

Appendix A

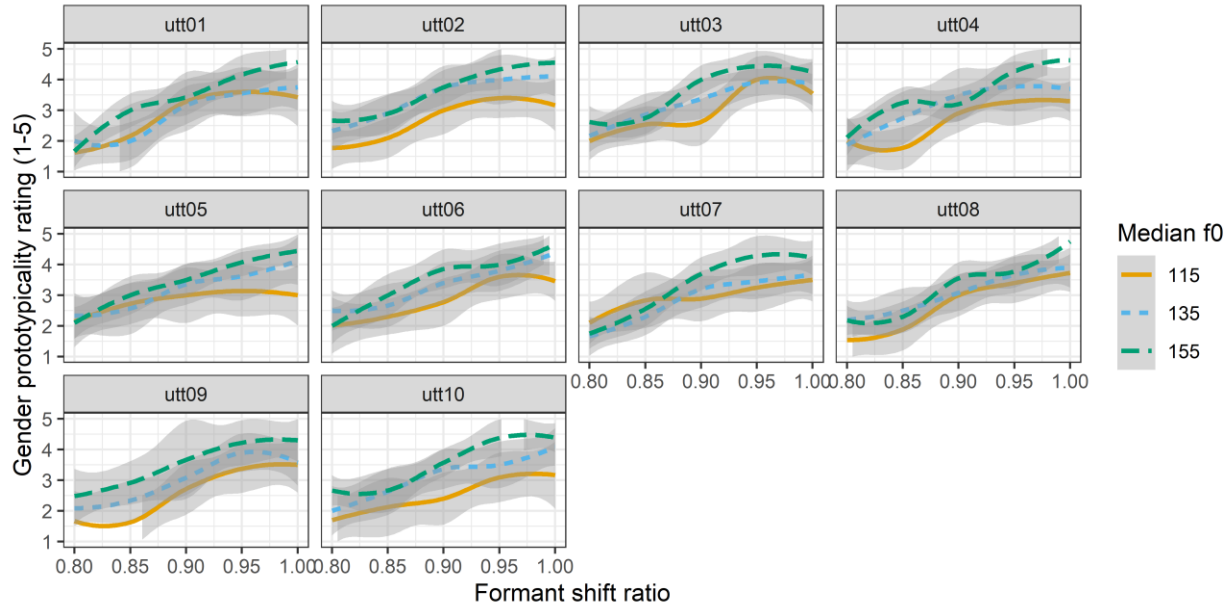


Figure A1: Gender prototypicality ratings plotted by formant shift ratio, median f0, and utterance.

Family: cumulative

Links: mu = logit; disc = identity

Formula: Response ~ utt_c * fsr_val_c * npm_val_c + (1 + utt_c + fsr_val_c + npm_val_c | Schedule.ID) + (1 + npm_val + fsr_val | utt)

Data: GP (Number of observations: 1350)

Draws: 4 chains, each with iter = 4000; warmup = 2000; thin = 1;

total post-warmup draws = 8000

Multilevel Hyperparameters:

~Schedule.ID (Number of levels: 18)

Parameter	Estimate	Est.Error	1-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	1.90	0.37	1.34	2.77	1.00	2516	3853
sd(utt_c)	0.34	0.18	0.02	0.73	1.00	2050	2031
sd(fsr_val_c)	2.56	0.52	1.75	3.75	1.00	4435	5296
sd(npm_val_c)	1.17	0.28	0.74	1.82	1.00	4491	5857
cor(Intercept,utt_c)	0.29	0.34	-0.46	0.85	1.00	9572	5373
cor(Intercept,fsr_val_c)	0.02	0.22	-0.42	0.44	1.00	6590	5854
cor(utt_c,fsr_val_c)	-0.39	0.34	-0.90	0.43	1.00	1190	1125
cor(Intercept,npm_val_c)	-0.26	0.23	-0.67	0.23	1.00	6991	6072

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
cor(utt_c,npm_val_c)	-0.11	0.35	-0.76	0.59	1.00	1133	2401
cor(fsr_val_c,npm_val_c)	0.01	0.24	-0.46	0.47	1.00	8061	6578

~utt (Number of levels: 10)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.16	0.12	0.01	0.46	1.00	3757	4608
sd(npm_val135)	0.22	0.16	0.01	0.58	1.00	3828	4438
sd(npm_val155)	0.20	0.16	0.01	0.58	1.00	4604	4920
sd(fsr_val0.85)	0.17	0.14	0.01	0.53	1.00	5822	4994
sd(fsr_val0.9)	0.35	0.23	0.01	0.87	1.00	2786	2902
sd(fsr_val0.95)	0.28	0.21	0.01	0.80	1.00	3209	4383
sd(fsr_val1)	0.53	0.34	0.03	1.33	1.00	2326	3986
cor(Intercept,npm_val135)	0.01	0.35	-0.66	0.67	1.00	11361	5898
cor(Intercept,npm_val155)	-0.01	0.35	-0.67	0.66	1.00	14313	6499
cor(npm_val135,npm_val155)	0.14	0.36	-0.58	0.76	1.00	7945	6553
cor(Intercept,fsr_val0.85)	-0.03	0.36	-0.69	0.65	1.00	14038	6319
cor(npm_val135,fsr_val0.85)	-0.02	0.36	-0.69	0.66	1.00	11396	6526
cor(npm_val155,fsr_val0.85)	-0.03	0.35	-0.70	0.63	1.00	9405	6145
cor(Intercept,fsr_val0.9)	-0.02	0.36	-0.69	0.66	1.00	7268	5401
cor(npm_val135,fsr_val0.9)	0.04	0.35	-0.64	0.69	1.00	8568	6720
cor(npm_val155,fsr_val0.9)	-0.05	0.36	-0.71	0.64	1.00	6548	6434
cor(fsr_val0.85,fsr_val0.9)	0.02	0.35	-0.65	0.67	1.00	5640	6584
cor(Intercept,fsr_val0.95)	-0.05	0.36	-0.71	0.66	1.00	11610	5656
cor(npm_val135,fsr_val0.95)	-0.01	0.35	-0.67	0.65	1.00	9081	6179
cor(npm_val155,fsr_val0.95)	-0.03	0.35	-0.69	0.63	1.00	7839	6396
cor(fsr_val0.85,fsr_val0.95)	-0.01	0.35	-0.67	0.66	1.00	6986	7040
cor(fsr_val0.9,fsr_val0.95)	0.14	0.36	-0.59	0.78	1.00	4789	6163
cor(Intercept,fsr_val1)	-0.09	0.36	-0.74	0.62	1.00	6616	6745
cor(npm_val135,fsr_val1)	-0.06	0.35	-0.69	0.63	1.00	7211	6306
cor(npm_val155,fsr_val1)	-0.01	0.36	-0.68	0.67	1.00	6017	6280
cor(fsr_val0.85,fsr_val1)	0.05	0.35	-0.64	0.71	1.00	6110	6632
cor(fsr_val0.9,fsr_val1)	-0.18	0.34	-0.77	0.54	1.00	6099	6873
cor(fsr_val0.95,fsr_val1)	-0.06	0.35	-0.70	0.61	1.00	6550	6575

Regression Coefficients:

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
Intercept[1]	-4.20	0.47	-5.12	-3.26	1.00	1362	2467
Intercept[2]	-1.32	0.46	-2.20	-0.43	1.00	1311	2236
Intercept[3]	0.52	0.45	-0.36	1.43	1.00	1321	2138
Intercept[4]	3.76	0.47	2.87	4.69	1.00	1399	2403
utt_c	-0.36	0.21	-0.79	0.07	1.00	6195	6208
fsr_val_c	4.34	0.67	3.03	5.67	1.00	5503	5635
npm_val_c	1.88	0.32	1.25	2.53	1.00	4806	5400
utt_c:fsr_val_c	-0.21	0.29	-0.79	0.33	1.00	10349	6036
utt_c:npm_val_c	0.07	0.26	-0.44	0.58	1.00	12915	6306
fsr_val_c:npm_val_c	0.90	0.25	0.43	1.39	1.00	19736	6082
utt_c:fsr_val_c:npm_val_c	0.06	0.46	-0.84	1.00	1.00	18537	5200

Further Distributional Parameters:

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
disc	1.00	0.00	1.00	1.00	NA	NA	NA

Draws were sampled using sampling(NUTS). For each parameter, Bulk_ESS and Tail_ESS are effective sample size measures, and Rhat is the potential scale reduction factor on split chains (at convergence, Rhat = 1).

Table A2: Bayesian ordinal (cumulative) regression model summary on norming data.

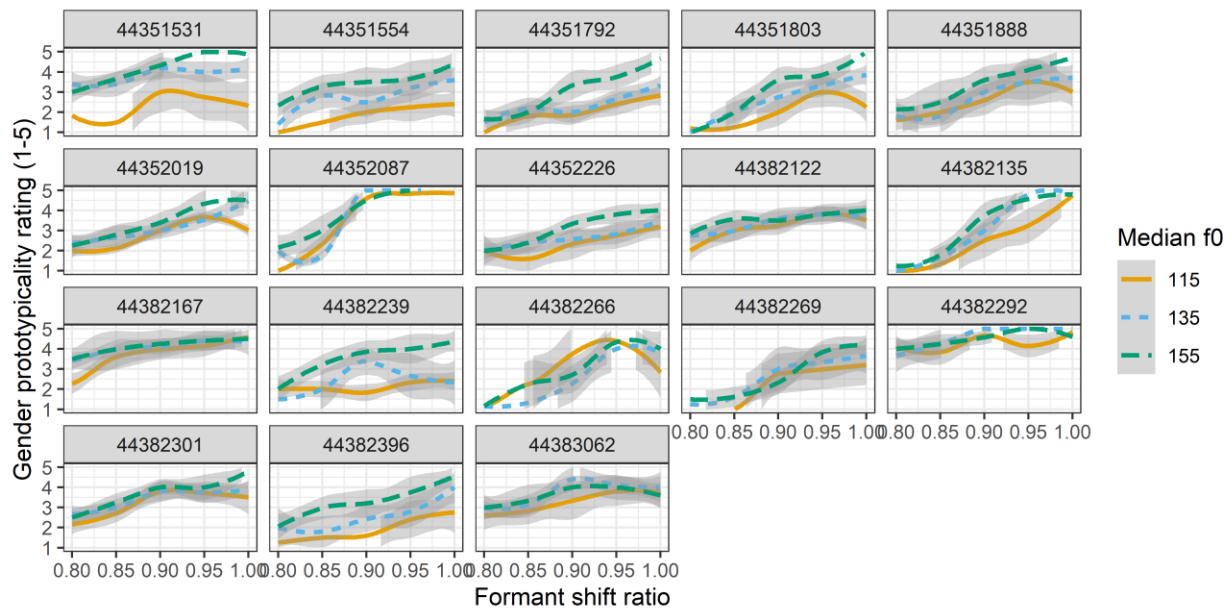


Figure A3: Gender prototypicality ratings plotted by formant shift ratio, (new) median f0, and individual participant code.

