

1. INTRODUCTION

- Little is known about the dialect of Welsh spoken in Argentina, compared to what we know about dialects spoken in Wales (Mayr & Davies 2011, Awbery 1984, Jones 1984)
- No adult monolingual Welsh speakers exist, so comparison between Welsh-English bilinguals and Welsh-Spanish bilinguals is necessary
- Vowel length in Welsh is predictable...

Environment	Short vowel	Long vowel	Example
vd stop		✓	<i>byd</i> /bi:d/ 'world'
vd fricative		✓	<i>modd</i> /mo:ð/ 'way'
vl fricative		✓	<i>bach</i> /ba:x/ 'small'
vl lateral (S. Welsh)		✓	<i>gwell</i> /gwe:t/ 'better'
vl lateral (N. Welsh)	✓		<i>gwell</i> /gweɫ/ 'better'
∅		✓	<i>ci</i> /ki:/ 'dog'
vl stop	✓		<i>lloc</i> /tɔk/ 'sheepfold'
cluster	✓		<i>punt</i> /pɪnt/ 'pound'
fric + stop cluster (N. Welsh)		✓	<i>cwsg</i> /ku:sk/ 'sleep'
nasal	✓	✓	<i>pren</i> /pren/ 'tree' <i>hen</i> /he:n/ 'old'
liquid	✓	✓	<i>del</i> /del/ 'pretty' <i>pêl</i> /pe:l/ 'ball'

- ...except before /n, l, r/ where it distinguishes minimal pairs (Awbery 1984):

- ton* /ton/ 'wave' -- *tôn* /to:n/ 'tune'
- pwl* /pul/ 'fit' -- *pŵl* /pu:l/ 'dull'
- mor* /mor/ 'so' -- *môr* /mo:r/ 'sea'

- Neither English nor Spanish use vowel length phonemically:

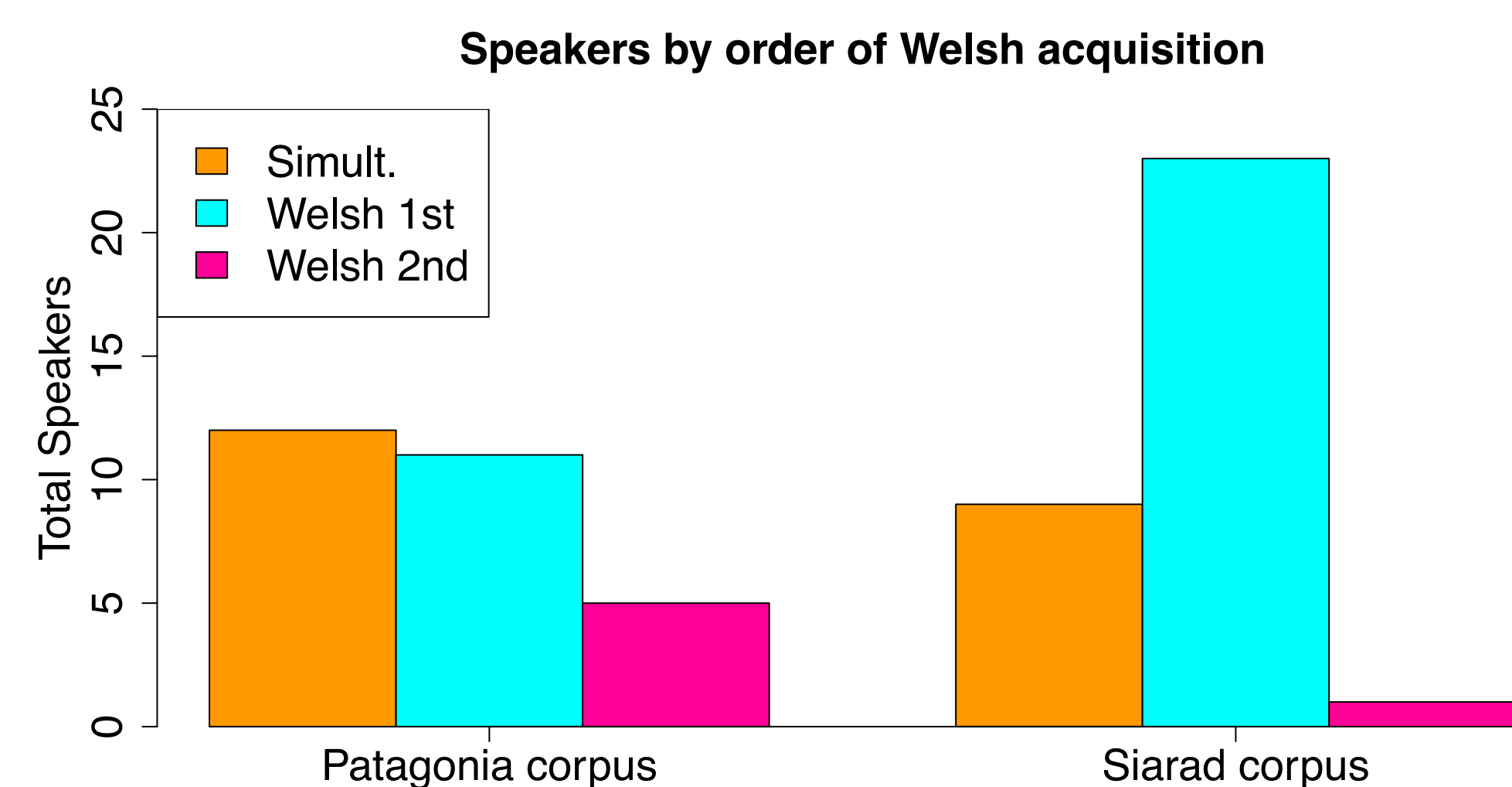
- English: duration correlates with tense/lax vowel distinction ('beat' vs. 'bit'), and distinction of voiced and voiceless word-final stops ('pat' vs. 'pad')** (Peterson & Lehiste, 1960)
- Spanish: duration does not contribute to any phonemic distinctions** (Gálvez, 1994; Zimmerman & Sapon, 1958)

