

### 8.5a

## Random Assignment in an Experiment

## What you'll need: the Fathom document **TerminalBoredom.ftm**

Suppose a group of 40 students is afflicted with terminal boredom. In this experiment, students will be randomly assigned one of two treatments, *sit* or *stand*, for their terminal boredom. The treatment *sit* will be assigned to 50% of the students. Each student will also be assigned the results of the treatment, *cured* or *still bored*. The result *cured* will be randomly assigned to 75% of the students (without regard to what treatment they received). You'll study the sampling distribution of the difference between the proportions cured by the two treatments if the treatments are equally likely to be effective.

1. Open the Fathom document **TerminalBoredom.ftm**. This contains an empty collection in which the attributes have been defined to assign the treatments and the results as described above.
2. Select the collection **Terminal Boredom Experiment** and add 40 cases to the collection. With the collection selected, drag a new table from the tool shelf. The first column shows the treatments alternating between *sit* and *stand*. The second column shows the results of the treatments. The first thirty are *cured* and the last ten are *still bored*.

Because the treatment assigned has no effect on the result of terminal boredom, we'll let each student keep the same result if the treatment is changed.

3. Select the collection and choose **Scramble Attribute Values** from the **Collection** menu. This creates a second collection with the first column randomly scrambled, randomly assigning the treatments to the students.
4. With the collection **Scrambled Terminal Boredom Experiment** selected, drag the lower right corner of the frame until a button appears that says **Scramble Attribute Values Again**. Then drag a new table from the tool shelf. Click the button **Scramble Attribute Values Again** a few times to see what happens. You may delete the table for the collection **Terminal Boredom Experiment**.
5. Double-click on the collection **Scrambled Terminal Boredom Experiment** to open the Inspector. Select the **Measures** tab. Name a new measure **Difference\_In\_Proportions**. Define the formula as shown:

**Formula for Difference\_In\_Proportions**

proportion(Result\_of\_Treatment = "Cured", Treatment = "Sit")  
- proportion(Result\_of\_Treatment = "Cured", Treatment = "Stand")

Medium

Calculator Panel:

- Attributes
- Functions
- Global Values
- Icon Names
- Measures
- Special

Buttons: Cancel, Apply, OK

Attributes are the names you can use in expressions. They refer to attributes in a collection.

6. Close the Inspector, select the collection **Scrambled Terminal Boredom Experiment**, and select **Collect Measures** from the **Collection** menu. Double-click the **Measures from Scrambled Terminal Boredom Experiment** collection and select the **Collect Measures** tab. Turn the animation off, select “Replace existing cases,” change the number of measures to 200, and click **Collect More Measures**.
  7. Select the **Cases** tab in the inspector, drag a new graph from the tool shelf, and create a dotplot of the difference in treatment proportions.
  8. Describe the dotplot, including its shape, center, and spread.
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9. In the Inspector window, click **Collect More Measures** several times, observing how the dotplot changes. Do the shape, center, and spread stay basically the same? If not, describe how they differ.

## Extensions

1. What if the sample size were 1000 instead of 200? Predict how the dotplot would change, then check your prediction with simulation.
2. How would the dotplot change if the proportion of students cured was 90%? 10%? Predict, then check your predictions with simulation.