

## General Linear Model

### Mauchly's Test of Sphericity<sup>a</sup>

Measure: MovementTime2

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon <sup>b</sup> Greenhouse-Geisser
Cursor	.871	3.554	5	.615	.924
Amp	.382	25.015	2	<.001	.618
Width	.262	34.836	2	<.001	.575
Cursor * Amp	.386	23.593	20	.264	.808
Cursor * Width	.188	41.443	20	.003	.694
Amp * Width	.486	18.336	9	.032	.765
Cursor * Amp * Width	.013	99.467	77	.055	.635

### Mauchly's Test of Sphericity<sup>a</sup>

Measure: MovementTime2

Within Subjects Effect	Epsilon <sup>b</sup>	
	Huynh-Feldt	Lower-bound
Cursor	1.000	.333
Amp	.633	.500
Width	.585	.500
Cursor * Amp	1.000	.167
Cursor * Width	.837	.167
Amp * Width	.874	.250
Cursor * Amp * Width	.910	.083

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept

Within Subjects Design: Cursor + Amp + Width + Cursor \* Amp + Cursor \* Width + Amp \* Width + Cursor \* Amp \* Width

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

### Tests of Within-Subjects Effects

Measure: MovementTime2

Source		Type III Sum of Squares	df	Mean Square
Cursor	Sphericity Assumed	1.092	3	.364
	Greenhouse-Geisser	1.092	2.771	.394
	Huynh-Feldt	1.092	3.000	.364
	Lower-bound	1.092	1.000	1.092
Error(Cursor)	Sphericity Assumed	2.984	81	.037
	Greenhouse-Geisser	2.984	74.821	.040
	Huynh-Feldt	2.984	81.000	.037
	Lower-bound	2.984	27.000	.111
Amp	Sphericity Assumed	7.147	2	3.573
	Greenhouse-Geisser	7.147	1.236	5.782
	Huynh-Feldt	7.147	1.266	5.646
	Lower-bound	7.147	1.000	7.147
Error(Amp)	Sphericity Assumed	.762	54	.014
	Greenhouse-Geisser	.762	33.376	.023
	Huynh-Feldt	.762	34.177	.022
	Lower-bound	.762	27.000	.028
Width	Sphericity Assumed	14.435	2	7.218
	Greenhouse-Geisser	14.435	1.151	12.545
	Huynh-Feldt	14.435	1.169	12.348
	Lower-bound	14.435	1.000	14.435
Error(Width)	Sphericity Assumed	1.435	54	.027
	Greenhouse-Geisser	1.435	31.068	.046
	Huynh-Feldt	1.435	31.564	.045
	Lower-bound	1.435	27.000	.053
Cursor * Amp	Sphericity Assumed	.141	6	.023
	Greenhouse-Geisser	.141	4.848	.029
	Huynh-Feldt	.141	6.000	.023
	Lower-bound	.141	1.000	.141
Error(Cursor*Amp)	Sphericity Assumed	1.074	162	.007
	Greenhouse-Geisser	1.074	130.887	.008
	Huynh-Feldt	1.074	162.000	.007
	Lower-bound	1.074	27.000	.040
Cursor * Width	Sphericity Assumed	.038	6	.006
	Greenhouse-Geisser	.038	4.166	.009
	Huynh-Feldt	.038	5.020	.008
	Lower-bound	.038	1.000	.038
Error(Cursor*Width)	Sphericity Assumed	.865	162	.005
	Greenhouse-Geisser	.865	112.473	.008
	Huynh-Feldt	.865	135.551	.006
	Lower-bound	.865	27.000	.032

### Tests of Within-Subjects Effects

Measure: MovementTime2

Source		F	Sig.	Partial Eta Squared
Cursor	Sphericity Assumed	9.882	<.001	.268
	Greenhouse-Geisser	9.882	<.001	.268
	Huynh-Feldt	9.882	<.001	.268
	Lower-bound	9.882	.004	.268
Error(Cursor)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Amp	Sphericity Assumed	253.365	<.001	.904
	Greenhouse-Geisser	253.365	<.001	.904
	Huynh-Feldt	253.365	<.001	.904
	Lower-bound	253.365	<.001	.904
Error(Amp)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Width	Sphericity Assumed	271.533	<.001	.910
	Greenhouse-Geisser	271.533	<.001	.910
	Huynh-Feldt	271.533	<.001	.910
	Lower-bound	271.533	<.001	.910
Error(Width)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Cursor * Amp	Sphericity Assumed	3.537	.003	.116
	Greenhouse-Geisser	3.537	.005	.116
	Huynh-Feldt	3.537	.003	.116
	Lower-bound	3.537	.071	.116
Error(Cursor*Amp)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Cursor * Width	Sphericity Assumed	1.183	.318	.042
	Greenhouse-Geisser	1.183	.322	.042
	Huynh-Feldt	1.183	.321	.042
	Lower-bound	1.183	.286	.042
Error(Cursor*Width)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			

