Comparing Cuddling Preferences

In the *Cuddling Preferences* activity, you computed compatibility intervals to infer the percentage of British dog owners who prefer cuddling with their dog rather than with their partner. The same poll was also given to American pet owners. In this activity, you will be exploring the following research question:

Is the percentage of British pet owners who prefer cuddling with their dog higher than the percentage of American pet owners who prefer cuddling with their dog?

Compatibility intervals can be used to evaluate whether there are **statistical differences** between two groups. In this activity, you will compute compatibility intervals for the percentage of both American and British dog owners who prefer cuddling with their dog rather than with their partner dog owners. Then you will use those compatibility intervals to answer the research question.

Comparing Groups with Compatibility Intervals (n=20)

In the *Cuddling Preferences* activity, you already computed the compatibility interval for the percentage of British dog owners who prefer cuddling with their dog rather than with their partner using the *british-cuddle-20.tp3* data.

1. Fill in the information for the compatibility interval for British pet owners (from the previous *Cuddling Preferences* activity) in the first row of the table below.

Sample Size	Observed Percentage	Standard Error	Compatibility Interval
20			
20			

2. Draw the range of the compatibility interval for the percentage of British dog owners who prefer cuddling with their dog using the axis below.

| 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
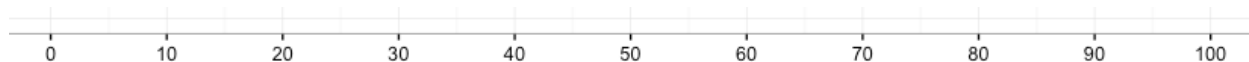
3. Use the data from the file *american-cuddle-20.tp3* to provide an answer to the research question: What percentage of American dog owners prefer cuddling with their dog rather than with their partner after accounting for sampling uncertainty? To do this, estimate the percentage from the observed data, and then carry out 500 bootstrap trials to estimate the uncertainty in the estimate. Fill in the information from this analysis in the second row of the table from Question #1.

4. Draw the range of the compatibility interval for American dog owners on the axis in Question #1.

Remember that the compatibility interval for British dog owners gives the percentage of British dog owners who prefer cuddling with their dogs after accounting for sampling uncertainty. Similarly the compatibility interval for American dog owners gives the percentage of American dog owners who prefer cuddling with their dogs after accounting for sampling uncertainty. If both intervals include some of the same values (the intervals overlap), it provides evidence that the two groups could have the same level of preference (i.e., evidence of no difference)...or at least the uncertainty is too great for us to differentiate which group has the higher percentage.
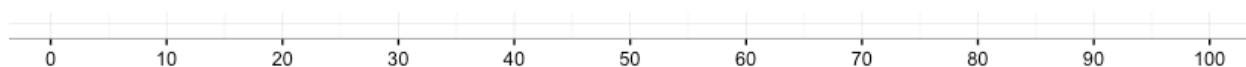
5. Do the two intervals you drew in Question #1 overlap each other?

6. Explain using your drawing whether there is evidence that the percentage of British dog owners who prefer cuddling with their dog is higher than the percentage of American dog owners who prefer cuddling with their dog.

Comparing Groups with Compatibility Intervals (n=100)

7. In the *Cuddling Preferences* activity, you also computed the compatibility interval for the percentage of British dog owners who prefer cuddling with their dog rather than with their partner using the *british-cuddle-100.tp3* data. Fill in the information for the compatibility interval for British pet owners in the first row of the table below.

Sample Size	Observed Percentage	Standard Error	Compatibility Interval
100			
100			

8. Draw the range of this compatibility compatibility interval using the axis below.

9. Use the data from the file *american-cuddle-100.tp3* to provide an answer to the research question: What percentage of American dog owners prefer cuddling with their dog rather than with their partner? To do this, estimate the percentage from the observed data, and then carry out 500 bootstrap trials to estimate the uncertainty in the estimate. Fill in the information from this analysis in the second row of the table from Question #7.

10. Draw the range of the compatibility interval for American dog owners on the axis in Question #8.
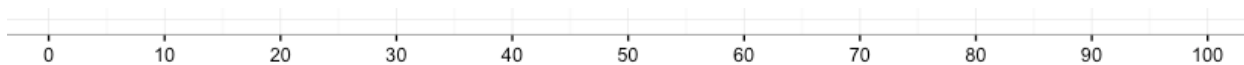
11. Based on whether or not the two intervals you drew in Question #8 overlap each other, explain whether there is evidence that the percentage of British dog owners who prefer cuddling with their dog is higher than the percentage of American dog owners who prefer cuddling with their dog.

Comparing Groups with Compatibility Intervals (n=500)

12. In the *Cuddling Preferences* activity, you also computed the compatibility interval for the percentage of British dog owners who prefer cuddling with their dog rather than with their partner using the *british-cuddle-500.tp3* data. Fill in the information for the compatibility interval for British pet owners in the first row of the table below.

Sample Size	Observed Percentage	Standard Error	Compatibility Interval
500			
500			

13. Draw the range of the compatibility interval for British pet owners using the axis below.

14. Use the data from the file *american-cuddle-500.tp3* to provide an answer to the research question: What percentage of American dog owners prefer cuddling with their dog rather than with their partner? To do this, estimate the percentage from the observed data, and then carry out 500 bootstrap trials to estimate the uncertainty in the estimate. Fill in the information from this analysis in the second row of the table from Question #12.

15. Draw the range of the compatibility interval for American dog owners on the axis in Question #13.

16. Based on whether or not the two intervals you drew in Question #13 overlap each other, explain whether there is evidence that the percentage of British dog owners who prefer cuddling with their dog is higher than the percentage of American dog owners who prefer cuddling with their dog.

How Uncertainty is Related to Detecting Differences

17. Recall that the amount of uncertainty, which is quantified by the standard error, is related to sample size. Describe the relationship between sample size and the amount of uncertainty. (Hint: Look back at the SEs in each of the three analyses you did today.)

18. The sample percentages and observed differences in each of the three analyses you carried out were exactly the same:

British Pet Owners: 55%
American Pet Owners: 40%
Observed Difference: 15% in favor of British Pet Owners

However, the answer to the RQ was not the same in each analysis; in some analyses you found evidence of a difference after accounting for sampling uncertainty, and in other analyses you did not. Describe the relationship between sample size, uncertainty, and the propensity to detect a difference between groups.