

Quick Answers

To your initial review concerns

List of topics for Review

- Partial correlation (variable importance)
- ANCOVA
- Bootstrap, 2, 3, 4
- Single model/Exploratory regression
- MR, 2, 3, 4, 5
 - Stepwise
- Bayesian approach, 2
- Testing assumptions
- ANOVA
 - Multiple comparisons
- Equivalence testing
- Effect sizes
- Robust methods, 2, 3
- Moderation, Mediation

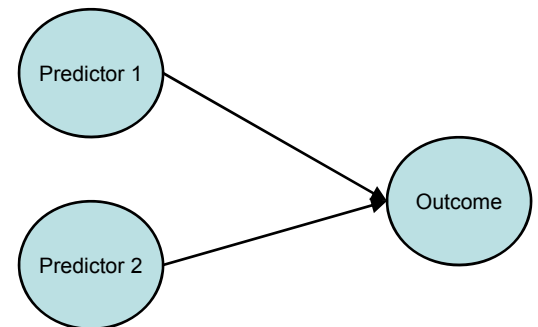
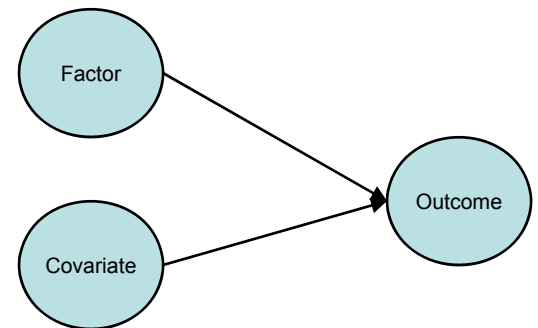
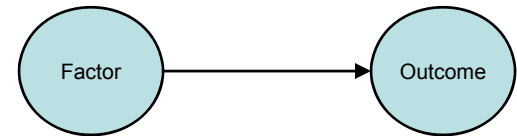


List of Topics for Future

- MANOVA
- SEM or related (FA, Path)
- Time-series¹
- Logistic regression
 - Odds ratio

ANOVA etc.

- Conceptual model of a One-Way ANOVA
 - Grouping variable(s) predicting continuous outcome measure
 - Actual model has $K - 1$ coded predictors
- ANCOVA
 - Add a continuous variable
 - Sequential regression
- MR
 - All continuous or mix of continuous and categorical





ANOVA issues

- Ignores context and individual differences
- Unbalanced designs are difficult to interpret
 - Main effects are not independent, and it doesn't do well to distinguish effects
 - Method of sums of squares can worsen the problem
- Why does your model of this aspect of human nature only have categorical predictors/causes?
- Post hoc approaches are used when planned contrasts should have been
- Typical post hocs are too conservative (loss of power)

Effect sizes

- r family: measure of linear association or, if squared, shared variance between one or more variables and another one or more variables
- d family: for group comparisons, measures of standardized mean difference
 - Can use robust measure of central tendency
 - Case level effect sizes: in some way suggest the overlap of one sample and another in group comparison situations
- Gist: effect

Equivalence Testing

- “Backwards t-test” for group comparisons
 - Or simply t-tests of a non-nil null hypothesis
- Places effect size (Δ) as the starting point
 - If you don’t know your scales well enough to tell what a meaningful effect is before you even collect, this won’t help you
 - You might also consider research something else or using a measure you can
 - Can even use rules of thumb¹
- If you see an effect that big or greater, they are not equivalent (may or may not be statistically different)
- If the difference is smaller than that your stated effect size, it must be shown to be unlikely due to just random sampling.
- If so, then the groups are equivalent
- Alternative approach, see if the CI for the difference is entirely within the range of $\pm \Delta$
- Gist: equivalence testing does the normal t-test but puts the focus on effect size and allows room for ambiguous outcomes rather than the dichotomous reject/accept approach.

Bootstrap Basics

- Resample with replacement from the original dataset to create R datasets which will have the look and feel of the original
- Purpose: create an empirical sampling distribution, providing a CI for any statistic you can come up with.
 - For example, you don't use it to give you the mean (the average of the bootstrap samples is the sample mean), you use it to give you the CI for it.
- Useful for: anything. Why bother with assumptions that may not be met?
- How to do it: Most stat packages
- Issues: if you have crappy and/or unrepresentative data this will be as useless to you as that dataset already is



'Robust' methods

- Work better and are more accurate in the face of violated assumptions
 - No, the regular ones are not robust or we wouldn't be making the distinction
- As an example, a robust regression will provide more accurate results when residuals are heteroscedastic
- Bootstrapping is more 'robust' in the face of non-normality
- Rank based procedures can be better when outliers are present

Bayesian Approach

- Use prior information to assess the probability of models or statistics of interest
- Conceptually it makes a lot more sense than the NHST approach
 - Probability of hypotheses given the data $p(H|D)$
 - Credible intervals
 - Probability that a random parameter will fall into that interval
 - NHST assumes a fixed parameter and varies the intervals
 - Model comparison

Regression

- Given the number of questions regarding it, we will review it in full along with extending it and trying other approaches