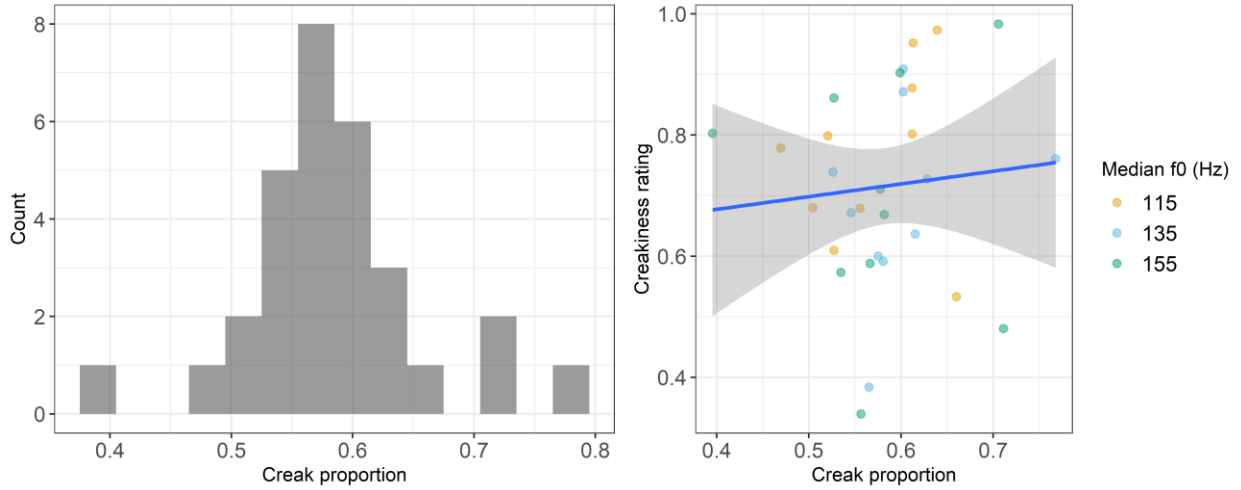


Figure A4: Creak proportion histogram (left) and creakiness ratings by proportion of creak (right) for each creaky utterance in stimuli and median f0.

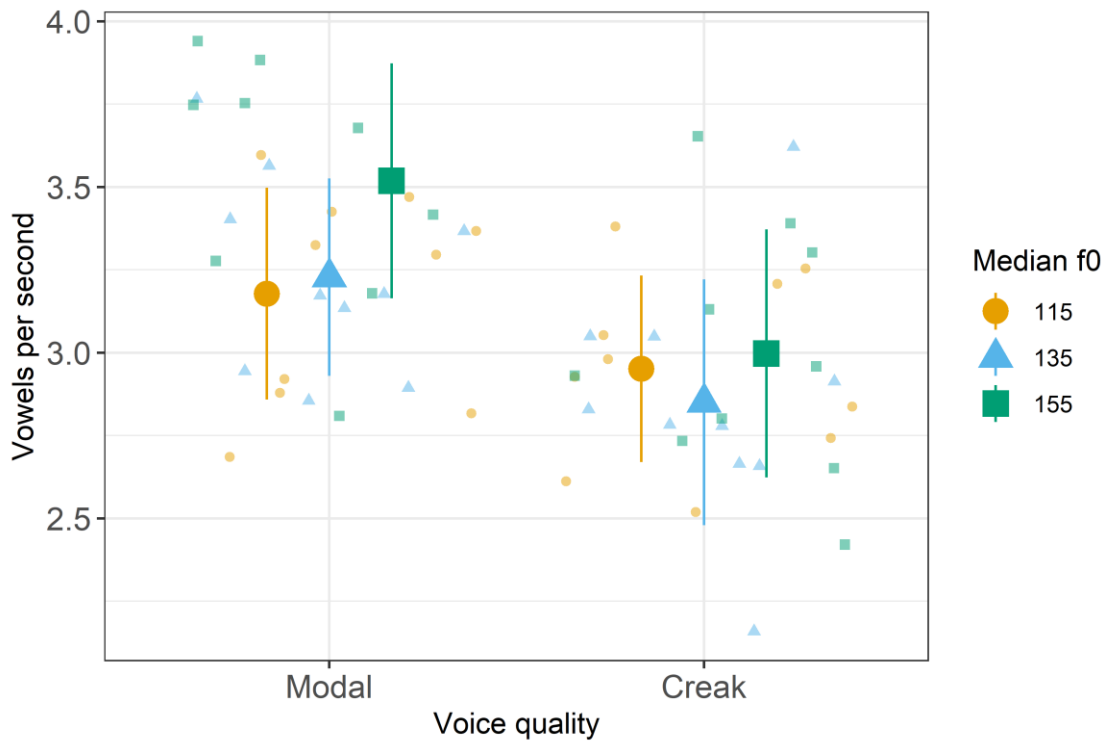


Figure A5: Speech rate (vowels per second) plotted by voice quality and median f0.

Stimuli	Harvard Sentences
Norming study	
Utts. 1-10	List 1 / Utts. 1-10
Creaky voice perception experiment	

Utt. 1-5	List 3 / Utt. 1-5
Utt. 6-10	List 3 / Utt. 6-10
Utt. 11-15	List 5 / Utt. 1-5
Utt. 16-20	List 5 / Utt. 6-10
Utt. 21-25	List 7 / Utt. 1-5
Utt. 26-30	List 7 / Utt. 6-10
Utt. 31-35	List 4 / Utt. 1-5
Utt. 36-40	List 4 / Utt. 6-10
Utt. 41-45	List 6 / Utt. 1-5
Utt. 46-50	List 6 / Utt. 6-10
Utt. 51-55	List 8 / Utt. 1-5
Utt. 56-60	List 8 / Utt. 6-10

Table A6: Current study’s stimuli to original Harvard Sentences numbering correspondence.

Family: zero_one_inflated_beta

Links: mu = logit; phi = log; zoi = logit; coi = logit

Formula: Response_prop ~ face_gender_c * VQ_c * npm_val_h + (1 + face_gender_c * npm_val_h * VQ_c | Schedule.ID) + (1 + face_gender_c | audiofile) + (1 + VQ_c * npm_val_h | face)

phi ~ 1 + (1 | Schedule.ID)

coi ~ 1 + (1 | Schedule.ID)

zoi ~ 1 + (1 | Schedule.ID)

Data: CR (Number of observations: 2400)

Draws: 4 chains, each with iter = 2000; warmup = 1000; thin = 1;

total post-warmup draws = 4000

Multilevel Hyperparameters:

~audiofile (Number of levels: 60)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.29	0.03	0.23	0.36	1.00	1193	1764
sd(face_gender_c)	0.05	0.04	0.00	0.13	1.00	1353	1669
cor(Intercept,face_gender_c)	0.09	0.44	-0.80	0.86	1.00	3989	2573

~face (Number of levels: 60)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.04	0.02	0.00	0.08	1.00	937	1573
sd(VQ_c)	0.04	0.03	0.00	0.12	1.00	1666	1728
sd(npm_val_h135v115)	0.07	0.03	0.01	0.13	1.00	830	1098
sd(npm_val_h155v135115)	0.03	0.02	0.00	0.06	1.00	1005	1426

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(VQ_c:npm_val_h135v115)	0.08	0.05	0.00	0.19	1.00	1333	1447
sd(VQ_c:npm_val_h155v135115)	0.05	0.03	0.00	0.12	1.00	1150	1630
cor(Intercept,VQ_c)	-0.04	0.35	-0.69	0.62	1.00	3158	3144
cor(Intercept,npm_val_h135v115)	-0.08	0.35	-0.70	0.61	1.00	1400	1919
cor(VQ_c,npm_val_h135v115)	0.07	0.35	-0.62	0.71	1.00	1558	2314
cor(Intercept,npm_val_h155v135115)	0.00	0.35	-0.66	0.67	1.00	2226	2655
cor(VQ_c,npm_val_h155v135115)	0.00	0.36	-0.66	0.67	1.00	2114	2583
cor(npm_val_h135v115,npm_val_h155v135115)	-0.04	0.34	-0.66	0.63	1.00	3213	2863
cor(Intercept,VQ_c:npm_val_h135v115)	-0.03	0.35	-0.66	0.63	1.00	2384	2333
cor(VQ_c,VQ_c:npm_val_h135v115)	-0.05	0.35	-0.68	0.62	1.00	2217	2526
cor(npm_val_h135v115,VQ_c:npm_val_h135v115)	-0.17	0.34	-0.76	0.53	1.00	2201	2585
cor(npm_val_h155v135115,VQ_c:npm_val_h135v115)	0.04	0.35	-0.62	0.70	1.00	2976	2705
cor(Intercept,VQ_c:npm_val_h155v135115)	-0.03	0.35	-0.69	0.62	1.00	2952	2676
cor(VQ_c,VQ_c:npm_val_h155v135115)	0.06	0.35	-0.63	0.70	1.00	2552	2437
cor(npm_val_h135v115,VQ_c:npm_val_h155v135115)	0.01	0.34	-0.65	0.67	1.00	2881	3032
cor(npm_val_h155v135115,VQ_c:npm_val_h155v135115)	-0.09	0.35	-0.72	0.61	1.00	2355	3068
cor(VQ_c:npm_val_h135v115,VQ_c:npm_val_h155v135115)	-0.02	0.36	-0.68	0.66	1.00	2442	3173

