Supplementary material

1) List of stimulus sentences

1. Yesterday, Shima said "beat"?
2. Yesterday, Sasan said "sugar candy".
3. Yesterday, Nina said "red".
4. Yesterday, Hamed said "white"?
5. Yesterday, Elham said "crocodile".
6. Yesterday, Mahsa said "cashmere".
7. Yesterday, Rana said "army"?
8. Yesterday, Sasan said "suger candy"?
9. Yesterday, Hamed said "white".
10. Yesterday, Elham said "crocodile"?
11. Yesterday, Nina said "red"?
12. Yesterday, Kusha said "dumbbells"?
13. Yesterday, Leila said "mustache"?
14. Yesterday, Leila said "mustache".
15. Yesterday, Sasan said "kebab"?
16. Yesterday, Kusha said "dumbbells".
17. Yesterday, Rana said "army".
18. Yesterday, Mahsa said "cashmere"?
19. Yesterday, Shima said "beat".
20. Yesterday, Sasan said "kebab".

2) Statistical modelling

Dependent variables:

1. Left eyebrow raising,
2. Right eyebrow raising,
3. Right eye opening,
4. Left eye opening,
5. Lip aperture,
6. Lip spreading,
7. Word duration,
8. Mean amplitude difference of the stressed syllable and unstressed syllable

Factors with levels:

9. Speech mode [whispered, normal]
10. Sentence type [question, statement]
11. Mask condition [with mask, without mask]
12. Speech type [reading, semi-spontaneous]
13. Vowel [a, e, i]

2.1 Left eyebrow raising

Initial_model <- lmer (left eyebrow raising ~ speech_mode * sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type | word), data = data)

Final_model <- lmer (left eyebrow raising ~ speech_mode * sentence_type + speech_mode * mask_condition + sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 |word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	5.115e+01	9.741e-01	1.080e+01	52.517	2.34e-14 ***
speech_mode [whispered]	7.177e-01	1.625e-01	1.251e+01	4.416	0.000762 ***
sentence_type [statement]	-9.529e-01	1.735e-01	1.183e+01	-5.494	0.000145 ***
mask_condition [without_mask]	-1.688e+00	3.588e-01	9.639e+00	-4.705	0.000923 ***
gender [male]	3.869e-02	9.683e-01	8.350e+00	0.040	0.969067
speech_type [semi_spontaneous]	1.511e-01	1.422e-01	9.084e+00	1.063	0.315263
vowel e	9.922e-03	6.942e-02	1.146e+01	0.143	0.888829
vowel i	-2.535e-02	7.940e-02	1.040e+01	-0.319	0.755866
speech_mode:sentence_type	-2.726e-01	8.152e-02	1.404e+03	-3.344	0.000846 ***
speech_mode:mask_condition	-2.934e-01	8.370e-02	1.408e+03	-3.505	0.000471 ***
sentence_type:mask_condition	1.284e-01	8.400e-02	1.408e+03	1.528	0.126680

Contrast	estimate	SE	df	t.ratio	p.value
Normal, Question vs. Whispered Question	-0.571	0.155	10.47	-3.676	0.0176
Normal Question vs. Normal Statement	0.889	0.167	10.13	5.319	0.0015
Normal Question vs. Whispered Statement	0.590	0.212	9.00	2.789	0.0824
Whispered Question vs. Normal Statement	1.460	0.229	9.01	6.365	0.0006
Whispered Question vs. Whispered Statement	1.161	0.168	10.23	6.931	0.0002
Normal Statement vs. Whispered Statement	-0.298	0.155	10.32	-1.929	0.2747
Normal, with mask vs. Whispered, with mask	-0.581	0.157	10.87	-3.702	0.0160
Normal, with mask vs. Normal, without mask	1.624	0.363	9.08	4.479	0.0067
Normal, with mask vs. Whispered, without mask	1.336	0.358	8.84	3.733	0.0206
Whispered, with mask vs. Normal, without mask	2.205	0.420	8.91	5.254	0.0025
Whispered, with mask vs. Whispered, without mask	1.917	0.363	9.11	5.286	0.0022
Normal, without mask vs. Whispered, without mask	-0.288	0.154	10.07	-1.874	0.2970

