

## Mixed Model Analysis

### Model Dimension<sup>a</sup>

		Number of Levels	Covariance Structure	Number of Parameters
Fixed Effects	Intercept	1		1
	SNR	3		2
	Program	6		5
	SNR * Program	18		10
Random Effects	Audiogram	4	Variance Components	1
Residual				1
Total		32		20

a. Dependent Variable: HASQL.

### Information Criteria<sup>a</sup>

-2 Restricted Log Likelihood	-1347.582700
Akaike's Information Criterion (AIC)	-1343.582700
Hurvich and Tsai's Criterion (AICC)	-1343.561079
Bozdogan's Criterion (CAIC)	-1332.933982
Schwarz's Bayesian Criterion (BIC)	-1334.933982

The information criteria are displayed in smaller-is-better form.

a. Dependent Variable: HASQL.

### Coefficients of Determination

Pseudo-R Square Measures	Marginal	.423
	Conditional	.677

### Intraclass Correlation Coefficients

Overall ICCs	Adjusted	.440
	Conditional	.254

## Fixed Effects

### Type III Tests of Fixed Effects<sup>a</sup>

Source	Numerator df	Denominator df	F	Sig.
Intercept	1	3.000	32.495	.011
SNR	2	555.001	311.357	<.001
Program	5	555.001	24.671	<.001
SNR * Program	10	555.001	.519	.877

a. Dependent Variable: HASQL.

### Covariance Parameters

#### Estimates of Covariance Parameters<sup>a</sup>

Parameter	Estimate	Std. Error
Residual	.005	.000
Audiogram Variance	.004	.003

a. Dependent Variable: HASQL.

### Estimated Marginal Means

#### 1. Grand Mean<sup>a</sup>

Mean	Std. Error	df	95% Confidence Interval	
			Lower Bound	Upper Bound
.171	.030	3.000	.076	.267

a. Dependent Variable: HASQL.

#### 2. SNR

#### Estimates<sup>a</sup>

SNR	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
-5	.086	.030	3.107	-.008	.181
0	.169	.030	3.107	.075	.264
5	.258	.030	3.107	.164	.353

a. Dependent Variable: HASQL.

### Pairwise Comparisons<sup>a</sup>

(I) SNR	(J) SNR	Mean Difference (I-J)	Std. Error	df	Sig. <sup>c</sup>	95% Confidence Interval for Difference <sup>c</sup>	
						Lower Bound	Upper Bound
-5	0	-.083 <sup>*</sup>	.007	555.001	<.001	-.099	-.066
	5	-.172 <sup>*</sup>	.007	555.001	<.001	-.189	-.155
0	-5	.083 <sup>*</sup>	.007	555.001	<.001	.066	.099
	5	-.089 <sup>*</sup>	.007	555.001	<.001	-.106	-.073
5	-5	.172 <sup>*</sup>	.007	555.001	<.001	.155	.189
	0	.089 <sup>*</sup>	.007	555.001	<.001	.073	.106

Based on estimated marginal means

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

a. Dependent Variable: HASQI.

c. Adjustment for multiple comparisons: Bonferroni.

### Univariate Tests<sup>a</sup>

Numerator df	Denominator df	F	Sig.
2	555.001	311.357	<.001

The F tests the effect of SNR. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Dependent Variable: HASQI.

## 3. Program

### Estimates<sup>a</sup>

Program	Mean	Std. Error	df	95% Confidence Interval	
				Lower Bound	Upper Bound
No Processing	.144	.031	3.269	.050	.237
Beam	.144	.031	3.269	.051	.238
Beam + NoiseBlock	.160	.031	3.269	.066	.253
DNN	.195	.031	3.269	.102	.289
NoiseBlock	.156	.031	3.269	.062	.249
Beam + DNN	.230	.031	3.269	.136	.323

a. Dependent Variable: HASQI.

