

1. Betz and Thomas (1979) have reported a distinct connection between personality and health. They identified three personality types who differ in their susceptibility to serious stress-related illness (heart attack, high blood pressure, etc.). The three personality types are *alphas* (who are cautious and steady), *betas* (who are carefree and outgoing) and *gammas* (who tend toward extremes of behavior, such as being overly cautious or very careless). For the analysis below, lower scores indicate poorer health. Complete the analysis and interpret the results. [15 pts]

#### ANOVA Table for Health

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Personality	2	573.067	286.533	4.603	.0191	9.206	.732
Residual	27	1680.800	62.252				

#### Means Table for Health

##### Effect: Personality

	Count	Mean	Std. Dev.	Std. Err.
Alpha	10	44.200	9.807	3.101
Beta	10	47.200	7.376	2.332
Gamma	10	36.800	6.015	1.902

The three personalities varied on the health measure,  $F(2,27) = 4.603$ ,  $MSE = 62.252$ ,  $p = .019$ . Note that personality was not manipulated, so you wouldn't be able to make any causal claims. To determine which of the personalities varied, you'd need to conduct a post hoc test. Using Tukey's HSD:

$$HSD = 3.5 \sqrt{\frac{62.252}{10}} = 8.73$$

	Alpha	Beta	Gamma
Alpha	---		
Beta	3.0	---	
Gamma	7.4	10.4*	---

With only one comparison significant, I would simply conclude that Gammas ( $M = 36.8$ ) have significantly poorer health than Betas ( $M = 47.2$ ).

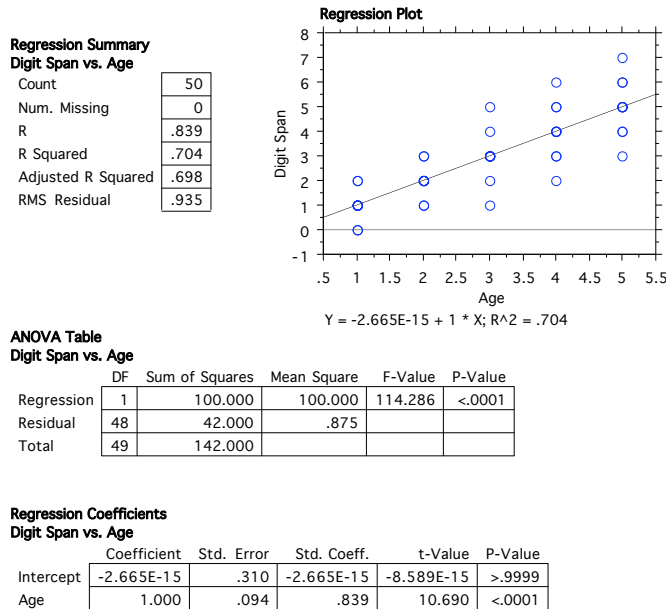
2. Mook argues that external validity is not always the purpose behind psychological research. For each of the studies below, indicate why the study is not externally valid, then why it's not a concern, given the intentions of the researcher(s). [10 pts]

Answer these questions using the Mook article.

Study	Why not externally valid	Why lack of EV is not a concern
Argyle (glasses and intelligence)		

Higgins & Marlatt (anxiety and alcohol consumption)		
Hecht (dark adaptation)		
Milgram (shock and obedience)		

3. Many researchers have been interested in how memory varied with age. To assess memory Dr. Lou King used a digit span task (number of numbers that can be repeated in the proper order). He studied children between one and five years of age. Interpret the results of his study (as seen below). If a child is three years old, what would you predict that child's digit span would be? If a child is six years old, what would you predict that child's digit span would be? What portion of variability is shared between age and digit span? Assuming that you are unwilling to attribute the relationship to age causing digit span, how would you explain the relationship you observe? [10 pts]



**There is a significant positive linear relationship between digit span and age,  $r(48) = .839, p < .001$ . (You need to recognize scientific notation in the output. With -2.665E-15, you have a value that is essentially zero, -.000000000000002665.) A three-year-old would have a digit span of 3 ( $(3 * 1) + 0$ ). Because you didn't observe a child of 6, you would be reluctant to make a prediction of that child's digit span. If the trend were to continue, of course, you would predict that the digit span would be 6. The proportion of shared variability ( $r^2$ ) is .704. One possible (third variable) explanation for these results is that a child's brain is developing over the time span, which leads to an increased ability to remember. Alternatively, you might explain the relationship as due to an increase in experience with using memory to solve problems.**

4a. Suppose that a moderate dose of Drug A, taken on a daily basis for a month, is thought to ameliorate the symptoms of depression. You've developed a new drug (Drug B) that you think may be even more effective. You think that your drug may be more effective, possibly even in smaller dosages, so you want to compare the effectiveness of your drug at both small and moderate dosages. Design a study that assesses the effectiveness of Drug B. Provide plenty of detail about your study. [20 pts]

**I would probably use an independent groups design, with 150 people suffering from depression randomly assigned to one of five conditions (Placebo, Low Dose Drug A, Moderate Dose Drug A, Low Dose Drug B, Moderate Dose Drug B). Thus,  $n = 30$ . I would have all participants monitored by a clinical psychologist (paying particular attention to the participants in the Placebo condition).**

**I would first ensure that none of the participants was taking other drugs. Thus, there might be a tapering-off period (e.g., two weeks) during which participants would take no drugs at all. Then, they would begin taking the "drugs" for a full month (at whatever dosage rate is indicated, such as one pill a day). It would be important that all groups take one identical looking pill each day. At the end of the month, each of the participants would be assessed (e.g., using the Beck Depression Inventory).**

4b. Given your design, complete the source table seen below and tell me what you would conclude. [5 pts]

Source	df	SS	MS	F
Treatment	4	80	20	1.0
Error	145	2900	20	
Total	149	2980		

Even without  $F_{\text{crit}}$ , you should recognize that when  $F = 1.0$  you would retain  $H_0$ .

4c. If you obtained the results seen above, what would you do next? [5 pts]

**I'd probably search for a new question to study. ☺ Note that the  $F$  is practically screaming that the effect is not significant. Typically, in the presence of a non-significant result, you'd look to increasing the power of the study. With  $F = 1.0$ , you might well conclude that any change you might introduce to increase power wouldn't make a sufficiently large difference. Nonetheless, you could consider using more than  $n = 30$ . You might also consider using larger dosages (even though you'd like to think that a smaller dosage of your drug would work). You might also consider using a more homogeneous group (all men, all women, all people diagnosed with severe depression) and working to minimize any random influences on the data.**

5. So far, we've learned about correlation/regression analyses and ANOVA. How do these two statistical approaches differ? What types of questions are they intended to address? [5 pts]

**The two analytical approaches differ in many ways, but the crucial distinction is that the correlation is used to determine if relationships are present and ANOVA is used to determine if differences are present (think of how each  $H_0$  differs). In each case, the interpretation of the results would depend on the actual design of the study.**