Supplementary Table S1

Within-subjects ANOVA of simple conditions group-averaged ERP amplitudes by stimulus factors and electrode location

Variable	df	F	partial η^2	p
Position	1, 49	157.91	.76	< .001**
Deviance	1, 49	50.25	.51	< .001**
Anteriority	1.30, 63.52	2.62	.05	.102
Hemisphere	1.55, 75.85	38.90	.44	< .001**
Position * Deviance	1, 49	0.47	.01	.495
Position * Anteriority	1.27, 62.01	55.58	.53	< .001**
Position * Hemisphere	1.66, 81.37	8.76	.15	.001*
Deviance * Anteriority	1.68, 82.27	28.40	.37	<.001**
Deviance * Hemisphere	1.22, 59.85	11.75	.19	.001*
Anteriority * Hemisphere	3.12, 152.62	4.82	.09	.003*
Position * Deviance * Anteriority	1.60, 78.26	1.85	.04	.171
Position * Deviance * Hemisphere	1.37, 67.19	1.05	.02	.333
Position * Anteriority * Hemisphere	2.96, 145.21	7.75	.14	<.001**
Deviance * Anteriority * Hemisphere	3.08, 150.74	2.26	.04	.082
Position * Deviance * Anteriority * Hemisphere	3.28, 161.05	0.03	<.01	.995

Note: $N = 50$. Degrees of freedom are reported using the Greenhouse-Geisser correction for all tests containing three or more factors. Significant effects are marked with an asterisk (* = $p < .05$, ** = $p < .001$).

Supplementary Table S2

Within-subjects ANOVA of rule condition group-averaged ERP amplitudes by stimulus factors and electrode location

Variable	df	F	partial η^2	p
Deviance	1, 49	0.23	<.01	.632
Anteriority	1.29, 62.99	7.61	.13	.004*
Hemisphere	1.58, 77.22	38.76	.44	< .001**
Deviance * Anteriority	1.45, 71.08	1.17	.02	.303
Deviance * Hemisphere	1.31, 64.06	2.00	.04	.158
Anteriority * Hemisphere	3.00, 146.87	6.86	.12	<.001**
Deviance * Anteriority * Hemisphere	3.05, 149.48	0.56	.01	.644

Note: N = 50. Degrees of freedom are reported using the Greenhouse-Geisser correction for all tests containing three or more factors. Significant effects are marked with an asterisk (* = $p < .05$, ** = $p < .001$).

Supplementary Table S3

Within-subjects ANOVA of simple conditions group-averaged latencies by stimulus factors and electrode location

Variable	df	F	partial η^2	p
Position	1, 47	67.58	.59	$< .001$**
Deviance	1, 47	16.44	.26	$< .001$**
Anteriority	1.29, 60.61	1.78	.04	.186
Hemisphere	1.67, 78.38	12.69	.21	$< .001$**
Position * Deviance	1, 47	6.52	.12	.014*
Position * Anteriority	1.55, 72.89	2.33	.05	.117
Position * Hemisphere	1.90, 89.43	5.43	.10	.007*
Deviance * Hemisphere	1.96, 95.26	1.84	.04	.166
Deviance * Anteriority	1.45, 68.11	0.27	.01	.693
Anteriority * Hemisphere	2.75, 129.20	3.85	.08	.013*
Position * Deviance * Anteriority	1.75, 82.11	0.93	.02	.387
Position * Deviance * Hemisphere	1.94, 90.92	3.05	.06	.054
Position * Anteriority * Hemisphere	2.92, 137.39	1.94	.04	.128
Deviance * Anteriority * Hemisphere	3.50, 164.47	0.78	.02	.523
Position * Deviance * Anteriority * Hemisphere	3.01, 141.31	0.69	.01	.562

Note: $N = 48$. Degrees of freedom are reported using the Greenhouse-Geisser correction for all tests containing three or more factors. Significant effects are marked with an asterisk (* = $p < .05$, ** = $p < .001$).

