,b. Note that in order to fill all cells two nonsense words were used (ta<u>k</u>.kés, to<u>k</u>.kés).

(4) Stressed and unstressed vowels not adjacent to orthographic 'għ': no difference

Longer (if signif.)	*Shorter (if signif.)*	*Speaker A*	*Speaker B*	*Gloss*
tá̲fal	ta̲fúx	n.s.	n.s.	'clay, you don't know (pl)'
tá̲kka	*ta̲kkés	n.s.	n.s.	'tack; nonsense word'
tó̲kka	*to̲kkés	n.s.	n.s.	'cap (e.g. for pen); nonsense word'

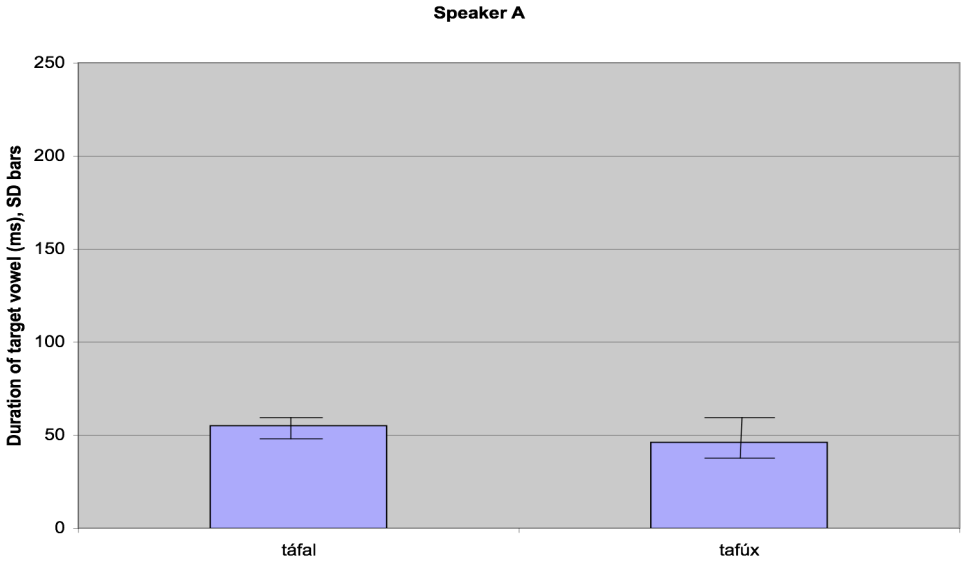

Figure 9a: táfal [tɐfɐl] vs. tafúx [tɐfuːʃ] 'clay, you don't know (pl)', Speaker A

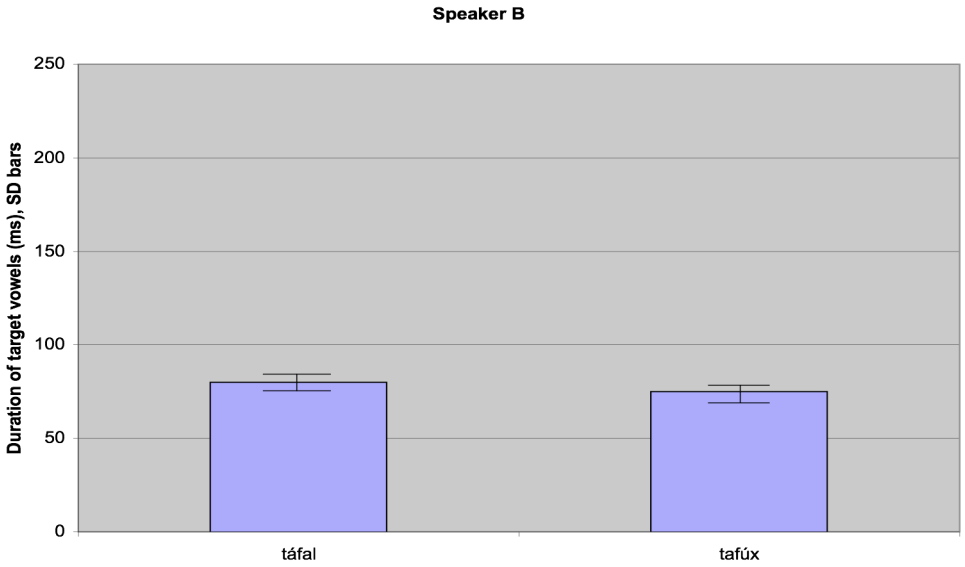

Figure 9b: táfal [tɐfɐl] vs. tafúx [tɐfuːʃ] 'clay, you don't know (pl)', Speaker B

2.3 The effect of 'għ' on vowel duration

With the above findings as a basis, we turn now to potential differences in duration between vowels as a function of their being in the context of 'għ.' In the comparisons that follow, phonemic distinctions, syllable structure and stress are held constant.

2.3.1 Monosyllabic words

Variable results are observed for vowels in monosyllabic words. In open syllables, there is no significant difference between vowels adjacent to an orthographic 'għ' and those that are not. The result is a regular long vowel, consistent with the observations of Puech (1979), as shown in Figures 10a, b for *ra* [rɐ:] 'he saw' vs. *ragħa* [rɐ:] 'he led to graze.'

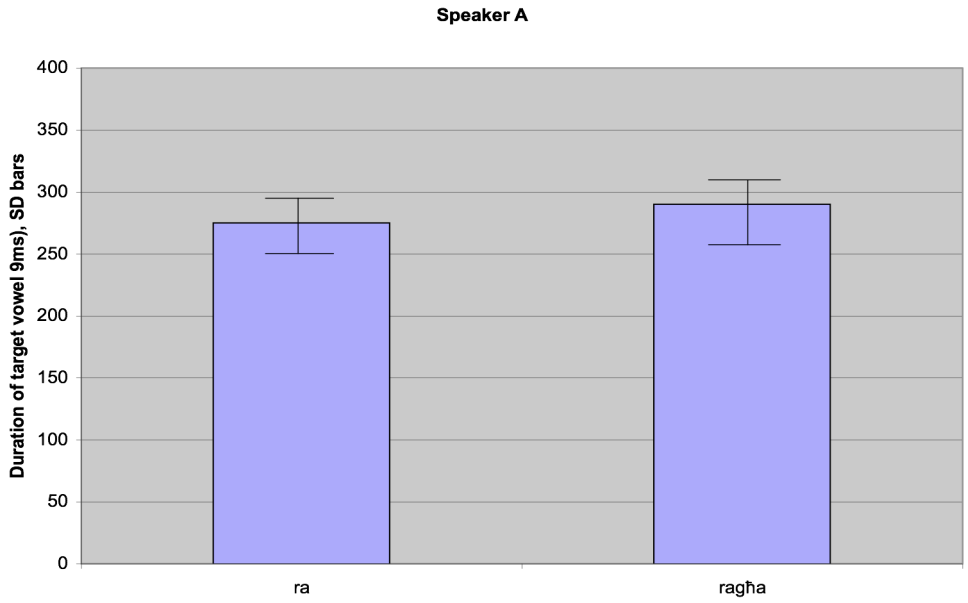

Figure 10a: *ra* [rɐ:] 'he saw' vs. *ragħa* [rɐ:] 'he led to graze', Speaker A

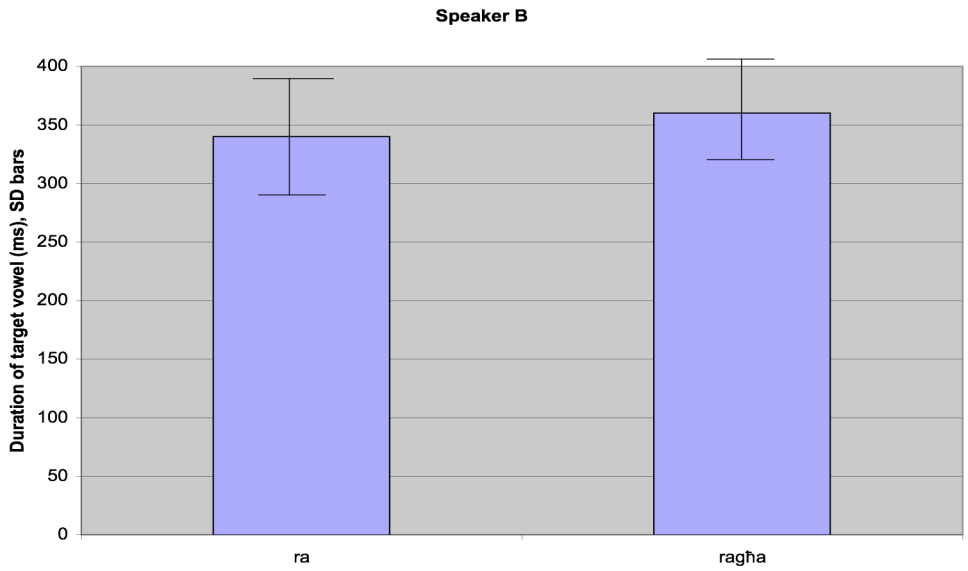

Figure 10b: *ra* [rɐ:] 'he saw' vs. *ragħa* [rɐ:] 'he led to graze', Speaker B

Similarly, in syllables closed by a single consonant, there is no significant difference between vowels adjacent to an orthographic 'għ' and those that were not. Again the result is a regular long vowel, and in Figures 11a,b for *rat* [ra:t] 'she saw' vs. *ragħad, ragħat* [ra:t] 'thunder (n.); she grazed'. The form *radd* [rɐtt] 'he gave back' with a phonetically short vowel is included for comparison.

