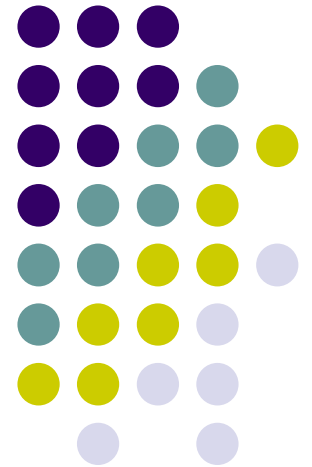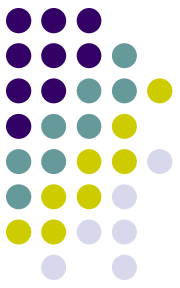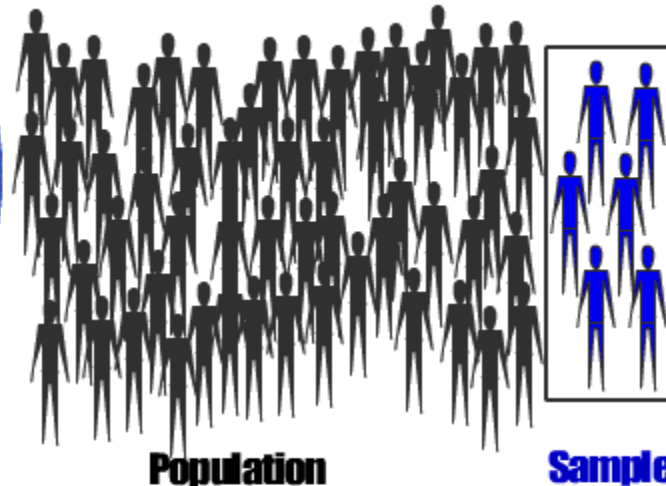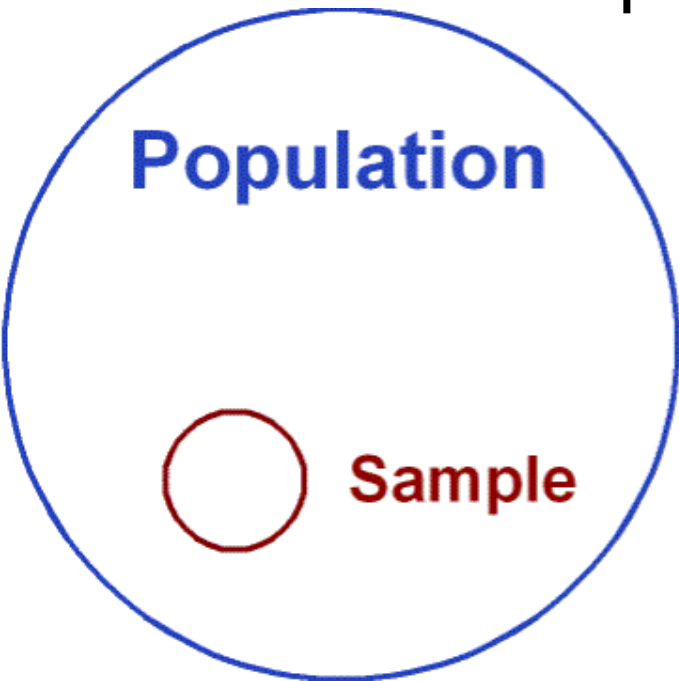# Pitfalls of Experimentation
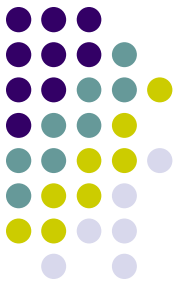
Population and Sample

- **<u>Population</u>**: the entire target that you want to learn about

- **<u>Sample</u>**: those from the population that you select to be part of your study
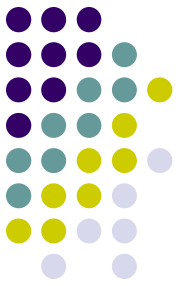

A subset of the population.