Supplementary Table S4

Pooled partial correlations for ERP difference waves (vMMN) amplitudes

Variable	Green Odd 2	Red Odd 1	Red Odd 2	Red Odd Rule	Green Odd Rule
Scalp Averaged Referenced					
Green Odd 1	.37*	-.20	.00	-.02	.13
Green Odd 2	—	-.06	.35*	-.08	022
Red Odd 1		—	.14	.34*	-.09
Red Odd 2			—	.02	-.11
Red Odd Rule				—	-.08
Laplacian Transformed					
Green Odd 1	.52*	-.07	-.15	-.19	.44*
Green Odd 2	—	.08	-.01	-.15	.40*
Red Odd 1		—	.40*	.26	.04
Red Odd 2			—	.51*	-.44*
Red Odd Rule				—	-.34*

Note: Correlations are reported controlling for variance due to age, sex, and minimum trial numbers. Green Odd 1 = ERP difference wave calculated from red standards minus green deviants in the first position of the stimulus pairs in the simple/green block, etc. "Odd" always refers to the color of the deviant stimulus in the relevant condition/stimulus position. Partial correlations were pooled across all imputed datasets. Correlations that are significant in the original dataset are marked with an asterisk (* = $p < .05$; uncorrected for six experimental conditions).
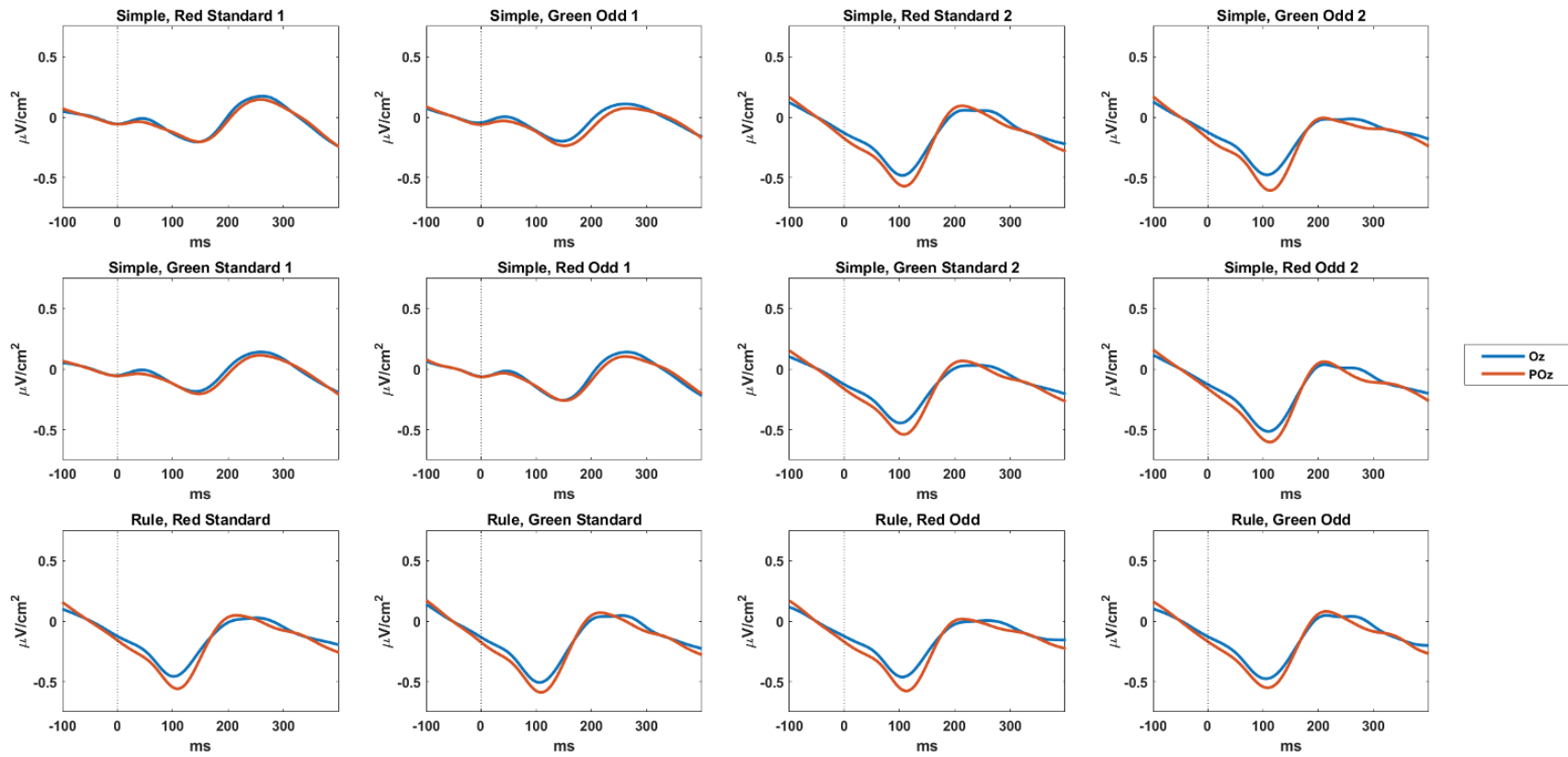
Supplementary Table S5

