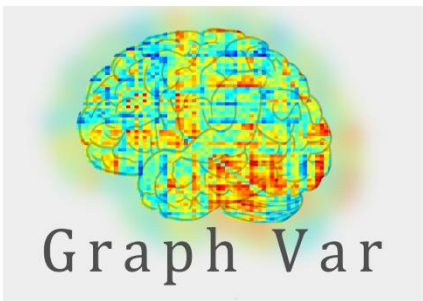


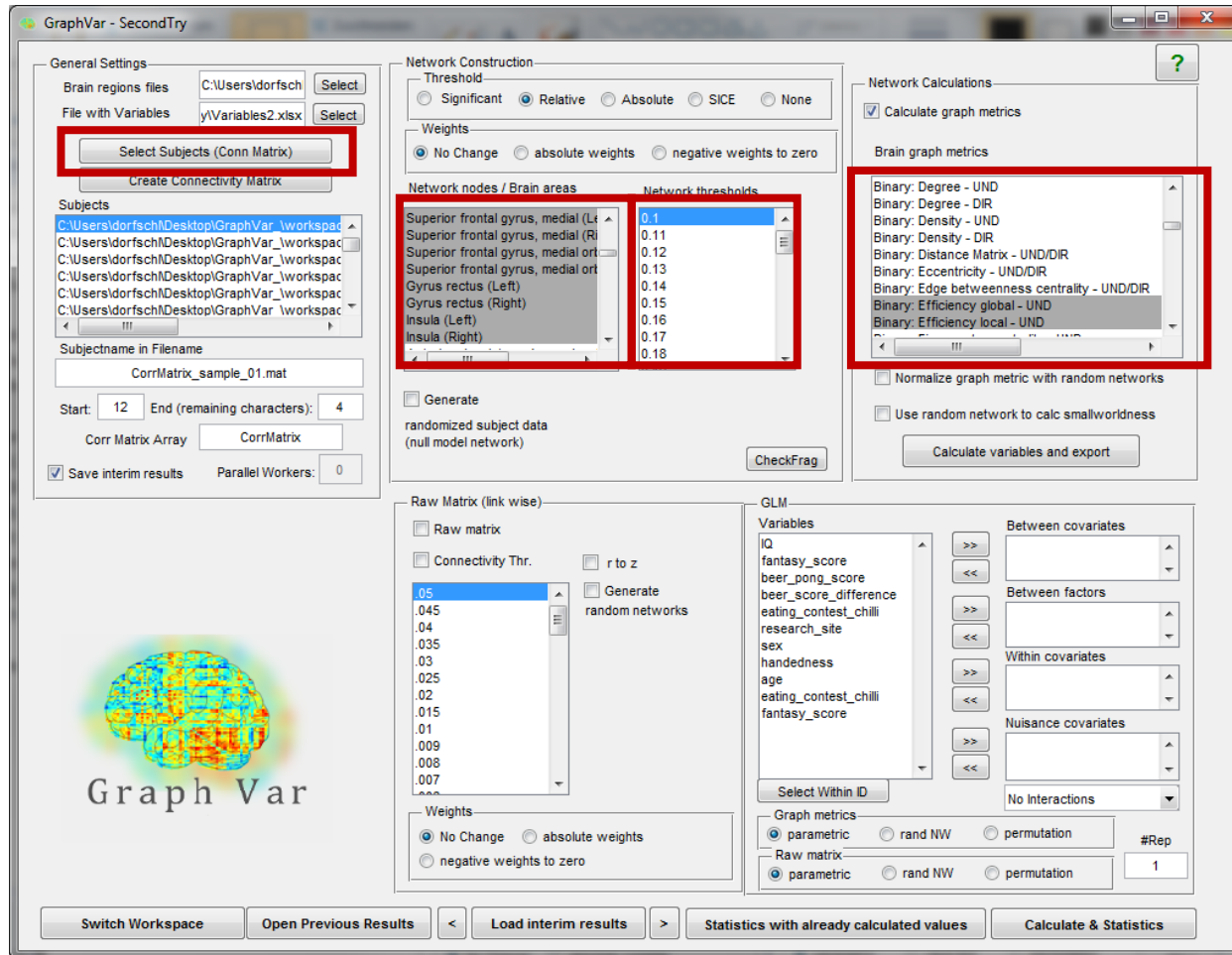
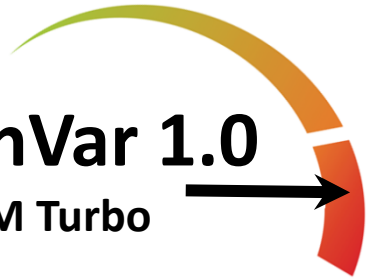
Statistical Validation of GraphVar

Comparison of GraphVar and SPSS Outputs

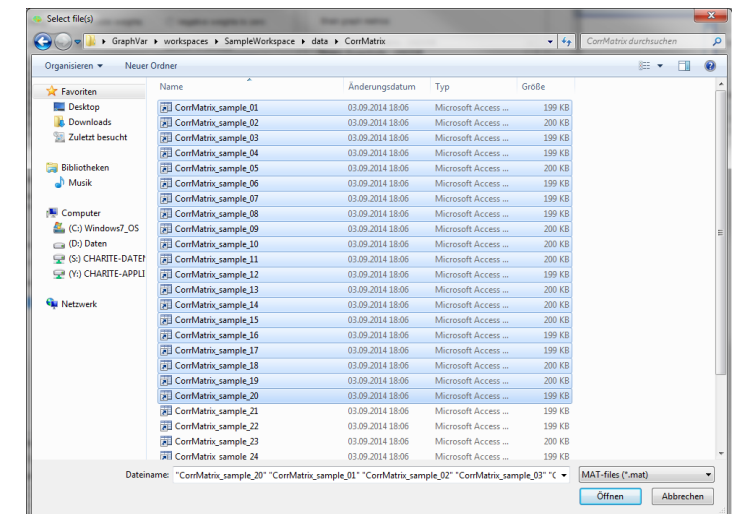


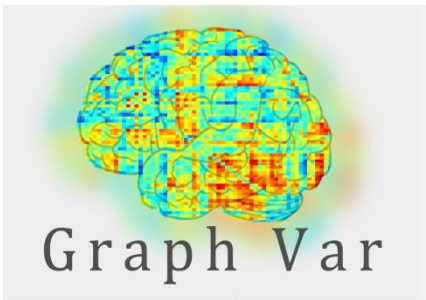
Setup of the GUI

GraphVar 1.0
GLM Turbo



Chose **subject one through 20** from the SampleWorkspace, setup the network from **Prefrontal Gyrus through Insula(Right)**, with a threshold of **0.1**.
For graph metrics chose „**Binary: Efficiency global**“ and „**Binary: Efficiency local**“.