~Schedule.ID (Number of levels: 40)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.63	0.07	0.50	0.79	1.00	687	1188
sd(face_gender_c)	0.06	0.04	0.00	0.15	1.00	1180	1709
sd(npm_val_h135v115)	0.10	0.03	0.05	0.16	1.00	1287	936
sd(npm_val_h155v135115)	0.05	0.02	0.02	0.09	1.00	1226	1565
sd(VQ_c)	0.61	0.08	0.47	0.78	1.00	1455	2488
sd(face_gender_c:npm_val_h135v115)	0.09	0.06	0.00	0.20	1.00	990	1240
sd(face_gender_c:npm_val_h155v135115)	0.03	0.02	0.00	0.08	1.00	2237	2407
sd(face_gender_c:VQ_c)	0.10	0.07	0.00	0.25	1.00	1584	1629
sd(npm_val_h135v115:VQ_c)	0.05	0.04	0.00	0.14	1.00	2137	2060
sd(npm_val_h155v135115:VQ_c)	0.03	0.02	0.00	0.09	1.00	1864	1798
sd(face_gender_c:npm_val_h135v115:VQ_c)	0.13	0.09	0.01	0.33	1.00	1615	1999
sd(face_gender_c:npm_val_h155v135115:VQ_c)	0.06	0.05	0.00	0.17	1.00	1731	1640

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(phi_Intercept)	0.61	0.08	0.47	0.78	1.00	941	1689
sd(coi_Intercept)	1.81	0.66	0.78	3.35	1.00	1435	2008
sd(zoi_Intercept)	1.73	0.35	1.16	2.54	1.00	908	1941
cor(Intercept,face_gender_c)	0.01	0.25	-0.49	0.48	1.00	4010	2849
cor(Intercept,npm_val_h135v115)	0.10	0.19	-0.26	0.46	1.00	3210	2747
cor(face_gender_c,npm_val_h135v115)	-0.06	0.26	-0.53	0.46	1.00	988	1914
cor(Intercept,npm_val_h155v135115)	-0.05	0.19	-0.41	0.32	1.00	3095	2836
cor(face_gender_c,npm_val_h155v135115)	-0.10	0.26	-0.57	0.43	1.01	1093	1714
cor(npm_val_h135v115,npm_val_h155v135115)	0.34	0.21	-0.12	0.71	1.00	1842	2530
cor(Intercept,VQ_c)	-0.11	0.15	-0.39	0.18	1.00	1651	2401
cor(face_gender_c,VQ_c)	0.07	0.24	-0.41	0.53	1.01	347	560
cor(npm_val_h135v115,VQ_c)	-0.20	0.20	-0.56	0.20	1.01	556	1177
cor(npm_val_h155v135115,VQ_c)	-0.01	0.20	-0.39	0.38	1.00	667	1478
cor(Intercept,face_gender_c:npm_val_h135v115)	0.13	0.23	-0.33	0.57	1.00	3600	2966
cor(face_gender_c,face_gender_c:npm_val_h135v115)	-0.00	0.27	-0.54	0.49	1.00	2726	2621
cor(npm_val_h135v115,face_gender_c:npm_val_h135v115)	0.08	0.25	-0.43	0.55	1.00	3481	2730
cor(npm_val_h155v135115,face_gender_c:npm_val_h135v115)	0.09	0.25	-0.40	0.57	1.00	3720	2686
cor(VQ_c,face_gender_c:npm_val_h135v115)	0.05	0.24	-0.43	0.50	1.00	4234	3064
cor(Intercept,face_gender_c:npm_val_h155v135115)	0.13	0.26	-0.41	0.61	1.00	3996	2744
cor(face_gender_c,face_gender_c:npm_val_h155v135115)	0.02	0.27	-0.49	0.52	1.00	4052	3157
cor(npm_val_h135v115,face_gender_c:npm_val_h155v135115)	0.04	0.26	-0.47	0.54	1.00	3883	2755
cor(npm_val_h155v135115,face_gender_c:npm_val_h155v135115)	0.00	0.26	-0.50	0.50	1.00	4436	2972
cor(VQ_c,face_gender_c:npm_val_h155v135115)	-0.03	0.26	-0.52	0.48	1.00	4390	3067
cor(face_gender_c:npm_val_h135v115,face_gender_c:npm_val_h155v135115)	0.02	0.27	-0.50	0.54	1.00	3407	3016
cor(Intercept,face_gender_c:VQ_c)	0.04	0.25	-0.45	0.51	1.00	4488	2729

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
cor(face_gender_c,face_gender_c:VQ_c)	0.01	0.27	-0.50	0.53	1.00	3293	2831
cor(npm_val_h135v115,face_gender_c:VQ_c)	-0.07	0.26	-0.56	0.46	1.00	3864	3064
cor(npm_val_h155v135115,face_gender_c:VQ_c)	-0.06	0.26	-0.55	0.47	1.00	3907	2941
cor(VQ_c,face_gender_c:VQ_c)	-0.02	0.25	-0.50	0.46	1.00	4123	3221
cor(face_gender_c:npm_val_h135v115,face_gender_c:VQ_c)	-0.01	0.27	-0.52	0.50	1.00	3068	2919
cor(face_gender_c:npm_val_h155v135115,face_gender_c:VQ_c)	0.00	0.27	-0.51	0.52	1.00	2581	3131
cor(Intercept,npm_val_h135v115:VQ_c)	-0.06	0.25	-0.53	0.44	1.00	4786	3076
cor(face_gender_c,npm_val_h135v115:VQ_c)	0.00	0.27	-0.52	0.51	1.00	3911	2858
cor(npm_val_h135v115,npm_val_h135v115:VQ_c)	-0.10	0.27	-0.59	0.43	1.00	4238	3113
cor(npm_val_h155v135115,npm_val_h135v115:VQ_c)	-0.04	0.25	-0.54	0.45	1.00	4081	3332
cor(VQ_c,npm_val_h135v115:VQ_c)	0.07	0.26	-0.46	0.56	1.00	4476	2969
cor(face_gender_c:npm_val_h135v115,npm_val_h135v115:VQ_c)	-0.02	0.27	-0.53	0.51	1.00	3693	3326
cor(face_gender_c:npm_val_h155v135115,npm_val_h135v115:VQ_c)	-0.01	0.27	-0.54	0.51	1.00	2946	2982
cor(face_gender_c:VQ_c,npm_val_h135v115:VQ_c)	0.02	0.27	-0.50	0.54	1.00	2925	2993
cor(Intercept,npm_val_h155v135115:VQ_c)	0.07	0.26	-0.45	0.55	1.00	4666	3010
cor(face_gender_c,npm_val_h155v135115:VQ_c)	0.01	0.27	-0.50	0.52	1.00	3314	3135
cor(npm_val_h135v115,npm_val_h155v135115:VQ_c)	-0.01	0.26	-0.50	0.50	1.00	4065	2966
cor(npm_val_h155v135115,npm_val_h155v135115:VQ_c)	-0.04	0.26	-0.53	0.47	1.00	3742	3225
cor(VQ_c,npm_val_h155v135115:VQ_c)	-0.03	0.25	-0.51	0.47	1.00	4509	3038
cor(face_gender_c:npm_val_h135v115,npm_val_h155v135115:VQ_c)	-0.04	0.27	-0.53	0.49	1.00	3219	2837
cor(face_gender_c:npm_val_h155v135115,npm_val_h155v135115:VQ_c)	0.01	0.27	-0.49	0.52	1.00	3127	3246
cor(face_gender_c:VQ_c,npm_val_h155v135115:VQ_c)	0.01	0.27	-0.52	0.52	1.00	2946	3360

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
cor(npm_val_h135v115:VQ_c,npm_val_h155v135115:VQ_c)	-0.01	0.26	-0.52	0.50	1.00	2425	2856
cor(Intercept,face_gender_c:npm_val_h135v115:VQ_c)	-0.16	0.26	-0.62	0.37	1.00	4432	3032
cor(face_gender_c,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.27	-0.52	0.51	1.00	4079	2935
cor(npm_val_h135v115,face_gender_c:npm_val_h135v115:VQ_c)	-0.02	0.26	-0.51	0.48	1.00	4016	2778
cor(npm_val_h155v135115,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.26	-0.50	0.49	1.00	3968	2988
cor(VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	0.05	0.26	-0.46	0.54	1.00	4213	2965
cor(face_gender_c:npm_val_h135v115,face_gender_c:npm_val_h135v115:VQ_c)	-0.05	0.26	-0.55	0.47	1.00	2909	3359
cor(face_gender_c:npm_val_h155v135115,face_gender_c:npm_val_h135v115:VQ_c)	-0.03	0.27	-0.54	0.48	1.00	2933	3133
cor(face_gender_c:VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.27	-0.52	0.51	1.00	2726	3249
cor(npm_val_h135v115:VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	0.02	0.27	-0.49	0.53	1.00	2362	2771
cor(npm_val_h155v135115:VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.27	-0.52	0.50	1.00	2718	3529
cor(Intercept,face_gender_c:npm_val_h155v135115:VQ_c)	-0.06	0.25	-0.52	0.42	1.00	4767	3122
cor(face_gender_c,face_gender_c:npm_val_h155v135115:VQ_c)	-0.03	0.27	-0.54	0.49	1.00	3765	2787
cor(npm_val_h135v115,face_gender_c:npm_val_h155v135115:VQ_c)	0.00	0.26	-0.50	0.50	1.00	4280	3322
cor(npm_val_h155v135115,face_gender_c:npm_val_h155v135115:VQ_c)	0.04	0.26	-0.46	0.53	1.00	3899	3242
cor(VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	-0.01	0.26	-0.50	0.47	1.00	4621	2771
cor(face_gender_c:npm_val_h135v115,face_gender_c:npm_val_h155v135115:VQ_c)	-0.02	0.27	-0.54	0.48	1.00	3240	3125
cor(face_gender_c:npm_val_h155v135115,face_gender_c:npm_val_h155v135115:VQ_c)	-0.03	0.27	-0.53	0.49	1.00	2574	3230
cor(face_gender_c:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	-0.03	0.27	-0.55	0.50	1.00	2653	3171

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
cor(npm_val_h135v115:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.01	0.27	-0.50	0.53	1.00	2611	3311
cor(npm_val_h155v135115:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.00	0.27	-0.52	0.52	1.00	2713	3214
cor(face_gender_c:npm_val_h135v115:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.02	0.27	-0.48	0.54	1.00	2771	3551

