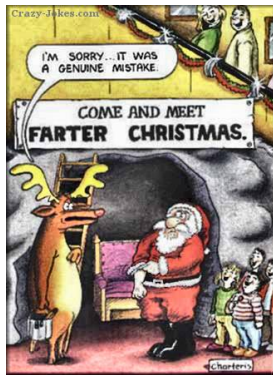


Hello All!

Well, here's the final act of this ongoing saga called PS 217. Thus far, you've collectively convinced me that I can't make up an exam that's sufficiently difficult that you won't do well. So, I've given up. ☺ As you've been diligently preparing for this exam and looking at old exams, you should notice that the current exam is a good deal shorter than previous exams. That's a concession to the quality of this class, the likes of which I haven't encountered in over 25 years of teaching this course. Have a wonderful break!



All of the other reindeer used to laugh and call him names.

Let's start out with a random question...

1. What's the difference between a parametric statistic (e.g., ANOVA, Pearsons' product-moment correlation coefficient) and a nonparametric statistic (e.g., Spearman's rho)? [1 pt]

2. Place, et al. (2008) wrote an article that appeared in *Psychological Science* titled: "The ability to judge the romantic interest of others." The abstract read:

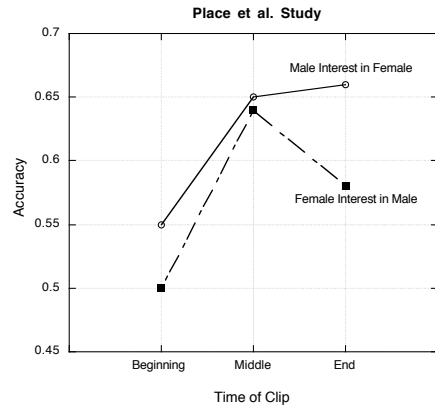
The ability to judge another individual's romantic interest level—both toward oneself and toward others—is an adaptively important skill when choosing a suitable mate to pursue. We tested this ability using videos of individuals on speed dates as stimuli. Male and female observers were equally good at predicting interest levels, but they were more accurate when predicting male interest: Predictions of female interest were just above chance. Observers predicted interest successfully using stimuli as short as 10 s, and they performed best when watching clips of the middle or end of the speed date. There was considerable variability between daters, with some being very easy to read and others apparently masking their true intentions. Variability between observers was also found. The results suggest that the ability to read nonverbal behavior quickly in mate choice is present not only for individuals in the interaction, but also for third-party observers.

To simplify the study and place it in a format that is consistent with your knowledge, let's imagine the study as a 2x3 independent groups design. Forty-eight participants (24 male and 24 female) viewed a short video clip of a speed dating couple. They were shown only a portion of the speed dating interaction from the beginning, middle, or end of the interaction. Half the participants rated only the males in the interaction (Male's interest in female) and the other half of the participants rated only the females in the interaction (Female's interest in male). The dependent variable is accuracy in correctly judging the romantic interest of the target person in the video (on a scale of 0 = totally inaccurate to 1 = totally accurate). Below is a source table that analyzes data similar to those found by Place et al. Complete the source table and interpret the results as completely as you can. [15 pts]

**Descriptive Statistics**

Dependent Variable: Accuracy

Gender	Time	Mean	Std. Deviation	N
Male Interest in Female	Beginning of clip	.5500	.04000	8
	Middle of clip	.6513	.01959	8
	End of clip	.6600	.03464	8
	Total	.6204	.05974	24
Female Interest in Male	Beginning of clip	.4975	.02375	8
	Middle of clip	.6437	.02722	8
	End of clip	.5812	.02949	8
	Total	.5742	.06639	24
Total	Beginning of clip	.5238	.04177	16
	Middle of clip	.6475	.02324	16
	End of clip	.6206	.05118	16
	Total	.5973	.06671	48



**Tests of Between-Subjects Effects**

Dependent Variable: Accuracy

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>b</sup>
Gender	.026				.000	.406	28.739	.999
Time	.136				.000	.783	151.798	1.000
Gender * Time	.010				.006	.217	11.630	.846
Error			.001					
Corrected Total								

3. In an article by Shackman et al. (2009) in *Psychological Science* entitled “Right dorsolateral prefrontal cortical activity and behavioral intervention,” the abstract reads:

Individuals show marked variation in their responses to threat. Such individual differences in behavioral inhibition play a profound role in mental and physical well-being. Behavioral inhibition is thought to reflect variation in the sensitivity of a distributed neural system responsible for generating anxiety and organizing defensive responses to threat and punishment. Although progress has been made in identifying the key constituents of this behavioral inhibition system in humans, the involvement of dorsolateral prefrontal cortex (DLPFC) remains unclear. Here, we acquired self-reported Behavioral Inhibition System Sensitivity scores and high-resolution electroencephalography from a large sample. Using the enhanced spatial resolution afforded by source modeling techniques, we show that individuals with greater tonic (resting) activity in right-posterior DLPFC rate themselves as more behaviorally inhibited. This observation provides novel support for recent conceptualizations of behavioral inhibition and clues to the mechanisms that might underlie variation in threat-induced negative affect.

From the PASW analysis below (of data that mimic those found in the Shackman et al. study), interpret the results as completely as you can. How many participants are in the study? If a person received a score of 20 on the Behavioral Inhibition Scale (BIS), what would you predict that person’s EEG asymmetry score to be? If a person received a score of 12 on the Behavioral Inhibition Scale (BIS), what would you predict that person’s EEG asymmetry score to be? What is the function of the standard error of estimate? [10 pts]

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.448 <sup>a</sup>	.201	.184	.13669

a. Predictors: (Constant), Behavioral Inhibition Scale

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	.226	1	.226	12.083	.001 <sup>a</sup>
	Residual	.897	48	.019		
	Total	1.123	49			

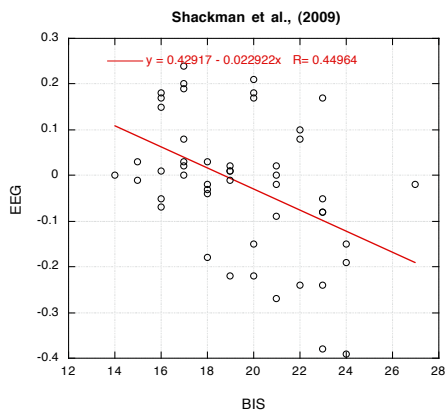
a. Predictors: (Constant), Behavioral Inhibition Scale

b. Dependent Variable: EEG asymmetry

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.427	.129		3.319	.002
	Behavioral Inhibition Scale	-.023	.007	-.448	-3.476	.001

a. Dependent Variable: EEG asymmetry



4. [G&W] Is there a relationship between cognitive ability and social rank? It may be the case for birds. Boogert, Reader, and Laland (2006) measured social rank and individual learning ability for a group of starlings. The following data represent results similar to those obtained in the study. Analyze the data as completely as possible. [15 pts]

Starling	Social Rank	Learning Score
A	1	3
B	3	10
C	2	7
D	3	11
E	5	19
F	4	17
G	5	17
H	2	4
I	4	12
J	2	3

5. Some questions related to repeated measures designs:

a. In a single factor repeated measures design with 7 levels of the factor (A), how many participants would you need to conduct the study if you wanted a minimum of 15 scores per condition (cell)? [2 pts]

b. Suppose that you conduct the study (as in *a* above). Complete the resulting source table below. [5 pts]

<b>Source</b>	<b><i>SS</i></b>	<b><i>df</i></b>	<b><i>MS</i></b>	<b><i>F</i></b>
Between (A)	120			
Within				
Subject	243			
Error				
Total	687			

c. Use the above source table to illustrate why it is that the repeated measures analysis will typically be more powerful than the independent groups analysis. That is, what component of the source table is largely responsible for making the repeated measures analysis more powerful? (Show why.) [2 pts]

d. What component of the above source table is most similar to the interaction term in a two-factor ANOVA? [1 pt]

e. Why is it that you typically cannot conduct a repeated measures study for a characteristic of a person (e.g., gender, IQ)? [1 pt]

f. Under what other circumstances would you not be able to conduct an experiment as a repeated measures design? [1 pt]

g. In an independent groups ANOVA, the best estimate of population variance ( $\sigma^2$ ) is  $MS_{\text{within}}$  ( $MS_{\text{Error}}$ ). Why is it that  $MS_{\text{Error}}$  in a repeated measures ANOVA is *not* a good estimate of population variance? [2 pts]

6. Master et al. (2009) reported in *Psychological Science* a study entitled “A picture’s worth: Partner photographs reduce experimentally induced pain.” Their introduction follows (no abstract)...

