

Supplemental Material

Repair or Violation Detection? Pre-Attentive Processing Strategies of Phonotactic Illegality Demonstrated on the Constraint of g-Deletion in German

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For reasons of straightforwardness, only effects based on CZ electrode position are reported in the main article. Full topographical analyses as well as separate analyses for each of the data sets obtained from Experiments 1 and 2 are provided in the following supplementary material. Each table delivers the analyzed factors with factor levels, all possible factor interactions, F-value, original degrees of freedom, Greenhouse-Geisser epsilon (where appropriate) and partial eta-squared indicating effect size. The asterisk(s) next to the F-value represent(s) statistical significance with $p < .05$ (*), $p < .01$ (**), or $p < .001$ (***). Sections are numbered corresponding to the results sections of the main article.

3.1 Nasal change: segmental iMMN in Contrast 3

Effects attributable to the change of the nasals in Contrast 3 were analyzed by means of an overall univariate four-way mixed design ANOVA with the within-subject factors PLACE (place of articulation: coronal/dorsal), POSITION (F-/C-/P-line) and LATERALITY (3-/z-/4-line), and the between-subjects factor EXPERIMENT (1/2). Subsequently, broken down Analyses are given separately for Experiment 1 and 2.

Nasal change (overall): 216-256 ms (Experiment 1) and 208-248 ms (Experiment 2)					
Source	Factor Levels	F	df	G-G-ε	η _p ²
PLACE	2: coronal/dorsal	55.154***	1,30		.648
POSITION	3: frontal/central/parietal	13.631***	2,60	.589	.312
LATERALITY	3: left/central/right	11.462***	2,60	.775	.276
EXPERIMENT	2: untrained/professional speaker	5.780*	1,30		.162
PLACE*EXPERIMENT		3.269	1,30		.089
POSITION*EXPERIMENT		14.753***	2,60	.589	.330
LATERALITY*EXPERIMENT		5.992**	2,60	.775	.166
PLACE*POSITION		2.983	2,60	.567	.090
PLACE*POSITION*EXPERIMENT		.024	2,60	.567	.001
PLACE*LATERALITY		1.523	2,60	.679	.048
PLACE*LATERALITY*EXPERIMENT		.184	2,60	.679	.006
POSITION*LATERALITY		1.197	4,120	.783	.038
POSITION*LATERALITY*EXPERIMENT		.355	4,120	.783	.012
PLACE*POSITION*LATERALITY		1.529	4,120	.649	.049
PLACE*POSITION*LATERALITY*EXPERIMENT		.262	4,120	.649	.009

Nasal change (Experiment 1): 216-256 ms					
Source	Factor Levels	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	52.842***	1,15		.779

POSITION	3: frontal/central/parietal	17.650***	2,30	.556	.541
LATERALITY	3: left/central/right	9.931**	2,30	.731	.389
PLACE*POSITION		1.254	2,30	.530	.077
PLACE*LATERALITY		1.024	2,30	.663	.064
POSITION*LATERALITY		.828	4,60	.808	.052
PLACE*POSITION*LATERALITY		1.891	4,60	.648	.112
Nasal change (Experiment 2): 208-248 ms (Experiment 2)					
Quelle	Faktorstufen	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	13.229**	1,15		.469
POSITION	3: frontal/central/parietal	2.129	2,30	.637	.124
LATERALITY	3: left/central/right	5.953*	2,30	.827	.284
PLACE*POSITION		2.033	2,30	.653	.119
PLACE*LATERALITY		.677	2,30	.625	.043
POSITION*LATERALITY		.723	4,60	.679	.046
PLACE*POSITION*LATERALITY		.284	4,60	.623	.019

3.2 Illegality effects in all contrasts

For analyzing possible effects due to the phonotactic (ill)legality of the stimuli, two univariate three-way mixed-design ANOVAs were run according to the Phonotactic Repair Hypothesis (see section 3.2.1) and the Evaluation Hypothesis (see section 3.2.2).

3.2.1 Phonotactic Repair Hypothesis: iMMN in Contrasts1 & 2

Effects elicited by the pseudowords [ɔndo1], [ɔno1], [ɔNgo2],and [ɔNo2] were analyzed using the within-subject factors PLACE (place of articulation: coronal/dorsal), SEGMENT (segmental structure: with/without plosive), POSITION (F-/C-/P-line) and LATERALITY (3-/z-/4-line), and and the between-subjects factor EXPERIMENT (1/2). Subsequenetly, broken down Analyses are given separately for Experiment 1 and 2.