Regression Coefficients:

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
Intercept	0.48	0.11	0.27	0.69	1.01	271	513
phi_Intercept	2.10	0.10	1.91	2.30	1.01	564	1197
zoi_Intercept	-4.06	0.36	-4.82	-3.42	1.00	1014	1561
coi_Intercept	0.75	0.53	-0.19	1.88	1.00	1544	1479
face_gender_c	0.03	0.03	-0.04	0.10	1.00	3427	2537
VQ_c	1.04	0.12	0.80	1.30	1.00	1058	1319
npm_val_h135v115	-0.12	0.05	-0.22	-0.02	1.00	1075	1528
npm_val_h155v135115	-0.10	0.03	-0.16	-0.04	1.00	929	1674
face_gender_c:VQ_c	-0.04	0.06	-0.16	0.08	1.00	4061	3263
face_gender_c:npm_val_h135v115	0.00	0.05	-0.09	0.09	1.00	3119	2933
face_gender_c:npm_val_h155v135115	-0.05	0.02	-0.10	-0.01	1.00	3672	3046
VQ_c:npm_val_h135v115	0.10	0.10	-0.09	0.29	1.00	812	1636
VQ_c:npm_val_h155v135115	-0.01	0.06	-0.12	0.10	1.00	978	1985
face_gender_c:VQ_c:npm_val_h135v115	-0.10	0.08	-0.26	0.06	1.00	3297	2745
face_gender_c:VQ_c:npm_val_h155v135115	0.03	0.04	-0.06	0.11	1.00	3519	2584

Draws were sampled using sampling(NUTS). For each parameter, Bulk_ESS and Tail_ESS are effective sample size measures, and Rhat is the potential scale reduction factor on split chains (at convergence, Rhat = 1).

Table A7: Bayesian zero and one inflated beta regression model summary on response data from the creakiness rating task.

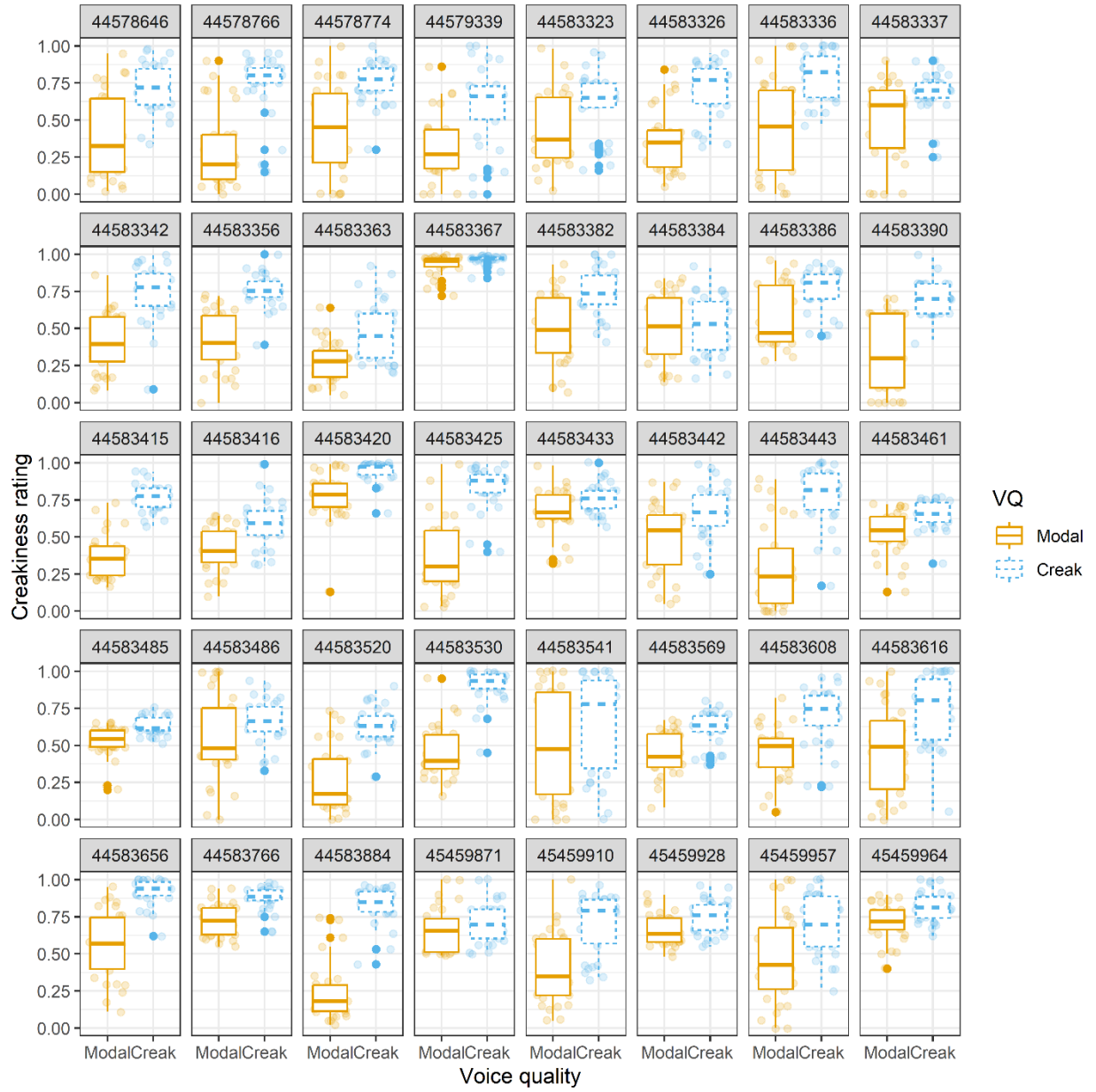


Figure A8: Empirical creakiness ratings by voice quality (x-axis, colour, line type), and participant ID (facet).

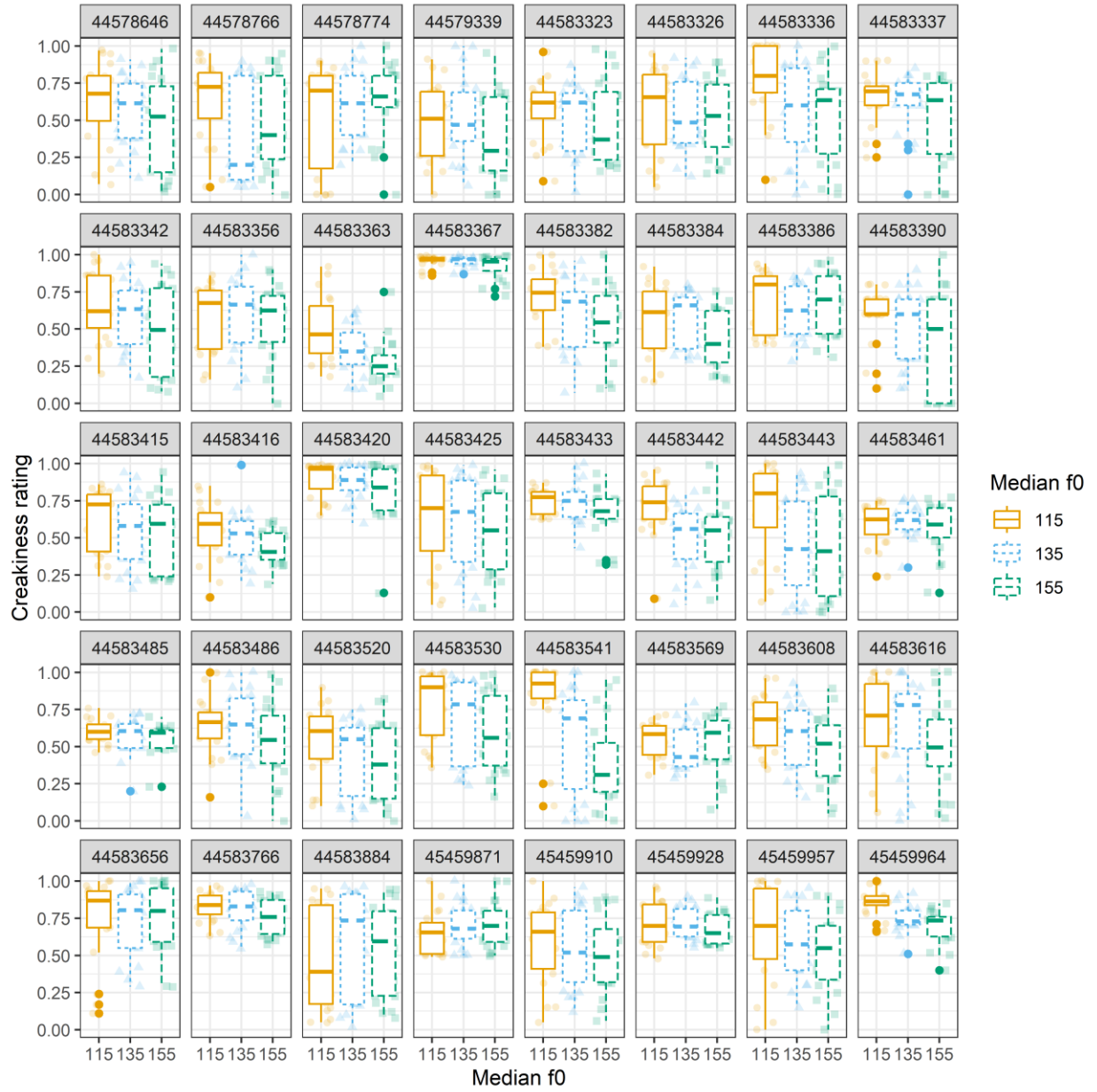


Figure A9: Empirical creakiness ratings by median f0 (x-axis, colour, line type), and participant ID (facet).