Linear Regression



GLM

Variables

IQ
fantasy_score
beer_pong_score
beer_score_difference
eating_contest_chilli
research_site
sex
handedness
age

Between covariates

eating_contest_chilli
fantasy_score

Between factors

Within covariates

Nuisance covariates

Select Within ID

No Interactions

Graph metrics

☒ parametric ☐ rand NW ☐ permutation

Raw matrix

☒ parametric ☐ rand NW ☐ permutation

#Rep

1

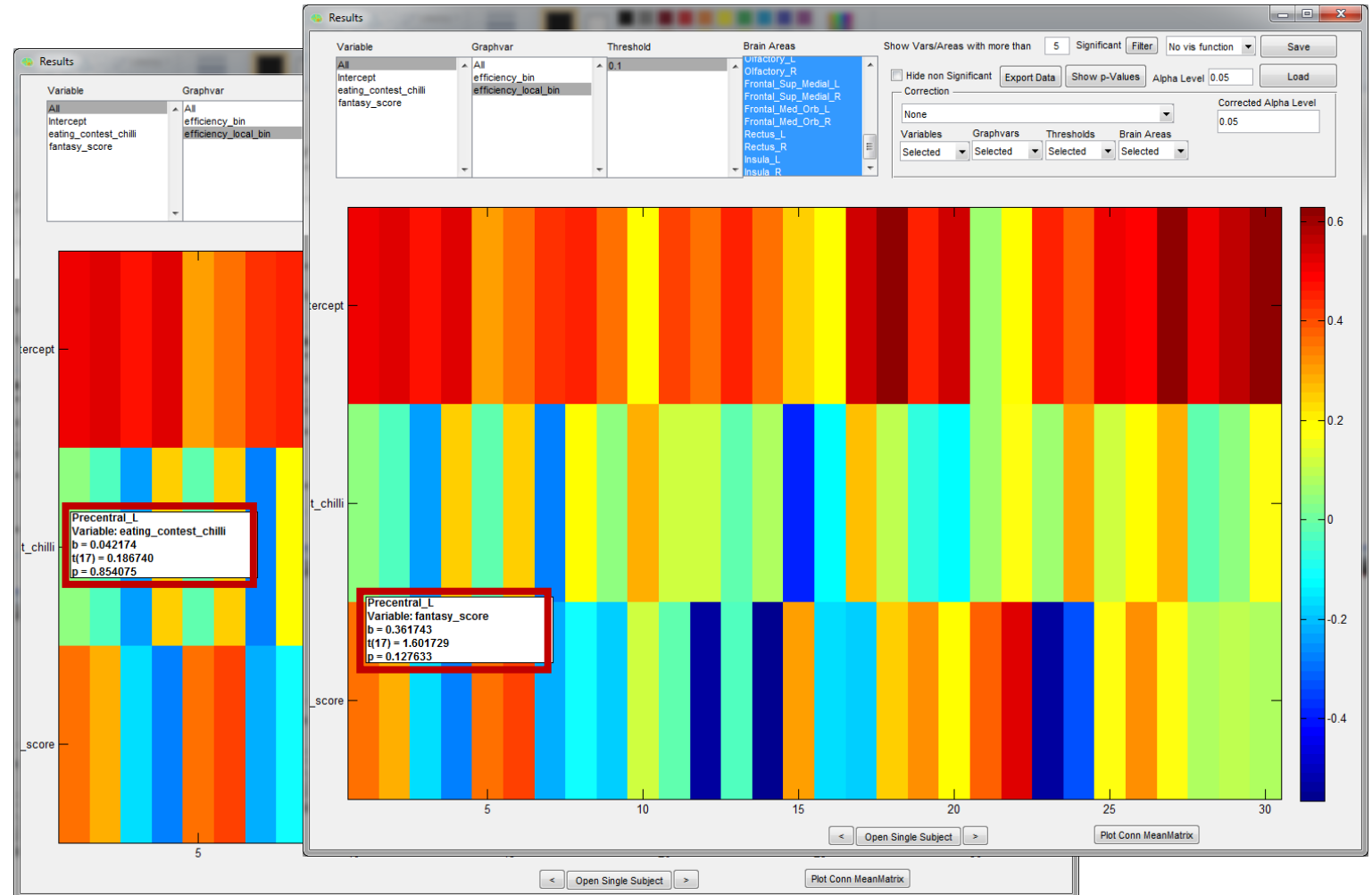
GUI Setup

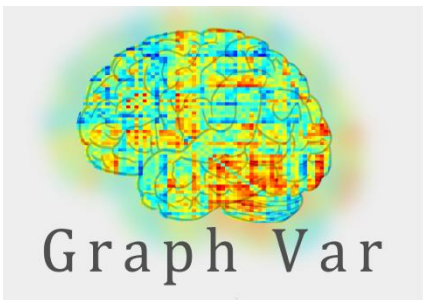
Koeffizienten^a

Modell		Nicht standardisierte Koeffizienten		Standardisiert e Koeffizienten	T	Sig.
		Regressionskoeffizient B	Standardfehler	Beta		
1	(Konstante)	-,208	,553		-,376	,712
	eating_contest_chilli	,004	,022	,042	,187	,854
	fantasy_score	,015	,009	,362	1,602	,128

a. Abhängige Variable: Precentral_L

SPSS Output for a Linear Regression





Regression with Interaction Term GraphVar 1.0

GLM Turbo



GLM

Variables

IQ
fantasy_score
beer_pong_score
beer_score_difference
eating_contest_chilli
research_site
handedness
eating_contest_chilli
fantasy_score