### Tests of Within-Subjects Effects

Measure: MovementTime2

Source		Type III Sum of Squares	df	Mean Square
Amp * Width	Sphericity Assumed	.576	4	.144
	Greenhouse-Geisser	.576	3.062	.188
	Huynh-Feldt	.576	3.498	.165
	Lower-bound	.576	1.000	.576
Error(Amp*Width)	Sphericity Assumed	.517	108	.005
	Greenhouse-Geisser	.517	82.673	.006
	Huynh-Feldt	.517	94.446	.005
	Lower-bound	.517	27.000	.019
Cursor * Amp * Width	Sphericity Assumed	.071	12	.006
	Greenhouse-Geisser	.071	7.626	.009
	Huynh-Feldt	.071	10.918	.006
	Lower-bound	.071	1.000	.071
Error(Cursor*Amp*Width)	Sphericity Assumed	1.445	324	.004
	Greenhouse-Geisser	1.445	205.901	.007
	Huynh-Feldt	1.445	294.787	.005
	Lower-bound	1.445	27.000	.054

### Tests of Within-Subjects Effects

Measure: MovementTime2

Source		F	Sig.	Partial Eta Squared
Amp * Width	Sphericity Assumed	30.086	<.001	.527
	Greenhouse-Geisser	30.086	<.001	.527
	Huynh-Feldt	30.086	<.001	.527
	Lower-bound	30.086	<.001	.527
Error(Amp*Width)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			
Cursor * Amp * Width	Sphericity Assumed	1.317	.207	.047
	Greenhouse-Geisser	1.317	.239	.047
	Huynh-Feldt	1.317	.214	.047
	Lower-bound	1.317	.261	.047
Error(Cursor*Amp*Width)	Sphericity Assumed			
	Greenhouse-Geisser			
	Huynh-Feldt			
	Lower-bound			

### Estimated Marginal Means

## 1. Grand Mean

Measure: MovementTime2

Mean	Std. Error	95% Confidence Interval	
		Lower Bound	Upper Bound
.248	.016	.216	.279

## 2. Cursor

### Estimates

Measure: MovementTime2

Cursor	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.201	.018	.165	.238
2	.231	.016	.198	.264
3	.278	.020	.237	.319
4	.279	.021	.237	.321

### Pairwise Comparisons

Measure: MovementTime2

(I) Cursor	(J) Cursor	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
1	2	-.030	.016	.456	-.076	.016
	3	-.077 <sup>*</sup>	.019	.003	-.132	-.021
	4	-.078 <sup>*</sup>	.016	<.001	-.124	-.032
2	1	.030	.016	.456	-.016	.076
	3	-.047	.017	.070	-.096	.002
	4	-.048	.018	.070	-.098	.002
3	1	.077 <sup>*</sup>	.019	.003	.021	.132
	2	.047	.017	.070	-.002	.096
	4	-.001	.015	1.000	-.045	.043
4	1	.078 <sup>*</sup>	.016	<.001	.032	.124
	2	.048	.018	.070	-.002	.098
	3	.001	.015	1.000	-.043	.045

Based on estimated marginal means

\*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

## 3. Amp

### Estimates

Measure: MovementTime2

Amp	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.140	.012	.116	.164
2	.258	.017	.223	.292
3	.345	.020	.305	.386

### Pairwise Comparisons

Measure: MovementTime2

(I) Amp	(J) Amp	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
1	2	-.118 <sup>*</sup>	.008	<.001	-.139	-.097
	3	-.206 <sup>*</sup>	.012	<.001	-.236	-.175
2	1	.118 <sup>*</sup>	.008	<.001	.097	.139
	3	-.088 <sup>*</sup>	.006	<.001	-.103	-.072
3	1	.206 <sup>*</sup>	.012	<.001	.175	.236
	2	.088 <sup>*</sup>	.006	<.001	.072	.103

Based on estimated marginal means

\*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

## 4. Width

### Estimates

Measure: MovementTime2

Width	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	.401	.023	.353	.449
2	.233	.016	.199	.266
3	.109	.009	.091	.127

### Pairwise Comparisons

Measure: MovementTime2

(I) Width	(J) Width	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
					Lower Bound	Upper Bound
1	2	.168 <sup>*</sup>	.010	<.001	.143	.194
	3	.292 <sup>*</sup>	.017	<.001	.248	.336
2	1	-.168 <sup>*</sup>	.010	<.001	-.194	-.143
	3	.124 <sup>*</sup>	.009	<.001	.100	.147
3	1	-.292 <sup>*</sup>	.017	<.001	-.336	-.248
	2	-.124 <sup>*</sup>	.009	<.001	-.147	-.100