2. HYPOTHESES

- Hypothesis 1:** English speakers will acquire phonemic vowel length distinctions in Welsh more easily/completely than will Spanish speakers, following the assimilation theory of the **Speech Learning Model (SLM)** (Flege 1995).
- Hypothesis 2:** L1 Welsh bilinguals are predicted to produce phonemic vowel length distinctions with greater differences in duration than L2 Welsh bilinguals.

3. METHODS

- Vowel duration data was collected from the Bangor Siarad and Bangor Patagonia corpora of Welsh bilingual speech (available online at www.bangortalk.org.uk) (Deuchar et al. 2013)
- Bangor Patagonia corpus:** recorded in Argentina in 2009
 - totals 21 hours of speech (195,190 words)
- Bangor Siarad corpus:** recorded in Wales between 2005 and 2008
 - totals 40 hours of speech (452,116 words)
- Speakers were divided into 3 groups based on order of language acquisition:
 - Welsh acquired simultaneously with Spanish or English
 - Welsh acquired first
 - Welsh acquired second (after Spanish or English)



- Vowels were extracted from monosyllabic words with short and long vowels in both predictable and unpredictable environments
- Goal: two vowel tokens for each of the seven basic orthographic vowels of Welsh (*a, e, i, o, u, w, y*) for each speaker (/a, e, i, o, i, u, ə/)

- Praat was used to extract vowel durations (Boersma & Weenink 2015)
- 454 tokens analyzed (245 from the Patagonia corpus and 209 from the Siarad corpus).**

