

You may work with one partner on this assignment, submitting one report with both names, provided that both students contribute substantially to the work.

***Kissing Right?***

Most people are right-handed and even the right eye is dominant for most people. Molecular biologists have suggested that late-stage human embryos tend to turn their heads to the right. In a study reported in *Nature* (2003), German bio-psychologist Onur Güntürkün conjectured that this tendency to turn to the right manifests itself in other ways as well, so he studied kissing couples to see if they tended to lean their heads to the right while kissing. He and his researchers observed couples in public places such as airports, train stations, beaches, and parks. They were careful not to include couples who were holding objects such as luggage that might have affected which direction they turned. For each couple observed, the researchers noted whether the couple leaned their heads to the right or to the left. They found that of the first 12 kissing couples that they observed, 8 leaned their heads to the right.

(a) What proportion of these couples leaned to the right?

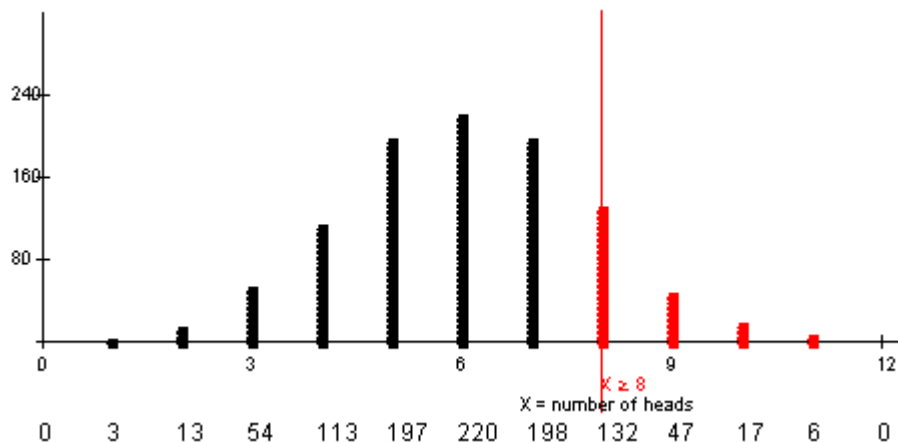
$8/12 \approx .667$

(b) Describe (in words) the null model to be investigated with this study.

The null model is that kissing couples have no preference/tendency and so are equally likely to lean to the right or left (50% each way).

(c) Use the coin-tossing applet (that we used in class on the first day) to conduct a simulation (using 1000 repetitions), addressing the question of whether the researchers' finding (8 of 12 leaning to right) provide strong evidence in support of the researchers' conjecture that kissing couples lean to the right more than half the time. Produce a rough sketch of the null distribution (or a print-out of the applet output), and indicate where the observed research result falls in that distribution. Also report the approximate p-value from this simulation analysis.

Simulating 1000 repetitions produced the following results:



Observing 8 or more couples who lean to the right, under the assumption of no preference, happened in 202 of the 1000 repetitions of 12 couples. The approximate p-value is .202.

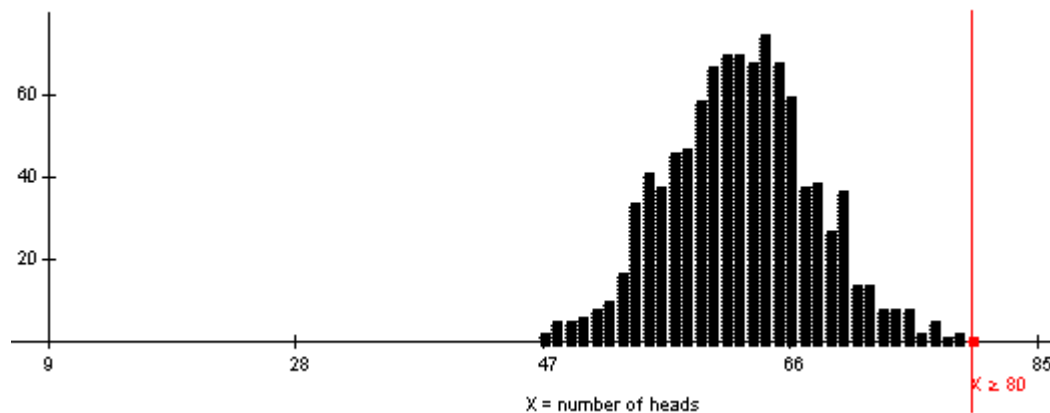
(d) Write a paragraph, as if to the researchers, describing what your simulation analysis reveals about whether the data provide strong evidence in support of their conjecture.

This simulation analysis reveals that it is not surprising to observe 8 or more couples who lean to the right, under the assumption of no preference. Such an extreme result happened in 202 of the 1000 repetitions of 12 couples. Because this approximate p-value is not very small, the researchers' data (8 of 12 couples leaning right) does not provide strong evidence that couples really have a preference/tendency.

These researchers actually studied a total of 124 kissing couples, 80 of whom leaned their heads to the right.

(e) Use the applet to conduct a simulation analysis of these data. Again produce a rough sketch of the null distribution, and indicate where the observed research result falls in that distribution. Also report the approximate p-value, and summarize your conclusion.

The simulation results are displayed here:



Assuming that kissing couples have no preference/tendency to lean their heads in either direction, only once in 1000 repetitions of 124 couples did 80 or more lean to the right. Therefore, these data provide very strong evidence that kissing couples do indeed tend to lean their heads to the right more than half the time.