Between covariates
age

Between factors
sex

Within covariates

Nuisance covariates

Select Within ID

Interactions 1st order

Graph metrics
☒ parametric ☐ rand NW ☐ permutation

Raw matrix
☒ parametric ☐ rand NW ☐ permutation

#Rep
1

GUI Setup

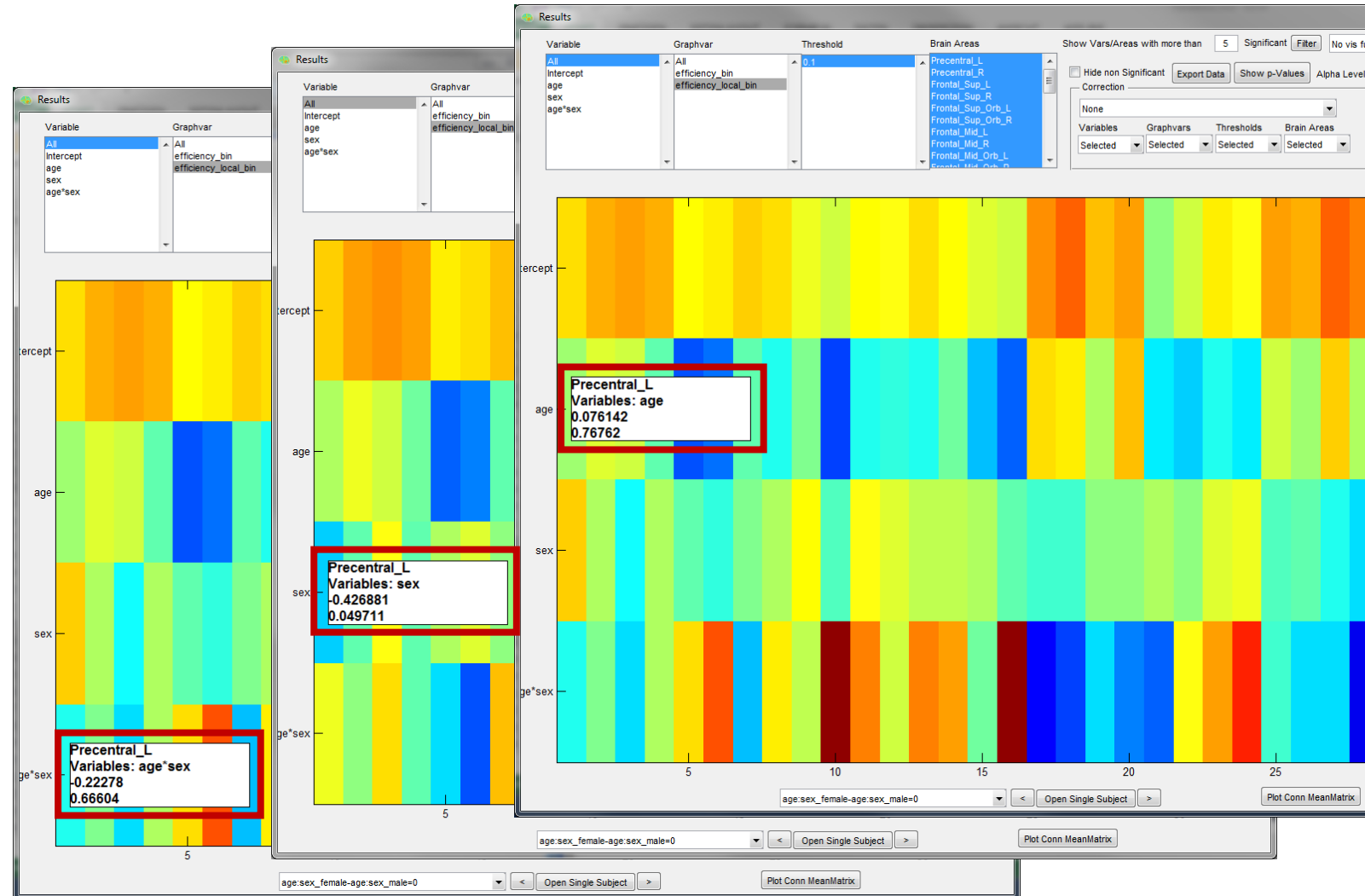
Tests of Between-Subjects Effects

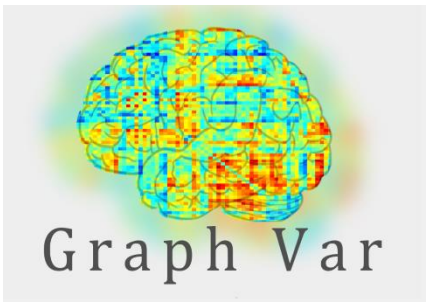
Dependent Variable: Precentral gyrus (Left)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	,785 ^a	3	,262	1,873	,175
Intercept	2,279	1	2,279	16,322	,001
sex	,629	1	,629	4,507	,050
Zage	,013	1	,013	,090	,768
sex * Zage	,027	1	,027	,193	,666
Error	2,234	16	,140		
Total	8,137	20			
Corrected Total	3,019	19			

a. R Squared = ,260 (Adjusted R Squared = ,121)

SPSS Output Between-Subject Effects, z-transformed values for „age“ (Zage)





Regression with Interaction Term

GraphVar 1.0

GLM Turbo



Estimated Marginal Means

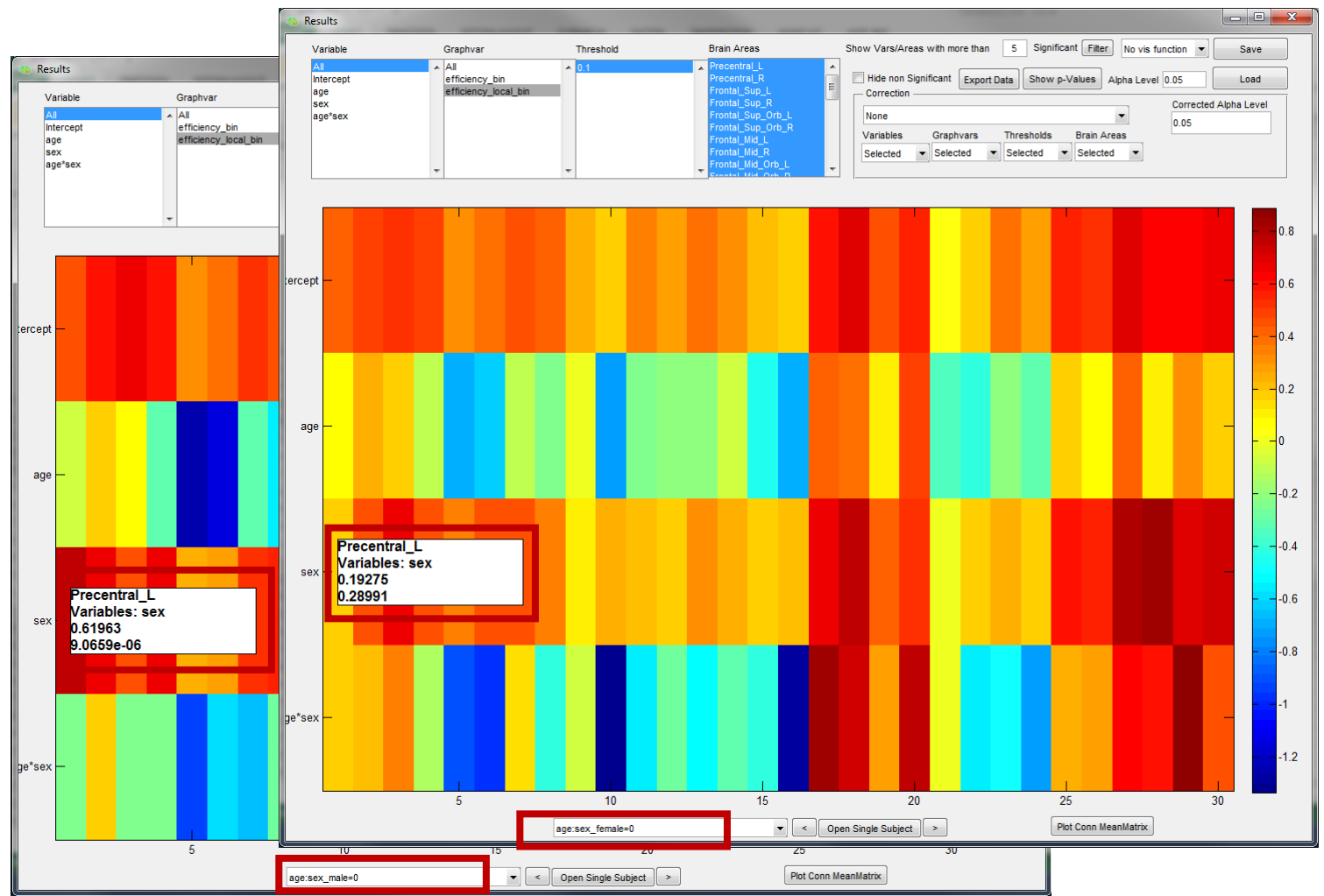
1. sex

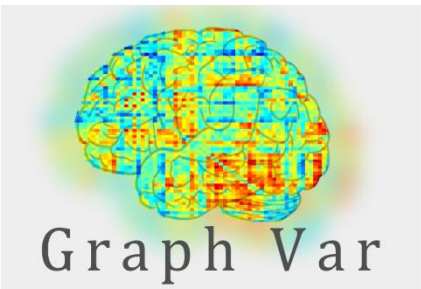
Dependent Variable: Precentral gyrus (Left)

sex	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
1	,620 ^a	,097	,414	,825
2	,193 ^a	,176	-,181	,566

a. Covariates appearing in the model are evaluated at the following values: age = 34,2000.