2.2 Right eyebrow raising

Initial_model <- lmer (right eyebrow raising ~ speech_mode * sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type | word), data = data)

Final_model <- lmer (right eyebrow raising ~ speech_mode * sentence_type + speech_mode * mask_condition + sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1| word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	52.56063	1.43863	8.57546	36.535	1.03e-10 ***
speech_mode [whispered]	0.72995	0.29455	10.20373	2.478	0.03221 *
sentence_type [statement]	-0.88865	0.16975	13.29155	-5.235	0.00015 ***
mask_condition [without_mask]	-1.77593	0.44875	9.08353	-3.957	0.00326 **
gender [male]	-1.85295	0.65419	15.53240	-2.832	0.01228 *
speech_type [semi_spontaneous]	0.05079	0.26138	9.04389	0.194	0.85021
vowel e	-0.01338	0.07236	9.89548	-0.185	0.85706
vowel i	0.03639	0.08241	8.22575	-0.442	0.67014
speech_mode:sentence_type	-0.20586	0.09321	1400.60641	-2.208	0.02738 *
speech_mode:mask_condition	-0.61186	0.09597	1406.35668	-6.375	2.47e-10 ***
sentence_type:mask_condition	-0.07365	0.09578	1405.42054	-0.769	0.44209

Contrast	estimate	SE	df	t.ratio	p.value
Normal, Question vs. Whispered Question	-0.424	0.289	9.52	-1.465	0.4924
Normal Question vs. Normal Statement	0.925	0.161	10.65	5.735	0.0007
Normal Question vs. Whispered Statement	0.707	0.294	9.00	2.403	0.1459
Whispered Question vs. Normal Statement	1.349	0.352	9.01	3.831	0.0173
Whispered Question vs. Whispered Statement	1.131	0.162	10.80	6.982	0.0001
Normal Statement vs. Whispered Statement	-0.218	0.289	9.47	-0.755	0.8724
Normal, with mask vs. Whispered, with mask	-0.6270	0.291	9.67	-2.158	0.2023
Normal, with mask vs. Normal, without mask	1.8128	0.450	9.13	4.029	0.0127
Normal, with mask vs. Whispered, without mask	1.7976	0.356	8.93	5.043	0.0032
Whispered, with mask vs. Normal, without mask	2.4398	0.661	8.99	3.690	0.0214
Whispered, with mask vs. Whispered, without mask	2.4246	0.451	9.21	5.373	0.0019
Normal, without mask vs. Whispered, without mask	-0.0152	0.288	9.37	-0.053	0.9999

2.3 Left eye opening

Initial_model <- lmer (left eye opening ~ speech_mode * sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type | word), data = data)

Final_model <- lmer (left eye opening ~ speech_mode * sentence_type + speech_mode * mask_condition + sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1| word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	15.58995	0.48539	11.54381	32.118	1.18e-12 ***
speech_mode [whispered]	0.19889	0.05482	27.44286	3.628	0.00115 **
sentence_type [statement]	-0.50329	0.07332	15.28426	-6.864	4.87e-06 ***
mask_condition [without_mask]	-0.30041	0.35216	9.09946	-0.853	0.41553
gender [male]	-0.92005	0.47896	8.62361	-1.921	0.08834 .
speech_type [semi_spontaneous]	0.05490	0.08209	9.02896	0.669	0.52034
vowel e	-0.03881	0.05843	10.32632	-0.664	0.52110
vowel i	-0.04811	0.05529	9.87379	-0.870	0.40481
speech_mode:sentence_type	0.03515	0.04649	1396.78586	0.756	0.44972
speech_mode:mask_condition	-0.05999	0.04722	1348.11264	-1.270	0.20422
sentence_type:mask_condition	-0.01866	0.04769	1385.95294	-0.391	0.69561

2.4 Right eye opening

Initial_model <- lmer (right eye opening ~ speech_mode * sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type | word), data = data)

