

Investigation 5: Predicting Elections? (assigned Tues Feb 14; due Fri Feb 17)

You may work with a group of as many as three students on this assignment, handing in one report with all names, provided that you all contribute to the work. Word-processed reports are preferred to hand-written ones. Please copy/paste relevant, well-labeled computer output into a Word file as appropriate.

Do voters make judgments about political candidates based on his/her facial appearance? Can you correctly predict the outcome of an election, more often than not, simply by choosing the candidate whose face is judged to be more competent-looking? Researchers investigated this question in a study published in *Science* (Todorov, Mandisodka, Goren, and Hall, 2005). Participants were shown pictures of two candidates and asked who has the more competent-looking face. Researchers then predicted the winner to be the candidate whose face was judged to look more competent by most of the participants. For the 32 U.S. Senate races in 2004, this method predicted the winner correctly in 23 of them.

- a) Identify the observational units (cases) and variable in this study. Also classify the variable as categorical (also binary?) or quantitative.
- b) In what proportion of these Senate races did the “competent face” method predict the winner correctly?
- c) Describe (in words) the null model/hypothesis to be investigated with this study.
- d) Use the Coin Tossing applet (see link under “Applets” from our course web page) to conduct a simulation (using 1000 repetitions), addressing the question of whether the researchers’ results provide strong evidence in support of the researchers’ conjecture that the “competent face” method would correctly predict the election winner more than half the time. Submit a print-out of the applet output (you can use the “print screen” key or the “snipping” tool), and also report the approximate p-value from this simulation analysis.

Let the random variable X represent the number of correct predictions in 32 elections, assuming that the “competent face” method does no better than random guessing at predicting the winner.
- e) Describe the probability distribution of X , giving both the name of the distribution and its parameter values.
- f) Finish this expression: The exact p-value can be calculated as $P(X \text{ ____ })$, where the first ____ is replaced with a symbol and the second ____ is replaced with a number. Then calculate the exact p-value to 5 decimal places. (Feel free to use Minitab or Excel or an applet.)
- g) Interpret what this p-value means: It is the probability of what, assuming what?

h) Write a paragraph, as if to the researchers, describing what your simulation analysis and p-value calculation reveal about whether the data provide strong evidence in support of their conjecture. Also explain the reasoning process behind your conclusion.

i) Determine the smallest number of correct prediction (in 32 elections) that would produce a p-value of less than .05. Also describe the process by which you determine this number.