Pooled partial correlations for ERP difference waves (vMMN) latencies

Variable	Green Odd 2	Red Odd 1	Red Odd 2	Red Odd Rule	Green Odd Rule
Scalp Referenced					
Green Odd 1	.22	.06	-.14	.14	.09
Green Odd 2	—	-.20	-.06	-.06	.29
Red Odd 1		—	.44*	.06	.07
Red Odd 2			—	.05	.01
Red Odd Rule				—	-.03
Laplacian Transformed					
Green Odd 1	.26	.04	-.03	.07	.09
Green Odd 2	—	.33	.07	.07	.28
Red Odd 1		—	.29	.40*	-.03
Red Odd 2			—	.50*	-.32
Red Odd Rule				—	-.18

Note: Correlations are reported controlling for variance due to age, sex, and minimum trial numbers. Green Odd 1 = ERP difference wave calculated from red standards minus green deviants in the first position of the stimulus pairs in the simple/green block, etc. "Odd" always refers to the color of the deviant stimulus in the relevant condition/stimulus position. Partial correlations were pooled across all imputed datasets. Correlations that are significant in the original dataset are marked with an asterisk (* = $p < .05$; uncorrected for six experimental conditions).
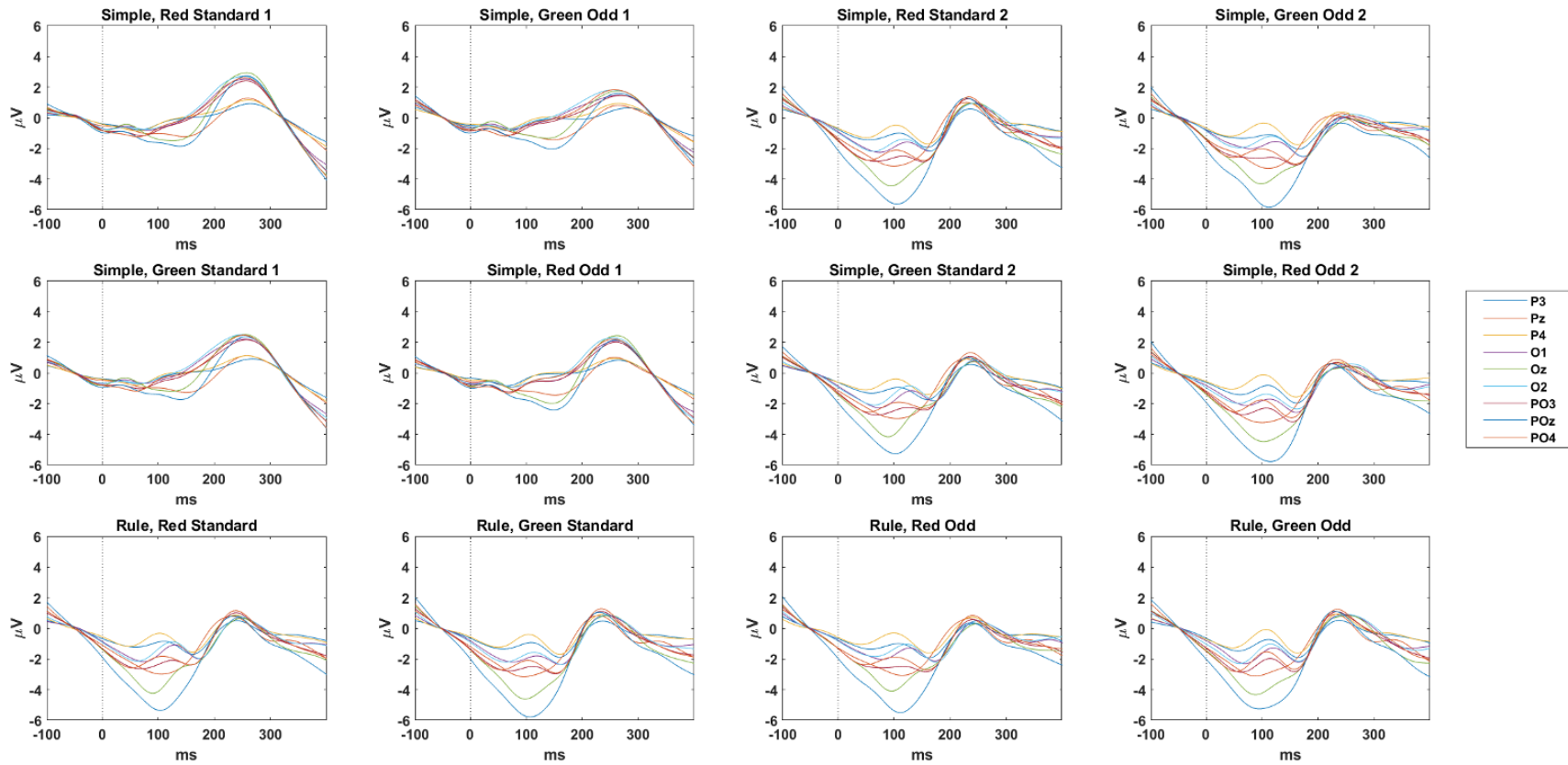
Supplementary Fig. S1. Plots depict the group-averaged, scalp-averaged reference ERPs for each stimulus condition, over all participants, in the nine electrodes of interest for that referencing approach. Variables extracted from these ERPs were used as inputs for the analyses of condition effects. Difference waves derived from these ERPs provided the basis for the analyses of individual differences effects (see Methods). Dotted lines indicate the time point of stimulus onset. Note the presence of anticipatory potentials in the pre-stimulus period for ERPs time-locked to the onset of second-position stimuli.
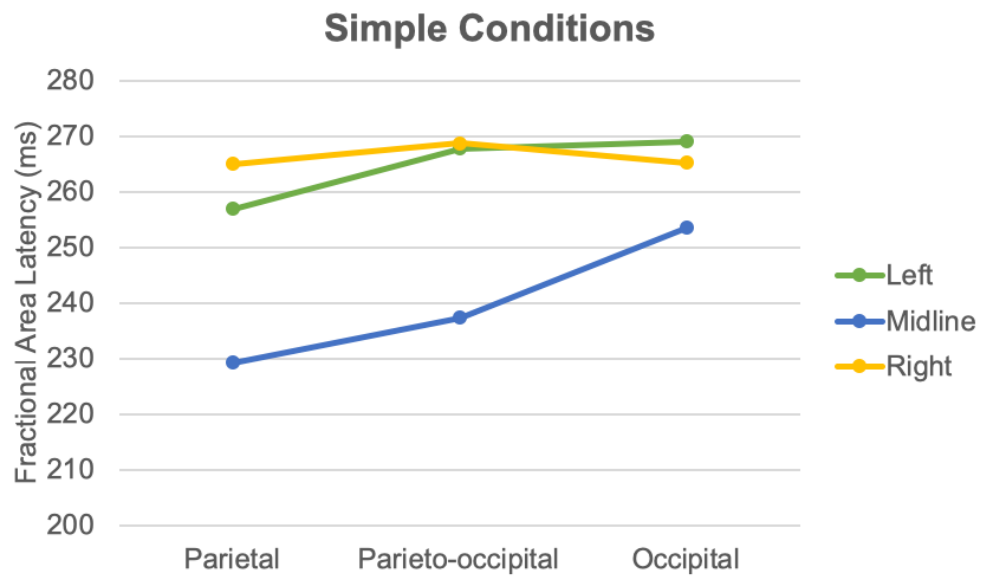
Supplementary Fig. S2. Plots depict the group-averaged, Laplacian transformed ERPs for each stimulus condition, over all participants, in the nine electrodes of interest for that referencing