

# Research Design

Review:

We have covered Values, Ethics and Basic  
Philosophy of Psychology as a Science

Operational definitions of Dependent variables  
and Independent variables

Fundamentals of Experimental methods and  
using Descriptive statistics to enhance  
decisions about how to do research

Now moving into Research design

# Research Design

Over next several weeks, in depth examination of  
Experimental Designs

- Description of each
- Advantages and disadvantages
- Statistical analyses associated with each

## **Types of designs:**

**Posttest only (control group)**

**Pretest Posttest**

**One-Factor between groups**

**Repeated measure One-Factor**

**Factorial Design**

**Mixed designs**

# Research Design

Control Group Posttest Only design

What is a control versus  
treatment/experimental group?

Many people conduct (quasi) research without  
a control group

Examples: weight loss, sleeping pills, nicotine  
patch, DARE

# Research Design

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**Control Group: Totally same as Experimental  
except for ??? (what?)**

# Research Design

Control groups control for everything BUT the experimental factor (at one or several levels)

Placebo Effect: Expectations or belief create an effect

Sometimes known as **non-specific effects** or subject-expectancy effects, a so-called placebo effect (or its counterpart, the nocebo effect), occurs when a person's behavior is altered in some way (e.g., symptoms are alleviated or exacerbated) by an otherwise inert treatment, due to the individual *expecting* or *believing* that it will work.

# Hypothesis Construction

- Null Hypothesis: It's not going to happen!
- A Priori Hypothesis: Yes, it will (and it may happen at several levels or intensities)
- Post Hoc Hypothesis: Um, since we were both wrong, I think this is what happened

# Hypothesis Construction

- One tailed hypothesis
  - I think this treatment will make people better 😊
  - Well, I think your treatment is a bunch of hogwash, and I think it will make people worse ☹️
- Two tailed hypothesis
  - Now, now: I think the treatment will make people better or worse depending on the kind of illness they have
  - Note-this is not a **Null** hypothesis

# Hypothesis Construction

Important:

The **Direction** of the hypothesis makes a difference in statistical interpretation

Back to A Priori vs. Post Hoc hypotheses.....

Null hypothesis: Can be rejected, but never supported

Alternate hypotheses can be supported



# Hypothesis Construction

I said my treatment would make people better

I randomly assigned half to treatment and half to control in a double blind study

1) The people in the treatment group got much better than the people in the control group ( $p < .05$ ) Reject the Null hypothesis

2) The people in the treatment group look just like the control group ( $p > .05$ ) Fail to reject the Null hypothesis

Type I Error?    1 chance in 20      Need to replicate

Type II Error?      Alpha level?      Power?