Final_model <- lmer (right eye opening ~ speech_mode * sentence_type + speech_mode * mask_condition + sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1|word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	15.52661	0.39433	11.23586	39.374	2.13e-13 ***
speech_mode [whispered]	0.20101	0.07111	16.43352	2.827	0.0119 *
sentence_type [statement]	-0.44295	0.07620	14.65217	-5.813	3.75e-05 ***
mask_condition [without_mask]	-0.18175	0.28730	9.14354	-0.633	0.5425
gender [male]	-0.75113	0.29872	14.89999	-2.514	0.0239 *
speech_type [semi_spontaneous]	-0.03976	0.07897	8.91471	-0.503	0.6268
vowel e	-0.02868	0.05733	10.11728	-0.500	0.6276
vowel i	-0.03267	0.05376	9.50523	-0.608	0.5576
speech_mode:sentence_type	0.03812	0.04637	1396.21051	0.822	0.4112
speech_mode:mask_condition	-0.05790	0.04740	1388.95475	-1.221	0.2222
sentence_type:mask_condition	-0.06027	0.04753	1383.09000	-1.268	0.2050

2.5 Lip spreading

Initial_model <- lmer (lip spreading ~ speech_mode * sentence_type + gender + speech_type + vowel + (1 + speech_mode + sentence_type + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + speech_type | word), data = data)

Final_model <- lmer (lip spreading ~ speech_mode * sentence_type + gender + speech_type + vowel + (1 + speech_mode + sentence_type | participant) + (1 | word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	58.6647	1.6083	9.8739	36.477	7.34e-12 ***
speech_mode [whispered]	-1.7045	1.0523	9.6066	-1.620	0.13760
sentence_type [statement]	0.4441	0.2775	101.7940	1.601	0.11258
gender [male]	5.3181	2.0745	8.1937	2.564	0.03283 *
speech_type [semi_spontaneous]	-0.9103	0.1880	760.0029	-4.843	1.55e-06 ***
vowel e	2.4429	0.4765	7.0397	5.127	0.00133 **
vowel i	2.3512	0.4761	7.0156	4.939	0.00167 **
speech_mode:sentence_type	0.3246	0.3759	759.9979	0.864	0.38808

2.6 Lip aperture

Initial_model <- lmer (lip aperture ~ speech_mode * sentence_type + gender + speech_type + vowel + (1 + speech_mode + sentence_type + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + speech_type | word), data = data)

Final_model <- lmer (lip aperture ~ speech_mode * sentence_type + gender + speech_type + vowel + (1 + speech_mode + sentence_type + speech_type + vowel| participant) + (1| word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	31.0035	3.4615	9.9353	8.957	4.52e-06 ***
speech_mode [whispered]	1.2958	0.2239	11.0241	5.788	0.000120 ***
sentence_type [statement]	-0.9403	0.1734	12.8313	-5.423	0.000122 ***
gender [male]	-4.5262	2.0370	8.0007	-2.222	0.057002 .
speech_type [semi_spontaneous]	-3.7100	3.4744	8.9993	-1.068	0.313408
vowel e	-0.3547	0.4849	14.0519	-0.731	0.476525
vowel i	-0.5952	0.4832	13.9761	-1.232	0.238331
speech_mode:sentence_type	-0.5105	0.1392	725.4411	-3.667	0.000264 **

Contrast	estimate	SE	df	t.ratio	p.value
Normal, Question vs. Whispered Question	-1.296	0.224	11.0	-5.788	0.0006
Normal Question vs. Normal Statement	0.940	0.173	12.8	5.423	0.0006
Normal Question vs. Whispered Statement	0.155	0.278	9.0	0.557	0.9424
Whispered Question vs. Normal Statement	2.236	0.252	9.0	8.884	<.0001
Whispered Question vs. Whispered Statement	1.451	0.173	12.7	8.387	<.0001
Normal Statement vs. Whispered Statement	-0.785	0.224	11.0	-3.507	0.0217

