

(Adapted from Payne, 2001).

There have been a series of recent incidents in which police officers have fired at and killed African American males whom they judged to be armed but in fact were not. These incidents have led to a line of work to explore whether the race of a target might affect the identification of a weapon. To examine this issue, Payne (2000) conducted a study in which participants went through 120 trials on which either a gun or a tool were shown on the computer screen. The participants' task was to identify each object as either a gun or a tool as quickly and as accurately as possible. On every trial, immediately preceding the object that appeared on the screen (either a gun or a tool), a face appeared very briefly and participants' were told to ignore these. The ethnicity of the faces varied, with half of them African American males and half of them White males. In sum, there were four kinds of trials (30 of each), with ethnicity of face crossed by whether the object was a gun or a tool. The dependent variable examined was the mean latency (time in milliseconds) needed to correctly identify the object as a gun or a tool. It was hypothesized that African American faces would speed up (i.e., smaller latency) the correct identification of guns, compared to tools, whereas that would not be the case for White faces.

The following variables were measured for every participant:

AGUN	Mean latency to correctly identify a gun as a gun following an African American face (average across 30 trials).
WGUN	Mean latency to correctly identify a gun as a gun following a White face (average across 30 trials).
ATOOL	Mean latency to correctly identify a tool as a tool following an African American face (average across 30 trials).
WTOOL	Mean latency to correctly identify a tool as a tool following an White face (average across 30 trials).
GENDER	Participant's Gender (-1 if Male, +1 if Female)
PREJ	Questionnaire measure of prejudice (1-7, with higher numbers indicating more prejudice)

From these variables, the following additional variables were computed:

$WGVST = AGUN + WGUN - ATOOL - WTOOL$

(The difference in response latencies between guns and tools)

$WWVSA = AGUN + ATOOL - WGUN - WTOOL$;

(The difference in response latencies following an White versus African American face)

$WWXGT = WGUN - AGUN - WTOOL + ATOOL$;

(The difference due to the interaction of face ethnicity with gun versus tool)

PREJD Prejudice mean deviated

On the attached pages are the means for the AGUN, WGUN, ATOOL, and WTOOL variables, first ignoring GENDER and then broken down for each GENDER. Following these a series of models were estimated, using the following PROC REG commands:

```
PROC REG;  
MODEL WGVST=GENDER;  
MODEL WWVSA=GENDER;  
MODEL WWAXGT=GENDER;  
MODEL WGVST=GENDER PREJD;  
MODEL WWVSA=GENDER PREJD;  
MODEL WWAXGT=GENDER PREJD;
```

Based on this output, answer the following questions.

1. Ignoring participant's prejudice level (but including GENDER as a between-participant variable), is there evidence that the ethnicity of the face interacts with the object (gun versus tool) in affecting the speed with which each object is identified?
2. Draw a graph of the four cell means (ignoring GENDER) and provide a substantive interpretation for your answer to question 1.
3. Is there any evidence to suggest that GENDER moderates the interactive effects of face ethnicity and type of object, again ignoring prejudice level?
4. In the first model, where WGVST is regressed on GENDER, provide an interpretation for the intercept value (-13.43). The significance of this intercept tells you what?
5. GENDER has a significant slope in this first model. What substantive conclusion does this permit?
6. In the final model, PREJD is a significant predictor. What do you conclude from this?
7. Given the fact that the dependent variable in all of these models is the latency of response, would you expect residuals to be normally distributed? Why or why not? What transformation might be appropriate to deal with any problems?

