Grad Stats Final Spring 2003

There are three questions on this final. Good luck.

Question 1

Adrinne provided me with a paper entitled "Increases in Manic Symptoms After Life Events Involving Goal Attainment" published in the *Journal of Abnormal Psychology*. The following is loosely based on that paper. In this study, 43 bipolar ("manic-depressives") patients were followed monthly. Of particular interest was what happened to the patient's symptoms after a goal attainment (such as getting into grad school, passing exams, getting a job, and other positive life events). Data are available for the following variables:

ManicBefore	Severity of Mania symptoms the month before the goal attainment
ManicAfter	Severity of Mania symptoms the month after the goal attainment
DepressBefore	Severity of Depressive symptoms the month before the goal attainment
DepressAfter	Severity of Depressive symptoms the month after the goal attainment
Goal	A rating (by coders blind to the diagnosis) of the positivity of the goal attained. 1 = modest goal, 4 = major goal.
Age	Age in years

1. The researchers wanted to be sure that Goal was not related to other demographic variables such as Age. Specify Models A/C for testing whether Age predicts Goal (the positivity of the goal attained).

2. They tested a number of demographic variables in addition to Age and found that none were significant. For a sample size of 43, what was the approximate power for detecting a small effect? A large effect?

3. Controlling for Manic symptoms before the goal was attained, did the magnitude of the Goal predict Manic symptoms afterwards? Specify Models A/C.

4. A journal editor suggests that a simple difference score might be better for answering the previous question. Specify Models A/C for testing whether the coefficient for ManicBefore significantly differs from 1 in the Model A for the prior question.

5. Now let's do use the change score for manic severity. Does the change in the manic symptoms depend on Goal? Specify Models A/C.

6. In the context of the previous question, did manic severity change on average? Specify Models A/C.

7. Is the change in Manic severity predicted by the change in Depression severity?

8. A key implication of the name “bipolar” is that if the patient is manic, then he or she is not simultaneously depressed. Specify Models A/C and use only the Before scores to determine between-subjects if depression severity predicts mania severity. And what is the predicted sign of the relationship?

9. Now suppose both mania and depression severity scores are available for each patient for a number of months. Explain how you would use these data to test whether within-subjects fluctuations in depression severity over time predict fluctuations in mania over time.

Question 2

A political scientist uses a 5-point conservatism scale to predict whether individuals voted for the Republican candidate. CONDEV is the mean-deviated form of the conservatism scale. The output below is obtained (SAS has slightly changed the format of the proc logistic output from the handouts in class, but you should be able to find everything you need).

Write a brief summary of these results, being sure to interpret the two parameters in terms of either odds or probabilities as you prefer. You may find useful that e^-0.1994 = .82 and e^2.1771 = 8.82.

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The LOGISTIC Procedure
              Model Information
Data Set                      WORK.VOTE
Response Variable             voterep
Number of Response Levels     2
Number of Observations        63
Model                         binary logit
Optimization Technique        Fisher's scoring

          Response Profile
 Ordered                       Total
   Value      voterep      Frequency

       1            1             29
       2            0             34

Probability modeled is voterep=1.

         Model Fit Statistics
                                Intercept
                 Intercept         and
Criterion           Only        Covariates

AIC                88.939          58.279
SC                 91.082          62.565
-2 Log L           86.939          54.279


Testing Global Null Hypothesis: BETA=0

Test                     Chi-Square       DF     Pr > ChiSq

Likelihood Ratio            32.6603        1         <.0001
Score                       25.6499        1         <.0001
Wald                        14.4880        1         0.0001
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Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	-0.1994	0.3358	0.3524	0.5528
condev	1	2.1771	0.5720	14.4880	0.0001

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
condev	8.821	2.875	27.064

Question 3

Correll et al. (2002) report a study examining racial biases in high pressure decision scenarios potentially faced by police officers. Participants are confronted by targets who are either holding a gun or some other object (cell phone, wallet, etc.). Participants have to make a decision within a 750 millisecond time frame about whether the target is armed. They push the "shoot" button if the target is armed and the "not shoot" button if the target is holding some object other than a gun. Half the targets are young African American males, half are young White males. In total there are 80 trials, 20 involving armed African American targets, 20 involving armed White targets, 20 involving unarmed African American targets, and 20 involving unarmed White targets. For each participant, we record four mean latency scores (reaction times in milliseconds) for these four kinds of targets, averaging across the 20 trials. These latency scores are the mean amount of time (in milliseconds) it take the person to make a correct "shoot" versus "no shoot" decision for the four different kinds of targets.

In addition, half of the participants are male and half are female, all white. Finally, we also have a questionnaire measure of prejudice for each participant.

In sum the dataset contains the following variables:

WTG	Mean latency (in milliseconds) for correct responses to White armed targets
ATG	Mean latency (in milliseconds) for correct responses to African American armed targets
WTNG	Mean latency (in milliseconds) for correct responses to White unarmed targets
ATNG	Mean latency (in milliseconds) for correct responses to African American unarmed targets
SEX	+1 if male; -1 if female
PREJ	Questionnaire measure of racial prejudice (these scores have been standardized, so they have a mean of 0 and a standard deviation of 1).