SPSS Output Estimated Marginal Means





Regression with Interaction Term

Multiple Group Variables



GLM

Variables

age
IQ
fantasy_score
eating_contest_chilli
beer_pong_score
beer_score_difference
eating_contest_chilli
fantasy_score
research_site

Between covariates

Between factors

sex
handedness

Within covariates

Nuisance covariates

Select Within ID

Interactions 1st order

Graph metrics

☒ parametric ☐ rand NW ☐ permutation

Raw matrix

☒ parametric ☐ rand NW ☐ permutation

#Rep 1

GUI Setup

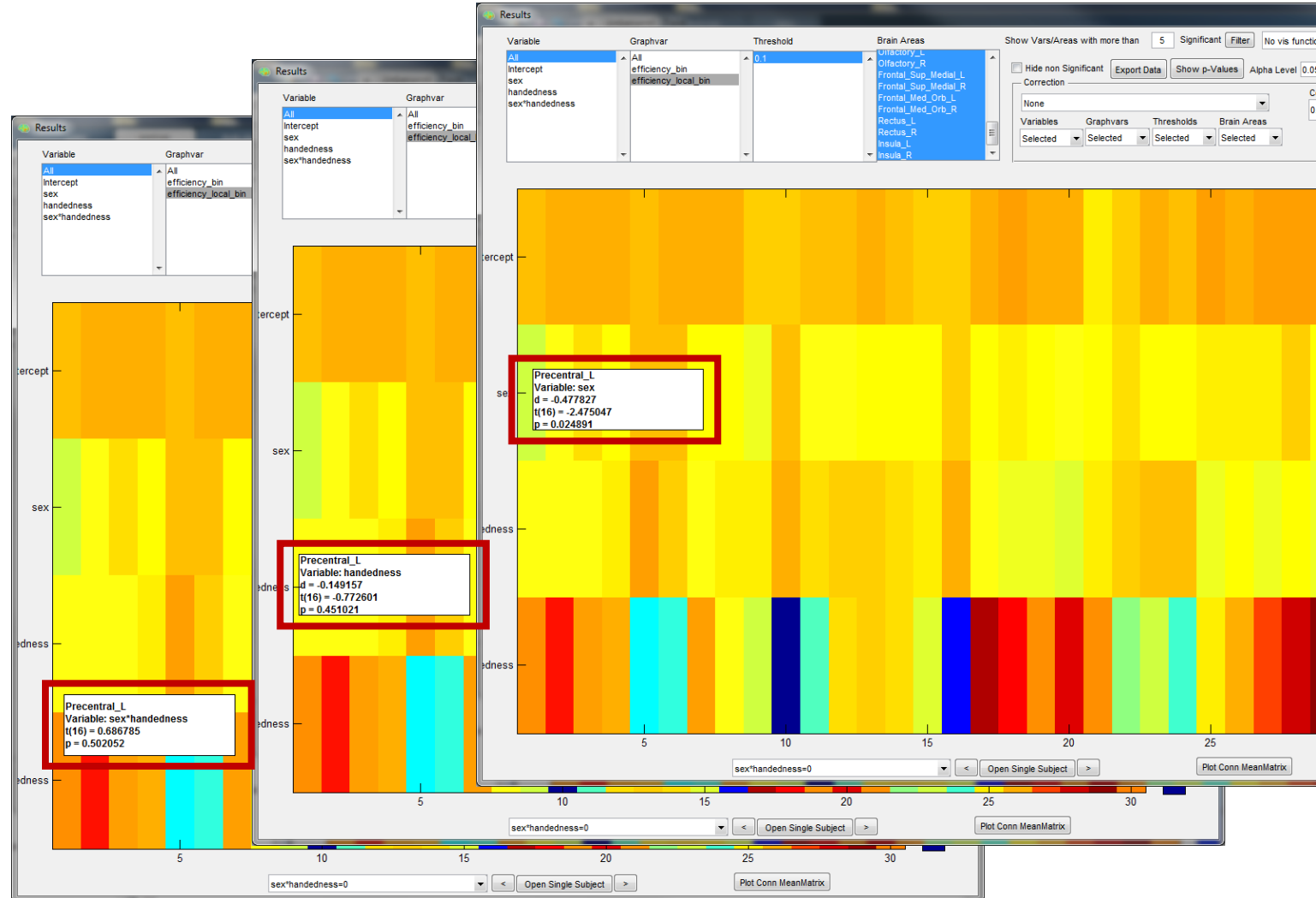
Tests of Between-Subjects Effects

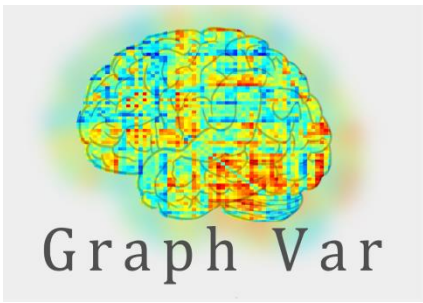
Dependent Variable: Precentral gyrus (Left)

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	,853 ^a	3	,284	2,099	,141
Intercept	2,096	1	2,096	15,480	,001
sex * Handedness	,064	1	,064	,472	,502
sex	,829	1	,829	6,126	,025
Handedness	,081	1	,081	,597	,451
Error	2,166	16	,135		
Total	8,137	20			
Corrected Total	3,019	19			

a. R Squared = ,282 (Adjusted R Squared = ,148)