approach. Variables extracted from these ERPs were used as inputs for the analyses of condition effects. Difference waves derived from these ERPs provided the basis for the analyses of individual differences effects (see Methods). Dotted lines indicate the time point of stimulus onset. Note the presence of anticipatory potentials in the pre-stimulus period for ERPs time-locked to the onset of second-position stimuli.
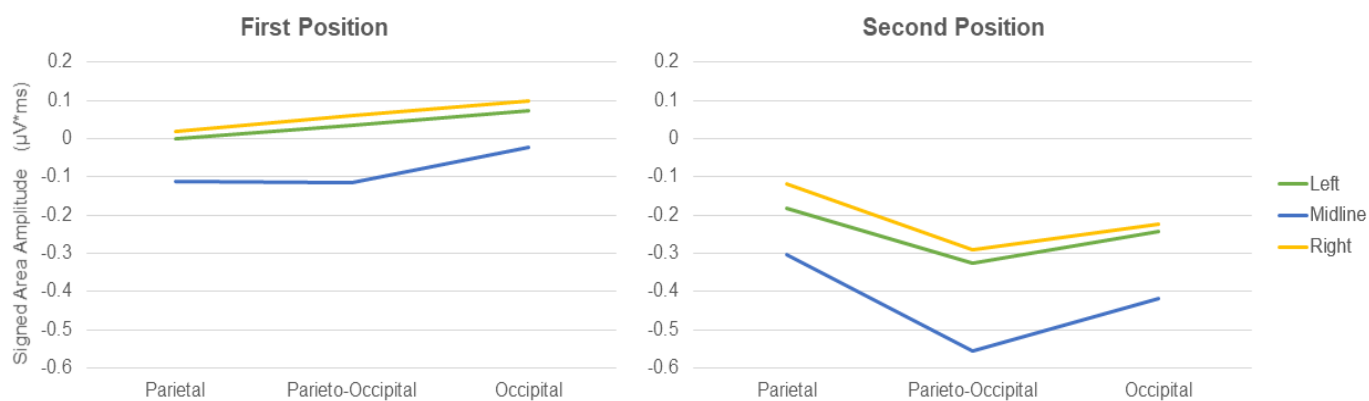
Supplementary Fig. S3. Interaction between stimulus Position, Anteriority, Hemisphere on the basis of group-averaged ERP amplitudes in the simple conditions. Values reflect negative integral ERP amplitudes for first and second-position stimuli, averaging over stimulus Deviance.
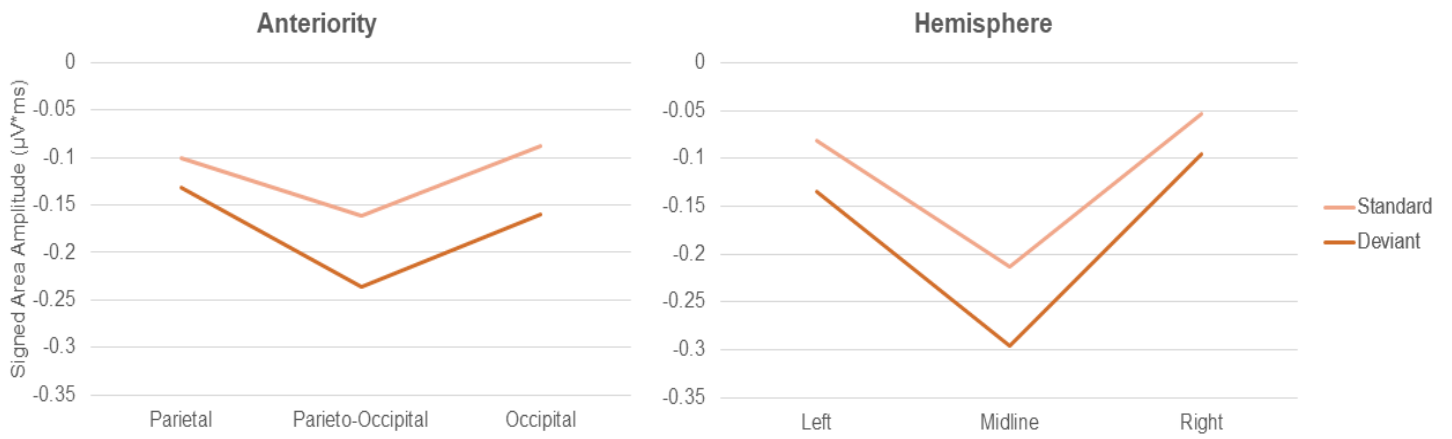
Supplementary Fig. S4. Interaction between stimulus Deviance and Anteriority and Deviance and Hemisphere on the basis of group-averaged ERP amplitudes in the simple conditions.