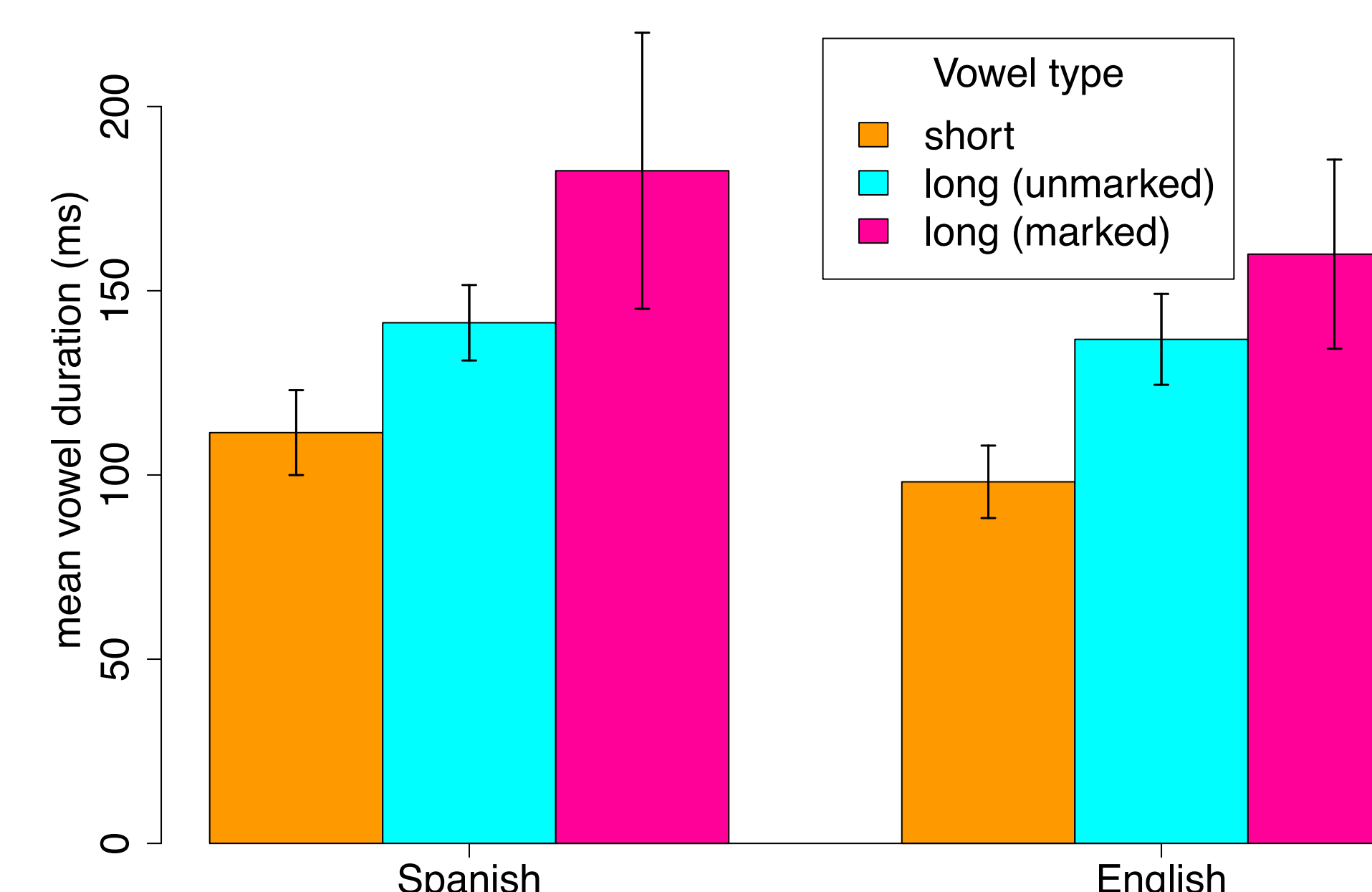
4. RESULTS

- Linear mixed effects models created to investigate each hypothesized interaction
- Random intercepts included for subjects and items (Barr et al. 2013)
- P-values obtained by conducting likelihood ratio tests of the full models against a version of each model lacking the factor of interest.
- Factors:
 - Control factor for **following environment** (_#, _[C +voice], _[C -voice]) included in all models
 - Vowel type** (short, long unmarked, long marked)
 - Order of acquisition** (Welsh-first (including simultaneous acquirers), Welsh-second)
 - Other language** (Spanish, English)

- Question 1:** Do Welsh-Spanish bilinguals produce phonemic vowel length distinctions in Welsh differently than Welsh-English bilinguals?

- No significant interaction of other language and vowel type – **no significant differences between how Spanish speakers and English speakers produced durations of any vowel type** ($X^2(2) = 1.17, p = 0.558$)
- Significant simple effects of vowel type on duration for both English ($X^2(2) = 17.33, p < 0.001$) and Spanish ($X^2(2) = 18.45, p < 0.001$) bilinguals
- No significant simple effects of corpus (language) at any level of vowel type (all $p > 0.5$)