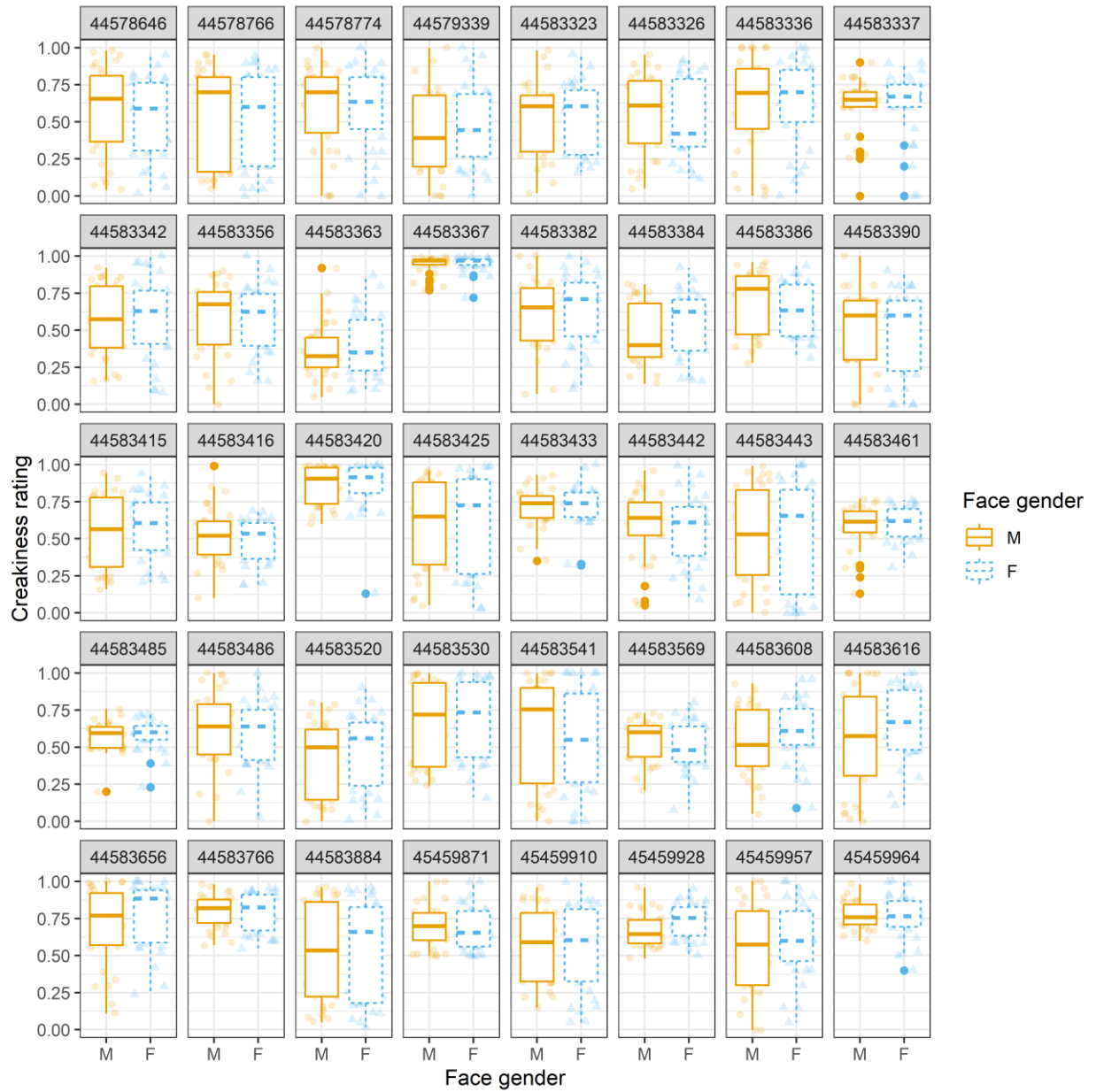


Figure A10: Empirical creakiness ratings by face gender (x-axis, colour, line type), and participant ID (facet).

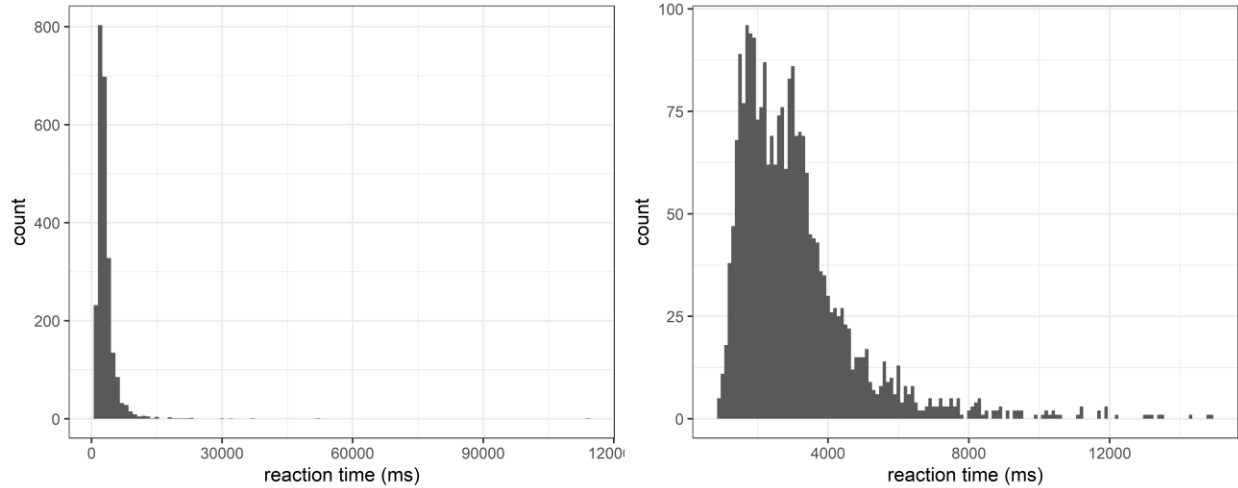


Figure A11: Distributions of reaction time responses (ms) before (left) and after (right) cleaning.

Family: shifted_lognormal

Links: mu = identity; sigma = identity; ndt = identity

Formula: Reaction.Time ~ face_gender_c * VQ_c * npm_val_h + (1 + face_gender_c * npm_val_h * VQ_c | Schedule.ID) + (1 + face_gender_c | audiofile) + (1 + VQ_c * npm_val_h | face)

Data: CR_RTclean (Number of observations: 2384)

Draws: 4 chains, each with iter = 4000; warmup = 1000; thin = 1;

total post-warmup draws = 12000

Multilevel Hyperparameters:

~audiofile (Number of levels: 60)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.04	0.02	0.00	0.08	1.00	1776	2109
sd(face_gender_c)	0.04	0.03	0.00	0.11	1.00	3367	4328
cor(Intercept,face_gender_c)	0.10	0.48	-0.83	0.90	1.00	7042	7178

~face (Number of levels: 60)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.02	0.01	0.00	0.05	1.00	3549	3843
sd(VQ_c)	0.03	0.02	0.00	0.09	1.00	4346	4383
sd(npm_val_h135v115)	0.03	0.02	0.00	0.08	1.00	2817	3262
sd(npm_val_h155v135115)	0.01	0.01	0.00	0.03	1.00	3995	5751
sd(VQ_c:npm_val_h135v115)	0.04	0.03	0.00	0.11	1.00	4234	5068

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(VQ_c:npm_val_h155v135115)	0.03	0.02	0.00	0.07	1.00	3555	4462
cor(Intercept,VQ_c)	-0.06	0.35	-0.70	0.62	1.00	9149	9183
cor(Intercept,npm_val_h135v115)	0.09	0.35	-0.61	0.72	1.00	5421	7273
cor(VQ_c,npm_val_h135v115)	-0.06	0.35	-0.69	0.63	1.00	6407	8240
cor(Intercept,npm_val_h155v135115)	-0.06	0.36	-0.71	0.62	1.00	9056	8066
cor(VQ_c,npm_val_h155v135115)	-0.01	0.35	-0.68	0.66	1.00	9869	8798
cor(npm_val_h135v115,npm_val_h155v135115)	-0.09	0.35	-0.73	0.61	1.00	8566	8836
cor(Intercept,VQ_c:npm_val_h135v115)	-0.01	0.35	-0.67	0.65	1.00	9686	8485
cor(VQ_c,VQ_c:npm_val_h135v115)	-0.02	0.35	-0.68	0.66	1.00	9655	8700
cor(npm_val_h135v115,VQ_c:npm_val_h135v115)	0.02	0.35	-0.65	0.67	1.00	10651	9705
cor(npm_val_h155v135115,VQ_c:npm_val_h135v115)	0.02	0.35	-0.65	0.69	1.00	9045	9178
cor(Intercept,VQ_c:npm_val_h155v135115)	0.06	0.35	-0.63	0.69	1.00	7614	7921
cor(VQ_c,VQ_c:npm_val_h155v135115)	-0.06	0.35	-0.70	0.62	1.00	8262	8597
cor(npm_val_h135v115,VQ_c:npm_val_h155v135115)	0.08	0.35	-0.61	0.71	1.00	8796	9382
cor(npm_val_h155v135115,VQ_c:npm_val_h155v135115)	-0.06	0.35	-0.70	0.63	1.00	7711	8416
cor(VQ_c:npm_val_h135v115,VQ_c:npm_val_h155v135115)	-0.00	0.35	-0.66	0.66	1.00	7743	9872

~Schedule.ID (Number of levels: 40)

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(Intercept)	0.50	0.06	0.40	0.64	1.00	1162	2242
sd(face_gender_c)	0.07	0.03	0.01	0.12	1.00	3943	3064
sd(npm_val_h135v115)	0.03	0.02	0.00	0.07	1.00	3148	4204
sd(npm_val_h155v135115)	0.02	0.01	0.00	0.04	1.00	2888	3782
sd(VQ_c)	0.06	0.03	0.01	0.13	1.00	3367	2849
sd(face_gender_c:npm_val_h135v115)	0.07	0.04	0.00	0.16	1.00	2679	3236
sd(face_gender_c:npm_val_h155v135115)	0.02	0.01	0.00	0.05	1.00	6351	5691
sd(face_gender_c:VQ_c)	0.07	0.05	0.00	0.19	1.00	4106	4564
sd(npm_val_h135v115:VQ_c)	0.03	0.02	0.00	0.09	1.00	5437	4856
sd(npm_val_h155v135115:VQ_c)	0.02	0.02	0.00	0.06	1.00	4518	5517