### Pairwise Comparisons<sup>a</sup>

(I) Program	(J) Program	Mean Difference (I-J)	Std. Error	df	Sig. <sup>c</sup>
No Processing	Beam	.000	.010	555.001	1.000
	Beam + NoiseBlock	-.016	.010	555.001	1.000
	DNN	-.051 <sup>*</sup>	.010	555.001	<.001
	NoiseBlock	-.012	.010	555.001	1.000
	Beam + DNN	-.086 <sup>*</sup>	.010	555.001	<.001
Beam	No Processing	.000	.010	555.001	1.000
	Beam + NoiseBlock	-.015	.010	555.001	1.000
	DNN	-.051 <sup>*</sup>	.010	555.001	<.001
	NoiseBlock	-.011	.010	555.001	1.000
	Beam + DNN	-.085 <sup>*</sup>	.010	555.001	<.001
Beam + NoiseBlock	No Processing	.016	.010	555.001	1.000
	Beam	.015	.010	555.001	1.000
	DNN	-.036 <sup>*</sup>	.010	555.001	.004
	NoiseBlock	.004	.010	555.001	1.000
	Beam + DNN	-.070 <sup>*</sup>	.010	555.001	<.001
DNN	No Processing	.051 <sup>*</sup>	.010	555.001	<.001
	Beam	.051 <sup>*</sup>	.010	555.001	<.001
	Beam + NoiseBlock	.036 <sup>*</sup>	.010	555.001	.004
	NoiseBlock	.040 <sup>*</sup>	.010	555.001	<.001
	Beam + DNN	-.034 <sup>*</sup>	.010	555.001	.007
NoiseBlock	No Processing	.012	.010	555.001	1.000
	Beam	.011	.010	555.001	1.000
	Beam + NoiseBlock	-.004	.010	555.001	1.000
	DNN	-.040 <sup>*</sup>	.010	555.001	<.001
	Beam + DNN	-.074 <sup>*</sup>	.010	555.001	<.001
Beam + DNN	No Processing	.086 <sup>*</sup>	.010	555.001	<.001
	Beam	.085 <sup>*</sup>	.010	555.001	<.001
	Beam + NoiseBlock	.070 <sup>*</sup>	.010	555.001	<.001
	DNN	.034 <sup>*</sup>	.010	555.001	.007
	NoiseBlock	.074 <sup>*</sup>	.010	555.001	<.001

### Pairwise Comparisons<sup>a</sup>

(I) Program	(J) Program	95% Confidence Interval for Difference <sup>c</sup>	
		Lower Bound	Upper Bound
No Processing	Beam	-.029	.028
	Beam + NoiseBlock	-.044	.013
	DNN	-.080	-.023
	NoiseBlock	-.040	.017
	Beam + DNN	-.115	-.057
Beam	No Processing	-.028	.029
	Beam + NoiseBlock	-.044	.013
	DNN	-.080	-.022
	NoiseBlock	-.040	.017
	Beam + DNN	-.114	-.057
Beam + NoiseBlock	No Processing	-.013	.044
	Beam	-.013	.044
	DNN	-.065	-.007
	NoiseBlock	-.025	.033
	Beam + DNN	-.099	-.041
DNN	No Processing	.023	.080
	Beam	.022	.080
	Beam + NoiseBlock	.007	.065
	NoiseBlock	.011	.068
	Beam + DNN	-.063	-.006
NoiseBlock	No Processing	-.017	.040
	Beam	-.017	.040
	Beam + NoiseBlock	-.033	.025
	DNN	-.068	-.011
	Beam + DNN	-.103	-.045
Beam + DNN	No Processing	.057	.115
	Beam	.057	.114
	Beam + NoiseBlock	.041	.099
	DNN	.006	.063
	NoiseBlock	.045	.103

Based on estimated marginal means

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

a. Dependent Variable: HASQI.

c. Adjustment for multiple comparisons: Bonferroni.

### Univariate Tests<sup>a</sup>

Numerator df	Denominator df	F	Sig.
5	555.001	24.671	<.001

The F tests the effect of Program. This test is based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Dependent Variable: HASQI.