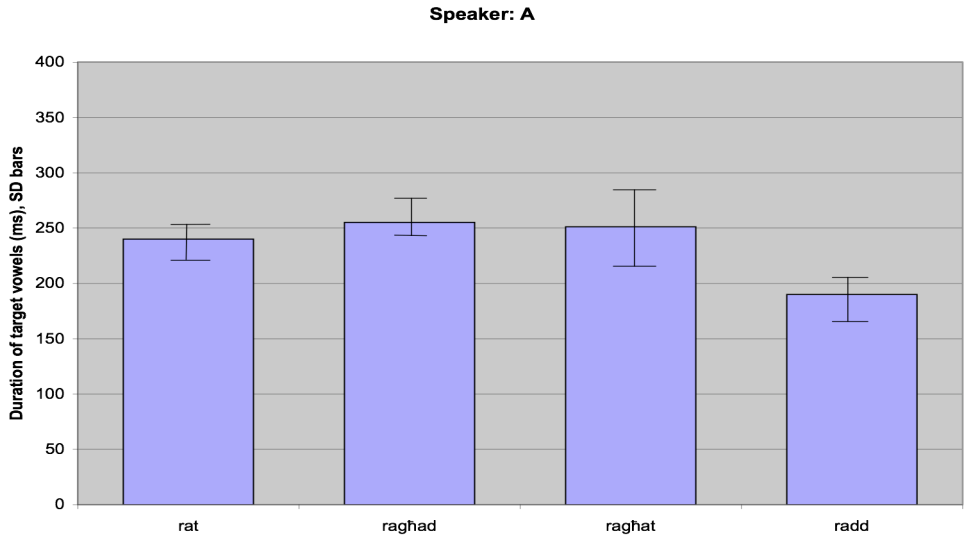

Figure 11a: *rat* [rɐ:t] 'she saw' vs. *ragħad* 'thunder' (n.); *ragħat* [rɐ:t] 'she grazed';
cf. radd [rɐtt] 'he gave back', Speaker A

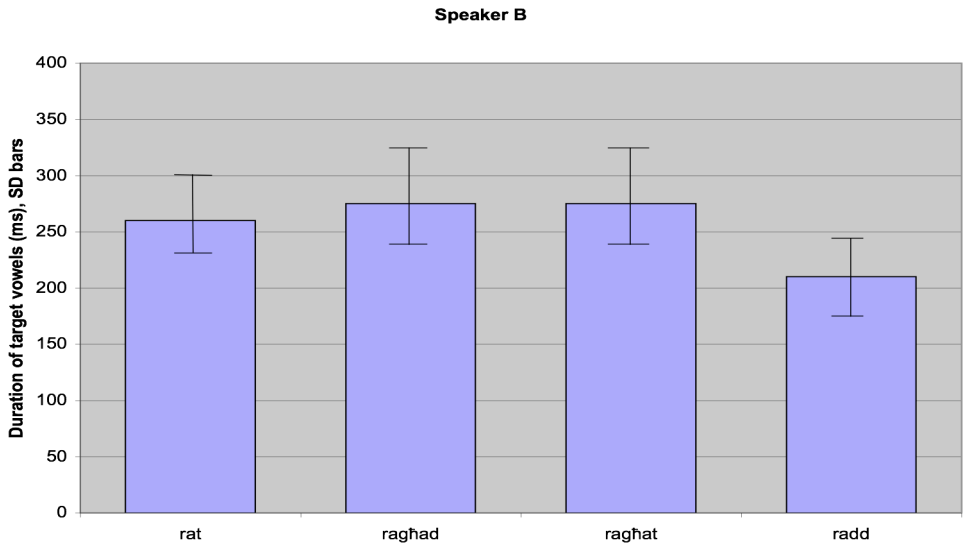

Figure 11b: *rat* [rɐ:t] 'she saw' vs. *ragħad* 'thunder' (n.); *ragħat* [rɐ:t] 'she grazed'; cf. radd [rɐtt] 'he gave back', Speaker B

For vowels followed by a complex coda, increased duration varied as a function of lexical item and speaker. Speaker B (Msida) never showed a durational difference while Speaker A (Mellieħa) did for some words. In particular, as shown in Figures 12a,b, there is a significant difference in duration between sold 'penny' vs. sgħolt 'I coughed' for speaker A but not for speaker B.

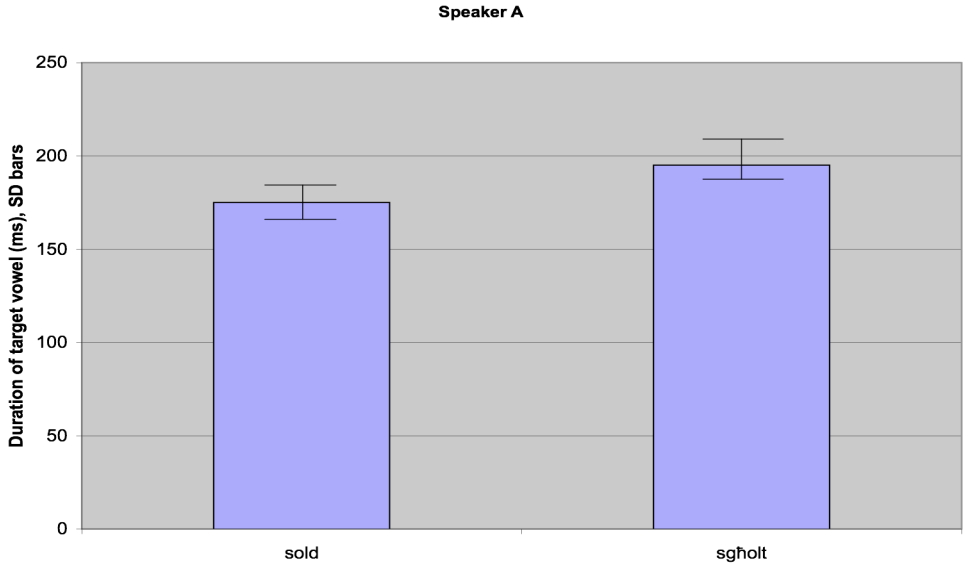

Figure 12a: sold [sɔlt] 'penny' vs. sgħolt [sɔ:lt] 'I coughed', Speaker A

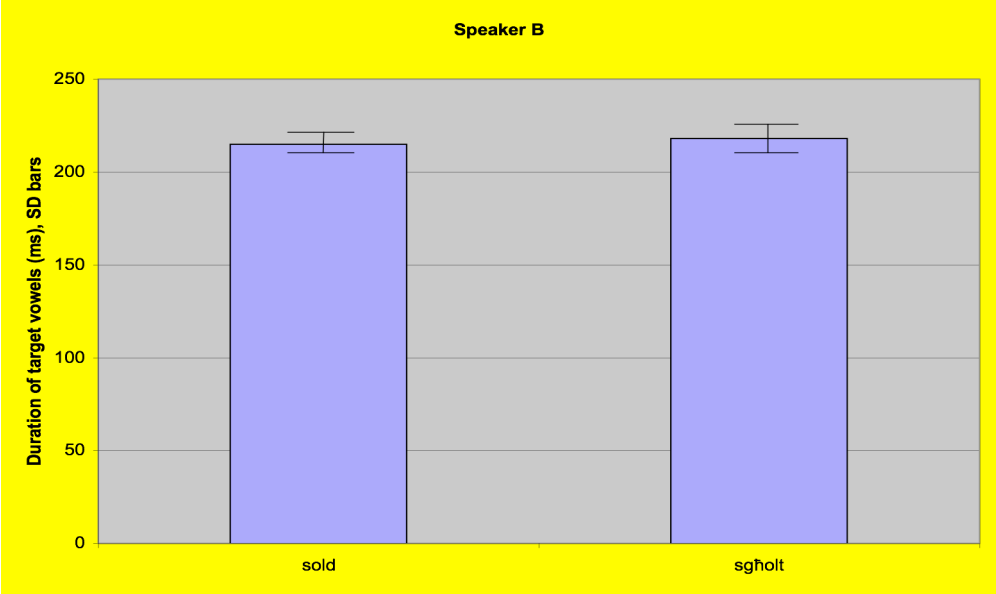

Figure 12b: sold [sɔlt] ‘penny’ vs. sgħolt [sɔlt], Speaker B

Similar results are observed for att ‘act’ vs. għadd ‘he added’ where the relevant vowel occurs in absolute word-initial position; the difference is significant for speaker A, while it is a trend for speaker B, as shown in Figures 13a,b. For comparison, the forms *qagħad* [ʔɐ:t] 'he stayed' vs. *għad* [ɐ:t] 'yet, still' with a phonetically long vowel are also shown.