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sd(face_gender_c:npm_val_h135v115:VQ_c)	0.08	0.06	0.00	0.22	1.00	4415	4822
sd(face_gender_c:npm_val_h155v135115:VQ_c)	0.11	0.04	0.02	0.19	1.00	2993	1796
cor(Intercept,face_gender_c)	-0.32	0.22	-0.69	0.17	1.00	9159	6302
cor(Intercept,npm_val_h135v115)	-0.03	0.24	-0.49	0.43	1.00	12675	8578
cor(face_gender_c,npm_val_h135v115)	-0.07	0.26	-0.55	0.45	1.00	9444	8496
cor(Intercept,npm_val_h155v135115)	0.13	0.23	-0.33	0.55	1.00	10997	7967
cor(face_gender_c,npm_val_h155v135115)	-0.10	0.26	-0.57	0.41	1.00	8582	8892
cor(npm_val_h135v115,npm_val_h155v135115)	-0.06	0.26	-0.55	0.46	1.00	8518	8749
cor(Intercept,VQ_c)	0.23	0.22	-0.24	0.62	1.00	9337	8310
cor(face_gender_c,VQ_c)	-0.13	0.25	-0.60	0.37	1.00	8016	8326
cor(npm_val_h135v115,VQ_c)	-0.01	0.26	-0.51	0.49	1.00	7783	8568
cor(npm_val_h155v135115,VQ_c)	0.02	0.26	-0.48	0.52	1.00	7756	8925
cor(Intercept,face_gender_c:npm_val_h135v115)	-0.04	0.22	-0.47	0.41	1.00	11432	9105
cor(face_gender_c,face_gender_c:npm_val_h135v115)	0.09	0.26	-0.42	0.56	1.00	7732	9122
cor(npm_val_h135v115,face_gender_c:npm_val_h135v115)	-0.01	0.26	-0.52	0.50	1.00	7553	8061
cor(npm_val_h155v135115,face_gender_c:npm_val_h135v115)	-0.01	0.26	-0.50	0.51	1.00	8530	9232
cor(VQ_c,face_gender_c:npm_val_h135v115)	-0.10	0.26	-0.58	0.43	1.00	6730	7890
cor(Intercept,face_gender_c:npm_val_h155v135115)	0.01	0.26	-0.49	0.51	1.00	13782	8159
cor(face_gender_c,face_gender_c:npm_val_h155v135115)	-0.02	0.27	-0.53	0.50	1.00	12944	9308
cor(npm_val_h135v115,face_gender_c:npm_val_h155v135115)	0.03	0.27	-0.50	0.54	1.00	11353	9262
cor(npm_val_h155v135115,face_gender_c:npm_val_h155v135115)	-0.02	0.26	-0.53	0.48	1.00	9959	8615
cor(VQ_c,face_gender_c:npm_val_h155v135115)	-0.00	0.27	-0.51	0.51	1.00	10463	8941
cor(face_gender_c:npm_val_h135v115,face_gender_c:npm_val_h155v135115)	-0.03	0.27	-0.53	0.49	1.00	10365	9427
cor(Intercept,face_gender_c:VQ_c)	-0.01	0.25	-0.49	0.48	1.00	13603	8505
cor(face_gender_c,face_gender_c:VQ_c)	-0.02	0.26	-0.52	0.48	1.00	11095	8781
cor(npm_val_h135v115,face_gender_c:VQ_c)	-0.01	0.27	-0.52	0.50	1.00	10938	9064
cor(npm_val_h155v135115,face_gender_c:VQ_c)	0.01	0.27	-0.50	0.51	1.00	10594	9681
cor(VQ_c,face_gender_c:VQ_c)	0.04	0.27	-0.48	0.54	1.00	9430	9170

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
cor(face_gender_c:npm_val_h135v115,face_gender_c:VQ_c)	-0.01	0.27	-0.52	0.51	1.00	9522	9652
cor(face_gender_c:npm_val_h155v135115,face_gender_c:VQ_c)	-0.00	0.27	-0.52	0.52	1.00	8803	9740
cor(Intercept,npm_val_h135v115:VQ_c)	0.01	0.26	-0.49	0.52	1.00	14510	8324
cor(face_gender_c,npm_val_h135v115:VQ_c)	-0.00	0.26	-0.52	0.50	1.00	12744	8346
cor(npm_val_h135v115,npm_val_h135v115:VQ_c)	-0.03	0.27	-0.53	0.49	1.00	10178	8877
cor(npm_val_h155v135115,npm_val_h135v115:VQ_c)	0.04	0.27	-0.49	0.54	1.00	11367	9164
cor(VQ_c,npm_val_h135v115:VQ_c)	0.00	0.27	-0.50	0.52	1.00	11116	9411
cor(face_gender_c:npm_val_h135v115,npm_val_h135v115:VQ_c)	0.00	0.27	-0.52	0.51	1.00	10985	9422
cor(face_gender_c:npm_val_h155v135115,npm_val_h135v115:VQ_c)	-0.00	0.27	-0.52	0.51	1.00	8182	9691
cor(face_gender_c:VQ_c,npm_val_h135v115:VQ_c)	-0.02	0.27	-0.53	0.49	1.00	8631	9429
cor(Intercept,npm_val_h155v135115:VQ_c)	0.08	0.25	-0.42	0.54	1.00	12409	8966
cor(face_gender_c,npm_val_h155v135115:VQ_c)	-0.07	0.26	-0.57	0.45	1.00	10941	8822
cor(npm_val_h135v115,npm_val_h155v135115:VQ_c)	-0.01	0.26	-0.51	0.49	1.00	10134	8481
cor(npm_val_h155v135115,npm_val_h155v135115:VQ_c)	0.01	0.26	-0.50	0.51	1.00	11301	9644
cor(VQ_c,npm_val_h155v135115:VQ_c)	0.10	0.26	-0.43	0.59	1.00	9328	9290
cor(face_gender_c:npm_val_h135v115,npm_val_h155v135115:VQ_c)	0.02	0.26	-0.50	0.53	1.00	10040	9938
cor(face_gender_c:npm_val_h155v135115,npm_val_h155v135115:VQ_c)	-0.02	0.27	-0.53	0.49	1.00	9331	9709
cor(face_gender_c:VQ_c,npm_val_h155v135115:VQ_c)	0.01	0.27	-0.50	0.53	1.00	9162	9717
cor(npm_val_h135v115:VQ_c,npm_val_h155v135115:VQ_c)	0.00	0.27	-0.51	0.52	1.00	7731	9290
cor(Intercept,face_gender_c:npm_val_h135v115:VQ_c)	0.08	0.25	-0.42	0.54	1.00	12990	9163
cor(face_gender_c,face_gender_c:npm_val_h135v115:VQ_c)	-0.03	0.27	-0.54	0.49	1.00	12200	8796
cor(npm_val_h135v115,face_gender_c:npm_val_h135v115:VQ_c)	0.06	0.27	-0.46	0.56	1.00	10095	9396

Parameter	Estimate	Est.Error	l-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
cor(npm_val_h155v135115,face_gender_c:npm_val_h135v115:VQ_c)	-0.02	0.27	-0.52	0.51	1.00	11348	9704
cor(VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.26	-0.52	0.50	1.00	10521	10174
cor(face_gender_c:npm_val_h135v115,face_gender_c:npm_val_h135v115:VQ_c)	0.01	0.26	-0.50	0.52	1.00	10782	9849
cor(face_gender_c:npm_val_h155v135115,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.26	-0.52	0.50	1.00	9048	9315
cor(face_gender_c:VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	0.00	0.27	-0.51	0.51	1.00	8629	9499
cor(npm_val_h135v115:VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	0.00	0.27	-0.51	0.52	1.00	8106	9011
cor(npm_val_h155v135115:VQ_c,face_gender_c:npm_val_h135v115:VQ_c)	-0.01	0.27	-0.53	0.51	1.00	8557	9550
cor(Intercept,face_gender_c:npm_val_h155v135115:VQ_c)	0.29	0.20	-0.16	0.65	1.00	9265	7075
cor(face_gender_c,face_gender_c:npm_val_h155v135115:VQ_c)	-0.25	0.25	-0.68	0.27	1.00	6282	6959
cor(npm_val_h135v115,face_gender_c:npm_val_h155v135115:VQ_c)	0.02	0.26	-0.49	0.52	1.00	7585	7690
cor(npm_val_h155v135115,face_gender_c:npm_val_h155v135115:VQ_c)	0.10	0.25	-0.41	0.57	1.00	6902	8947
cor(VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.11	0.25	-0.38	0.57	1.00	8581	9896
cor(face_gender_c:npm_val_h135v115,face_gender_c:npm_val_h155v135115:VQ_c)	-0.04	0.26	-0.53	0.47	1.00	7964	9102
cor(face_gender_c:npm_val_h155v135115,face_gender_c:npm_val_h155v135115:VQ_c)	-0.04	0.27	-0.54	0.48	1.00	8118	9852
cor(face_gender_c:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.01	0.26	-0.50	0.51	1.00	8860	9984
cor(npm_val_h135v115:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.02	0.26	-0.49	0.51	1.00	8257	9157
cor(npm_val_h155v135115:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.11	0.26	-0.42	0.58	1.00	6790	9259
cor(face_gender_c:npm_val_h135v115:VQ_c,face_gender_c:npm_val_h155v135115:VQ_c)	0.03	0.26	-0.48	0.52	1.00	8441	9687

Regression Coefficients:

Parameter	Estimate	Est.Error	1-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
Intercept	7.52	0.08	7.35	7.68	1.00	665	1434
face_gender_c	-0.01	0.02	-0.06	0.03	1.00	7651	8183
VQ_c	-0.06	0.03	-0.11	-0.01	1.00	8194	8074
npm_val_h135v115	-0.02	0.02	-0.05	0.02	1.00	9151	8912
npm_val_h155v135115	0.00	0.01	-0.02	0.02	1.00	9371	8606
face_gender_c:VQ_c	-0.04	0.04	-0.13	0.05	1.00	10903	8900
face_gender_c:npm_val_h135v115	-0.06	0.03	-0.12	-0.00	1.00	9040	8879
face_gender_c:npm_val_h155v135115	-0.00	0.02	-0.03	0.03	1.00	11549	8495
VQ_c:npm_val_h135v115	0.01	0.03	-0.04	0.07	1.00	8387	7883
VQ_c:npm_val_h155v135115	0.01	0.02	-0.02	0.05	1.00	8978	8568
face_gender_c:VQ_c:npm_val_h135v115	0.04	0.05	-0.07	0.15	1.00	11814	9340
face_gender_c:VQ_c:npm_val_h155v135115	-0.02	0.04	-0.09	0.05	1.00	7785	8590

Further Distributional Parameters:

Parameter	Estimate	Est.Error	1-95% CI	u-95% CI	Rhat	Bulk_ESS	Tail_ESS
sigma	0.48	0.01	0.46	0.50	1.00	7921	8292
ndt	758.32	22.98	710.01	799.83	1.00	8237	7588

Draws were sampled using sampling(NUTS). For each parameter, Bulk_ESS and Tail_ESS are effective sample size measures, and Rhat is the potential scale reduction factor on split chains (at convergence, Rhat = 1).