Simple Conditions

Supplementary Fig. S5. Interaction of Hemisphere and Anteriority on the basis of group-averaged ERP latencies in the simple conditions.
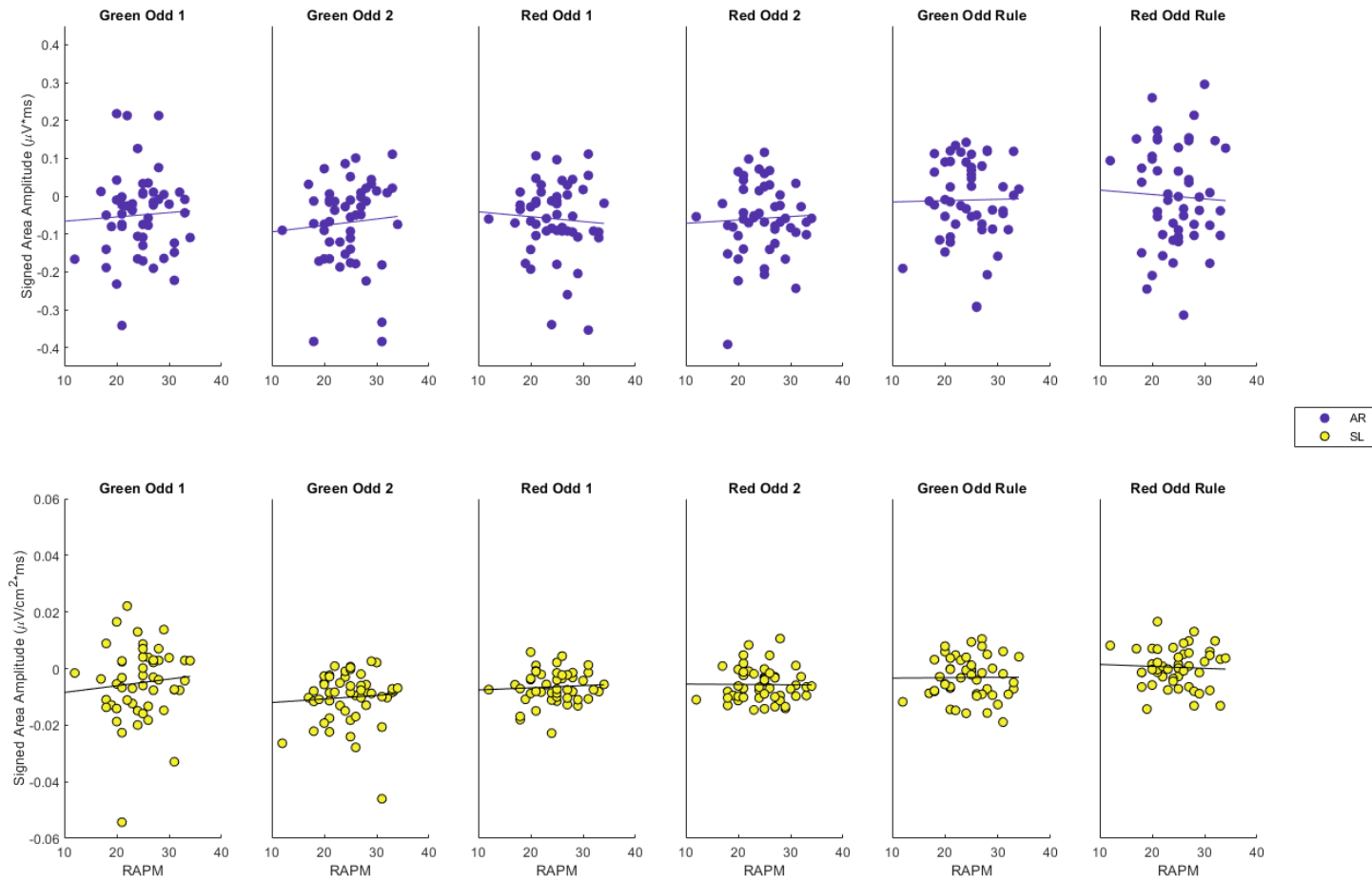
Supplementary Fig. S6. Scatterplots depict signed area amplitudes for each of the six vMMN difference waves plotted against RAPM scores, for the scalp-averaged reference and Laplacian-transformed data. Regression lines are plotted uncorrected for age, sex, and minimum trial numbers. RAPM = Ravens Advanced