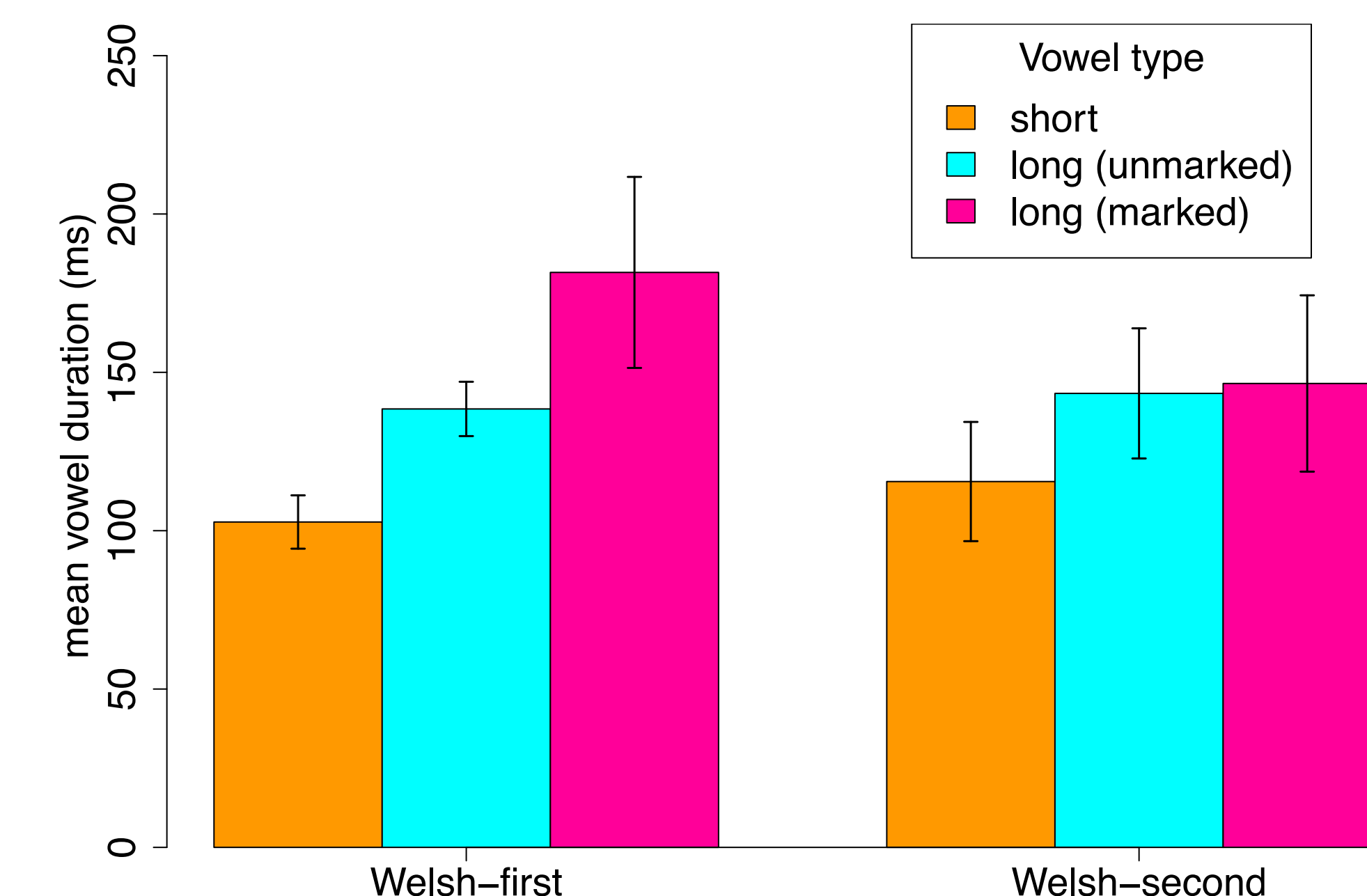
Mean vowel duration for all vowel types by other language



- Question 2:** Do Welsh-first bilinguals produce phonemic vowel length distinctions differently than Welsh-second bilinguals?

- No significant interaction of order of language acquisition and vowel type ($X^2(2) = 5.07, p = 0.0794$), but interaction is taking place
- Simple effect of vowel type on duration for Welsh-first speakers** ($X^2(2) = 31.56, p < 0.001$), but no effect for Welsh-second speakers ($X^2(2) = 3.25, p = 0.197$).
- No significant simple effects of acquisition order at any level of vowel type (all $p > 0.1$)
- Welsh-first speakers (including simultaneous acquirers) produce the difference between contrastive vowel lengths more distinctly than Welsh-second speakers (but less data overall for Welsh-second speakers, so further investigation needed).

Mean vowel duration for all vowel types by order of Welsh acquisition



- Welsh-first speakers (but not Welsh-second speakers) produce orthographically marked long vowels with longer duration than non-marked long vowels (ex: /u:/ in *dŵr* 'water' longer than /u:/ in *cwch* 'boat')

5. CONCLUSION

- Welsh bilingualism with Spanish does not affect the production of phonemic vowel length (compared to bilingualism with English). There were no significant differences in vowel duration productions between the two groups (contra predictions of the SLM).
- Order of language acquisition does affect production of phonemic vowel length: speakers who acquired Welsh before Spanish or English produce greater differences in duration between contrasting phonemic (and orthographically marked) vowel lengths.

References
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