### 4. SNR \* Program

#### Estimates<sup>a</sup>

SNR	Program	Mean	Std. Error	df	95% Confidence Interval	
					Lower Bound	Upper Bound
-5	No Processing	.065	.032	3.960	-.025	.154
	Beam	.069	.032	3.960	-.021	.159
	Beam + NoiseBlock	.080	.032	3.960	-.010	.170
	DNN	.105	.032	3.960	.015	.194
	NoiseBlock	.072	.032	3.960	-.018	.162
	Beam + DNN	.128	.032	3.960	.038	.218
0	No Processing	.138	.032	3.960	.048	.227
	Beam	.140	.032	3.960	.050	.230
	Beam + NoiseBlock	.157	.032	3.960	.067	.247
	DNN	.195	.032	3.960	.105	.284
	NoiseBlock	.151	.032	3.960	.061	.241
	Beam + DNN	.235	.032	3.960	.145	.325
5	No Processing	.229	.032	3.960	.139	.319
	Beam	.223	.032	3.960	.134	.313
	Beam + NoiseBlock	.242	.032	3.960	.152	.332
	DNN	.287	.032	3.960	.197	.377
	NoiseBlock	.244	.032	3.960	.154	.333
	Beam + DNN	.326	.032	3.960	.236	.416

a. Dependent Variable: HASQI.

### Pairwise Comparisons<sup>a</sup>

SNR	(I) Program	(J) Program	Mean Difference (I-J)	Std. Error	df	Sig. <sup>c</sup>
-5	No Processing	Beam	-.005	.017	555.001	1.000
		Beam + NoiseBlock	-.015	.017	555.001	1.000
		DNN	-.040	.017	555.001	.270
		NoiseBlock	-.007	.017	555.001	1.000
		Beam + DNN	-.064 <sup>*</sup>	.017	555.001	.003
	Beam	No Processing	.005	.017	555.001	1.000
		Beam + NoiseBlock	-.010	.017	555.001	1.000
		DNN	-.035	.017	555.001	.552
		NoiseBlock	-.003	.017	555.001	1.000
		Beam + DNN	-.059 <sup>*</sup>	.017	555.001	.008
	Beam + NoiseBlock	No Processing	.015	.017	555.001	1.000
		Beam	.010	.017	555.001	1.000
		DNN	-.025	.017	555.001	1.000
		NoiseBlock	.008	.017	555.001	1.000
		Beam + DNN	-.049	.017	555.001	.062
	DNN	No Processing	.040	.017	555.001	.270
		Beam	.035	.017	555.001	.552
		Beam + NoiseBlock	.025	.017	555.001	1.000
		NoiseBlock	.033	.017	555.001	.812
		Beam + DNN	-.024	.017	555.001	1.000
	NoiseBlock	No Processing	.007	.017	555.001	1.000
		Beam	.003	.017	555.001	1.000
		Beam + NoiseBlock	-.008	.017	555.001	1.000
		DNN	-.033	.017	555.001	.812
		Beam + DNN	-.056 <sup>*</sup>	.017	555.001	.014
	Beam + DNN	No Processing	.064 <sup>*</sup>	.017	555.001	.003
		Beam	.059 <sup>*</sup>	.017	555.001	.008
		Beam + NoiseBlock	.049	.017	555.001	.062
		DNN	.024	.017	555.001	1.000
		NoiseBlock	.056 <sup>*</sup>	.017	555.001	.014
0	No Processing	Beam	-.003	.017	555.001	1.000
		Beam + NoiseBlock	-.020	.017	555.001	1.000
		DNN	-.057 <sup>*</sup>	.017	555.001	.012
		NoiseBlock	-.013	.017	555.001	1.000
		Beam + DNN	-.097 <sup>*</sup>	.017	555.001	<.001
	Beam	No Processing	.003	.017	555.001	1.000
		Beam + NoiseBlock	-.017	.017	555.001	1.000

