Kissing the 'Right' Way

A German bio-psychologist, Onur Güntürkün, was curious whether the human tendency for right-sightedness (e.g., right-handed, right-footed, right-eyed), manifested itself in other situations as well. In trying to understand why human brains function asymmetrically, with each side controlling different abilities, he investigated whether kissing couples were more likely to lean their heads to the right than to the left[1]. He and his researchers observed 124 couples (estimated ages 13 to 70 years, not holding any other objects like luggage that might influence their behavior) in public places such as airports, train stations, beaches, and parks in the United States, Germany, and Turkey.

In this activity, you will be exploring the following research question:

What percentage of couples lean their heads to the right when kissing after accounting for sampling uncertainty?

Observed Data: Of the 124 couples observed, 80 leaned their heads to the right when kissing.

[1] Güntürkün, O. (2003). Human behaviour: Adult persistence of head-turning asymmetry. *Nature, 421*, 711.

Discuss the following questions.

1. Based on only the observed data, answer the research question.

2. Consider if Güntürkün had observed a **different sample of 124 couples**. Would the data for these couples provide the same estimate of the percentage of couples who lean their heads to the right when kissing? Explain.

Modeling Sampling Variation

if Güntürkün had observed a different sample of 124 couples the one-number best guess for the percentage of couples lean their heads to the right when kissing would differ (i.e., there is sampling variation). Because of sampling variation, when answering research questions like Güntürkün's that ask for an estimate, it is important that we acknowledge that there is uncertainty in the estimate we provide because we know that sample estimates will vary from sample to sample.

Bootstrapping

To model the sampling uncertainty, you will bootstrap from the observed data. Bootstrapping to estimate the sampling uncertainty works whether you have one sample of data or two (as in Unit 4). To carry out a nonparametric bootstrap analysis using TinkerPlots™, you:

- Set up a sampling device to bootstrap the observed data. You can either dummy code these data, or leave them as categorical labels.
- Be sure that you set the device to sample with replacement. The Repeat value should be set to the same sample size as the observed data. (You want to replicate the sampling of 124 couples.)

3. Carry out 500 bootstrap trials, each time collecting the percentage of people who turn their heads to the right when kissing. Plot the results from the 500 trials and sketch the plot below. Make sure to label the axis. This distribution is referred to as the *bootstrap distribution*.

The Bootstrap Distribution

4. Find the mean of the bootstrap distribution. Explain why you could expect the bootstrap distribution to be centered at this value by referring to the model from your TinkerPlots™ sampler.

5. Compute the standard deviation of the bootstrapped percentages.

The standard deviation of a plot of results (e.g., means or proportions) is referred to as the **standard error (SE)**. To compute the SE using TinkerPlots™ continue to use the `stdDev()` function that you have been using. When you report that value from now on, you just will refer to it using its technical name, *standard error*

Margin of Error and Compatibility Interval

6. Use the standard error from the bootstrap simulation to compute the margin of error.

7. Compute (by hand) the compatibility interval for the percentage of couples that lean to the right when kissing. Use the compatibility interval to provide an answer to the research question.