2.7 Word duration

Initial_model <- lmer (word duration ~ speech_mode * sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type |word), data = data)

Final_model <- lmer (word duration ~ speech_mode * sentence_type + speech_mode * mask_condition + sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type |word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	6.711e-01	4.016e-02	1.870e+01	16.710	1.07e-12 ***
speech_mode [whispered]	3.625e-02	9.829e-03	1.741e+01	3.688	0.001764 **
sentence_type [statement]	-1.189e-01	1.576e-02	1.090e+01	-7.544	1.20e-05 ***
mask_condition [without_mask]	-1.485e-03	7.986e-03	2.102e+01	-0.186	0.854303
gender [male]	6.157e-02	2.089e-02	7.997e+00	2.947	0.018522 *
speech_type [semi_spontaneous]	3.027e-03	6.371e-03	1.106e+01	0.475	0.643908
vowel e	4.079e-02	3.349e-02	8.680e+00	1.218	0.255370
vowel i	2.199e-02	3.348e-02	8.674e+00	0.657	0.528428
speech_mode:sentence_type	1.211e-02	5.432e-03	1.516e+03	2.229	0.025982 *
speech_mode:mask_condition	-1.947e-02	5.432e-03	1.516e+03	-3.585	0.000348 ***
sentence_type:mask_condition	1.067e-02	5.432e-03	1.516e+03	1.965	0.049621 *

Contrast	estimate	SE	df	t.ratio	p.value
Normal, Question vs. Whispered Question	-0.0265	0.00945	14.84	-2.806	0.0580
Normal Question vs. Normal Statement	0.1135	0.01552	10.26	7.313	0.0001
Normal Question vs. Whispered Statement	0.0749	0.01419	12.61	5.279	0.0008
Whispered Question vs. Normal Statement	0.1400	0.02073	9.39	6.757	0.0003
Whispered Question vs. Whispered Statement	0.1014	0.01552	10.26	6.534	0.0003
Normal Statement vs. Whispered Statement	-0.0386	0.00945	14.84	-4.087	0.0049
Normal, with mask vs. Whispered, with mask	-0.04230	0.00945	14.8	-4.478	0.0023
Normal, with mask vs. Normal, without mask	-0.00385	0.00751	16.3	-0.513	0.9549
Normal, with mask vs. Whispered, without mask	-0.02668	0.01162	13.4	-2.295	0.1483
Whispered, with mask vs. Normal, without mask	0.03845	0.01126	11.3	3.416	0.0244
Whispered, with mask vs. Whispered, without mask	0.01562	0.00751	16.2	2.081	0.2006
Normal, without mask vs. Whispered, without mask	-0.02283	0.00945	14.8	-2.416	0.1170
Question, with mask vs. Statement, with mask	0.112817	0.01552	10.3	7.268	0.0001
Question, with mask vs. Question, without mask	0.011222	0.00751	16.3	1.494	0.4630
Question, with mask vs. Statement, without mask	0.113366	0.01832	11.1	6.189	0.0003
Statement, with mask vs. Question, without mask	-0.101596	0.01515	9.1	-6.704	0.0004
Statement, with mask vs. Statement, without mask	0.000549	0.00751	16.3	0.073	0.9999
Question, without mask vs. Statement, without mask	0.102144	0.01552	10.3	6.580	0.0003

2.8 Mean amplitude difference of the stressed syllable and unstressed syllable

Initial_model <- lmer (mean amplitude ~ speech_mode * sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1 + speech_mode + sentence_type + mask_condition + speech_type |word), data = data)