### Pairwise Comparisons<sup>a</sup>

SNR	(I) Program	(J) Program	95% Confidence Interval for Difference <sup>c</sup>	
			Lower Bound	Upper Bound
-5	No Processing	Beam	-.054	.045
		Beam + NoiseBlock	-.065	.035
		DNN	-.090	.010
		NoiseBlock	-.057	.042
		Beam + DNN	-.113	-.014
	Beam	No Processing	-.045	.054
		Beam + NoiseBlock	-.060	.039
		DNN	-.085	.014
		NoiseBlock	-.053	.047
		Beam + DNN	-.109	-.009
	Beam + NoiseBlock	No Processing	-.035	.065
		Beam	-.039	.060
		DNN	-.075	.025
		NoiseBlock	-.042	.057
		Beam + DNN	-.098	.001
	DNN	No Processing	-.010	.090
		Beam	-.014	.085
		Beam + NoiseBlock	-.025	.075
		NoiseBlock	-.017	.082
		Beam + DNN	-.073	.026
	NoiseBlock	No Processing	-.042	.057
		Beam	-.047	.053
		Beam + NoiseBlock	-.057	.042
		DNN	-.082	.017
		Beam + DNN	-.106	-.006
	Beam + DNN	No Processing	.014	.113
		Beam	.009	.109
		Beam + NoiseBlock	-.001	.098
		DNN	-.026	.073
		NoiseBlock	.006	.106
0	No Processing	Beam	-.052	.047
		Beam + NoiseBlock	-.069	.030
		DNN	-.107	-.007
		NoiseBlock	-.063	.036
		Beam + DNN	-.147	-.048
	Beam	No Processing	-.047	.052
		Beam + NoiseBlock	-.067	.033



### Pairwise Comparisons<sup>a</sup>

SNR	(I) Program	(J) Program	Mean Difference (I-J)	Std. Error	df	Sig. <sup>c</sup>
	Beam + NoiseBlock	DNN	-.054 <sup>*</sup>	.017	555.001	.020
		NoiseBlock	-.011	.017	555.001	1.000
		Beam + DNN	-.095 <sup>*</sup>	.017	555.001	<.001
		No Processing	.020	.017	555.001	1.000
		Beam	.017	.017	555.001	1.000
		DNN	-.037	.017	555.001	.407
		NoiseBlock	.006	.017	555.001	1.000
		Beam + DNN	-.078 <sup>*</sup>	.017	555.001	<.001
	DNN	No Processing	.057 <sup>*</sup>	.017	555.001	.012
		Beam	.054 <sup>*</sup>	.017	555.001	.020
		Beam + NoiseBlock	.037	.017	555.001	.407
		NoiseBlock	.043	.017	555.001	.155
		Beam + DNN	-.041	.017	555.001	.251
	NoiseBlock	No Processing	.013	.017	555.001	1.000
		Beam	.011	.017	555.001	1.000
		Beam + NoiseBlock	-.006	.017	555.001	1.000
		DNN	-.043	.017	555.001	.155
		Beam + DNN	-.084 <sup>*</sup>	.017	555.001	<.001
	Beam + DNN	No Processing	.097 <sup>*</sup>	.017	555.001	<.001
		Beam	.095 <sup>*</sup>	.017	555.001	<.001
		Beam + NoiseBlock	.078 <sup>*</sup>	.017	555.001	<.001
		DNN	.041	.017	555.001	.251
		NoiseBlock	.084 <sup>*</sup>	.017	555.001	<.001
5	No Processing	Beam	.006	.017	555.001	1.000
		Beam + NoiseBlock	-.012	.017	555.001	1.000
		DNN	-.057 <sup>*</sup>	.017	555.001	.011
		NoiseBlock	-.014	.017	555.001	1.000
		Beam + DNN	-.096 <sup>*</sup>	.017	555.001	<.001
	Beam	No Processing	-.006	.017	555.001	1.000
		Beam + NoiseBlock	-.018	.017	555.001	1.000
		DNN	-.063 <sup>*</sup>	.017	555.001	.003
		NoiseBlock	-.020	.017	555.001	1.000
		Beam + DNN	-.102 <sup>*</sup>	.017	555.001	<.001
	Beam + NoiseBlock	No Processing	.012	.017	555.001	1.000
		Beam	.018	.017	555.001	1.000
		DNN	-.045	.017	555.001	.119