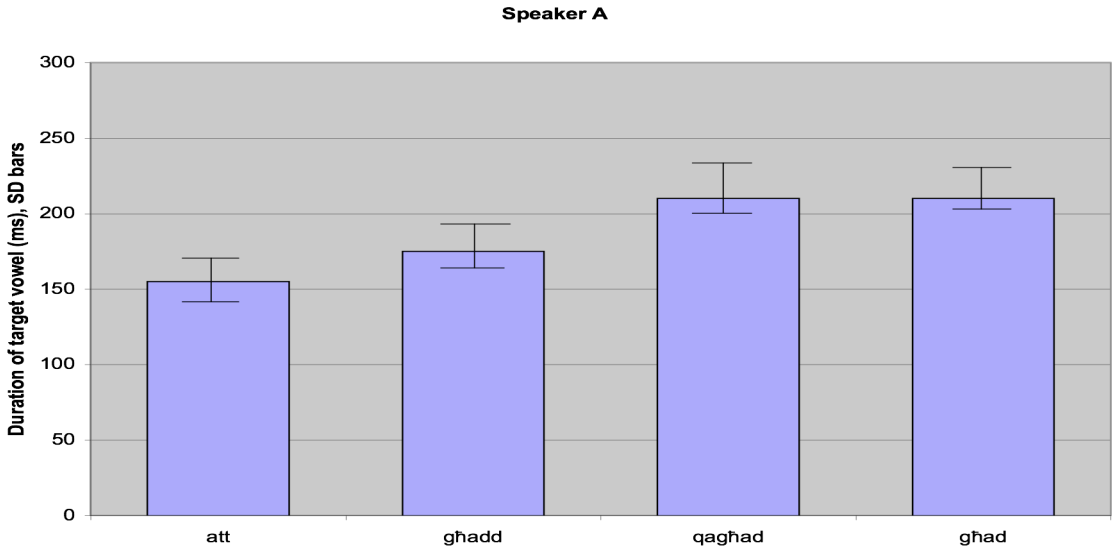

Figure 13a: att [ɐtt] ‘act’ vs. għadd [ɐ:tt] ‘he added’, Speaker A

cf. qagħad [ʔɐ:t] 'he stayed' vs. għad [ɐ:t] 'yet, still'

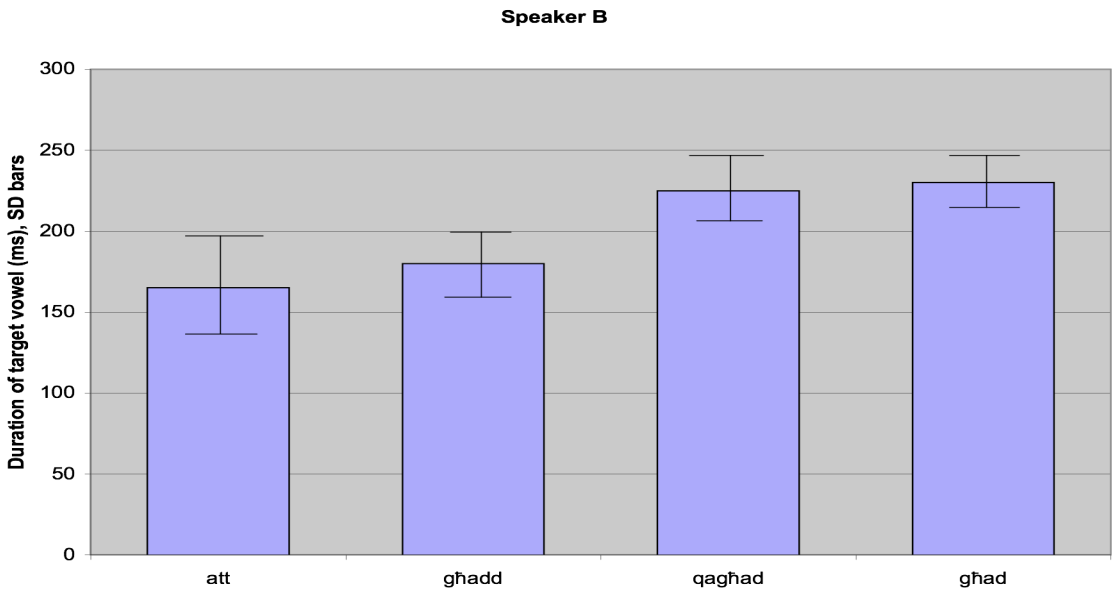

Figure 13b: att [ɐtt] 'act' vs. għadd [ɐtt] 'he added', Speaker B

cf. qagħad [ʔɐ:t] 'he stayed' vs. għad [ɐ:t] 'yet, still'

In contrast to the forms att 'act' vs. għadd 'he added' in Figure 13,where the vowel occurs in absolute word-initial position, there is no significant difference for either speaker between *qadd* [ʔɐt] 'waist', *qatt* [ʔɐt] 'never' and *qgħadt* [ʔɐt] 'I stayed'. All are realized as [ʔɐt] with a short vowel, as shown in Figures 14a,b.

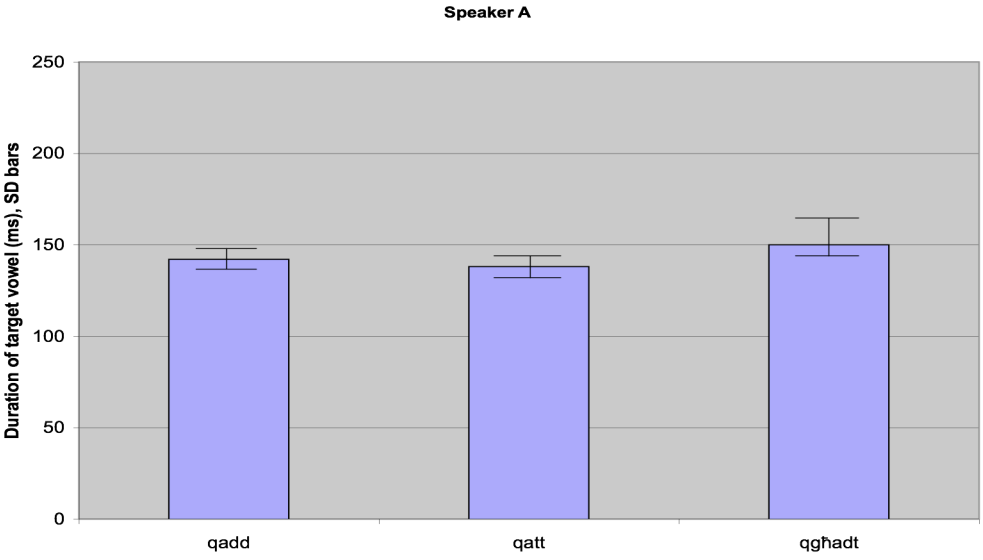

Figure 14a: *qadd* [ʔɐt] 'waist', *qatt* [ʔɐt] 'never', *qgħadt* [ʔɐt] 'I stayed', Speaker A

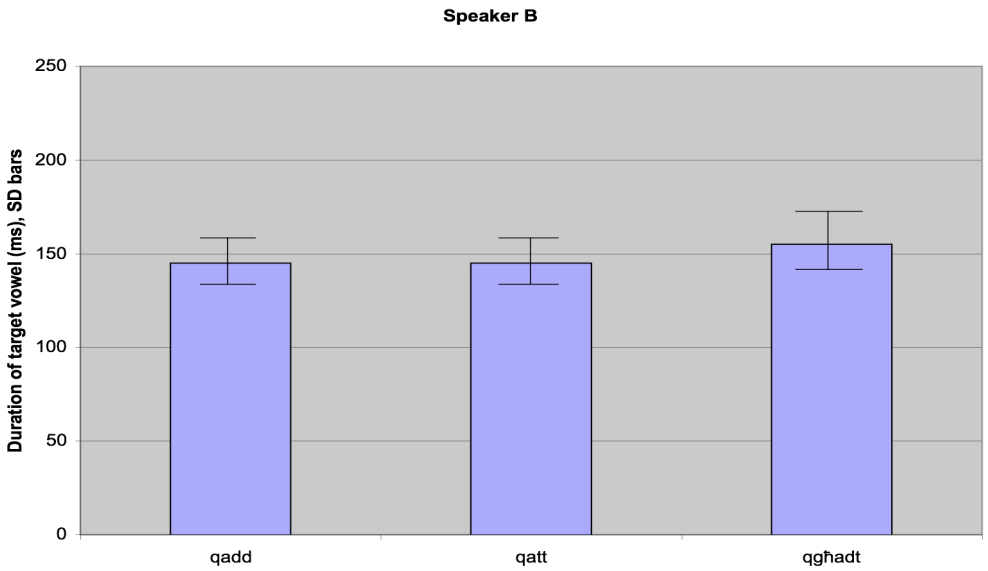

Figure 14b: *qa̲dd* [ʔɐt] 'waist', *qa̲tt* [ʔɐt] 'never', *qgħa̲dt* [ʔɐt] 'I stayed', Speaker B

In sum, the results for monosyllabic words indicate that for our two speakers, vowels occurring in phonological contexts where they are predicted to be short, e.g. before a complex coda, may be realized with increased duration in the context of 'għ', depending on speaker and lexical item. Conversely, the 'għ' context does not appear to influence duration of vowels in contexts where they are already phonetically long, e.g. before a simple coda.

2.3.2 Bisyllabic words

Initial stressed vowels

Focusing first on the initial stressed vowel of bisyllabic words, a vowel adjacent to 'għ' is significantly longer than a phonemically short vowel, as illustrated in (5), and in Figures 15 and 16. Recall that syllable type as well as stress have been held constant.