Final_model <- lmer (mean amplitude ~ speech_mode * sentence_type + speech_mode * mask_condition + sentence_type * mask_condition + gender + speech_type + vowel + (1 + speech_mode + sentence_type + mask_condition + speech_type + vowel| participant) + (1+ sentence_type |word), data = data)

	estimate	std. error	df	t=value	p=value
Intercept	2.53729	1.12138	15.42428	2.263	0.038486 *
speech_mode [whispered]	-3.24218	0.69622	16.99915	-4.657	0.000226 ***
sentence_type [statement]	-3.47724	0.59252	26.04606	-5.869	3.43e-06 ***
mask_condition [without_mask]	-0.93191	0.50789	41.08097	-1.835	0.073773 .
gender [male]	-0.67846	0.52737	23.97326	-1.287	0.210551
speech_type [semi_spontaneous]	-0.13868	0.35922	11.15773	-0.386	0.706712
vowel e	-0.45568	1.07066	14.33401	-0.426	0.676714
vowel i	-2.16259	0.78310	9.74346	-2.762	0.020539 *
speech_mode:sentence_type	2.68642	0.50701	1539.46578	5.299	1.34e-07 ***
speech_mode:mask_condition	0.05836	0.50704	1539.55554	0.115	0.908388
sentence_type:mask_condition	0.42696	0.50701	1539.46577	0.842	0.399855

Contrast	estimate	SE	df	t.ratio	p.value
Normal, Question vs. Whispered Question	3.2130	0.648	12.53	4.955	4.955
Normal Question vs. Normal Statement	3.2638	0.536	15.44	6.089	6.089
Normal Question vs. Whispered Statement	3.7903	0.736	9.48	5.151	5.151
Whispered Question vs. Normal Statement	0.0508	0.786	9.45	0.065	0.065
Whispered Question vs. Whispered Statement	0.5773	0.536	15.43	1.077	1.077
Normal Statement vs. Whispered Statement	0.5266	0.649	12.54	0.812	0.812

3) Correlation

3.1 Word duration and left eyebrow raising

Model <- lmer (z_scored_ left_eyebrow_raising ~ z_scored_word_duration + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	7.394e-03	8.409e-02	1.706e+02	0.088	0.9309
z_scored_word_duration	6.218e-02	3.711e-02	7.706e+02	1.676	0.0942 **.**

3.2 Word duration and right eyebrow raising

Model <- lmer (z_scored_ right_eyebrow_raising ~ z_scored_word_duration + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	7.637e-03	7.271e-02	1.766e+01	0.105	0.917536
z_scored_word_duration	1.341e-01	3.660e-02	5.625e+02	3.663	**0.000273 *** **

3.3 Word duration and left eye-opening

Model <- lmer (z_scored_ left_eye_opening ~ z_scored_word_duration + (1 + z_scored_word_duration | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	0.00669	0.07629	18.04431	0.088	0.931085
z_scored_word_duration	0.12310	0.03677	636.07025	3.348	**0.000861 *** **

3.4 Word duration and right eye-opening

Model <- lmer (z_scored_ right_eye_opening ~ z_scored_word_duration + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	6.137e-03	7.618e-02	1.761e+01	0.081	0.93670
z_scored_word_duration	1.045e-01	3.683e-02	6.221e+02	2.836	**0.00471 ** **

3.5 Word duration and lip aperture

Model <- lmer (z_scored_ lip aperture ~ z_scored_word_duration + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	2.521e-03	9.806e-02	1.875e+01	0.026	0.97976
z_scored_word_duration	1.504e-01	4.705e-02	5.035e+02	3.196	**0.00148 ****

3.6 Word duration and lip spreading

Model <- lmer (z_scored_ lip_spreading ~ z_scored_word_duration + (1 | participant) + (1 + z_scored_word_duration | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	0.02597	0.12862	18.86980	0.202	0.842
z_scored_word_duration	-0.05785	0.05573	21.79961	-1.038	0.311

3.7 Mean amplitude difference (normalized amplitude) and left eyebrow raising

Model <- lmer (z_scored_ left_eyebrow_raising ~ z_scored_amplitude_stressed_syllable + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	5.170e-03	8.986e-02	1.892e+01	0.058	0.955
z_scored _amplitude	3.129e-02	4.193e-02	1.448e+03	0.746	0.456

3.8 Normalized amplitude and right eyebrow raising

Model <- lmer (z_scored_ right_eyebrow_raising ~ z_scored_amplitude_stressed_syllable + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	4.975e-03	8.533e-02	1.894e+01	0.058	0.954
z_scored _amplitude	4.882e-02	4.228e-02	1.440e+03	1.155	0.248

3.9 Normalized amplitude and left eye-opening

Model <- lmer (z_scored_ left_eye_opening ~ z_scored_amplitude_stressed_syllable + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	2.781e-03	8.580e-02	1.892e+01	0.032	0.974
z_scored_amplitude	8.011e-02	4.206e-02	1.450e+03	1.905	0.057 .