Progressive Matrices; AR = Scalp-averaged reference, SL = surface Laplacian.
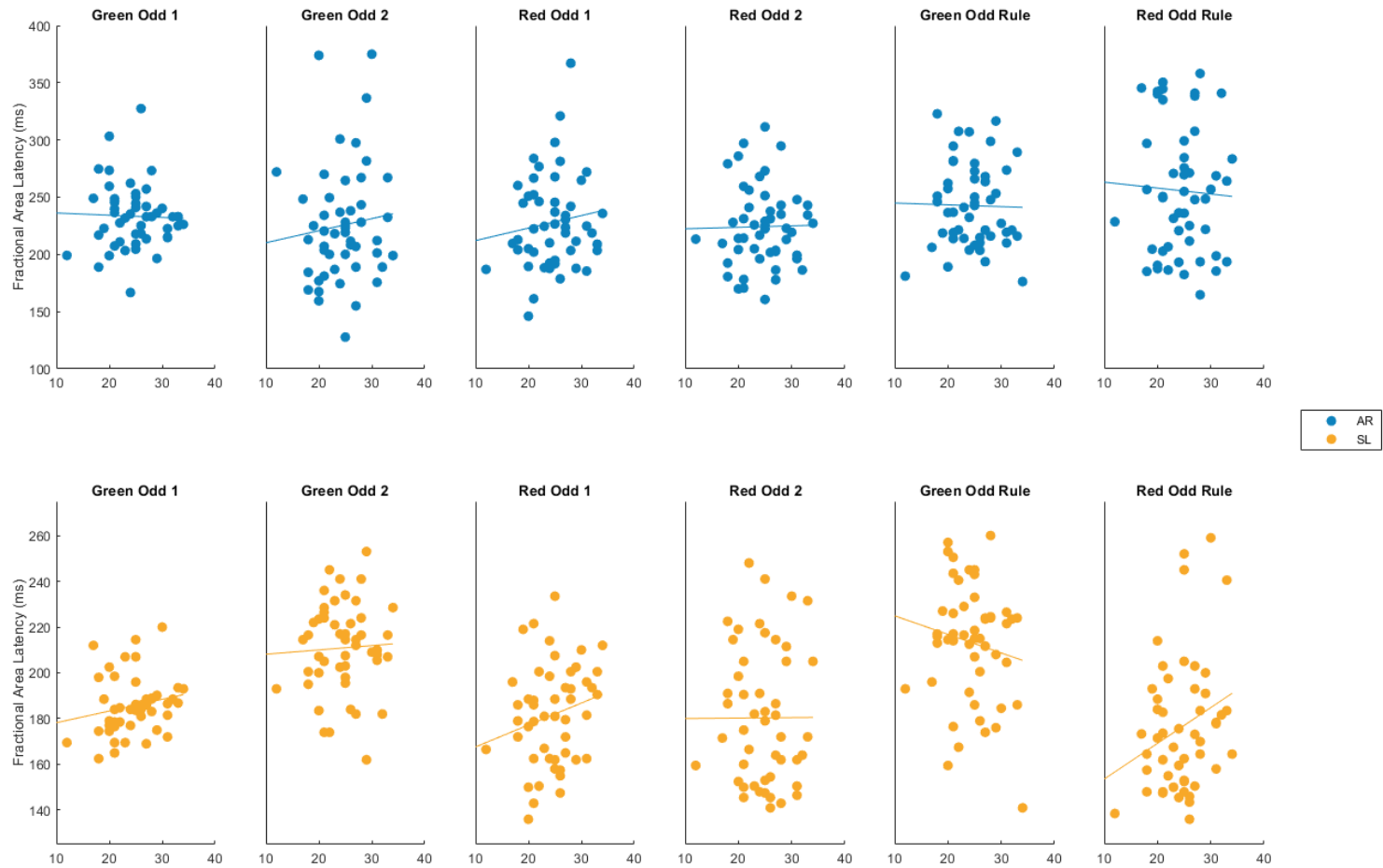
Supplementary Fig. S7. Scatterplots depict fractional area latencies for each of the six vMMN difference waves plotted against RAPM scores, for the scalp-averaged reference and Laplacian-transformed data. Regression lines are plotted uncorrected for age, sex, and minimum trial numbers. RAPM = Ravens Advanced Progressive Matrices; AR = Scalp-averaged reference, SL = surface Laplacian.