(5) Short vowels vs. vowels in the context of 'għ': Durational differences significant

Phonemically short V	*V in context of 'għ'*	*Gloss*
bóton [bɔ.tɔn]	bogħdót [bɔ:.dɔt]	'a brood; she hated'
qádef [ʔɐ.dɛf]	qágħdet [ʔɐ:.dɛt]	'he rowed; she stayed'
óqtol [ɔʔ.tɔl]	għóqda [ó:ʔ.dɐ]	'kill (sg.); a knot'
mákku, *mákka [mɐk.ku], [mɐk.ka]	mgħakkes [mɐ:k.kɛs]	'white bait; nonsense wd., oppressed'
tákka [tɐk.kɐ]	tgħákkes [tɐ:k.kɛs]	'tack; you oppress'
táxxa [tɐʃ.ʃɐ]	tgħáxxaq [tɐ:ʃ.ʃɐ]	'a tax; you delight someone'

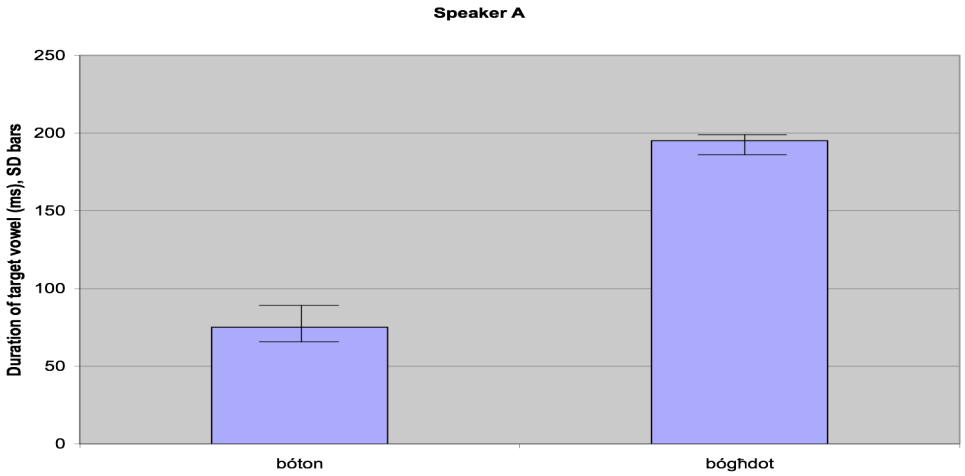

Figure 15a: bóton [bɔ.tɔn] vs. bógħdot [bɔ:.dɔt], Speaker A

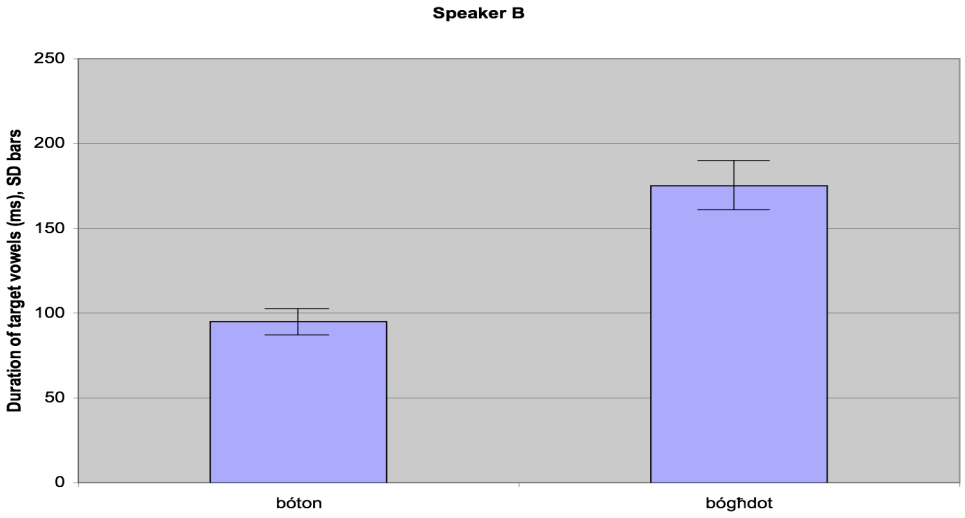

Figure 15b: bóton [bɔ.tɔn] vs. bógħdot [bɔ:.dɔt], Speaker B

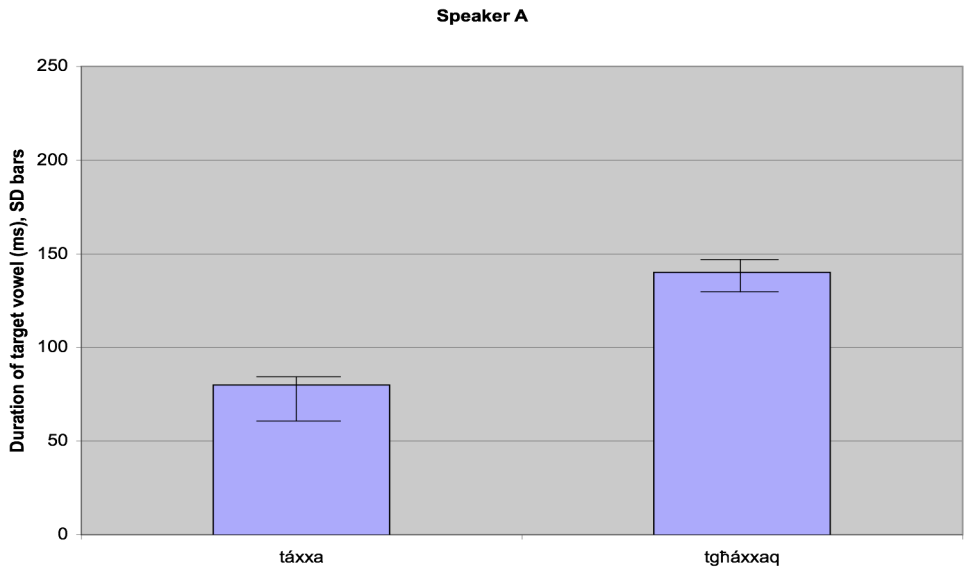

Figure 16a: tá̲xxa [tɐʃ.ʃɐ] vs. tg̲ħá̲xxaq [tɐ:ʃ.ʃɐ], Speaker A

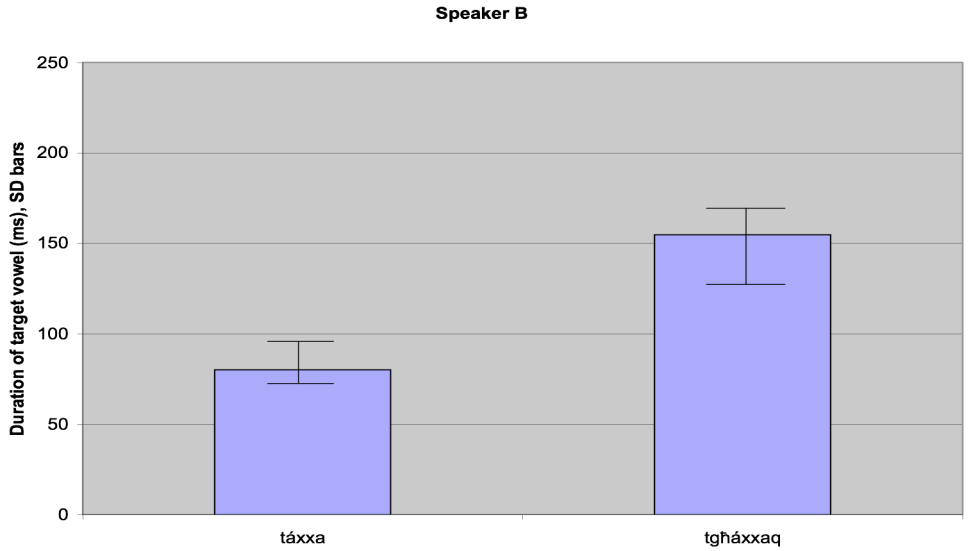

Figure 16b: tá̲xxa [tɐʃ.ʃɐ] vs. tg̲ħá̲xxaq [tɐ:ʃ.ʃɐ], Speaker B

The comparison of phonemically long vowels and vowels in the context of 'għ' are consistent with findings concerning, e.g. *ra* [rɐ:] 'he saw' vs. *ragħa* [rɐ:] 'he led to graze' (Figure 10). That is, no significant durational difference is observed between a vowel adjacent to 'gh' and a phonemically long vowel, as can be seen in Figures 17a,b for tá̲ma [tɐ:mɐ] ‘hope' vs. tá̲g̲ħma [tɐ:mɐ] 'to go blind’.

