**Acoustics and articulation of the subset scenario in Gaelic-English bilinguals:**

**Supplementary Materials**

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# Analysis of different vowel contexts in acoustics

The acoustic analysis showed a significant effect of vowel context on the F2–F1 measure. The values of lateral F2–F1 in the context of the three different vowels are plotted in Figure S1.



Figure S: Values of F2–F1 in laterals preceding the three vowel contexts in this analysis.

Posthoc analysis indicates that laterals preceding /i/ and /u/ vowels have similar values, but laterals preceding /a/ have lower F2–F1 values. This result is shown in Table S1.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Post-hoc comparisons** | $\hat{β}$ | **SE(**$\hat{β}$**)** | ***df*** | ***t*** | ***p(t)*** |
| i – a  | 1.04 | 0.17 | 41.4 | 6.11 | **<.001** |
| i – u | 0.28 | 0.17 | 41.4 | 1.63 | .25 |
| a – u  | -0.76 | 0.16 | 41.7 | -4.90 | **<.001** |

Table S: Posthoc testing comparing different vowel contexts in acoustics.

# Analysis of different vowel contexts in articulation

The articulatory analysis also showed a significant effect of vowel context. The values of tongue PC1 in different vowel contexts are shown in Figure S2.



Figure S: Values of PC1 in laterals preceding the three vowel contexts in this analysis.

Posthoc analysis indicates that laterals preceding /i/ and /u/ vowels have similar values, but laterals preceding /a/ have lower PC1 values. This result is shown in Table S2.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Post-hoc comparisons** | $\hat{β}$ | **SE(**$\hat{β}$**)** | ***df*** | ***t*** | ***p(t)*** |
| i – a  | 1.33 | 0.19 | 41.7 | 5.93 | **<.001** |
| i – u | 0.19 | 0.20 | 41.7 | 0.95 | .61 |
| a – u  | -0.95 | 0.18 | 41.4 | -5.35 | **<.001** |

Table S: Posthoc testing comparing different vowel contexts in articulation.

# Analysis of PC2 values

The values of PC2 according to phoneme/language category and word position are shown in Figure S3. Statistical modelling of these data are in Table S3. The model shows a significant effect of vowel category, but no other significant differences.



Figure S: PC2 values according to phoneme/language category and word position.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Full model** | $\hat{β}$ | **SE(**$\hat{β}$**)** | ***df*** | ***t*** | ***p(t)*** |
| Intercept | 0.71 | 0.22 | 22.14 | 3.28 | **.003** |
| **Model comparisons** |  |  | ***df*** | $$χ^{2}$$ | ***p***$(χ^{2})$ |
| Category |  |  | 6 | 7.25 | .30 |
| Position |  |  | 4 | 7.58 | .11 |
| Vowel |  |  | 2 | 55.93 | **<.001** |
| Position\*Category |  |  | 3 | 3.26 | .35 |

Table S: PC2 statistics. Full model AIC is 1190.09 compared to a null model AIC of 1226.04.

# Analysis of PC3 values

The values of PC3 according to phoneme/language category and word position are shown in Figure S4. The statistical model of these data is in Table S4. The model shows a significant effect of word position, and Figure S4 indicates that values are generally lower in word-final position. Again, there is a significant difference for vowel context. There is also a significant interaction of word position and language/phoneme category. Figure S4 suggests that this interaction stems from differences in the velarised and English laterals in word-initial and word-final position.



Figure S: PC3 values according to phoneme/language category and word position.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Full model** | $\hat{β}$ | **SE(**$\hat{β}$**)** | ***df*** | ***t*** | ***p(t)*** |
| Intercept | -0.02 | 0.20 | 26.96 | -0.11 | .91 |
| **Model comparisons** |  |  | ***df*** | $$χ^{2}$$ | ***p***$(χ^{2})$ |
| Category |  |  | 6 | 12.12 | .06 |
| Position |  |  | 4 | 15.10 | **.004** |
| Vowel |  |  | 2 | 8.32 | **.02** |
| Position\*Category |  |  | 3 | 9.94 | **.02** |

Table S: PC3 statistics. Full model AIC is 1919.29 compared to a null model AIC of 1623.37.

# Analysis of PC4 values

The values of PC4 according to phoneme/language category and word position are shown in Figure S5. The modelling of PC4 is in Table S5. The model shows a significant effect of language/phoneme category, and vowel position. Figure S5 indicates that the significant effect of language/phoneme category comes from large differences between the Gaelic laterals, especially in word-initial position.



Figure S: PC4 values according to phoneme/language category and word position.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Full model** | $\hat{β}$ | **SE(**$\hat{β}$**)** | ***df*** | ***t*** | ***p(t)*** |
| Intercept | 0.42 | 0.21 | 29.01 | 2.00 | **.05** |
| **Main effects** |  |  | ***df*** | $$χ^{2}$$ | ***p***$(χ^{2})$ |
| Category |  |  | 6 | 15.98 | **.01** |
| Position |  |  | 4 | 8.50 | .07 |
| Vowel |  |  | 2 | 6.94 | **.03** |
| Position\*Category |  |  | 3 | 4.21 | .24 |

Table S: PC4 statistics. Full model AIC is 1473.61 compared to a null model AIC of 1480.82.