SPSS Output Main-Effects





Regression with Interaction Term

Multiple Group Variables

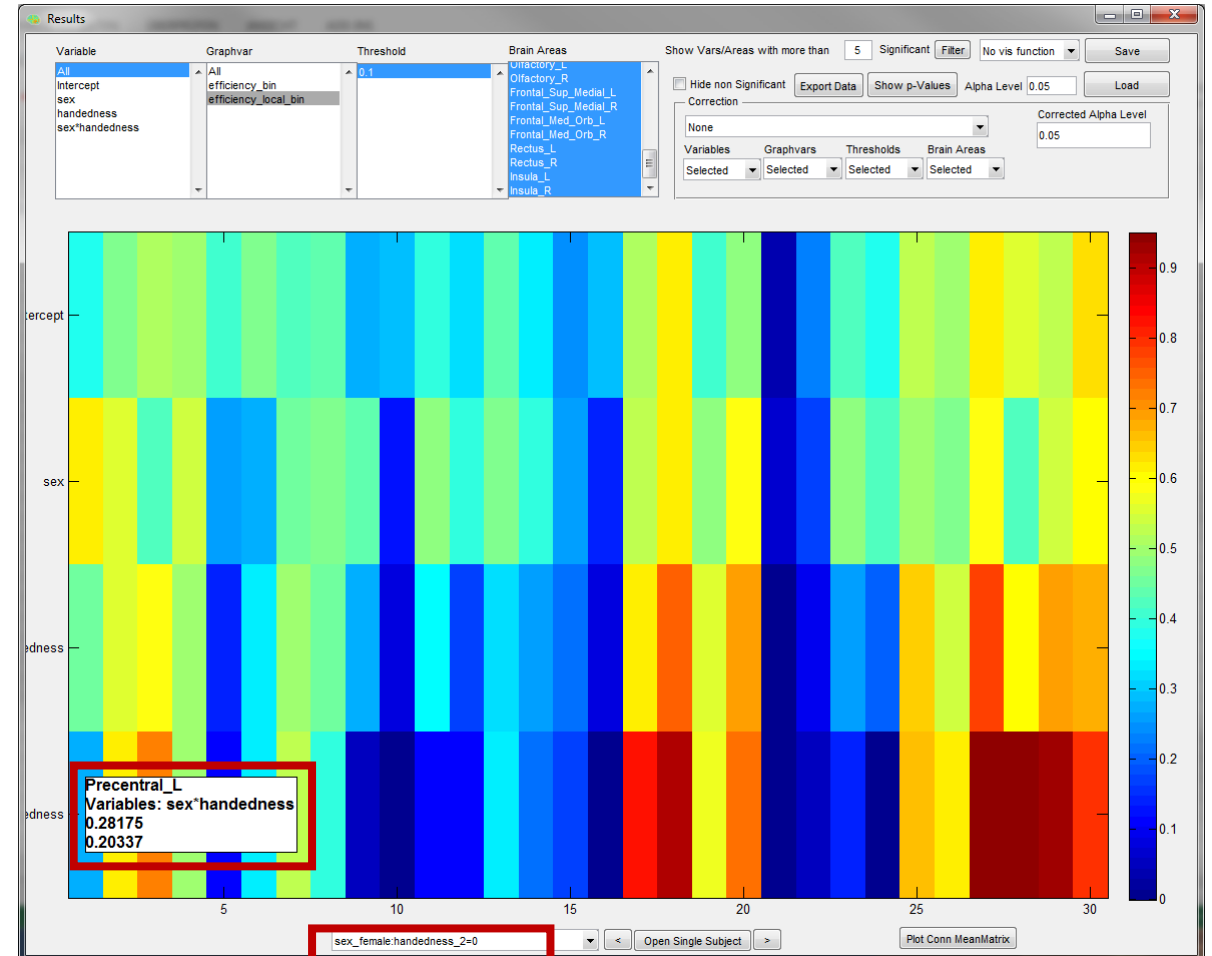


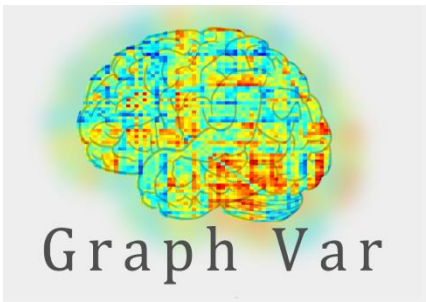
Descriptive Statistics

Dependent Variable: Precentral gyrus (Left)

sex	Handedness	Mean	Std. Deviation	N
1	1	,6104166666	,4177545322	8
	2	,6269841269	,3708990935	7
	Total	,6181481481	,3824781504	15
2	1	,0000000000	,0000000000	2
	2	,2817460320	,2440718147	3
	Total	,1690476192	,2315162485	5
Total	1	,4883333333	,4494200652	10
	2	,5234126984	,3643619302	10
	Total	,5058730158	,3986024870	20

SPSS Output Descriptive Statistics





Analysis of Variance

GraphVar 1.0
GLM Turbo

GLM

Variables

age
sex
IQ
fantasy_score
eating_contest_chilli
beer_pong_score
beer_score_difference
handedness
eating_contest_chilli
fantasy_score

Between covariates

Between factors

research_site

Within covariates

Nuisance covariates

Select Within ID

Graph metrics

☒ parametric ☐ rand NW ☐ permutation

Raw matrix

☒ parametric ☐ rand NW ☐ permutation

#Rep

1

No Interactions

GUI Setup

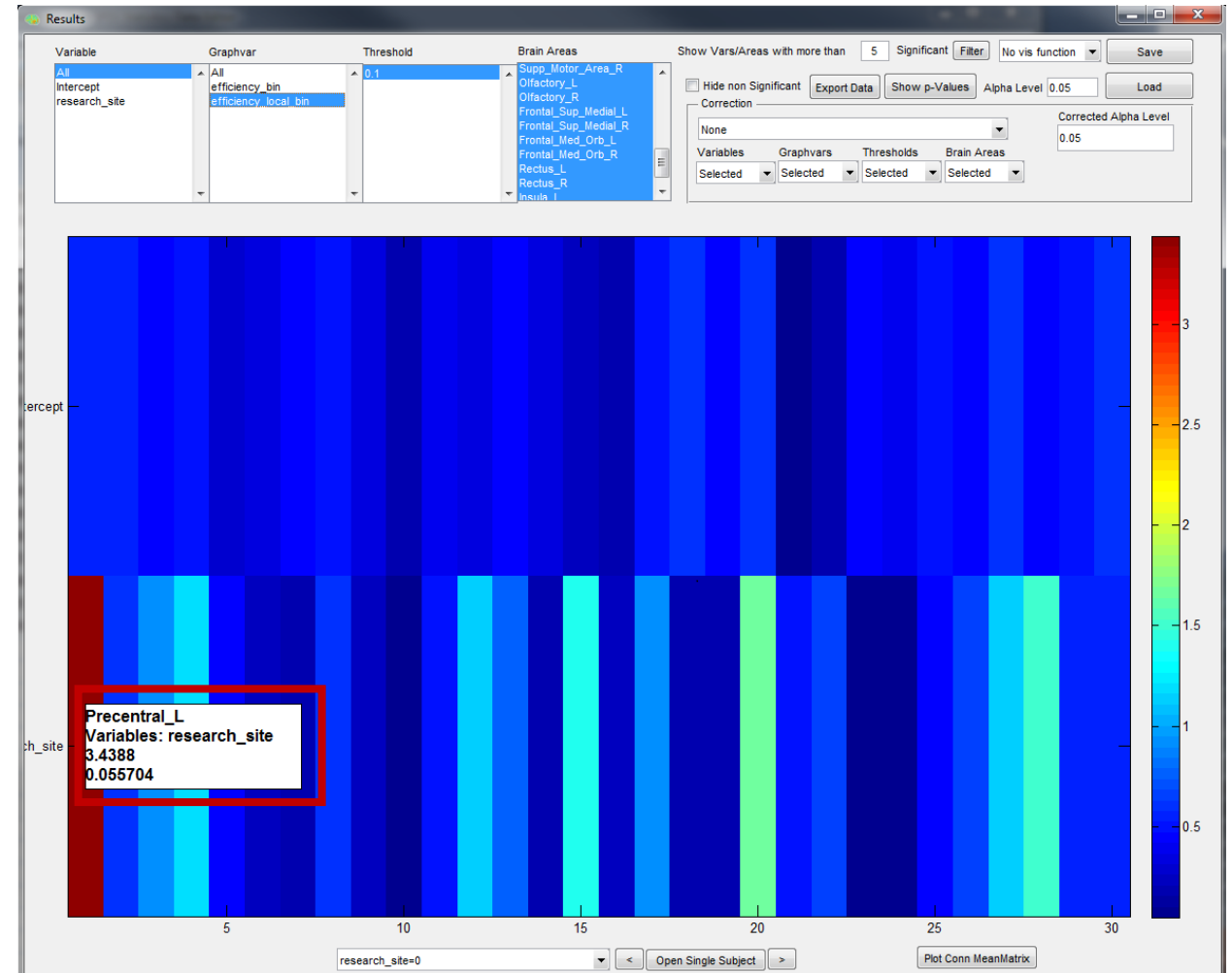
Tests of Between-Subjects Effects

Dependent Variable: Precentral gyrus (Left)