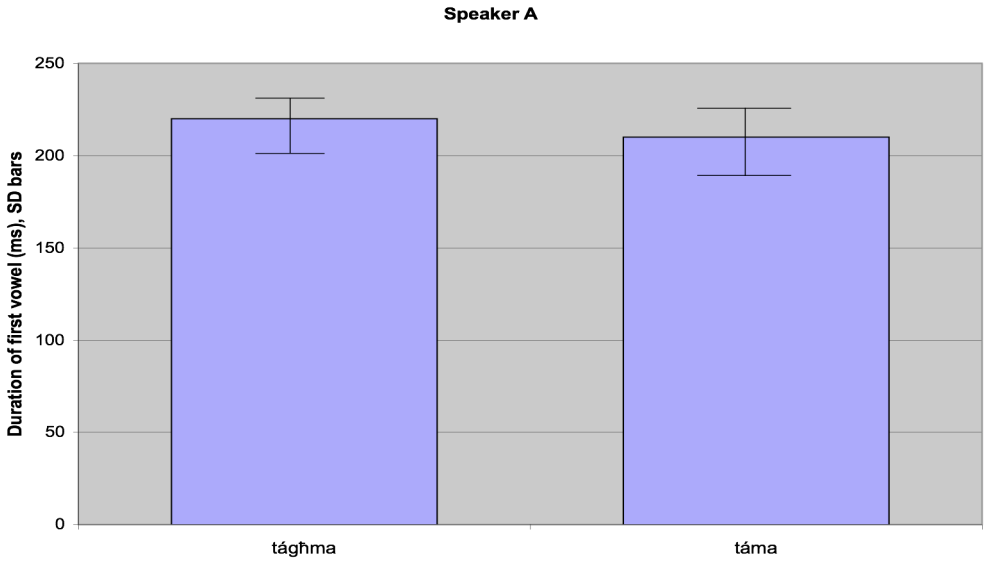

Figure 17a: tá̲ma [tɐ:mɐ] ‘hope' vs. tá̲g̲ħma [tɐ:mɐ] 'to go blind’, Speaker A

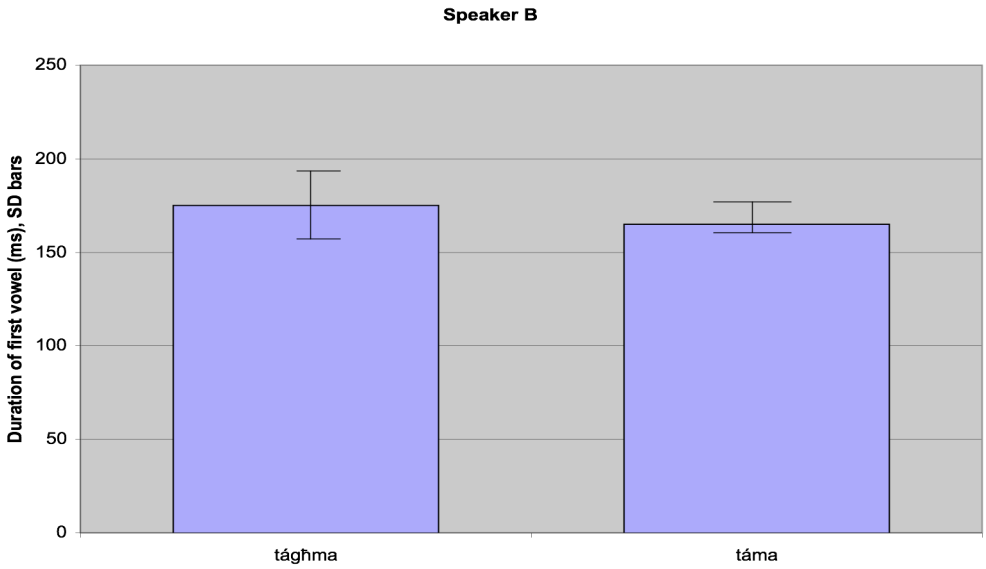

Figure 17b: tá̲ma [tɐ:mɐ] ‘hope' vs. tá̲g̲ħma [tɐ:mɐ] 'to go blind’, Speaker B

Initial unstressed vowels

Turning to initial unstressed vowels, a durational difference was consistently found for speaker A, but not for speaker B, a pattern similar to that observed for ‘sold, sgħolt’ see above in Figures 12a,b. The test words appear in (6) with representative graphs shown in Figures 18a,b.

(6) Vowels in an initial unstressed syllable: Durational differences speaker-dependent

		Speaker A	*Speaker B*	*Gloss*
tafúx	tagħfís	signif. [ta.fu:ʃ] [ta:.fi:s]	n.s. [ta.fu:ʃ] [ta.fi:s]	'you (pl) don't know; squeezing'
takkúna	tgħakkís	signif. [tak.ku:na] [ta:k.kis]	n.s. [tak.ku:na] [tak.ki:s]	'heel; oppression'
toddás*	tgħoddís	signif. [tod.das] [to:d.dis]	n.s. [tod.das] [tod.di:s]	'nonsense word; the act of pushing under water'
tokkés*	tgħokkís	signif. [tok.kɛs] [to:k.kis]	n.s. [tok.kɛs] [tok.ki:s]	'nonsense word; dialectal for 'tgħakkis'

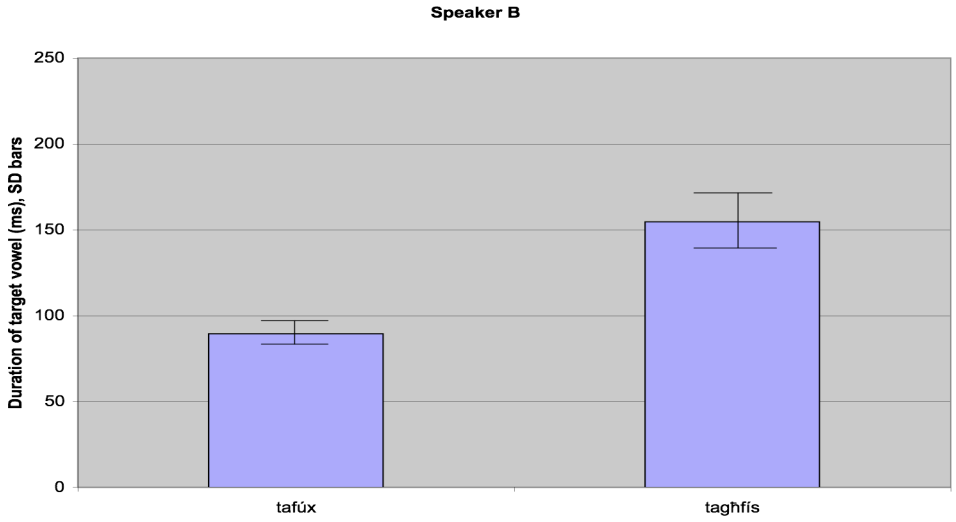

Figure 18a: tafúx [ta.fu:ʃ] 'you (pl) don't know' vs. tagħfís [ta:.fi:s] 'squeezing'
Speaker A

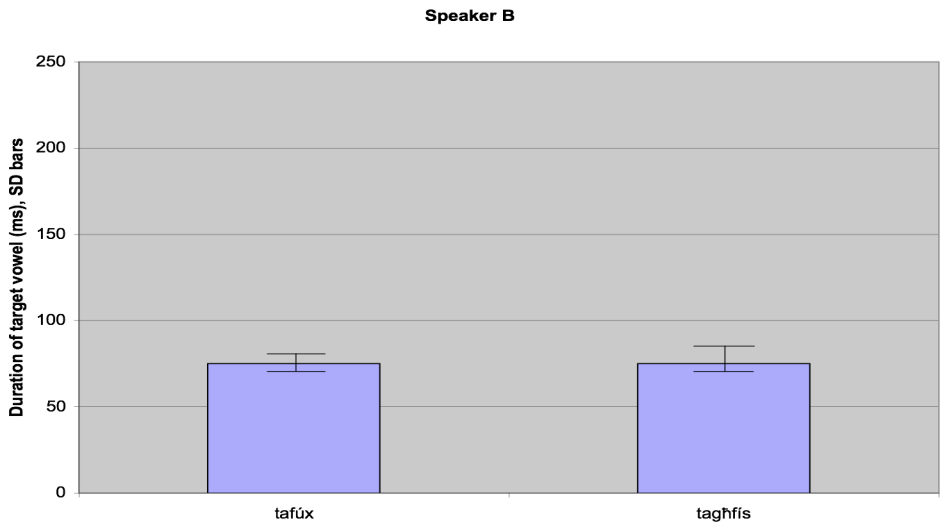

Figure 18b: tafúx [ta.fu:ʃ] 'you (pl) don't know', tagħfís [ta.fi:s] 'squeezing', Speaker B

Final unstressed vowels

No durational differences were observed in a final unstressed syllable between vowels adjacent and non-adjacent to 'għ', as shown in (7) and illustrated in Figures 19a,b and 20a,b. These findings are consistent with those of Puech (1979), though contrary to the assumptions of Brame (1972) who assumes that an historical pharyngeal consonant consistently gives rise to increased duration when adjacent to a vowel.