Variable	N	Mean	Std Dev	Minimum	Maximum
AGUN	60	637.8886430	38.8124302	547.7616480	719.8516987
WGUN	60	650.5133742	26.9044087	584.7906413	706.7590053
ATOOL	60	657.5344734	30.7192790	570.6099853	731.3494527
WTOOL	60	644.2962812	33.3328657	555.0727826	706.6676249

----- GENDER=-1 -----

Variable	N	Mean	Std Dev	Minimum	Maximum
AGUN	30	635.5181706	43.1231170	547.7616480	719.8516987
WGUN	30	645.9180967	28.2216194	584.7906413	687.1802782
ATOOL	30	659.6940334	38.4225919	570.6099853	731.3494527
WTOOL	30	648.7868999	34.0132271	555.0727826	705.8996200
PREJ	30	3.8333333	0.8742813	2.0000000	5.0000000

----- GENDER=1 -----

Variable	N	Mean	Std Dev	Minimum	Maximum
AGUN	30	640.2591154	34.5474375	553.7177344	700.6111419
WGUN	30	655.1086517	25.1496599	597.9934386	706.7590053
ATOOL	30	655.3749134	20.8313246	616.5897276	687.4262516
WTOOL	30	639.8056624	32.5860599	599.2180989	706.6676249
PREJ	30	3.5333333	1.0080139	2.0000000	6.0000000

Model: MODEL1
 Dependent Variable: WGVST

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	11123.61079	11123.61079	4.726	0.0338
Error	58	136514.74403	2353.70248		
C Total	59	147638.35482			
Root MSE		48.51497	R-square	0.0753	
Dep Mean		-13.42874	Adj R-sq	0.0594	
C.V.		-361.27724			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	-13.428737	6.26325592	-2.144	0.0362
GENDER	1	13.615929	6.26325592	2.174	0.0338

Model: MODEL2
 Dependent Variable: WWVSA

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	0.67739	0.67739	0.000	0.9886
Error	58	191830.51541	3307.42268		
C Total	59	191831.19280			
Root MSE		57.51020	R-square	0.0000	
Dep Mean		0.61346	Adj R-sq	-0.0172	
C.V.		9374.71059			

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	0.613461	7.42453442	0.083	0.9344
GENDER	1	0.106254	7.42453442	0.014	0.9886

Model: MODEL3
 Dependent Variable: WWAXGT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	1	1245.35372	1245.35372	0.396	0.5315
Error	58	182304.82250	3143.18659		
C Total	59	183550.17622			
Root MSE	56.06413	R-square	0.0068		
Dep Mean	25.86292	Adj R-sq	-0.0103		
C.V.	216.77414				

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	25.862923	7.23784797	3.573	0.0007
GENDER	1	4.555864	7.23784797	0.629	0.5315

Model: MODEL4
 Dependent Variable: WGVST

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	12181.51521	6090.75761	2.563	0.0859
Error	57	135456.83961	2376.43578		
C Total	59	147638.35482			
Root MSE	48.74870	R-square	0.0825		
Dep Mean	-13.42874	Adj R-sq	0.0503		
C.V.	-363.01775				

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	-13.428752	6.29343015	-2.134	0.0372
GENDER	1	14.294897	6.37517299	2.242	0.0289
PREJD	1	4.526454	6.78418934	0.667	0.5073

Model: MODEL5
 Dependent Variable: WWVSA

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	796.68914	398.34457	0.119	0.8882
Error	57	191034.50366	3351.48252		
C Total	59	191831.19280			
Root MSE	57.89199	R-square	0.0042		
Dep Mean	0.61346	Adj R-sq	-0.0308		
C.V.	9436.94663				

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	0.613474	7.47382379	0.082	0.9349
GENDER	1	-0.482707	7.57089828	-0.064	0.9494
PREJD	1	-3.926401	8.05662960	-0.487	0.6279

Model: MODEL6
 Dependent Variable: WWAXGT

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Value	Prob>F
Model	2	14740.05979	7370.02990	2.489	0.0920
Error	57	168810.11643	2961.58099		
C Total	59	183550.17622			
Root MSE	54.42041	R-square	0.0803		
Dep Mean	25.86292	Adj R-sq	0.0480		
C.V.	210.41863				

Parameter Estimates

Variable	DF	Parameter Estimate	Standard Error	T for H0: Parameter=0	Prob > T
INTERCEP	1	25.862870	7.02564468	3.681	0.0005
GENDER	1	6.980842	7.11689796	0.981	0.3308
PREJD	1	16.166523	7.57350167	2.135	0.0371