

Completed Individual Project (30 points total): Due 12/18/13

Part 1: draft due 11/8/13, Part 2: draft due 11/22/13, Part 3: draft due 12/6/13

Data Types. Your project ideally should be completed on multivariate data that are meaningful to you. If you do not have any data readily available, I can help you find some. Examples of acceptable data structures include the following:

- Multivariate data with at least 3 dependent variables (for the majority of your sample)
- Experimental studies with sequential conditions (e.g., baseline measurement, manipulation, second measurement, another manipulation, third measurement) or otherwise differentiable conditions focusing on manipulation or timing effects and moderation thereof
- Crossed sampling designs in which the same subjects respond to at least some of the same stimuli (e.g., persons viewing the same pictures, responding to the same words, or answering the same questions) focusing on predicting variation across persons and/or stimuli

Please consult me if you have a data set in mind that does not readily fall into these categories. Although I would discourage you from adding additional types of design features to your analysis given that we won't cover those models until later in the semester, we can talk about ways of accommodating more complex designs.

Variable Types. The number of variables you should plan on including in your analysis will be dictated somewhat on the complexity of your sampling design. Those of you with more complex designs should plan on including only one outcome and no more than 2-3 predictors. Those of you with simpler designs may include more complexity (maybe 2-3 outcomes with 1-2 predictors, or 1-2 outcomes with 3-4 predictors).

I would strongly prefer that your outcome variable(s) be continuous with at-least-somewhat-likely-to-be-normally distributed residuals, given that those are the only models we will be covering. However, if you are willing to learn generalized multivariate models for non-normal outcomes on your own, then I may permit you to use these kinds of outcomes.

Your predictor variables can be measured at any level, and they can be categorical or continuous (or semi-continuous). Please note if you are using any scale scores as predictors or outcomes, I would recommend that you take a mean across items instead of a sum to facilitate interpretations.

Format. The completed project will resemble the core of an APA-style manuscript (but with much less material for the introduction and discussion than a standard manuscript). The project has been divided into phases that map onto sections of the manuscript. The points to be assigned are indicated for each section. Please note that although each part of the project includes a list of elements to be included, I DO NOT WANT A NUMBERED LIST instead of a manuscript. That is, the text should be organized into standard headings and should flow with appropriate transitions between paragraphs and sections as in a real manuscript. You are encouraged to write as succinctly as you can, so long as you still include all the requested elements.

Submission. The project must be 100% complete before any points will be assigned. This means that I will provide feedback as to what is missing or should be revised as each part of the project is submitted (note due dates at the top of the page), but not assign points until the final version is submitted. **Parts of the project that are submitted late will be docked 3 points each.** When you submit your project parts, please use one cumulative document and retain all of my comments so that I can refer to previous parts as needed. **Please use Microsoft word (.docx or .doc) and track all revisions only** (i.e., do not have track changes turned on to add new text). Use this file name structure, in which lastname should be exactly what you use to log into the homework: **943 _Lastname_Project#.docx**, (e.g., 943_Templin_Project1.docx when part 1 is due). Files are to be submitted through email.

Part 1: Outline (3 points total for completion of all items):

1. Describe briefly the design of your study, including:
 - a. How many people (or other unit sampled repeatedly)?
 - b. How many occasions (or repeated measures: conditions, stimuli, etc) per person/unit?
 - c. Are there other relevant sources of nesting or crossing?
 - d. Am I familiar with these data? Remind me how if so (e.g., previous conversations).
2. For each variable of interest, describe the following:
 - a. Whether it will be a predictor or outcome
 - b. The construct it refers to and how it is measured (e.g., scale, latent, other)
 - c. Its sources of variation (i.e., varies across persons, time, stimuli, or otherwise)
 - d. The extent of any missing data (i.e., a lot, a little, none)
3. What do you want to know with respect to these variables? Describe your research questions here as best you can. I will try to suggest which analytic strategy may work best for you. If after receive my feedback you are unsure of what your models should look like specifically, please let me help you figure this out before the next project parts are due!

**Part 2: Mini-Introduction, Method, Data Description, and Unconditional Models
(17 points total)**

1. **Header and Style.** Create an APA-style header with your name and a page number. Use APA style throughout. **(1 point)**
2. **Mini-Introduction.** Write only the very last section of a traditional manuscript introduction, usually called something like “purpose (focus) of the current study”—it is not necessary to go into further details about the previous research or theory behind your data. This section should be about a page or less. It should describe the design of the study in broad terms and

present the research questions for your outcome and predictors (i.e., as repurposed from #3 in Part 1). You do not need to frame your questions in terms of statistical hypotheses on the first draft—just tell me very generally what you would like to examine with these models. The description of your research questions will become more specific in the final product.

(4 points)

3. **Method Section.** Organize the information you provided to answer Part 1 questions #1-2 into a traditional “Method” section (with headings of participants, measures, and procedure). Feel free to cannibalize from your other work so long as you include everything mentioned below. Keep in mind that if you need to limit your sample to occasion-specific complete data due to missing data, you should report the information below for that complete sample. **(7 points)**

- a) **Participants:** This should provide sample size, a summary of any important demographic characteristics, how participants were sampled or recruited. If your study is longitudinal, also describe the temporal design (age range, number and spacing of occasions, etc.)
- b) **Measures:** This should include the construct measured by each outcome and predictor and how each variable was computed/measured/recorded, including example items and their response options if using a scale. Describe how any missing items were handled (i.e., the minimum number of items required in order for a scale mean to be computed). Please clearly delineate (via separate headings or otherwise) whether each variable mentioned is a predictor or an outcome.