Social support is associated with reduced pain experience across several domains (Cogan & Spinnato, 1988; Kulik & Mahler, 1989; Zaza & Baine, 2002); intriguingly, a handful of experimental studies suggest that this connection may reflect a causal relationship. Participants who received interactive support during a cold pressor task reported less pain than participants who completed the task alone or engaged in nonsupportive interactions (Brown, Sheffield, Leary, & Robinson, 2003; Jackson, Iezzi, Chen, Ebnet, & Eglitis, 2005). Moreover, the mere presence of another supportive individual (vs. being alone) reduced pain ratings in a cold pressor task (Brown et al., 2003; but see McClelland & McCubbin, 2008) and reduced pain ratings among fibromyalgia patients following stimulation to a painful body site (Montoya, Larbig, Braun, Preissl, & Birbaumer, 2004).

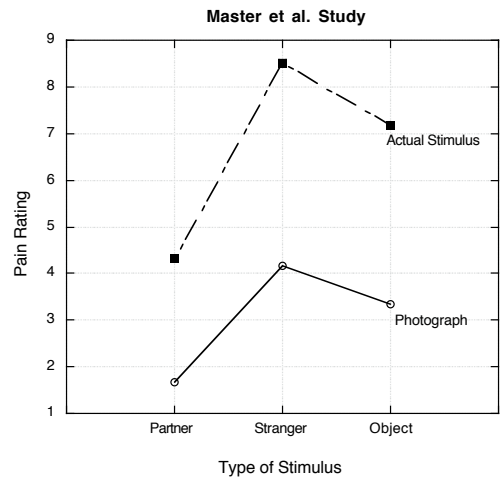
Could the same pain-attenuating effects of social support be observed by merely activating the mental representation of a supportive other? Previous work has shown that activating mental representations of important others can produce effects similar to those created by the actual presence of these individuals (Fitzsimons & Bargh, 2003; Mikulincer & Shaver, 2001). Building on this research, the current study examined whether simply viewing a photograph of one’s romantic partner could reduce physical-pain experience. We examined how this condition compared with one that is more consistent with previous conceptualizations of social support—one in which the participant held her partner’s hand.

I’ll modify the design of the study slightly, to make it consistent with your statistical knowledge. Women who were in relationships sat in front of a screen that prevented them from seeing their left arm, which was behind the screen. Thermal pain was delivered to the arm and rated by the participants (DV = pain rating, with lower numbers indicating lower pain ratings). In some cases, the pain was rated while either: a. holding her partner’s hand behind the curtain, b. holding a stranger’s hand (the experimenter) behind the curtain, or c. holding an object (squeezable ball) behind the curtain. In other cases, the pain was rated while either: a. looking at a photograph of her partner, b. looking at a photograph of a male stranger (matched for ethnicity of actual partner), or c. looking at a photograph of an object. Thus, you can think of this study as a 2x3 independent groups design (Focal Stimulus: Real vs. Photograph and Type of Stimulus: Partner, Stranger, Inanimate Object). Complete the source table below and interpret the data as completely as you can. [15 pts]

**Descriptive Statistics**

Dependent Variable: Pain

Focal Stimulus	Type of Stimulus	Mean	Std. Deviation	N
Photograph of Stimulus	Partner	1.6667	.81650	6
	Stranger	4.1667	.75277	6
	Inanimate Object	3.3333	1.03280	6
	Total	3.0556	1.34917	18
Actual Stimulus	Partner	4.3333	1.03280	6
	Stranger	8.5000	1.04881	6
	Inanimate Object	7.1667	.75277	6
	Total	6.6667	2.00000	18
Total	Partner	3.0000	1.65145	12
	Stranger	6.3333	2.42462	12
	Inanimate Object	5.2500	2.17945	12
	Total	4.8611	2.48599	36



### Tests of Between-Subjects Effects

Dependent Variable: Pain

Source	Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared	Noncent. Parameter	Observed Power <sup>b</sup>
FocalStim	117.4				.000	.823	139.901	1.000
TypeStim	69.4				.000	.734	82.715	1.000
FocalStim * TypeStim	4.4				.090	.148	5.232	.481
Error			.839					
Corrected Total								