(7) Vowels in a final unstressed syllable: no significant difference

Phonemically short V	*V in the context of 'għ'*	*Gloss*
nórbot [nɔr.bɔt]	nóbgħod [nɔ.bɔt]	'I tie, I hate'
nólqot [nɔl.ʔɔt]	nóqgħod [nɔ.ʔɔt]	'I hit; I stay'
qábad [ʔɐ.bɐt] ħábat [ħɐ.bɐt]	níbgħad [ni.bɐt]	'he caught; he collided; I send'
tálab [tɐ.lɐp]	níħab [ni.lɐp]	'he prayed; I play'
séna [sɛ.nɐ]	séngħa [sɛ.nɐ]	'year; trade'
dóta [dɔ.tɐ]	qátgħa [qɐ.tɐ]	'dowry; a cut'
brúda [bru:.dɐ]	redgħa [rɛ.dɐ]	'coldness; a suck'
ħáma [ħɐ.mɐ]	ġímgħa [ʤɪ.mɐ]	'mud; a week'

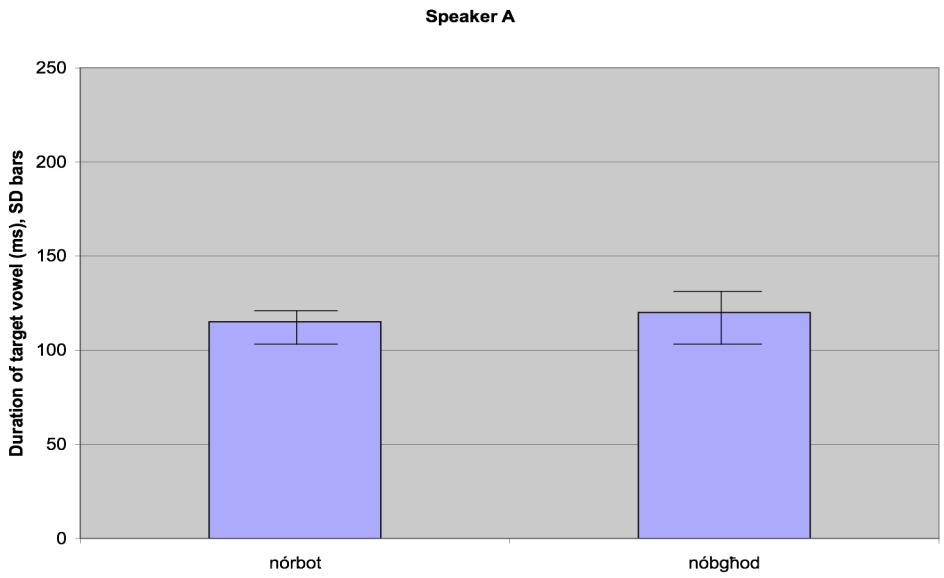

Figure 19a: nórbot [nɔr.bɔt] vs. nóbgħod [nɔ.bɔt] 'I tie, I hate', Speaker A

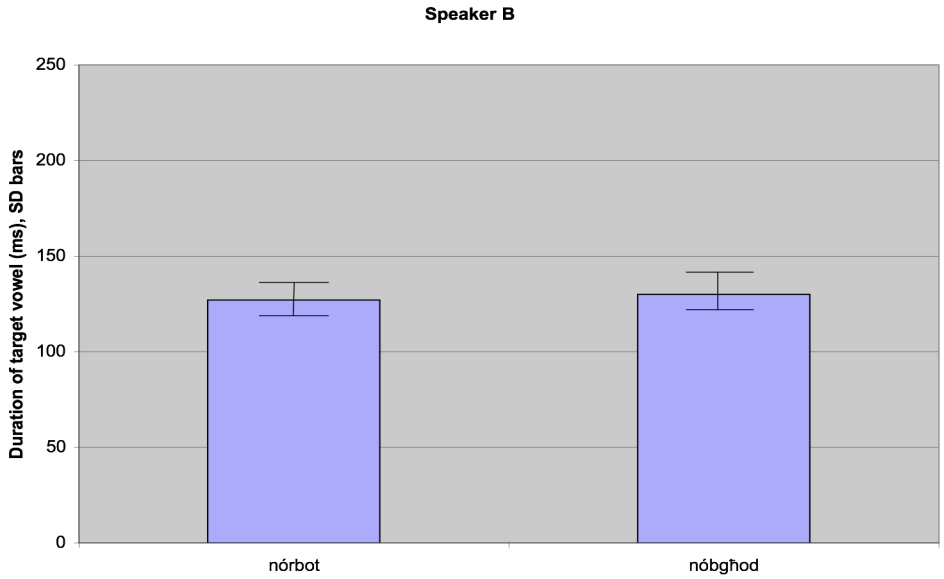

Figure 19b: nórbot [nɔr.bɔt] vs. nóbgħod [nɔ.bɔt] 'I tie, I hate', Speaker B

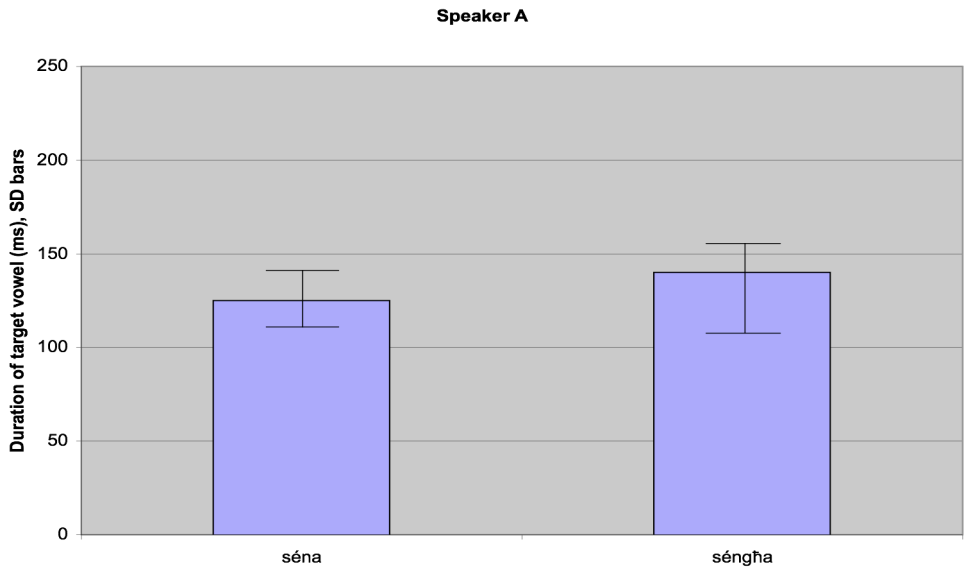

Figure 20a: séna [sɛ.nɐ] vs. séngħa [sɛ.nɐ] 'year; trade', Speaker A

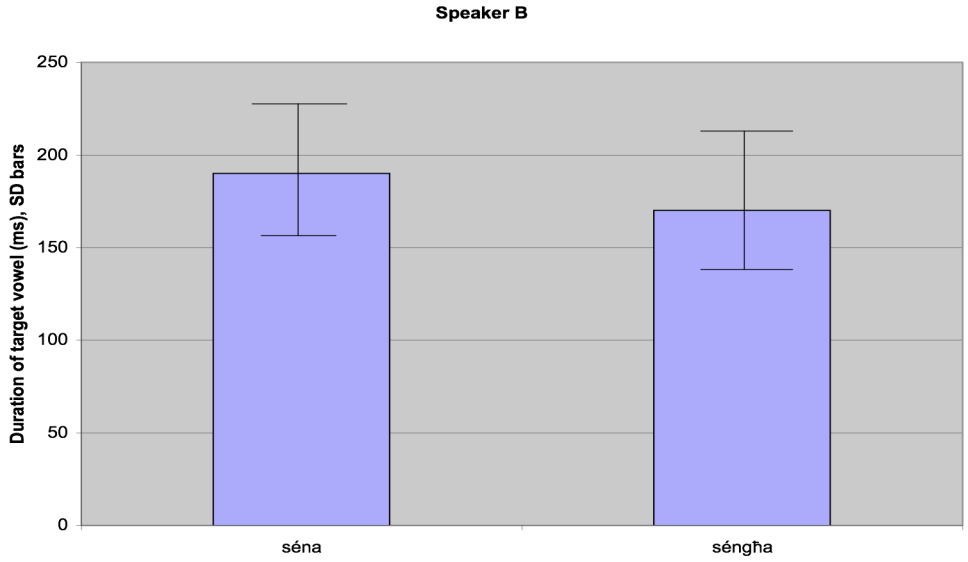

Figure 20b: séna [sɛ.nɐ] vs. séngħa [sɛ.nɐ] 'year; trade', Speaker B

3. The Interaction of stress and 'għ'

As shown above, stress can result in increased vowel duration under certain conditions. Similarly, a vowel in the context of 'għ' can give rise to increased duration. Since both factors can affect duration independently, the effect of combining the factors was also examined. The four conditions tested are shown in (8), with two nonsense words

included to fill all cells (tak.kés, tok.kés). Note that the vowels in the *no 'għ'* condition are all phonemically short. The results appear in Figures 21a,b and 22a,b.

(8) Vowel duration examined as a function of stress and adjacency to 'għ'

	Stress; għ	Unstressed; għ	Stressed; no 'għ'	Unstressed; no 'għ'
open syllable	tágħ.fas	tagħ.fís	tá.fal	ta.fúx
closed syllable	tgħák.kes	tgħak.kís	ták.ka	*tak.kés
	tgħók.kos	tgħok.kís	tók.ka	*tok.kés

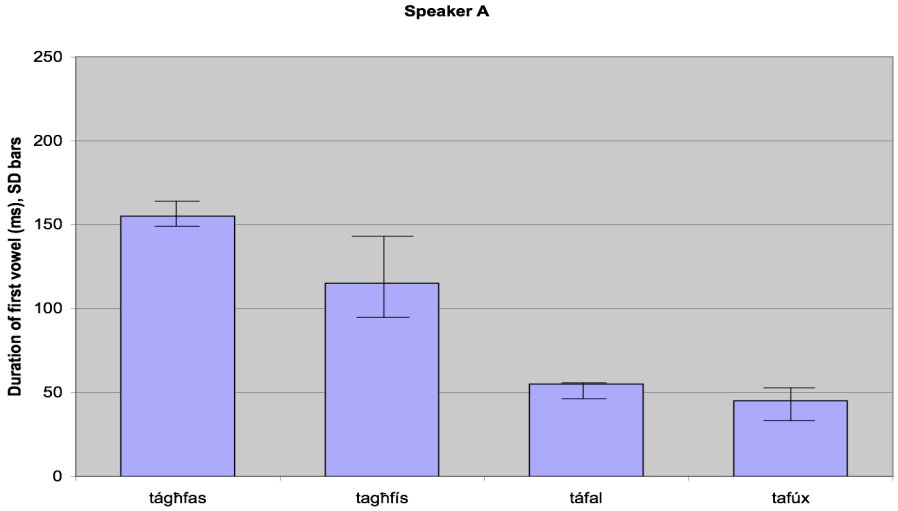

Figure 21a: Vowel duration as a function of stress and 'għ' (open syllable), Speaker A

