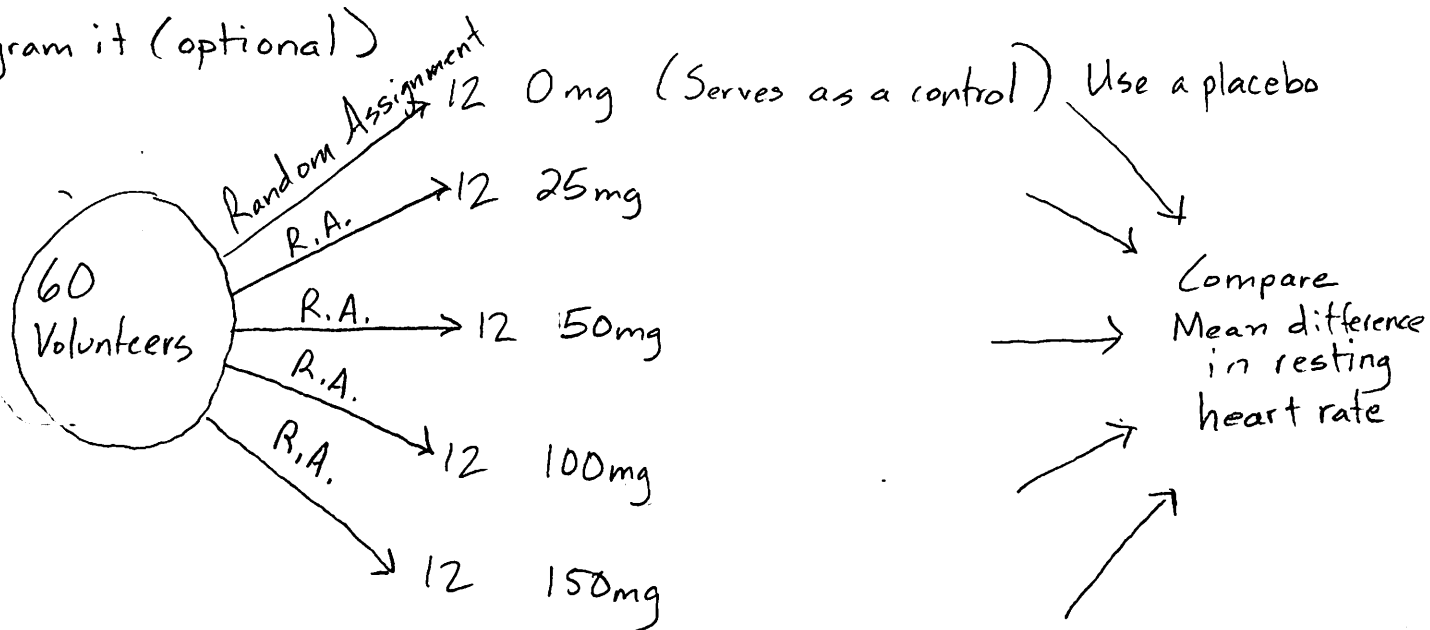


**Conducting Experiments**

Does caffeine significantly raise resting heart rates of individuals? Ms. Hogan's AP Statistics class will explore this question by designing experiments to test this claim. 60 students at Olympia High School have volunteered to take part in this study. There are 30 males and 30 females participating. The doses of caffeine that will be tested are 0mg, 25mg, 50mg, 100mg, and 150mg.

1. Design a completely randomized experiment.

Diagram it (optional)



Write up (not optional)

First collect resting heart rates from all volunteers. Randomly assign 12 volunteers into each of 5 treatment groups (0mg, 25mg, 50mg, 100mg, 150mg). To randomly assign volunteers, write each of their names on equally sized slips of paper, place in a container, mix well, and draw out 12 names at a time for each treatment. Administer doses, wait a period of time and record resting heart rate for each individual. Use a placebo for 0mg. Compare the mean difference in heart rates between the treatment groups.

2. The students suspect that females and males may react differently to caffeine. Design an experiment that takes this into account. What kind of experimental design would be appropriate now?

First block for gender. Run two simultaneous Randomized Block but separate experiments on males and females. Design

Randomly Assign 6 females into each of the 5 treatment groups. Randomly assign by writing all 30 female's names on equally sized slips of paper, place in container, mix well, and draw out 6 names for each treatment. Record resting heart rates first.

Use a placebo for 0mg. Administer treatments. Wait a period of time. Record resting heart rates. Compare the mean difference in resting heart among the treatment groups.

Repeat this process for the male volunteers.

**DO NOT COMPARE FEMALE AND MALE DATA.**

3. Design a matched pairs study. Discuss why and when this type of experimental design would be appropriate.

A matched pairs study would be appropriate if we believe individuals will react very differently to the treatments.

Matched pairs is recommended when you are comparing two treatments.

We will compare 0mg and 150 mg. Each volunteer will randomly receive each treatment. Record resting heart rate before each treatment. Flip a coin to determine which treatment to give first (Heads 0mg Tails 150mg). Compare the difference in heart rates for the two treatments.

Repeat this process for all 60 volunteers.