From these variables, the following additional ones are computed:

MEANLAT = (WTG+ATG+WTNG+ATNG)/4
GUNDIF = (WTG+ATG-WTNG-ATNG)
RACEDIF = (WTG-ATG+WTNG-ATNG)
BIAS=(WTG-ATG-WTNG+ATNG)

These four then are the dependent variables in a series of PROC REG models:
MODEL 1: MEANLAT=SEX PREJ
MODEL 2: GUNDIF=SEX PREJ
MODEL 3: RACEDIF=SEX PREJ
MODEL 4: BIAS=SEX PREJ

Below are the four mean latencies for the four kinds of targets:

	ARMED	UNARMED
WHITE	625.08	630.54
AFRICAN AMERICAN	620.38	642.42

In light of these means and the PROC REG output on the following pages, answer the following questions (for significant effects, make sure that your conclusions are directional):

1. Is there any evidence to suggest that one gender responds more slowly than the other? (Provide Pre, F*, and a conclusion.)

2. Is there any evidence to suggest a gender difference in PREJ scores? (Provide Pre, F*, and a conclusion.)

3. Collapsing across SEX and PREJ, is there evidence to suggest that participants make faster judgments in the case of armed targets than in the case of unarmed ones? (Provide Pre, F*, and a conclusion.)

4. Is there any evidence to suggest that gender affects the degree to which faster judgments are made in the case of armed targets than in the case of unarmed ones? (Provide Pre, F*, and a conclusion.)

5. Collapsing across SEX and PREJ, is there evidence of race bias in these data, such that responses to armed targets are faster if they are African Americans, but responses to unarmed targets are faster if they are White? (Provide Pre, F*, and a sentence conclusion.)

6. Does the magnitude of the race bias depend on participant's PREJ scores? (Provide Pre, F*, and a sentence conclusion.)

7. In Model 3, provide an interpretation for the regression coefficient associated with SEX (i.e., 5.797623).

8. Suppose you wanted to ask whether there was a simple difference due to the race of the target for only the armed targets. Describe briefly how you would conduct the analysis to answer this question. (What models with what variables?)

9. Nothing in the analyses reported suggests that distributional assumptions have been worried about. Should they be? If so, what assumption is likely violated in these data and what corrective action might be taken?

Model: MODEL1
Dependent Variable: MEANLAT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	300.37540	150.18770	2.827	0.0768
Error	27	1434.16240	53.11713		
C Total	29	1734.53780			

Root MSE	7.28815	R-square	0.1732
Dep Mean	629.60488	Adj R-sq	0.1119
C.V.	1.15758		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|	Type II SS
INTERCEP	1	630.238136	1.38092099	456.390	0.0001	11063850
SEX	1	2.374699	1.38482135	1.715	0.0978	156.193942
PREJ	1	-2.410893	1.35749022	-1.776	0.0870	167.539407

Variable	DF	Squared Partial Corr Type II	Tolerance
INTERCEP	1	.	.
SEX	1	0.09821317	0.99394430
PREJ	1	0.10460087	0.99394430

Model: MODEL2
Dependent Variable: GUNDIF

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	3548.24962	1774.12481	2.513	0.0998
Error	27	19064.41455	706.08943		
C Total	29	22612.66417			

Root MSE	26.57234	R-square	0.1569
Dep Mean	-27.49747	Adj R-sq	0.0945
C.V.	-96.63561		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|	Type II SS
INTERCEP	1	-30.514339	5.03479048	-6.061	0.0001	25936
SEX	1	-11.313273	5.04901104	-2.241	0.0335	3545.059830
PREJ	1	0.531354	4.94936268	0.107	0.9153	8.138224

Variable	DF	Squared Partial Corr Type II	Tolerance
INTERCEP	1	.	.
SEX	1	0.15679532	0.99394430
PREJ	1	0.00042670	0.99394430

Model: MODEL3
Dependent Variable: RACEDIF

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	1029.86130	514.93065	0.791	0.4634
Error	27	17566.51798	650.61178		
C Total	29	18596.37928			

Root MSE	25.50709	R-square	0.0554
Dep Mean	-7.17467	Adj R-sq	-0.0146
C.V.	-355.51607		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|	Type II SS
INTERCEP	1	-5.628634	4.83295229	-1.165	0.2544	882.476035
SEX	1	5.797623	4.84660277	1.196	0.2420	930.994145
PREJ	1	1.404145	4.75094918	0.296	0.7698	56.831002

Variable	DF	Squared Partial Corr Type II	Tolerance
INTERCEP	1	.	.
SEX	1	0.05033078	0.99394430
PREJ	1	0.00322476	0.99394430

Model: MODEL4
Dependent Variable: BIAS

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	296.05187	148.02594	0.469	0.6305
Error	27	8518.30901	315.49293		
C Total	29	8814.36089			

Root MSE	17.76212	R-square	0.0336
Dep Mean	16.58553	Adj R-sq	-0.0380
C.V.	107.09406		

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > |T|	Type II SS
INTERCEP	1	16.232203	3.36547494	4.823	0.0001	7339.252491
SEX	1	-1.324989	3.37498059	-0.393	0.6977	48.626359
PREJ	1	3.022014	3.30837125	0.913	0.3691	263.241330

Variable	DF	Squared Partial Corr Type II	Tolerance
INTERCEP	1	.	.
SEX	1	0.00567605	0.99394430
PREJ	1	0.02997664	0.99394430