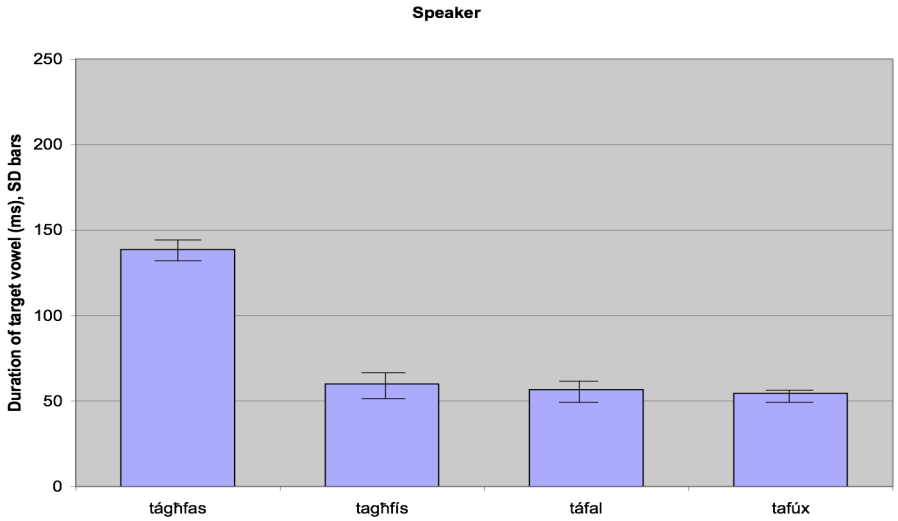

Figure 21b: Vowel duration as a function of stress and 'għ' (open syllable), Speaker B

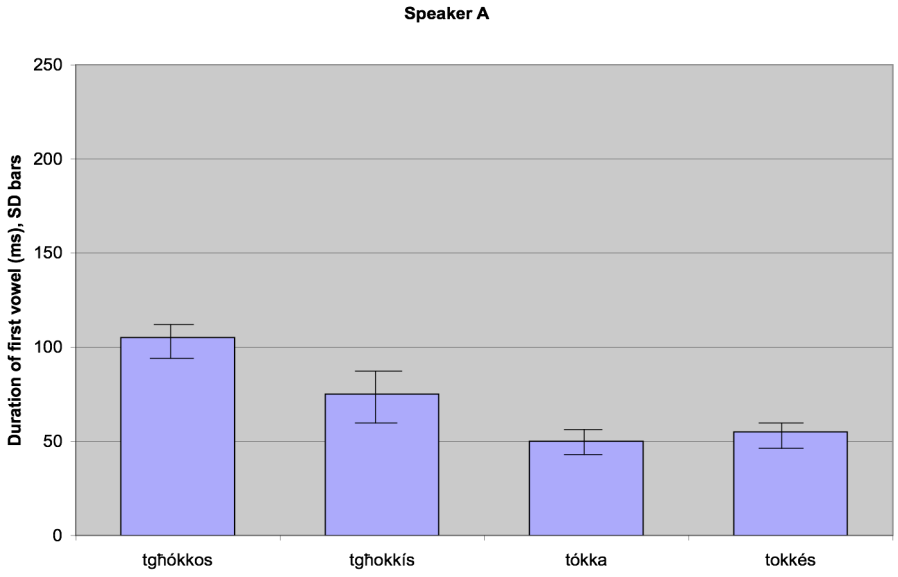

Figure 22a: Vowel duration as a function of stress and 'għ' (closed syllable), Speaker A

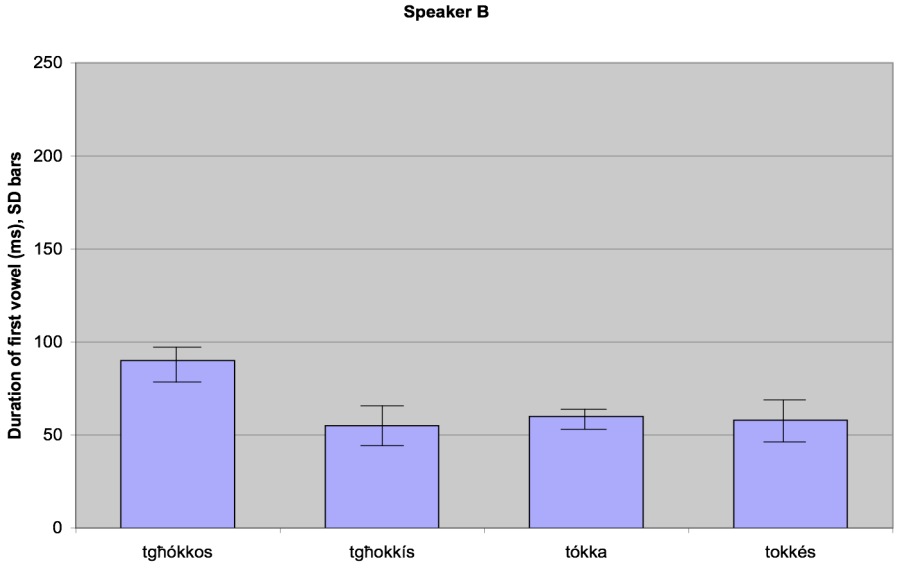

Figure 22b: Vowel duration as a function of stress and 'għ' (closed syllable), Speaker B

As noted above, the effect of stress on vowel duration is only shown to be significant for vowels occurring in the context of 'għ'. Thus, for both speakers stress is a factor in the following word pairs, with the stressed vowel in first word of each pair being significantly longer: tágħfas vs. tagħfís; tgħákkes vs. tgħakkís; tgħókkos vs. tgħokkís.

The presence vs. absence of 'għ' proved to be a significant factor contributing to differences in vowel duration in both stressed and unstressed initial syllables for speaker A, but only in stressed syllables for speaker B. In unstressed syllables, the duration of 'għ' and 'għ'-less syllables is neutralized, cf. *tagħfís, tafúx*. The result is that speaker A has at least one more phonetically distinct vowel length than speaker B.

(9) Vowel duration as a function of stress and 'għ'

	'għ' context	*'għ'-less context*	*Speaker A*	*Speaker B*
Stressed syllable	tágħfas	táfal	signif.	signif.
	tgħákkes	tákka	signif.	signif.
Unstressed syllable	tagħfís	tafúx	signif.	n.s.
	tgħakkís	*takkés/takkúna	signif.	n.s.

As shown in (10) we have added phonemic length to the comparison with an stressed and unstressed long and short vowels ([tá:ma] 'hope'; [támal] 'dates'; [damásk] 'type of tapestry', [kamín] 'screw'). The results for the two speakers are provided in Figures 23a,b.

(10) Phonemic vowel length included

Stress; għ	*Stress, no 'għ', phonemically long V*	*Unstressed; għ*	*Stressed; no 'għ'; phonemically short V*	*Unstressed; no 'għ'*
tágħma	táma	tagħmíd	támal	damásk, kamín

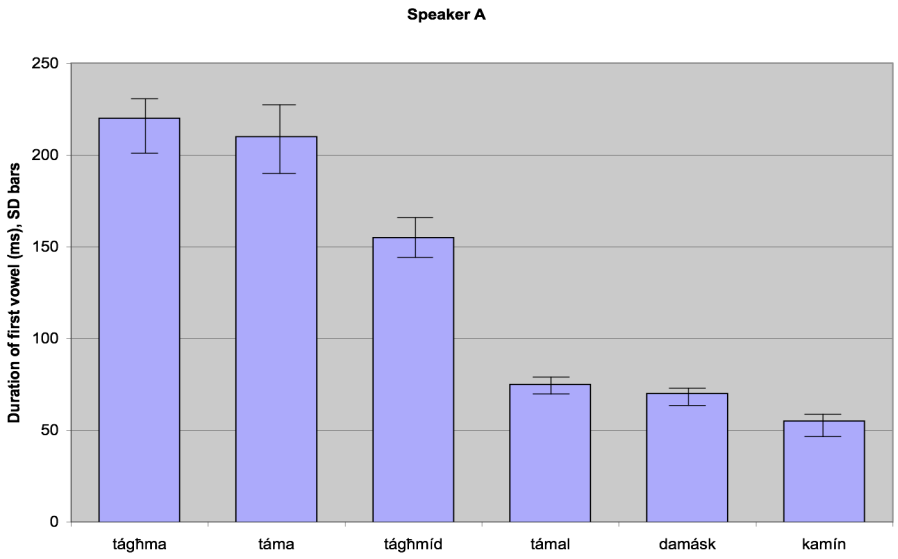

Figure 23a: Vowel duration as a function of stress, 'gh and phonemic length, Speaker A

