**Research Design**

The variable that we manipulate is the

Independent Variable

(Levels of prep course)

One condition (group or level) will be the control and the other will be the experimental.

**Research Design**

The variable that we measure is the

Dependent Variable

(Score on the SAT)

The dependent variable (score on the SAT) depends on the independent variable (prep

course or no prep course).

**Research Design**

•Two variables:

•Levels of prep course (IV)

•Score on SAT (DV)

1. What type of variable is the IV?

2. What type of variable is the DV?

**When to use the paired sample *t*-test**

•The assumptions behind the test

1. Dependent variable is a scale variable

2. Observations are randomly selected

3. Population is normally distributed

4. Observations are dependent

5. Pop. mean difference is zero (*μMdiff* = 0)

**Population distribution of mean differences**

• Similar to distribution of means

• Centered at *μMdiff* = 0

• Ex. SAT data

• H0: No difference in scores on the SAT by students who did not or did take a prep

course (*μMdiff* = 0)

**What is needed for a paired sample *t-*test?**

•Mean difference from our sample (*Mdiff*)

•Mean from distr. of mean diff. (*μMdiff*)

•Standard error from distr. mean diff. (*sMdiff*)

•Sample size (*N*)

**To compute standard deviation we need:**

•Individual difference scores (*Xdiff*)

•Mean difference of the sample (*Mdiff*)

•Sample size (*N*)

**To compute paired sample *t*-test:**

•Calculate difference for each person/observation

•Then treat the difference scores as a single sample *t*-test