Repair Hypothesis (overall): stimuli with plosive: 376 to 416ms (Experiment 1) and 357 to 397ms (Experiment 2) stimuli without plosive: 342 to 382ms (Experiment 1) and 348 to 388ms (Experiment 2)					
Source	Factor Levels	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	5.732*	1,30		.160
SEGMENT	2: with plosive/without plosive	3.892	1,30		.115
POSITION	3: frontal/central/parietal	6.334	2,60	.586	.174
LATERALITY	3: left/central/right	.945	2,30	.634	.031
EXPERIMENT	2: untrained/professional speaker	11.297**	1,30		.274
PLACE*EXPERIMENT		.299	1,30		.010
SEGMENT*EXPERIMENT		1.897	1,30		.059
POSITION*EXPERIMENT		7.345**	2,60	.586	.197
LATERALITY*EXPERIMENT		.228	2,60	.634	.008

PLACE*SEGMENT	4.009	1,30		.118
PLACE*SEGMENT*EXPERIMENT	.824	1,30		.027
PLACE*POSITION	3.274	2,60	.580	.098
PLACE*POSITION*EXPERIMENT	.149	2,60	.580	.005
SEGMENT*POSITION	.584	2,60	.687	.019
SEGMENT*POSITION*EXPERIMENT	.229	2,60	.687	.008
PLACE*SEGMENT*POSITION	.519	2,60	.564	.017
PLACE*SEGMENT*POSITION*EXPERIMENT	.040	2,60	.564	.001
PLACE*LATERALITY	.191	2,60	.919	.006
PLACE*LATERALITY*EXPERIMENT	1.048	2,60	.919	.034
SEGMENT*LATERALITY	.792	2,60	.759	.026
SEGMENT*LATERALITY*EXPERIMENT	.630	2,60	.759	.021
PLACE*SEGMENT*LATERALITY	1.741	2,60	.670	.055
PLACE*SEGMENT*LATERALITY*EXPERIMENT	.617	2,60	.670	.020
POSITION*LATERALITY	1.968	4,120	.608	.062
POSITION*LATERALITY*EXPERIMENT	.852	4,120	.608	.028
PLACE*POSITION*LATERALITY	2.844*	4,120	.866	.087
PLACE*POSITION*LATERALITY*EXPERIMENT	1.909	4,120	.866	.060
SEGMENT*POSITION*LATERALITY	.933	4,120	.685	.030
SEGMENT*POSITION*LATERALITY*EXPERIMENT	.182	4,120	.685	.006
PLACE*SEGMENT*POSITION*LATERALITY	1.148	4,120	.730	.037
PLACE*SEGMENT*POSITION*LATERALITY*EXP.	1.070	4,120	.730	.034

Repair Hypothesis (Experiment 1):
stimuli with plosive: 376 to 416ms; stimuli without plosive: 342 to 382ms

Source	Factor Levels	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	3.453	1,15		.187
SEGMENT	2: with plosive/without plosive	.155	1,15		.010
POSITION	3: frontal/central/parietal	12.220**	2,30	.600	.449
LATERALITY	3: left/central/right	1.317	2,30	.711	.081
PLACE*SEGMENT		.601	1,15		.039
PLACE*POSITION		2.431	2,30	.602	.139
SEGMENT*POSITION		.035	2,30	.646	.002
PLACE*SEGMENT*POSITION		.118	2,30	.545	.008
PLACE*LATERALITY		.197	2,30	.928	.013
SEGMENT*LATERALITY		.068	2,30	.755	.005
PLACE*SEGMENT*LATERALITY		.137	2,30	.642	.009
POSITION*LATERALITY		1.977	4,60	.516	.116

PLACE*POSITION*LATERALITY		3.539*	4,60	.861	.191
SEGMENT*POSITION*LATERALITY		.363	4,60	.655	.024
PLACE*SEGMENT*POSITION*LATERALITY		1.013	4,60	.852	.063
Repair Hypothesis (Experiment 2): stimuli with plosive: 357 to 397ms; stimuli without plosive: 348 to 388ms					
Quelle	Faktorstufen	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	2.282	1,15		.132
SEGMENT	2: with plosive/without plosive	6.545*	1,15		.304
POSITION	3: frontal/central/parietal	.869	2,30	.558	.055
LATERALITY	3: left/central/right	.105	2,30	.585	.007
PLACE*SEGMENT		4.221	1,15		.220
PLACE*POSITION		1.072	2,30	.561	.067
SEGMENT*POSITION		.945	2,30	.659	.059
PLACE*SEGMENT*POSITION		1.008	2,30	.622	.063
PLACE*LATERALITY		1.084	2,30	.906	.067
SEGMENT*LATERALITY		1.516	2,30	.763	.092
PLACE*SEGMENT*LATERALITY		2.602	2,30	.693	.148
POSITION*LATERALITY		.586	4,60	.609	.038
PLACE*POSITION*LATERALITY		1.415	4,60	.791	.086
SEGMENT*POSITION*LATERALITY		1.104	4,60	.724	.069
PLACE*SEGMENT*POSITION*LATERALITY		1.175	4,60	.512	.073

3.2.2 Evaluation Hypothesis: iMMN of ɔNo/ɔno in all Contrasts

Deviance-related effects elicited by the pseudowords [ɔno1], [ɔNo2], [ɔno3], [ɔNo3] were analyzed using the within-subjects factors PLACE (place of articulation: coronal/dorsal), CONTEXT (original oddball contrast: same/different), POSITION (F-/C-/P-line) and LATERALITY (3-/z-/4-line), and with the between-subjects factor EXPERIMENT (1/2). Subsequenetly, broken down Analyses are given separately for Experiment 1 and 2.