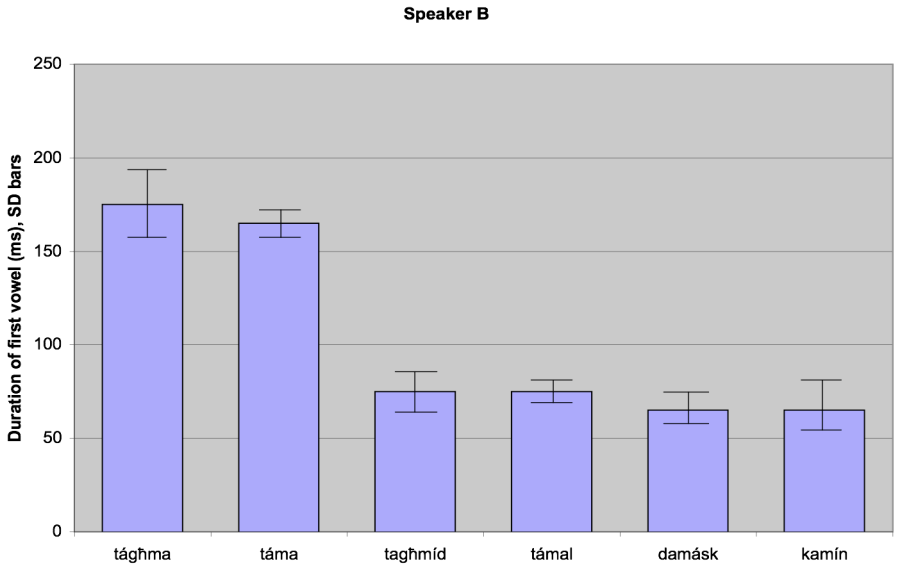

Figure 23b: Vowel duration as a function of stress, 'gh and phonemic length, Speaker B

As can be seen, *tágħma* and *táma* pattern together in having the vowels with the longest duration. Both also differ significantly from *támal*, which has an initial stressed phonemically short vowel. Interestingly, the unstressed vowel in *tagħmíd* is also significantly shorter than the stressed counterpart in *tágħma* and the phonemically long

vowel in *tá̲ma*. The initial vowel in *tag̲ħmíd* also differs significantly from the phonemically short vowels in *da̲másk* and *ka̲mín*. These findings indicate that there are at least three significant degrees of phonetic vowel duration with *tag̲ħmíd* positioned in between the longest and the shortest vowels.

With respect to phonemic vowel length, the distinctions between the initial vowels in *tág̲ħma*/*tá̲ma* and *tá̲mal,* and between *tag̲ħmíd* and *da̲másk*/*ka̲mín* can be considered contrastive given that length differences cannot be attributed to factors such as stress or syllable type. Whether or not a third degree of phonemic vowel length is motivated remains an open question. While *tág̲ħma*/*tá̲ma* differ *phonetically* from *tag̲ħmíd* in terms of vowel duration, it may be the case that the difference can be attributed to the presence vs. absence of stress. Motivation for a third degree of *phonemic* vowel length could come from evidence showing that the initial unstressed vowel in *tag̲ħmíd* is significantly longer than an initial unstressed /a/ that is not in the context of 'g̲ħ'.

4. Summary

The results of the pilot study indicate that in the dialects of our speakers, increased vowel duration does not always occur in the context of 'g̲ħ'. The main findings are summarized below.

(11)a. There is increased duration for vowels in the context of ‘għ’ as opposed to those not in an ‘għ’ context under the following conditions:

- absolute word-initial position in monosyllabic words ending in a complex coda, e.g. *g̲ħa̲dd* vs. *a̲tt*. Recall that there is no difference in vowel duration when the syllable is closed by a simple coda; that is, whe the vowel is predicted to be long already. Thus, a long vowel cannot be realized as phonetically longer, while a short vowel can be.
- an initial stressed syllable (of a bisyllabic word), e.g. *bógħdot* vs. *bó̲ton.* (Recall that in this case the għ-word contrasts with a phonemically short vowel.)

b. There is no increased duration for vowels in the context of 'għ' as opposed to those not in an 'għ' context under the following conditions:
   - monosyllabic words ending in an open syllable (long vowel), e.g. *ragħa* vs. *ra*.
   - monosyllabic words ending in a singly closed syllable (long vowel), e.g. *ragħad* vs. *rat*.
   - a final unstressed syllable (short vowel), e.g. *nórbot* vs. *nóbgħod*.

c. There is variability in whether or not increased duration is associated with vowels in the context of 'għ' under the following conditions:
   - in an initial unstressed syllable, a vowel is realized as longer in the context of 'għ' for speaker A but not for speaker B, e.g. *tagħfís* vs. *tafúx*.
   - in monosyllabic words ending in a complex coda, a vowel is never realized as longer in the context of 'għ' for speaker B, but may be for speaker A, e.g. *sgħolt* vs. *sold*.

This study has shown that a number of factors contribute to vowel duration in Maltese, including syllable type, stress, 'għ', and word-initial position. However, based on the data examined in this study, there is a ceiling on how long a vowel can be. That is, while a contrast in length was evident between shorter vowels in forms such as *att* 'act' vs. *għadd* 'he added', this distinction was not observed when an 'għ' context vowel was predicted to be phonetically long already, e.g. in an open syllable such as in *ragħa* 'he led to graze'.

Further, stress is shown to consistently have an influence on vowel duration only for vowels in the context of 'għ'. It is perhaps surprising that stress does not have the same effect for short-voweled syllables without 'għ'. In keeping with the proposal just above, it may be reasonable that there is also a lower limit on how short a vowel can be in Maltese. That is, in pairs such as *táfal* vs. *tafúx* , the initial vowels are short to begin with; further reduction due to lack of stress may simply be blocked.

Word-initial position was shown to play a role in two contexts. First, in absolute word-initial position, there was a difference in vowel duration in 'għ' vs. 'għ'-less syllables: *għadd* 'he added', *att* 'act'. Recall that this distinction was not present when the vowel was not in absolute word-initial position, e.g. *qadd* 'waist', *qgħadt* 'I stayed'. Second, for speaker A, a distinction in vowel duration between 'għ' and 'għ'-less syllables was preserved in the word-initial syllable but not in the word-final syllable and this was the case regardless of whether the first syllable was stressed or unstressed. These observations suggest that word-initial position in Maltese (regardless of whether stressed or unstressed) may have a special status phonologically, in that contrasts are maintained in this position while neutralized elsewhere. This observed asymmetry may relate to word-processing considerations. Since, according to Cutler, Hawkins and Gilligan 1985, lexical access is generally achieved on the basis of the initial part of the word, salient information tends to occur at the beginning. Moreover, beginnings of words tend to be particularly robust and able to resist phonological processes (Hall, 1992). For related discussion, see Beckman 1997 where vowel quality contrasts are preferentially preserved word-initially, and Hume (1998) for discussion of right peripherality in cases of metathesis.

5. Follow-up Research

The pilot study findings indicate that the extent to which increased duration occurs in the context of an historical pharyngeal consonant is affected by syllable type, stress and word position. However, the study is limited and so the results must be taken as suggestive at this point. For example, the observation that there was variability across the two speakers suggests that there may be dialectal differences. However, given the small sample it is impossible to determine whether the differences are representative of the speakers' larger dialect areas, due to gender differences, or simply to individual patterns. Thus, a further limitation is the fact that the study investigated the speech of only two speakers, one from Mellieħa and one from Msida.

For these reasons, a more extensive follow-up study is currently underway with the objective of building on earlier research to provide accurate descriptions of the

phonological patterning of vowel duration in contemporary Maltese.[4] A second goal is to use vowel duration as a vehicle for understanding the many factors, linguistic and extra-linguistic, that have influenced, and continue to influence, the Maltese language. A third goal is to use the results of our study as a testing ground for current linguistic theories.

To achieve these goals, we are taking advantage of Malta's rich dialectal landscape (Aquilina & Isserlin 1981) to investigate the realization of vowel duration in several different Maltese dialects from phonetic, phonological, and sociolinguistic perspectives. Speakers from four varieties of Maltese are being studied: Mellieħa, Marsaxlokk, Mġarr, and "Standard" Maltese (a "standard" speaker is a self-identified non-dialect speaker). Recordings are being made of 6 speakers of each variety stratified in terms of age, gender and education (male/female; under 40, over 40; with or without a university education). Each speaker is recorded saying 153 monosyllabic and bisyllabic words which include words with 'għ' as well as without 'għ'. The words in the latter group are used in order to establish baselines of vowel duration in the absence of 'għ', consistent with the pilot study.

Building on the results of the pilot study, six factors that potentially influence vowel duration are being tested: syllable type, syllable count, syllable position in word, stress, position of 'għ' in relation to vowel, and presence vs. absence of 'għ'. Thus far, data has been collected for six speakers of "Standard" Maltese and analysis of the sound files is underway.

6. Conclusion

The results from this preliminary study suggest that for two native speakers of Maltese the realization of the historical consonant [ʕ] as vowel duration is conditioned by several factors including phonemic vowel length, the vowel's position within the word, stress, lexical item and the speaker's dialect. We expect our follow-up research to show that the study of the single variable of vowel duration can provide an interesting window into the lexical, social, phonetic and phonological influences that have shaped and continue to shape the sound system of Maltese.

[4] The research team includes Ray Fabri (Malta), Samantha Gett (Ohio State), Elizabeth Hume (Ohio State), Adam Ussishkin (Arizona) and Sandra Vella (Malta).

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