3.10 Normalized amplitude and right eye-opening

Model <- lmer (z_scored_ right_eye_opening ~ z_scored_amplitude_stressed_syllable + (1 | participant) + (1 | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	2.094e-03	8.525e-02	1.892e+01	0.025	0.9807
z_scored _amplitude	7.779e-02	4.209e-02	1.450e+03	1.848	0.0648 .

3.11 Normalized amplitude and lip aperture

Model <- lmer (z_scored_ lip_ aperture ~ z_scored_amplitude_stressed_syllable + (1 | participant) + (1 | sentence), data = data1)

|	estimate	std. error	df	t=value	p=value
Intercept	1.307e-03	1.307e-03	1.885e+01	0.013	0.990
z_scored _amplitude	8.314e-02	8.314e-02	7.841e+02	1.481	0.139

3.12 Normalized amplitude and lip spreading

Model <- lmer (z_scored_ lip_ spreading ~ z_scored_amplitude_stressed_syllable + (1 | participant) + (1 + z_scored_amplitude_stressed_syllable | sentence), data = data1)

	estimate	std. error	df	t=value	p=value
Intercept	-0.00809	0.14070	18.90301	-0.057	0.955
z_scored _amplitude	0.06436	0.07560	18.39713	0.851	0.406

3. Inter-individual difference of left and right eyebrow raising in speech mode and mask condition
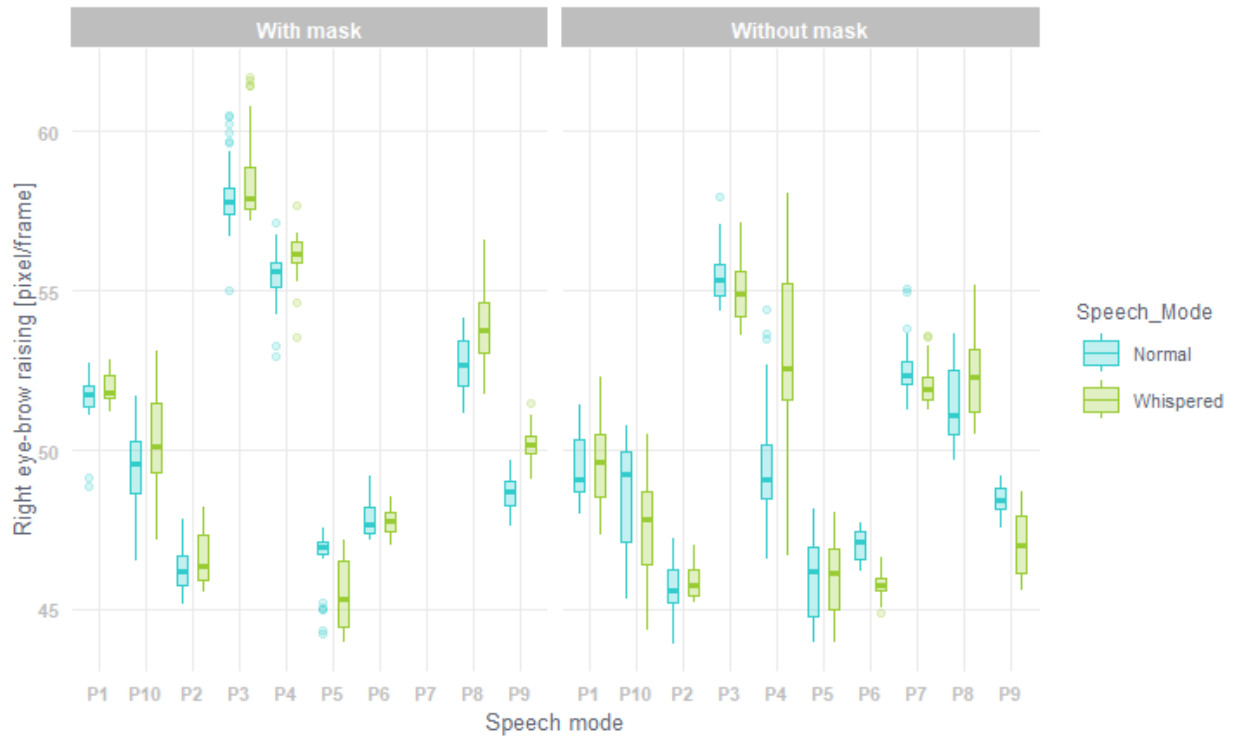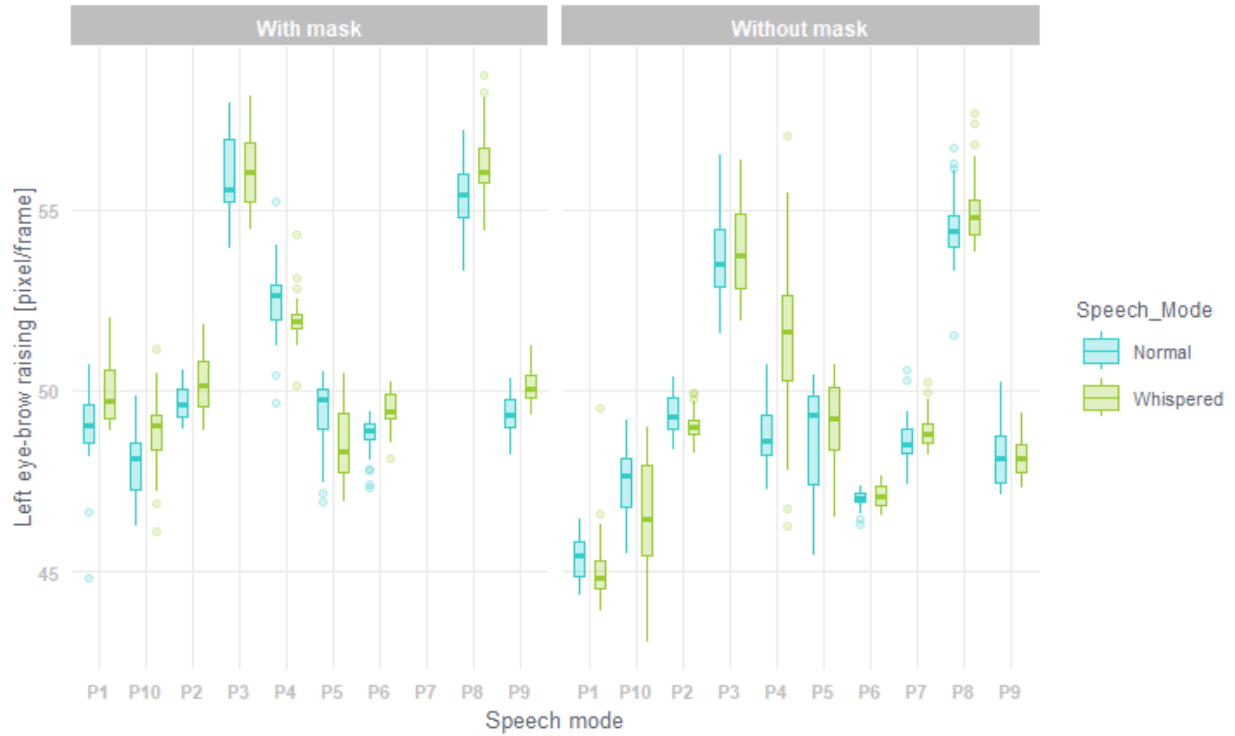
4. Inter-individual variation of mean amplitude difference when a face mask is utilized.