### Pairwise Comparisons<sup>a</sup>

SNR	(I) Program	(J) Program	95% Confidence Interval for Difference <sup>c</sup>	
			Lower Bound	Upper Bound
	Beam + NoiseBlock	DNN	-.104	-.005
		NoiseBlock	-.061	.039
		Beam + DNN	-.145	-.045
		No Processing	-.030	.069
		Beam	-.033	.067
		DNN	-.087	.012
		NoiseBlock	-.044	.056
		Beam + DNN	-.128	-.028
		No Processing	.007	.107
	DNN	Beam	.005	.104
		Beam + NoiseBlock	-.012	.087
		NoiseBlock	-.006	.093
		Beam + DNN	-.090	.009
		No Processing	-.036	.063
	NoiseBlock	Beam	-.039	.061
		Beam + NoiseBlock	-.056	.044
		DNN	-.093	.006
		Beam + DNN	-.134	-.034
		No Processing	.048	.147
	Beam + DNN	Beam	.045	.145
		Beam + NoiseBlock	.028	.128
		DNN	-.009	.090
		NoiseBlock	.034	.134
		No Processing	-.044	.056
5	No Processing	Beam	-.044	.056
		Beam + NoiseBlock	-.062	.037
		DNN	-.107	-.008
		NoiseBlock	-.064	.036
		Beam + DNN	-.146	-.047
	Beam	No Processing	-.056	.044
		Beam + NoiseBlock	-.068	.031
		DNN	-.113	-.014
		NoiseBlock	-.070	.030
		Beam + DNN	-.152	-.053
	Beam + NoiseBlock	No Processing	-.037	.062
		Beam	-.031	.068
		DNN	-.095	.005

### Pairwise Comparisons<sup>a</sup>

SNR	(I) Program	(J) Program	Mean Difference (I-J)	Std. Error	df	Sig. <sup>c</sup>
		NoiseBlock	-.002	.017	555.001	1.000
		Beam + DNN	-.084 <sup>*</sup>	.017	555.001	<.001
	DNN	No Processing	.057 <sup>*</sup>	.017	555.001	.011
		Beam	.063 <sup>*</sup>	.017	555.001	.003
		Beam + NoiseBlock	.045	.017	555.001	.119
		NoiseBlock	.043	.017	555.001	.161
		Beam + DNN	-.039	.017	555.001	.316
	NoiseBlock	No Processing	.014	.017	555.001	1.000
		Beam	.020	.017	555.001	1.000
		Beam + NoiseBlock	.002	.017	555.001	1.000
		DNN	-.043	.017	555.001	.161
		Beam + DNN	-.082 <sup>*</sup>	.017	555.001	<.001
	Beam + DNN	No Processing	.096 <sup>*</sup>	.017	555.001	<.001
		Beam	.102 <sup>*</sup>	.017	555.001	<.001
		Beam + NoiseBlock	.084 <sup>*</sup>	.017	555.001	<.001
		DNN	.039	.017	555.001	.316
		NoiseBlock	.082 <sup>*</sup>	.017	555.001	<.001

### Pairwise Comparisons<sup>a</sup>

SNR	(I) Program	(J) Program	95% Confidence Interval for Difference <sup>c</sup>	
			Lower Bound	Upper Bound
	DNN	NoiseBlock	-.052	.048
		Beam + DNN	-.134	-.034
		No Processing	.008	.107
		Beam	.014	.113
		Beam + NoiseBlock	-.005	.095
		NoiseBlock	-.007	.093
	NoiseBlock	Beam + DNN	-.089	.011
		No Processing	-.036	.064
		Beam	-.030	.070
		Beam + NoiseBlock	-.048	.052
		DNN	-.093	.007
		Beam + DNN	-.132	-.033
	Beam + DNN	No Processing	.047	.146
		Beam	.053	.152
		Beam + NoiseBlock	.034	.134
		DNN	-.011	.089
		NoiseBlock	.033	.132

Based on estimated marginal means

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

a. Dependent Variable: HASQI.

c. Adjustment for multiple comparisons: Bonferroni.

### Univariate Tests<sup>a</sup>

SNR	Numerator df	Denominator df	F	Sig.
-5	5	555.001	4.361	<.001
0	5	555.001	10.231	<.001
5	5	555.001	11.117	<.001

Each F tests the simple effects of Program within each level combination of the other effects shown. These tests are based on the linearly independent pairwise comparisons among the estimated marginal means.

a. Dependent Variable: HASQI.