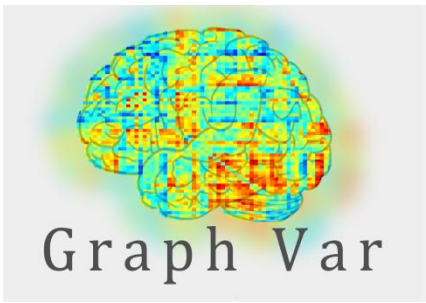
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	,870 ^a	2	,435	3,439	,056
Intercept	5,476	1	5,476	43,317	,000
research_site	,870	2	,435	3,439	,056
Error	2,149	17	,126		
Total	8,137	20			
Corrected Total	3,019	19			

a. R Squared = ,288 (Adjusted R Squared = ,204)

SPSS Output for a Univariate Linear Model



GraphVar Output



Analysis of Variance

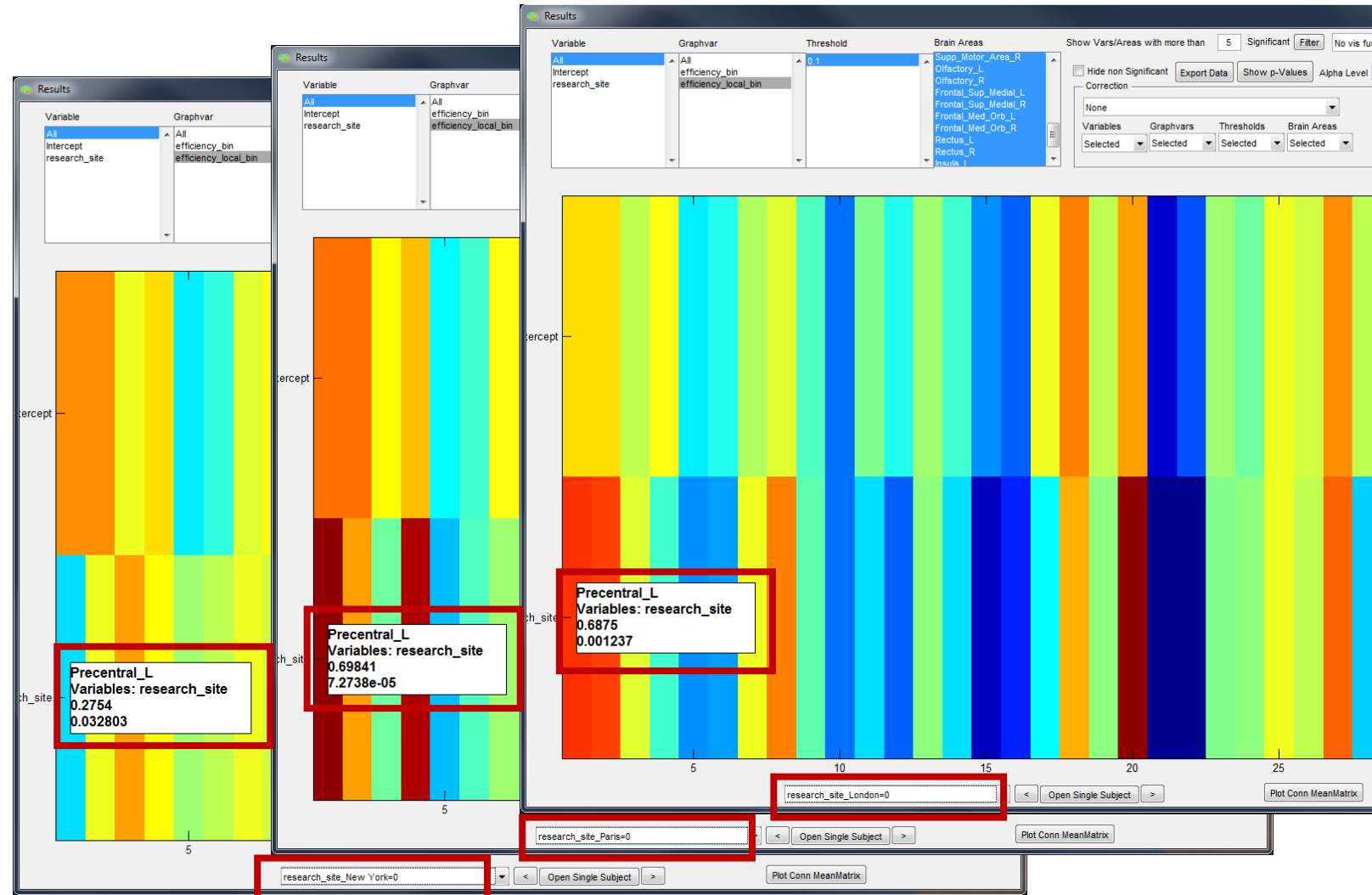


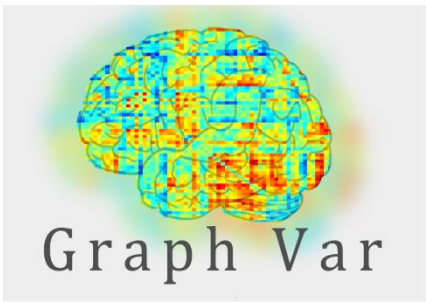
Descriptive Statistics

Dependent Variable: Precentral gyrus (Left)

research_site	Mean	Std. Deviation	N
1	,2753968254	,3551651591	9
2	,6984126983	,3526168236	7
3	,6875000000	,3624441209	4
Total	,5058730158	,3986024870	20

