

Appendix B: LME models

Table B.1: Coefficient estimates of model (mvot.3) predicting VOT: $lmer(VOT \sim manner + place + vowel + (1|speaker) + (1|repetition))$

	Estimate	SE	df	t-value	Pr(> t)
(Intercept)	27.29	2.82	8.68	9.66	0.0000
manner = lenis	34.08	0.89	1688.16	38.13	0.0000
manner = aspirated	53.58	0.89	1689.86	60.26	0.0000
manner = fortis	-12.11	0.89	1687.64	-13.57	0.0000
place = alveolar	-2.59	1.04	1686.79	-2.48	0.0132
vowel = a	1.21	1.27	1686.83	0.95	0.3434
vowel = e	-6.92	1.28	1686.84	-5.40	0.0000
vowel = i	3.48	1.27	1686.73	2.73	0.0064
vowel = o	-1.42	1.29	1686.76	-1.10	0.2725
vowel = u	5.11	1.27	1686.85	4.01	0.0001
vowel = Λ	1.69	1.27	1686.99	1.33	0.1826

Table B.2: Pairwise comparisons of estimated marginal means of VOT.

contrast	estimate	SE	df	t-ratio	p-value
place = labial					
lenis - aspirated	-19.50	1.44	1689.07	-13.551	<.0001
lenis - fortis	46.19	1.44	1687.40	32.017	<.0001
lenis - nasal	109.62	1.54	1689.93	71.089	<.0001
aspirated - fortis	65.69	1.44	1688.75	45.687	<.0001
aspirated - nasal	129.12	1.54	1691.11	84.043	<.0001
fortis - nasal	63.43	1.54	1689.69	41.154	<.0001
place = alveolar					
lenis - aspirated	-19.50	1.44	1689.07	-13.551	<.0001
lenis - fortis	46.19	1.44	1687.40	32.017	<.0001
lenis - nasal	109.62	1.54	1689.93	71.089	<.0001
aspirated - fortis	65.69	1.44	1688.75	45.687	<.0001
aspirated - nasal	129.12	1.54	1691.11	84.043	<.0001
fortis - nasal	63.43	1.54	1689.69	41.154	<.0001

Results are averaged over the levels of: vowel

Degrees-of-freedom method: kenward-roger

P-value adjustment: tukey method for comparing a family of 4 estimates

Table B.3: Coefficient estimates of model (mf0.5) predicting normalized f_0 : $\text{lmer}(f0_{scaled} \sim \text{vowel} + \text{manner} * \text{place} + \text{manner} * \text{sex} + (1|\text{speaker}) + (1|\text{repetition}))$

	Estimate	SE	df	t-value	Pr(> t)
(Intercept)	0.08	0.06	3.30	1.31	0.2728
vowel = a	-0.30	0.03	1766.61	-11.38	0.0000
vowel = e	-0.15	0.03	1766.57	-5.76	0.0000
vowel = i	0.17	0.03	1766.43	6.66	0.0000
vowel = o	0.07	0.03	1766.42	2.79	0.0053
vowel = u	0.16	0.03	1766.90	6.15	0.0000
vowel = Λ	-0.22	0.03	1767.39	-8.54	0.0000
manner = lenis	-0.88	0.03	1766.86	-34.73	0.0000
manner = aspirated	0.95	0.03	1766.57	37.52	0.0000
manner = fortis	0.80	0.03	1768.32	31.77	0.0000
place = alveolar	0.02	0.01	1766.66	1.48	0.1393
sex = M	-0.01	0.03	4.39	-0.32	0.7665
manner = lenis:place = alveolar	-0.03	0.02	1766.68	-1.56	0.1196
manner = aspirated:place = alveolar	0.02	0.02	1766.83	1.10	0.2695
manner = fortis:place = alveolar	0.05	0.02	1766.96	2.81	0.0050
manner = lenis:sex = M	0.24	0.04	1766.76	6.44	0.0000
manner = aspirated:sex = M	0.18	0.04	1766.59	4.94	0.0000
manner = fortis:sex = M	-0.34	0.04	1767.27	-9.14	0.0000

Table B.4: Coefficient estimates of model (mOq.2int.slp) predicting normalized Oq:
 $lmer(Oqscaled \sim manner * vowel + (1 + manner|speaker))$

	Estimate	SE	df	t-value	Pr(> t)
(Intercept)	0.22	0.07	8.13	3.11	0.0143
manner = lenis	0.36	0.11	7.97	3.33	0.0105
manner = aspirated	0.86	0.11	8.01	7.62	0.0001
manner = fortis	-0.77	0.10	7.85	-7.91	0.0001
vowel = a	0.11	0.04	1725.57	2.51	0.0120
vowel = e	0.27	0.04	1725.87	5.97	0.0000
vowel = i	-0.48	0.04	1725.40	-10.92	0.0000
vowel = o	-0.01	0.04	1725.33	-0.32	0.7487
vowel = u	-0.11	0.04	1725.64	-2.53	0.0116
vowel = Λ	0.03	0.04	1726.14	0.75	0.4516
manner = lenis:vowel = a	-0.03	0.08	1725.57	-0.37	0.7147
manner = aspirated:vowel = a	0.12	0.08	1725.37	1.59	0.1124
manner = fortis:vowel = a	-0.02	0.08	1725.87	-0.28	0.7809
manner = lenis:vowel = e	-0.05	0.08	1726.59	-0.58	0.5636
manner = aspirated:vowel = e	0.45	0.08	1725.60	5.91	0.0000
manner = fortis:vowel = e	-0.20	0.08	1725.51	-2.66	0.0080
manner = lenis:vowel = i	-0.13	0.08	1725.49	-1.73	0.0837
manner = aspirated:vowel = i	-0.34	0.08	1725.33	-4.44	0.0000
manner = fortis:vowel = i	0.06	0.08	1725.44	0.76	0.4470
manner = lenis:vowel = o	0.10	0.08	1725.44	1.34	0.1806
manner = aspirated:vowel = o	-0.23	0.08	1725.32	-2.94	0.0033
manner = fortis:vowel = o	0.11	0.08	1725.39	1.43	0.1527
manner = lenis:vowel = u	0.12	0.08	1726.00	1.58	0.1143
manner = aspirated:vowel = u	-0.15	0.08	1725.52	-2.00	0.0452
manner = fortis:vowel = u	-0.06	0.08	1725.49	-0.75	0.4507
manner = lenis:vowel = Λ	-0.06	0.08	1725.60	-0.72	0.4728
manner = aspirated:vowel = Λ	0.11	0.08	1725.45	1.45	0.1472
manner = fortis:vowel = Λ	0.14	0.08	1726.88	1.88	0.0597