Based on estimated marginal means

\*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

### 5. Cursor \* Amp

### Pairwise Comparisons

Measure: MovementTime2

Amp	(I) Cursor	(J) Cursor	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>
						Lower Bound
1	1	2	-.039 <sup>*</sup>	.013	.037	-.075
		3	-.053 <sup>*</sup>	.015	.009	-.096
		4	-.050 <sup>*</sup>	.013	.005	-.089
	2	1	.039 <sup>*</sup>	.013	.037	.002
		3	-.015	.012	1.000	-.048
		4	-.012	.013	1.000	-.049
	3	1	.053 <sup>*</sup>	.015	.009	.010
		2	.015	.012	1.000	-.018
		4	.003	.013	1.000	-.033
	4	1	.050 <sup>*</sup>	.013	.005	.012
		2	.012	.013	1.000	-.025
		3	-.003	.013	1.000	-.040
2	1	2	-.011	.022	1.000	-.073
		3	-.089 <sup>*</sup>	.024	.006	-.157
		4	-.086 <sup>*</sup>	.022	.004	-.150
	2	1	.011	.022	1.000	-.050
		3	-.077 <sup>*</sup>	.021	.006	-.137
		4	-.075 <sup>*</sup>	.022	.012	-.137
	3	1	.089 <sup>*</sup>	.024	.006	.021
		2	.077 <sup>*</sup>	.021	.006	.018
		4	.002	.021	1.000	-.058

## Pairwise Comparisons

Measure: MovementTime2

			95% Confidence Interval for <sup>b</sup> ...
Amp	(I) Cursor	(J) Cursor	Upper Bound
1	1	2	-.002
		3	-.010
		4	-.012
	2	1	.075
		3	.018
		4	.025
	3	1	.096
		2	.048
		4	.040
	4	1	.089
		2	.049
		3	.033
2	1	2	.050
		3	-.021
		4	-.022
	2	1	.073
		3	-.018
		4	-.013
	3	1	.157
		2	.137
		4	.063



### Pairwise Comparisons

Measure: MovementTime2

Amp	(I) Cursor	(J) Cursor	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for <sup>b</sup> ... Lower Bound
4		1	.086 <sup>*</sup>	.022	.004	.022
		2	.075 <sup>*</sup>	.022	.012	.013
		3	-.002	.021	1.000	-.063
3	1	2	-.040	.023	.570	-.107
		3	-.088 <sup>*</sup>	.026	.015	-.164
		4	-.097 <sup>*</sup>	.020	<.001	-.153
	2	1	.040	.023	.570	-.026
		3	-.048	.026	.428	-.121
		4	-.057	.024	.156	-.125
	3	1	.088 <sup>*</sup>	.026	.015	.013
		2	.048	.026	.428	-.025
		4	-.008	.018	1.000	-.061
	4	1	.097 <sup>*</sup>	.020	<.001	.041
		2	.057	.024	.156	-.012
		3	.008	.018	1.000	-.044

### Pairwise Comparisons

Measure: MovementTime2

Amp	(I) Cursor	(J) Cursor	95% Confidence Interval for <sup>b</sup> ... Upper Bound
4		1	.150
		2	.137
		3	.058
3	1	2	.026
		3	-.013
		4	-.041
	2	1	.107
		3	.025
		4	.012
	3	1	.164
		2	.121
		4	.044
	4	1	.153
		2	.125
		3	.061

Based on estimated marginal means

\*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

## 9. Amp \* Width

### Pairwise Comparisons

Measure: MovementTime2

Width	(I) Amp	(J) Amp	Mean Difference (I-J)	Std. Error	Sig. <sup>b</sup>	95% Confidence Interval for Difference <sup>b</sup>	
						Lower Bound	Upper Bound
1	1	2	-.165 <sup>*</sup>	.013	<.001	-.199	-.131
		3	-.264 <sup>*</sup>	.015	<.001	-.302	-.225
	2	1	.165 <sup>*</sup>	.013	<.001	.131	.199
		3	-.099 <sup>*</sup>	.009	<.001	-.122	-.076
	3	1	.264 <sup>*</sup>	.015	<.001	.225	.302
		2	.099 <sup>*</sup>	.009	<.001	.076	.122
2	1	2	-.122 <sup>*</sup>	.012	<.001	-.154	-.090
		3	-.224 <sup>*</sup>	.017	<.001	-.267	-.182
	2	1	.122 <sup>*</sup>	.012	<.001	.090	.154
		3	-.102 <sup>*</sup>	.011	<.001	-.131	-.073
	3	1	.224 <sup>*</sup>	.017	<.001	.182	.267
		2	.102 <sup>*</sup>	.011	<.001	.073	.131
3	1	2	-.067 <sup>*</sup>	.007	<.001	-.084	-.050
		3	-.129 <sup>*</sup>	.011	<.001	-.157	-.100
	2	1	.067 <sup>*</sup>	.007	<.001	.050	.084
		3	-.062 <sup>*</sup>	.008	<.001	-.081	-.043
	3	1	.129 <sup>*</sup>	.011	<.001	.100	.157
		2	.062 <sup>*</sup>	.008	<.001	.043	.081

Based on estimated marginal means

\*. The mean difference is significant at the .05 level.

b. Adjustment for multiple comparisons: Bonferroni.

### Profile Plots