Table A12: Bayesian shifted log-normal regression model summary on reaction time data from the creakiness rating task.

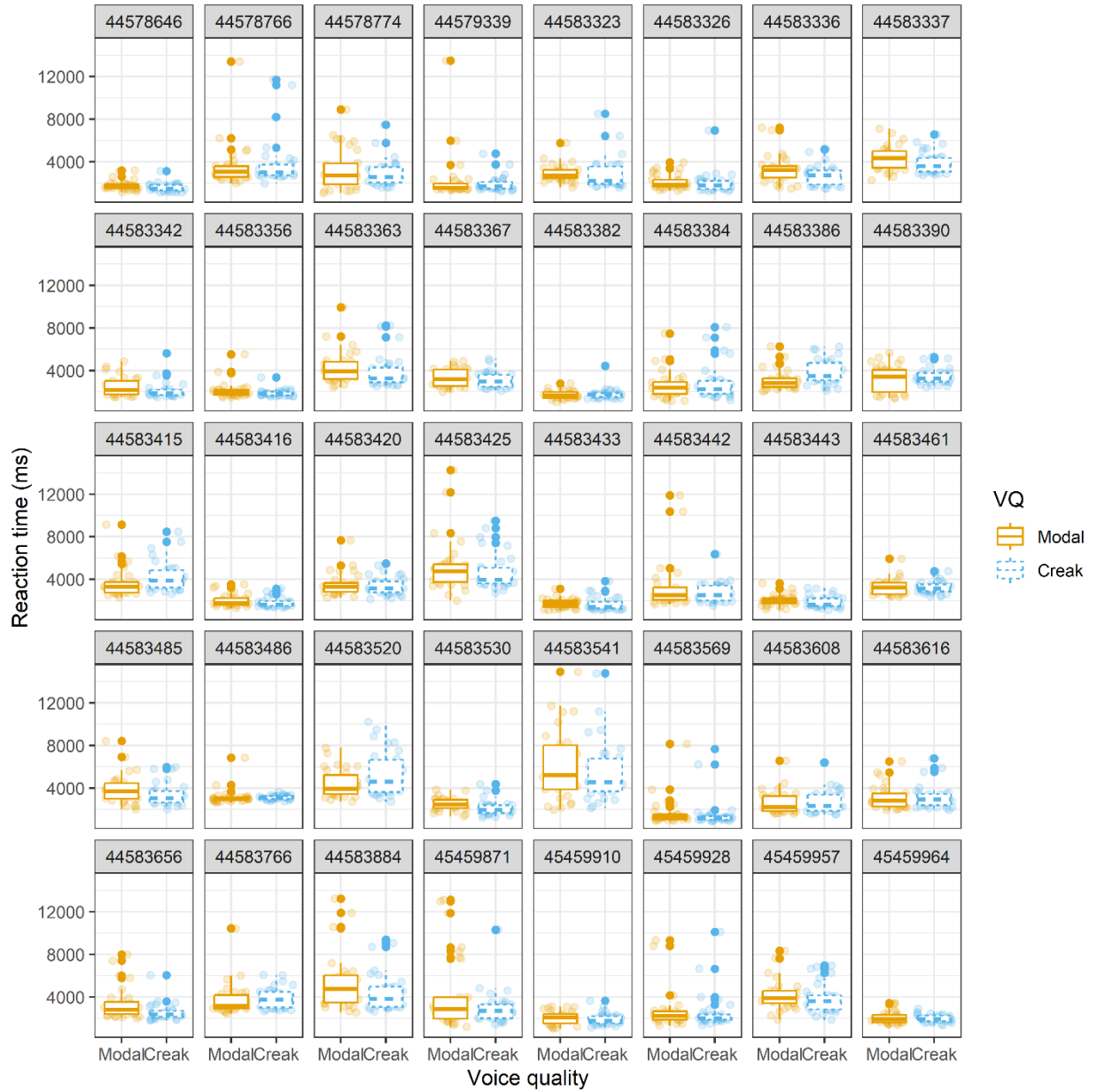


Figure A13: Empirical reaction time (in ms) by voice quality (x-axis, colour, line type), and participant ID (facet).

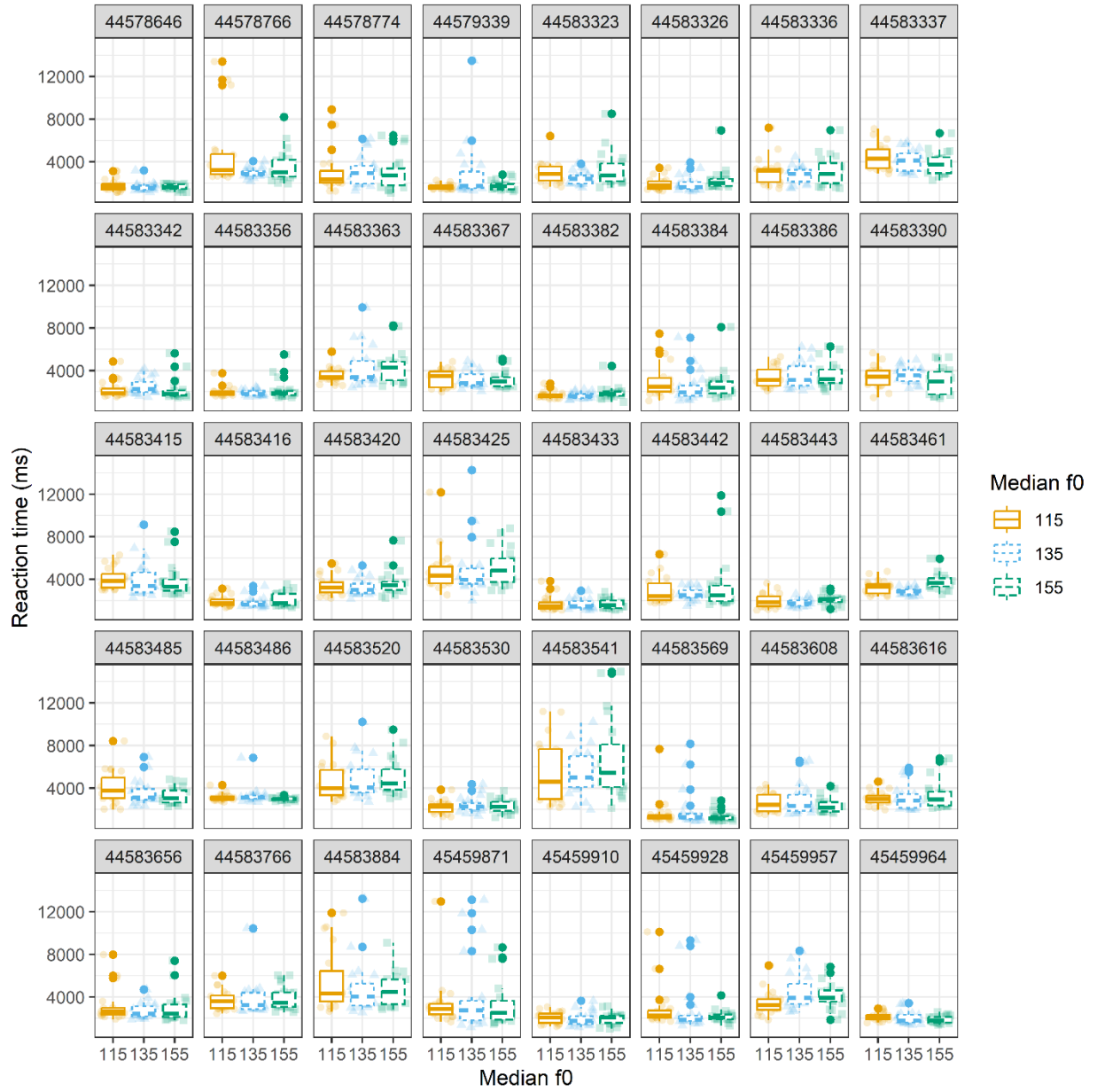


Figure A14: Empirical reaction time (in ms) by f0 (x-axis, colour, line type), and participant ID (facet).