Also as part of the measures section, make tables with each variable’s distributional properties—per occasion if time-varying, or per condition for other repeated measures designs. For continuous variables, this should include N, minimum, maximum, mean, SD, skewness, and kurtosis (use CLASS within PROC MEANS to get estimates by occasion). For categorical variables, this should include frequency per category per occasion or condition (use PROC FREQ). Refer the reader to these tables where relevant in the measures section.

- c) **Procedure:** Relevant procedural details about how the data were collected and/or experimental design

4. **Analytic Rationale.** Begin a sub-section under a general section of “Results” that will describe the decision-making that precedes your actual analyses. You will be adding to this sub-section in Part 3, but for now, include the following elements. **(2 points total)**
 - a) Remind the reader briefly of the sampling design of your study.
 - b) If you have some other kind of repeated measures design, you’ll need to explain why aren’t just using a standard ANOVA approach in terms of the unique benefits to your data and questions (e.g., what questions could not be answered via ANOVA that are of interest to you, or why your data aren’t likely to meet ANOVA model assumptions).
5. **Unconditional Models.** Begin another sub-section under “Results” that will quantify the sources of variation in your data. This will follow one of two strategies, as noted below. **(3 points)**
 - a) Compare models of increasing complexity to determine the type of covariance structure you have present. Report the relevant model comparisons in the text, as well as the proportion of variance arising from each source.
 - b) For the final unconditional model selected, interpret each model parameter (i.e., its meaning within the metric of the original variables where possible). Provide clearly labeled parameter estimates, standard errors, and *p*-values from the final unconditional model in a table (e.g., “UN(1,1)” is not a good label).

Part 3: Conditional Models (10 points total)

1. Continue the “Analytic Rationale” sub-section of the Results section to describe the parameterization of your model predictors. That is, remind the reader what your predictors were and at what level of analysis they were measured. Report and interpret the ICC for any time-varying predictor. Please use the names of the constructs rather than the names of the scales (e.g., call your predictor “Depression” instead of “CESD”), and use the same name throughout (i.e., no synonyms allowed). Also describe the centering of each predictor and therefore who the reference group/point for your conditional models will be.
2. Continue your Results section with a sub-section for “Conditional Models”. This is where you will describe the process of adding predictors to the final unconditional model you selected in Part 2. The goal of this section is to report the model results in such a way that they clearly answer the research questions that began the manuscript. To do so, estimate a sequential set of conditional models with predictors—these will include main effects and interaction effects where statistically and substantively appropriate (as well as possible random effects of your predictors when possible prior to including any cross-level interactions with those predictors). Document your decision-making process by describing the statistical and substantive considerations that lead you to add or remove terms from your model, and thus what the answer to each of your questions is based on your end point.
3. For the final model(s) selected, INTERPRET EACH MODEL PARAMETER (including the previous unconditional model parameters) using the scale of the original variables when possible. Where relevant to answering your research questions or describing interaction

effects, also report model-implied simple effects. Provide clearly labeled parameter estimates, standard errors, and *p*-values in a table. You may end up with more than one final model based on your questions and your pattern of results—please ask for my input if you are unsure what to report. **For two bonus points**, also write an equation that describes your final model (and include the parameter symbols were relevant in your table(s)).

4. Make at least one figure that illustrates your findings. Your x-axis may be *time* or any other predictor, whichever is most useful given what you are trying to show. If you aren't sure what kind of figure to make PLEASE come talk to me. Make sure everything is clearly labeled and don't cheat the axes (e.g., scale the axes to reflect the full range of the variable, or at least ± 2 SD).
5. Revise your “purpose of the current study” section written earlier to word your research questions as clearly and consistently as you can given your presentation of the results.
6. Add one more sub-section labeled “Summary” under results, and in general terms describe what you found in light of your original questions. This would normally be the beginning of your discussion, but a short summary of findings is sufficient for this.
7. Exhale and turn it in!

A few grammatical, style, or APA-related issues that have come up repeatedly in the past:

In APA style we use a *Method* section, not a *Methods* section. APA style has changed recently (now in version 6), so make sure your headings are consistent with the new version. Also, the term *participants* is used instead of *subjects*. *Males* and *females* should only be used for animals, not people. Use *men* and *women* (or *boys* and *girls* for children). Do not begin sentences with numbers, even in the method section.

The word *since* refers to time—it is not supposed to mean *because* or *given that*. Same goes with *while*—if you aren't referring to temporally contemporaneous events, you should use *whereas* or *although*.

Affect can be a verb; *effect* is always a noun. The word *data* is plural. We do not *calculate* models; we *estimate* them. We do not *run* analyses; we *conduct* analyses or *estimate* models.

Spell out all abbreviations in tables (perhaps in a footnote if running low on space). APA also discourages the use of author-defined acronyms, and so do I. One user-defined abbreviation per paper is probably the upper limit. A general rule is DO NOT MAKE YOUR READERS REMEMBER ANYTHING.

Try to scale your variables such that the direction corresponds with their names. For example, if I have a variable called *health* but higher scores mean worse health, what I really have is a variable called *sickness* or *lack of health*. I would recommend either changing the name or flipping the direction so that they are congruent.

Use the same terms to describe your constructs consistently throughout—synonyms might make your writing more interesting, but ultimately less clear. Avoid using *this* at the beginning of a sentence without a specific modifier. For example, rather than “This model fit better than the previous model,” try “the random linear time model fit better than the fixed linear time model.”

Use parallel sentence structure whenever possible. For example, a non-parallel (and harder to follow) sentence would be something like “The intraclass correlation for Y was .50, and .30 was the intraclass correlation for X.” Keep the noun–verb pattern the same, as well as the direction.

In general, the more formulaic (i.e., boring) your writing in methods and results sections, the easier they will be to understand. Save your creativity for the introduction and discussion.