SPSS Output Descriptive Statistics
for the Univariate Linear Model





Analysis of Variance

GraphVar 1.0
GLM Turbo

Multiple Comparisons

Dependent Variable: Precentral gyrus (Left)
LSD

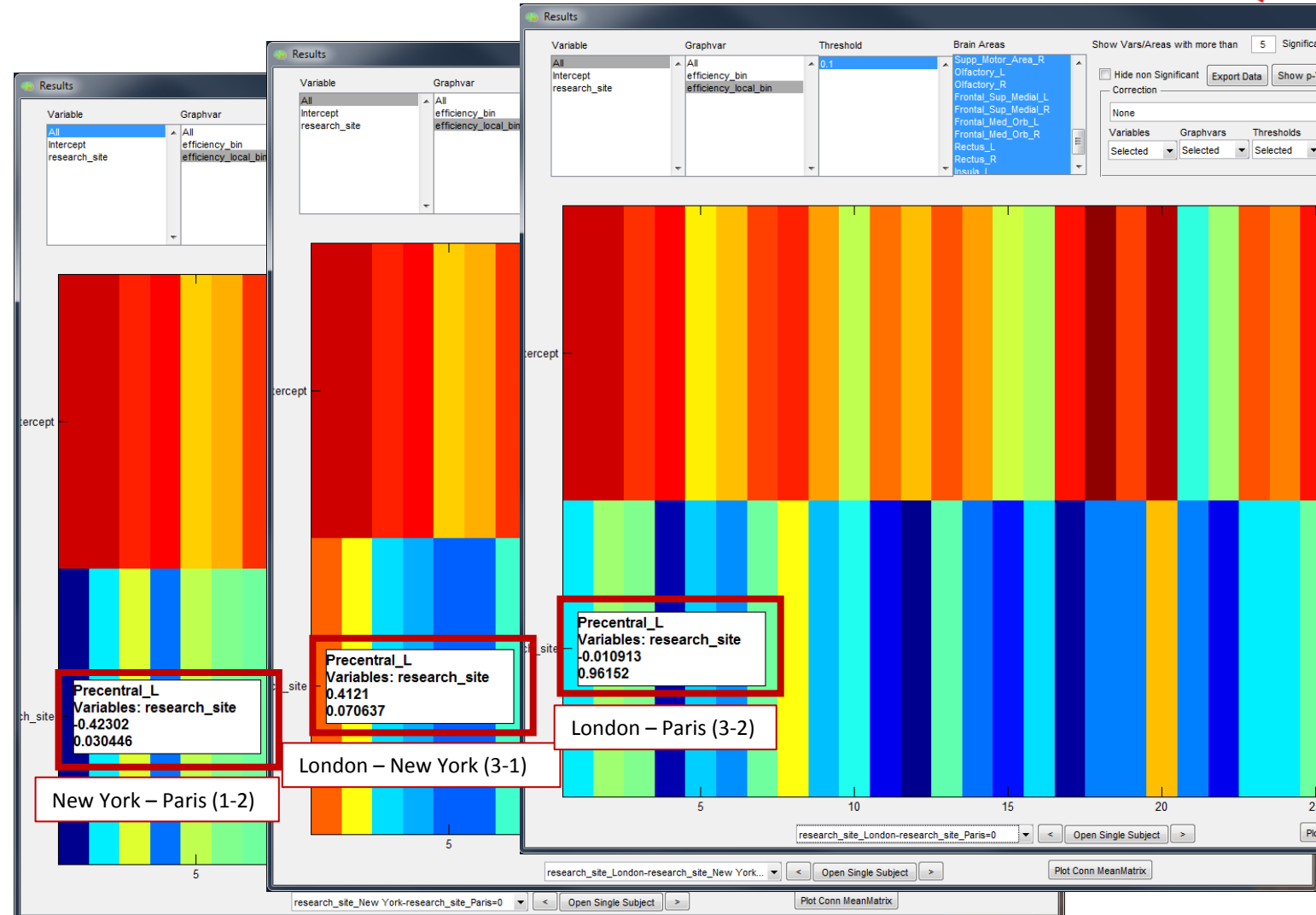
(I) research_site	(J) research_site	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1	2	-.423015873*	,1791886388	,030	-,801070854	-,044960891
	3	-,412103175	,2136688338	,071	-,862905009	,0386986595
2	1	,423015873*	,1791886388	,030	,0449608912	,8010708544
	3	,0109126983	,2228630557	,962	-,459287248	,4811126448
3	1	,4121031746	,2136688338	,071	-,038698659	,8629050086
	2	-,010912698	,2228630557	,962	-,481112645	,4592872483

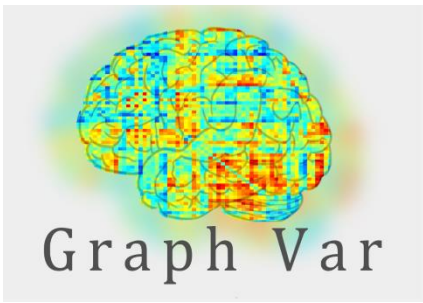
Based on observed means.

The error term is Mean Square(Error) = ,126.

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

SPSS Output Differences in Means





Within-Subject Design I

For GUI Setup (Data Sheet, Subject etc.) see Turbo GLM Tutorial „Within Subject Design“



GLM

Variables

IQ
fantasy_score
beer_pong_score
beer_score_difference
eating_contest_chilli
research_site
handedness
eating_contest_chilli
fantasy_score

Between covariates

Between factors

sex

Within covariates

Nuisance covariates

Within ID - Subj_ID Clear

Graph metrics

☒ parametric ☐ rand NW ☐ permutation

Raw matrix

☒ parametric ☐ rand NW ☐ permutation

#Rep

1

No Interactions

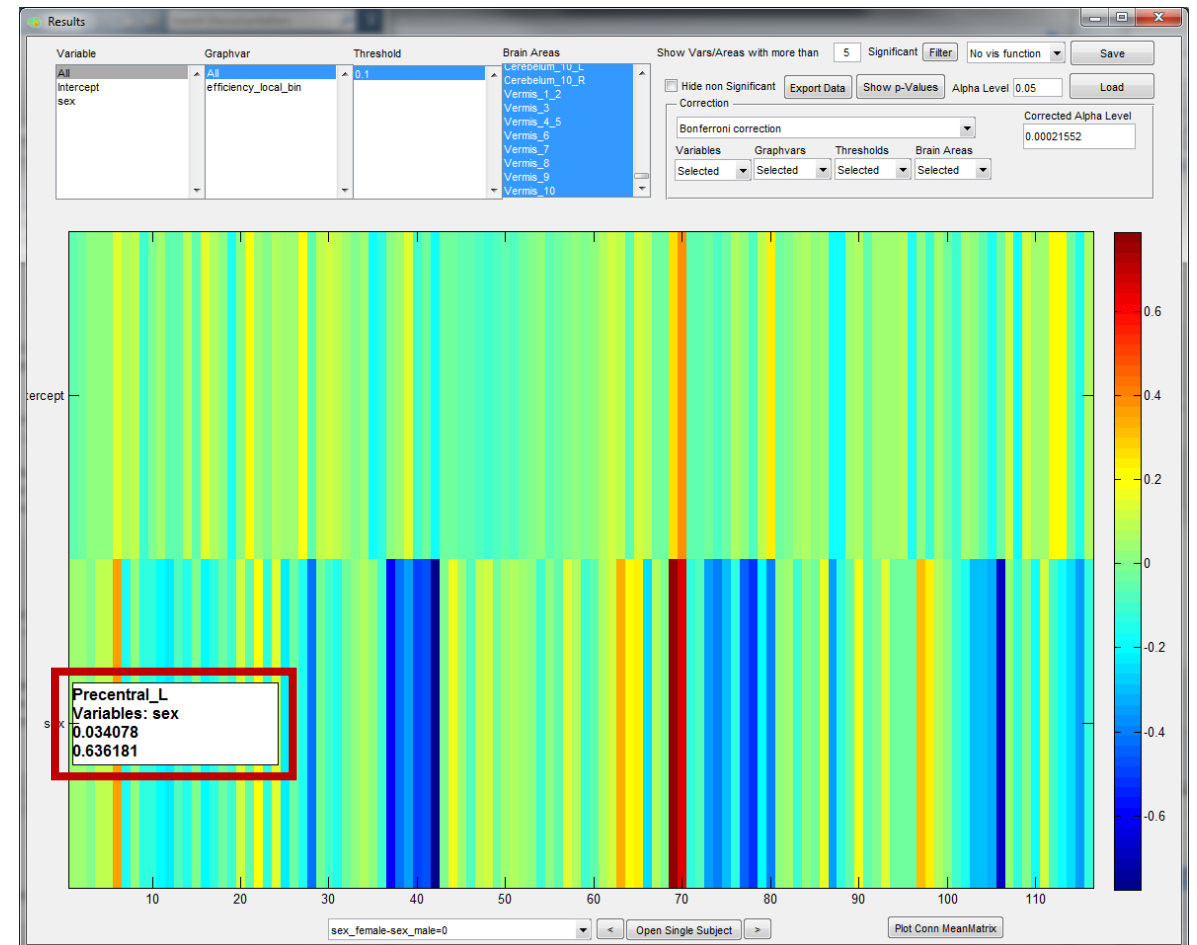
GUI Setup

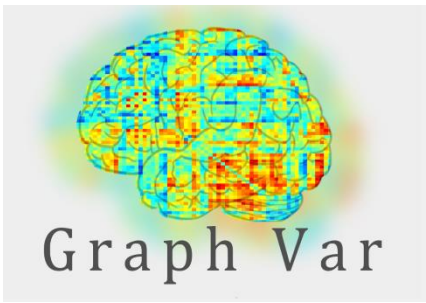
Tests of Within-Subjects Contrasts

Measure: MEASURE_1

Source	Time	Type III Sum of Squares	df	Mean Square	F	Sig.
Time	Linear	,021	1	,021	2,254	,157
Time * sex	Linear	,002	1	,002	,235	,636
Error(Time)	Linear	,120	13	,009		