Random Sample/Assignment

- **<u>Random Sample</u>**: everyone from the population has an equal chance of being chosen for the study

- **<u>Random Assignment</u>**: once chosen, those in the sample have an equal chance of being assigned to experimental or control group
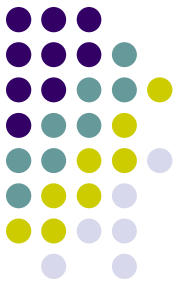
Hawthorne Effect

- But even the control group may experience changes.
- Just the fact that you know you are in an experiment can cause change.
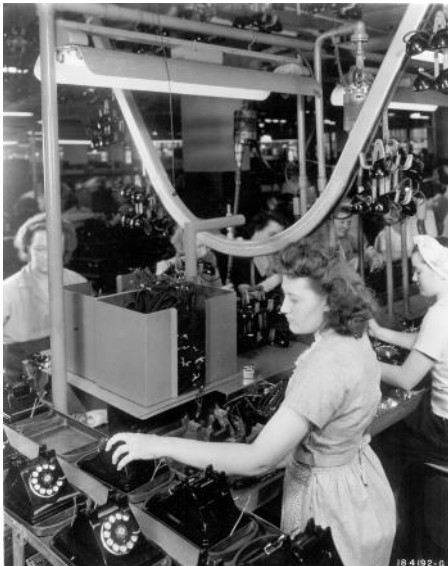
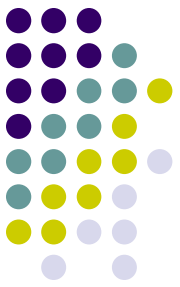Whether the lights were brighter or dimmer, production went up in the Hawthorne electric plant.

Placebo Effect
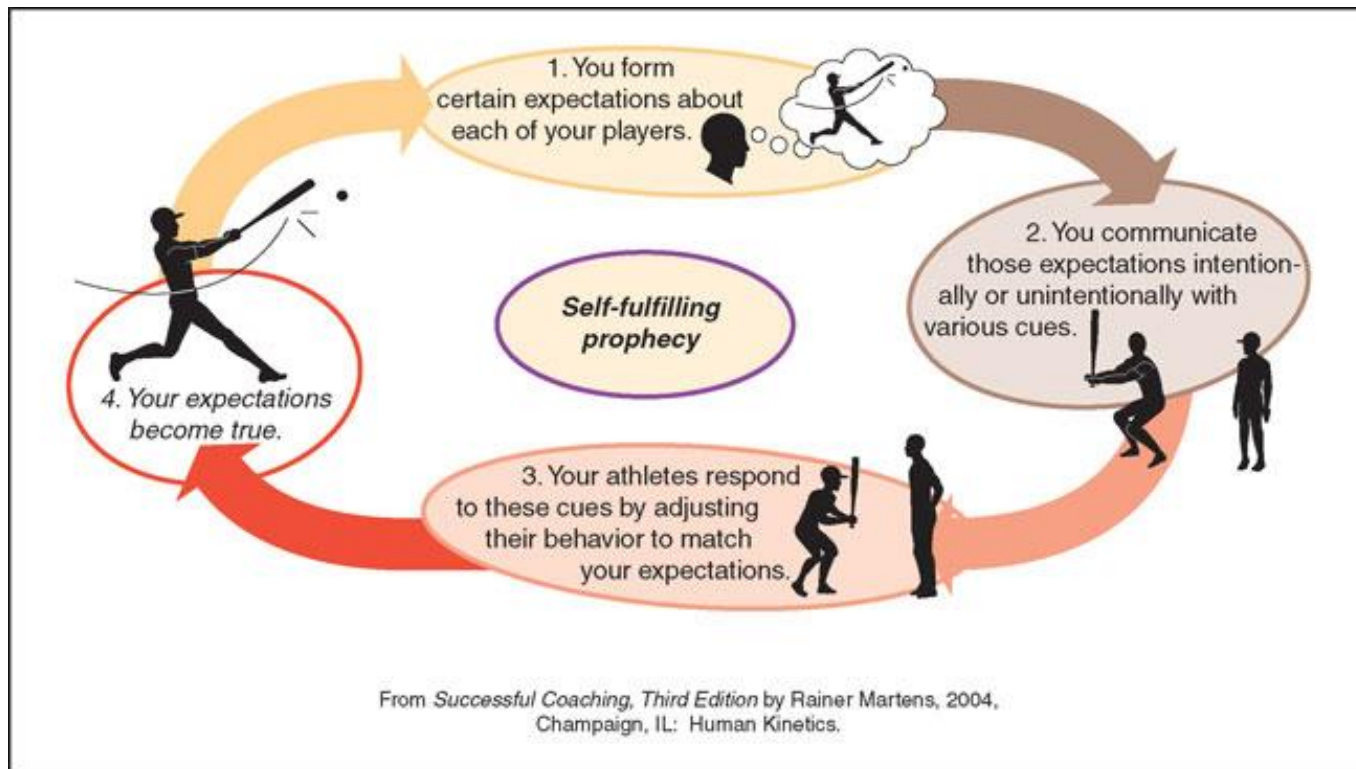
- Sometimes expecting to "get better" will actually make us get better!