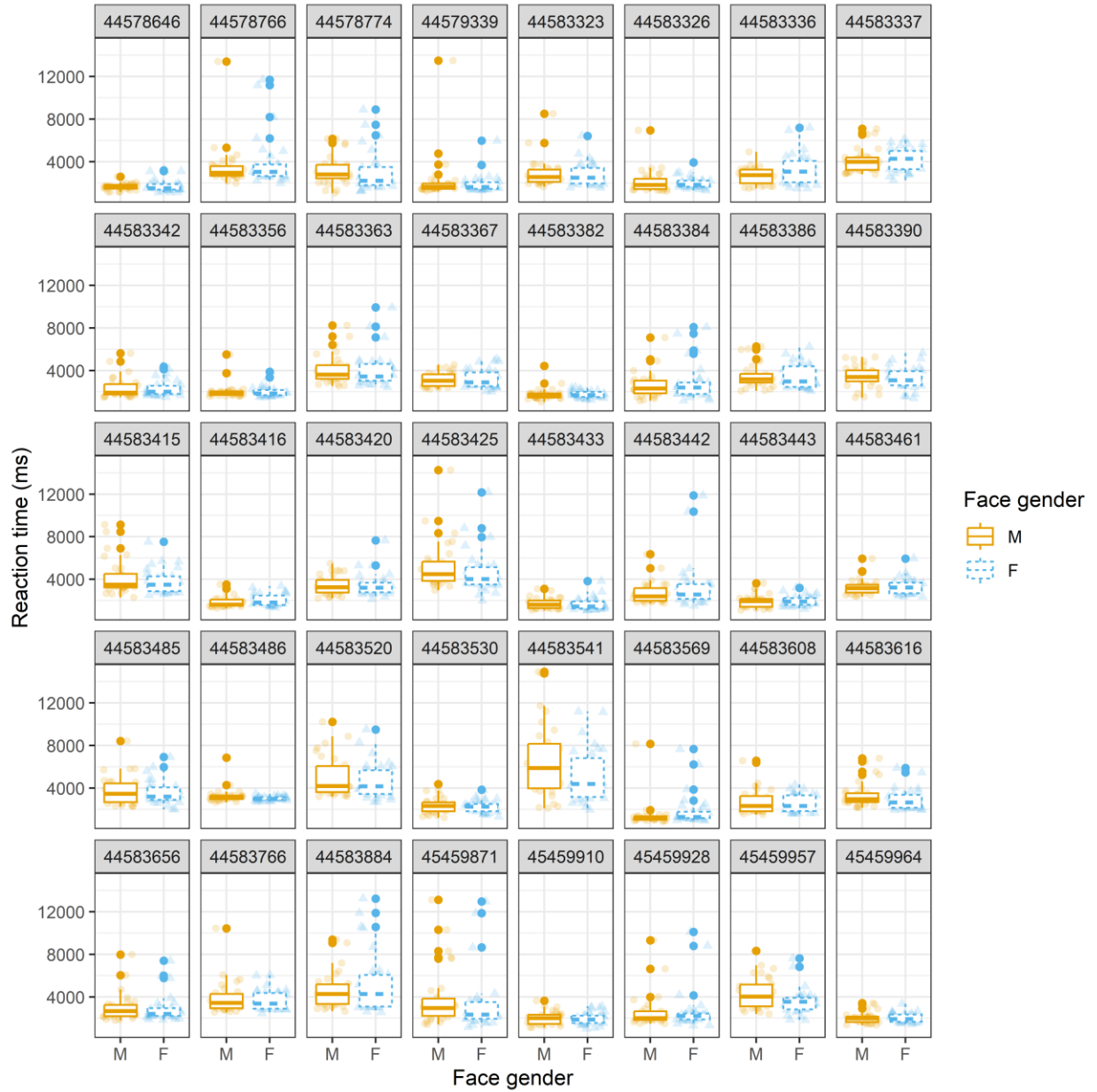


Figure A15: Empirical reaction time (in ms) by face gender (x-axis, colour, line type), and participant ID (facet).

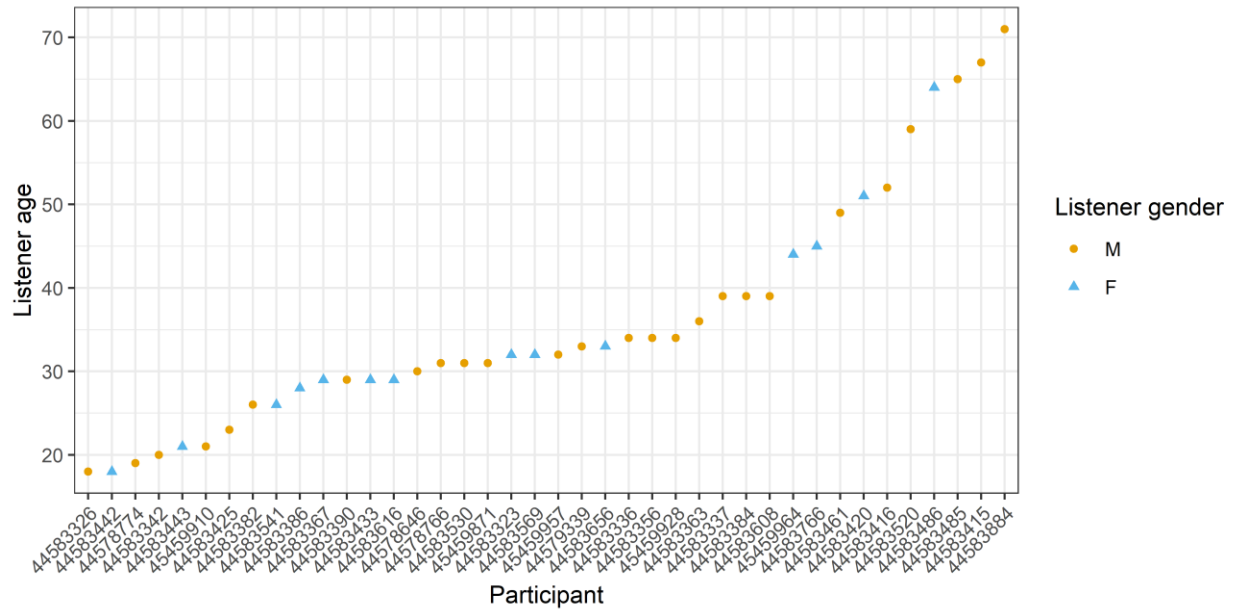


Figure A16: Participant IDs plotted by age and gender.

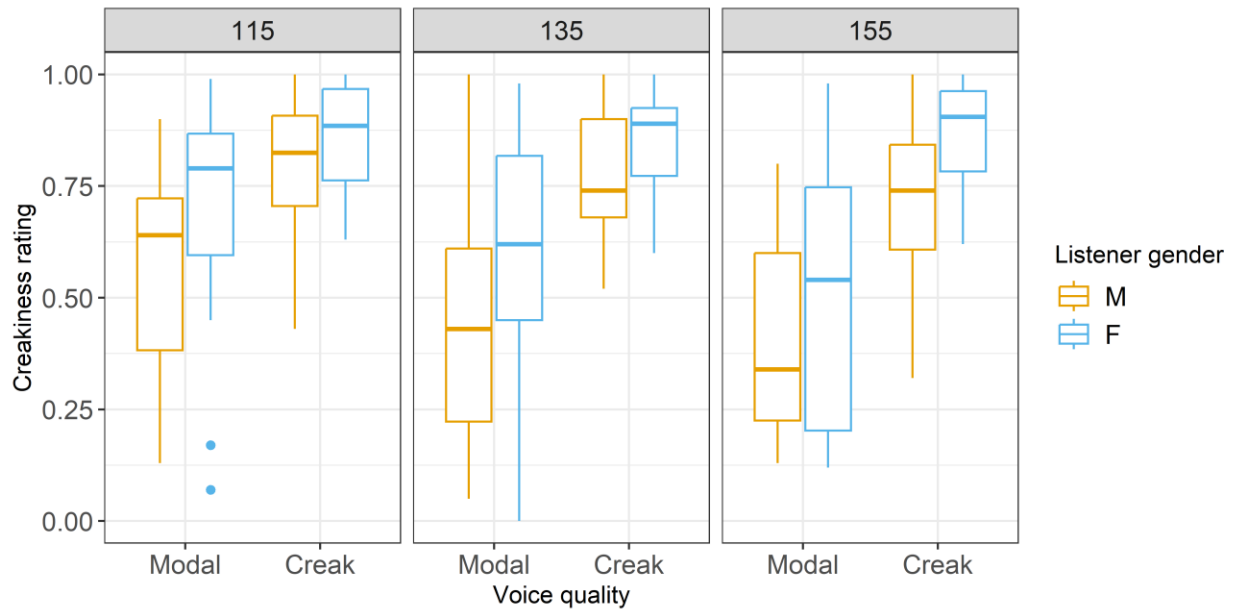


Figure A17: Empirical creakiness ratings plotted by voice quality, median f0, and listener gender.

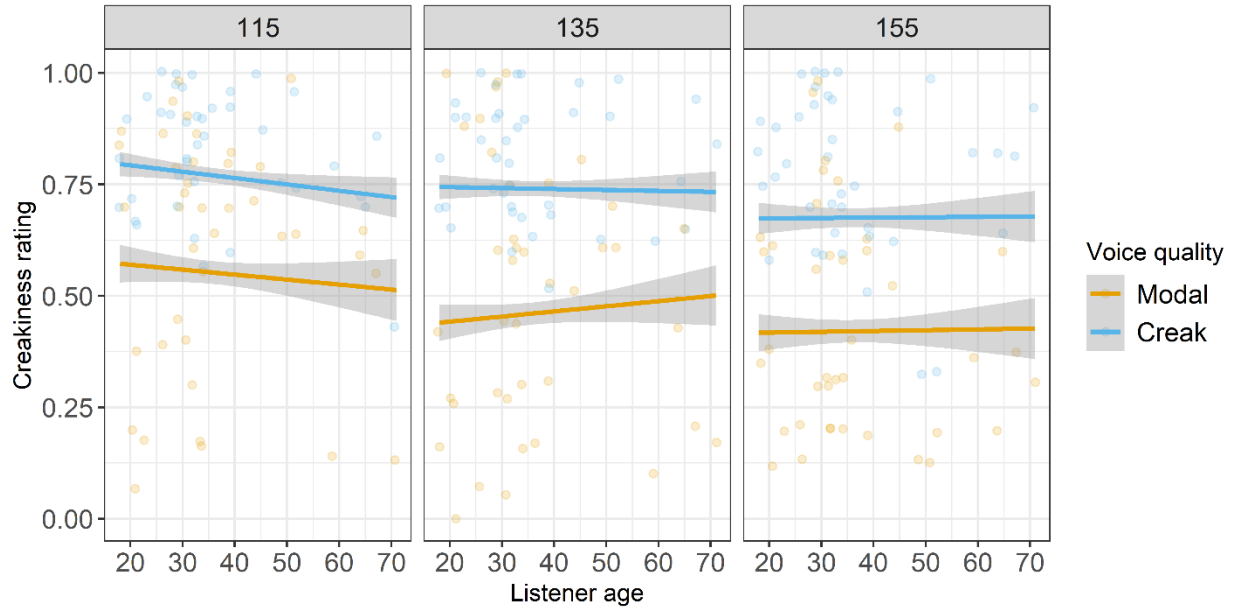


Figure A18: Empirical creakiness ratings plotted by voice quality, median f0, and listener age.