SPSS Output Within-Subject Contrasts





Within-Subject Design I

For GUI Setup (Data Sheet, Subject etc.) see Turbo GLM Tutorial „Within Subject Design“



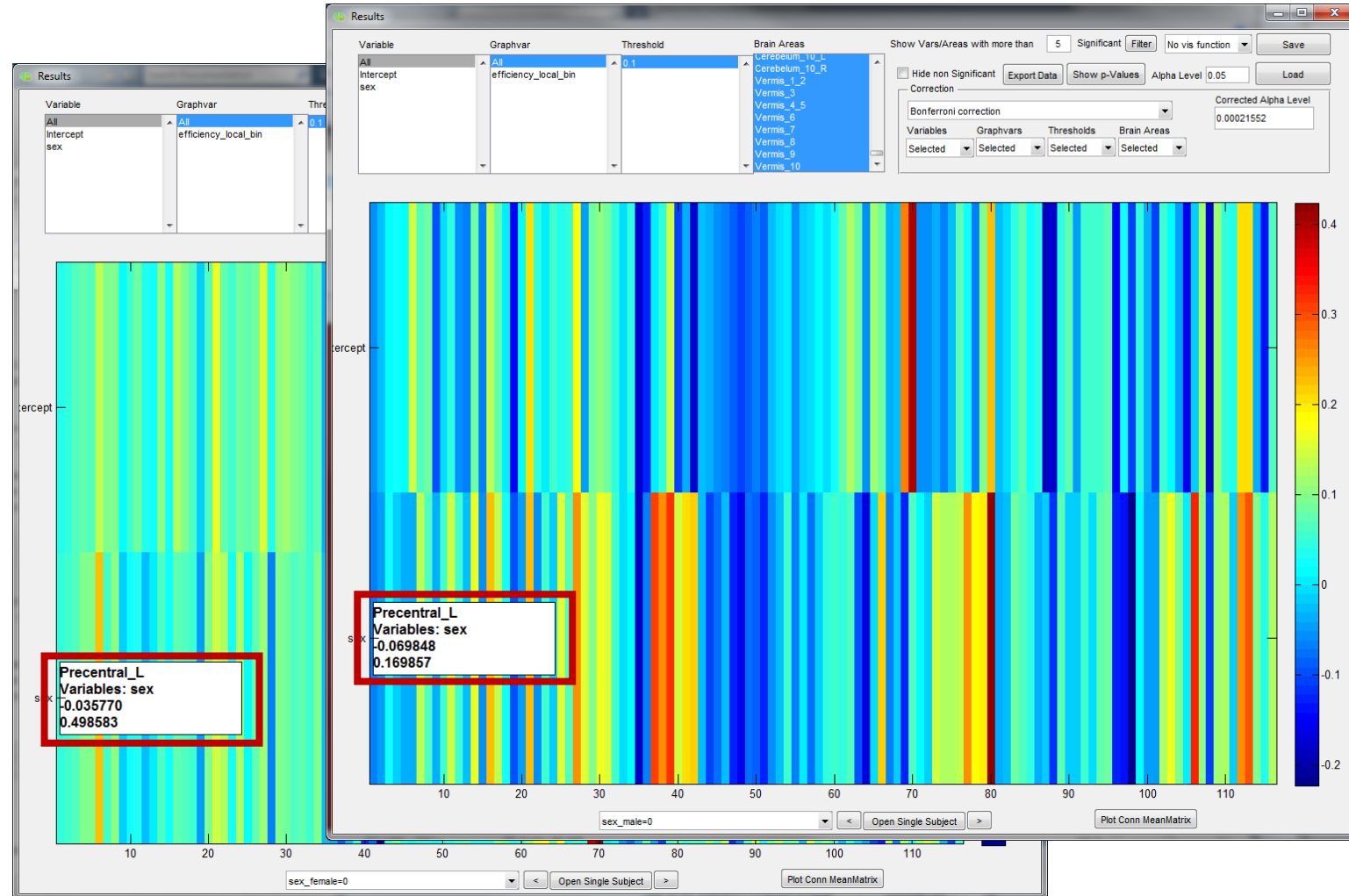
3. sex * Time

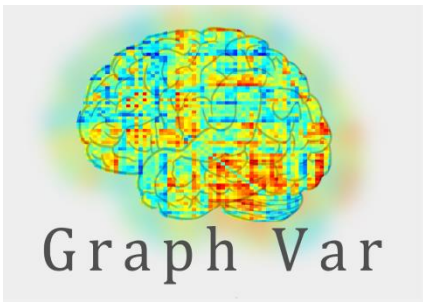
Measure: MEASURE_1

sex	Time	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
female	1	,784	,036	,706	,861
	2	,748	,031	,680	,815
male	1	,793	,034	,720	,865
	2	,723	,029	,660	,786

Female: $0.784 - 0.748 = 0.036$

Male: $0.793 - 0.723 = 0.07$





Within-Subject Design II

For GUI Setup (Data Sheet, Subject etc.) see Turbo GLM Tutorial „Within Subject Design“

GraphVar 1.0
GLM Turbo

GLM

Variables

fantasy_score
eating_contest_chili
research_site
handedness
eating_contest_chili
fantasy_score
age
sex
beer_score_difference

Between covariates

Between factors

Within covariates
beer_pong_score

Nuisance covariates

Within ID - Subj_ID Clear

Graph metrics
parametric rand NW permutation #Rep
Raw matrix
parametric rand NW permutation 1000

Network Calculations

☒ Calculate graph metrics

Brain graph metrics

Binary: Eccentricity - UND/DIR
Binary: Edge betweenness centrality - UND/DIR
Binary: Efficiency global - UND
Binary: Efficiency local - UND
Binary: Eigenvector centrality - UND
Binary: Flow coefficient global - DIR
Binary: Flow coefficient local - DIR
Binary: Graph radius - UND/DIR
Binary: Graph diameter - UND/DIR
Binary: K-coreness centrality - UND

☐ Normalize graph metric with random networks
☐ Use random network to calc smallworldness

Calculate variables and export

GUI Setup

Tests of Within-Subjects Effects

Measure: MEASURE_1

Source		Type III Sum of Squares	df	Mean Square	F	Sig.
time	Sphericity Assumed	,018	1	,018	1,371	,263
	Greenhouse-Geisser	,018	1,000	,018	1,371	,263
	Huynh-Feldt	,018	1,000	,018	1,371	,263
	Lower-bound	,018	1,000	,018	1,371	,263
time * beer_difference	Sphericity Assumed	7,839E-5	1	7,839E-5	,006	,940
	Greenhouse-Geisser	7,839E-5	1,000	7,839E-5	,006	,940
	Huynh-Feldt	7,839E-5	1,000	7,839E-5	,006	,940
	Lower-bound	7,839E-5	1,000	7,839E-5	,006	,940
Error(time)	Sphericity Assumed	,172	13	,013		
	Greenhouse-Geisser	,172	13,000	,013		
	Huynh-Feldt	,172	13,000	,013		
	Lower-bound	,172	13,000	,013		

SPSS Output Within-Subject Effects