- **Placebo** – a substance or treatment that has no effect apart from a person's belief in it
  - Sugar Pills

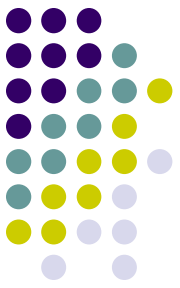- **Placebo Effect** – expectations affect performance

Self-Fulfilling Prophecy

- A belief that results in behavior that makes the belief come true
  - Researchers may inadvertently affect results!

1. You form certain expectations about each of your players.

2. You communicate those expectations intentionally or unintentionally with various cues.

3. Your athletes respond to these cues by adjusting their behavior to match your expectations.

4. Your expectations become true.

Self-fulfilling prophecy

From *Successful Coaching, Third Edition* by Rainer Martens, 2004, Champaign, IL: Human Kinetics.
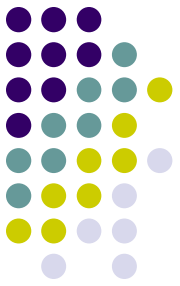
Single-Blind vs. Double-Blind

- **<u>Single-Blind study</u>**: participants do not know whether they are in the experimental or control group

- **<u>Double-Blind study</u>**: both subjects AND experimenters are kept uniformed

- Why conduct a blind studies? To reduce <u>experimenter bias</u>
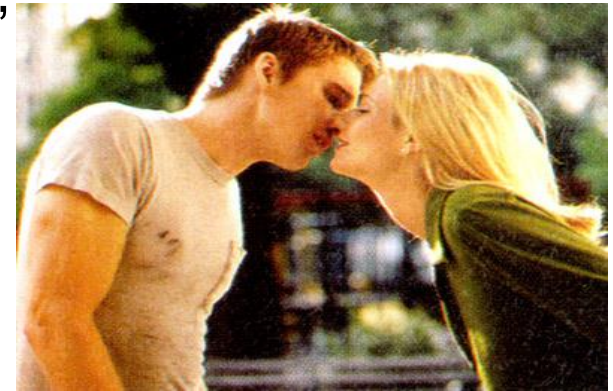
Operational Definitions

- I want to measure how being in love affects school performance.

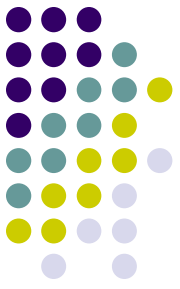 - But how do you measure LOVE? How do you <u>count</u> it?

- <u>**Operational Definitions**</u> – precise definitions that show how variables will be measured

  - How will the variables be measured in "real life" terms?

  - Let's say "love causes higher GPA"

  - We could measure "love" by…
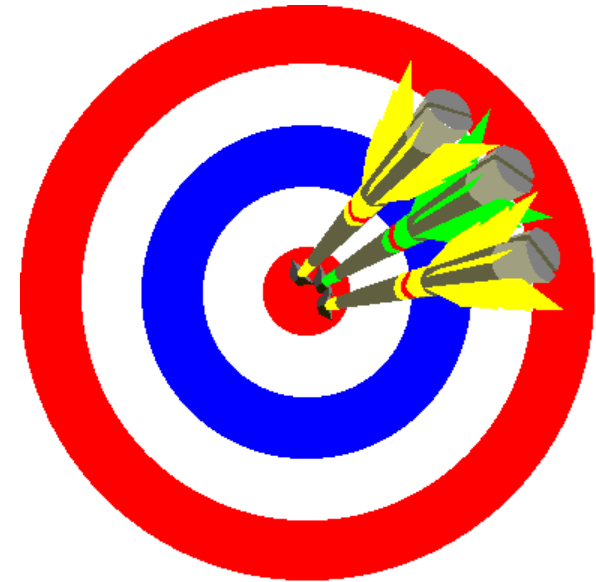
    - Kisses, hugs, etc.

Reliability

- So someone conducts an experiment and finds out their new drug, GullibleMed, cures cancer!

  - Do we just take them at their word and start ordering massive quantities of the drug?

- <u>**Reliability**</u> – replicate the experiment and get the same results to prove it works

  - How would we prove a new bow design is extremely accurate?

Statistical Significance
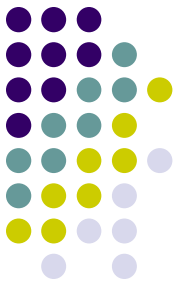
- You create an experiment to measure the effect of protein shakes on max bench press.
  - Workout group – 155 pounds
  - Non-workout group – 150 pounds
- Can we now say that drinking protein shakes makes you stronger? **NO**
- **Statistical Significance**: results must differ by a certain amount, otherwise they could be due to random chance alone