Evaluation Hypothesis (overall): 216-256 ms (Experiment 1) and 208-248 ms (Experiment 2)					
Source	Factor Levels	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	1.069	1,30		.034
CONTEXT	2: analog/different	1.020	1,30		.033
POSITION	3: frontal/central/parietal	.696	2,60	.560	.023
LATERALITY	3: left/central/right	4.373*	2,60	.944	.127
EXPERIMENT	2: untrained/professional speaker	4.919*	1,30		.141
PLACE*EXPERIMENT		.716	1,30		.023
CONTEXT*EXPERIMENT		2.532	1,30		.078

POSITION*EXPERIMENT	7.194**	2,60	.560	.193
LATERALITY*EXPERIMENT	2.383	2,60	.944	.074
PLACE*CONTEXT	14.613**	1,30		.328
PLACE*CONTEXT*EXPERIMENT	.261	1,30		.009
PLACE*POSITION	.786	2,60	.621	.026
PLACE*POSITION*EXPERIMENT	.749	2,60	.621	.024
CONTEXT*POSITION	3.953*	2,60	.595	.116
CONTEXT*POSITION*EXPERIMENT	.705	2,60	.595	.023
PLACE*CONTEXT*POSITION	5.914*	2,60	.530	.165
PLACE*CONTEXT*POSITION*EXPERIMENT	.030	2,60	.530	.001
PLACE*LATERALITY	2.873	2,60	.866	.087
PLACE*LATERALITY*EXPERIMENT	2.718	2,60	.866	.083
CONTEXT*LATERALITY	2.672	2,60	.689	.082
CONTEXT*LATERALITY*EXPERIMENT	.350	2,60	.689	.012
PLACE*CONTEXT*LATERALITY	.167	2,60	.769	.006
PLACE*CONTEXT*LATERALITY*EXPERIMENT	.332	2,60	.769	.011
POSITION*LATERALITY	.421	4,120	.733	.014
POSITION*LATERALITY*EXPERIMENT	.700	4,120	.733	.023
PLACE*POSITION*LATERALITY	4.783**	4,120	.724	.138
PLACE*POSITION*LATERALITY*EXPERIMENT	1.234	4,120	.724	.040
CONTEXT*POSITION*LATERALITY	1.327	4,120	.710	.042
CONTEXT*POSITION*LATERALITY*EXPERIMENT	.290	4,120	.710	.010
PLACE*CONTEXT*POSITION*LATERALITY	.937	4,120	.717	.030
PLACE*CONTEXT*POSITION*LATERALITY*EXP.	1.692	4,120	.717	.053

Evaluation Hypothesis (Experiment 1): 216-256 ms					
Source	Factor Levels	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	.024	1,15		.002
CONTEXT	2: analog/different	.108	1,15		.007
POSITION	3: frontal/central/parietal	2.452	2,30	.530	.140
LATERALITY	3: left/central/right	5.909**	2,30	.948	.283
PLACE*CONTEXT		6.489*	1,15		.302
PLACE*POSITION		.586	2,30	.598	.038
CONTEXT*POSITION		1.183	2,30	.570	.073
PLACE*CONTEXT*POSITION		1.852	2,30	.524	.110

PLACE*LATERALITY	.114	2,30	.827	.008
CONTEXT*LATERALITY	1.807	2,30	.710	.108
PLACE*CONTEXT*LATERALITY	.094	2,30	.745	.006
POSITION*LATERALITY	.264	4,60	.557	.017
PLACE*POSITION*LATERALITY	2.937	4,60	.600	.164
CONTEXT*POSITION*LATERALITY	.914	4,60	.664	.057
PLACE*CONTEXT*POSITION*LATERALITY	2.117	4,60	.664	.124

Evaluation Hypothesis (Experiment 2): 208-248 ms (Experiment 2)

Quelle	Faktorstufen	F	df	G-G-ε	η _p ²
PLACE	2: alveolar/velar	1.412	1,15		.086
CONTEXT	2: analog/different	7.690*	1,15		.339
POSITION	3: frontal/central/parietal	6.451*	2,30	.614	.301
LATERALITY	3: left/central/right	.814	2,30	.667	.051
PLACE*CONTEXT		9.914**	1,15		.398
PLACE*POSITION		1.072	2,30	.607	.067
CONTEXT*POSITION		3.787	2,30	.607	.202
PLACE*CONTEXT*POSITION		5.957*	2,30	.546	.284
PLACE*LATERALITY		5.994**	2,30	.894	.286
CONTEXT*LATERALITY		.933	2,30	.644	.059
PLACE*CONTEXT*LATERALITY		.535	2,30	.765	.034
POSITION*LATERALITY		.987	4,60	.886	.062
PLACE*POSITION*LATERALITY		3.068*	4,60	.717	.170
CONTEXT*POSITION*LATERALITY		.660	4,60	.688	.042
PLACE*CONTEXT*POSITION*LATERALITY		.415	4,60	.659	.027