

How to Lie Using Statistics

The purposes of this assignment is to help student become savvy consumers as well as help students to not be duped by people who might want to mislead them using statistics.

Visit this site <http://faculty.washington.edu/chudler/stat3.html>

Explain how to lie using statistics using each of the following methods.

The average switaroo

The Meaningless mean

The Sampling Trick

Games with Graphics (draw at least 2 examples)

Meaningless graphics

Visit this website: <https://archive.org/details/HowToLieWithStatistics>

Read chapter 7 of the book How to Lie Using Statistics

What is a semi-attached figure?

Explain how to use a semi-attached figure to lie.

Day 2 (a rough division of the task into 2 days)

Visit this website: <https://explorable.com/data-dredging>

Explain what **data dredging** (also called data snooping is). Suppose you invited a new vitamin pill that does not do what it is supposed to. How could you use data dredging to gain evidence for a false claim (that the pill is effective).

Using Loaded questions

Read 224 of your text book (The Practice of Statistics). Suppose you do not like the food in the school cafeteria. You decide to do a survey to gather evidence to show that other students do not like the food as well. (the problem is many of them are fully satisfied with the school cafeteria). Write a survey question about if students like the food in the cafeteria. Word it in a way that will make students answer unfavorably.

False Causality Visit this website:

http://en.wikipedia.org/wiki/Correlation_does_not_imply_causation

What is false causality?

Explain how it could be shown that Ice cream sales causes drowning when in fact they do not.

Explain how it could be shown that sleeping with the lights in can cause Myopia (near sightedness) later in life when in fact it does not.

Lack of conditions/ many studies

Read the following passage:

In AP Statistics, you must always show that the conditions are met to perform a test. If you perform a test when conditions are not met. The results would not be statistically valid. Suppose that you want to prove that is not true. You could perform many studies whose conditions are not met. These results will vary wildly. Then select only the studies that yield the results you favor. Explain how you could use this method to get statistical evidence that most people prefer going to statistics class over eating ice cream (probably not universally true).

(note: use your knowledge of statistics to answer this in your answer – do you want a large sample size or a small sample size if your goal is to mislead)

The changing survey

Read the following passage:

A former head of school (now retired) at a different school wanted to show his approval rating was going up (or at least not going down). So he could score well on his annual review by the board. In the first year teachers were asked to fill out a 50 question survey about his job performance, the next year a 45 question survey, the next year a 40 question survey. He reported the means each year and showed an upward trend that could be shown on a graph. This person wanted to show a strong increase. What do you think that he did to his survey each year in order to show this trend? (the wording of the questions was not changed, most questions were kept exactly the same).

Proving the null hypothesis

Visit this site

http://en.wikipedia.org/wiki/Misuse_of_statistics#Proof_of_the_null_hypothesis

Explain how proving the null hypothesis could be used to prove that smoking is not bad for you (a false claim).

Note: politicians in the US currently use this method to say that global warming is either not happening or not caused by humans – despite a strong evidence from the scientific community that shows a clear causal relationship between human activities and global warming. Who benefits from denying the existence of global warming? Why might politicians want to deny the existence of global warming?

Confusing Statistical significance with practical significance.

Visit the same website as in the previous question (just scroll down).

How might a company wanting to sell a cure for baldness falsely give evidence for their product by confusing statistical significance with practical significance?

The misleading mean

Read the following paragraph. While eating chips one day, my daughter asked me. How many chips do you have left in your bag? I replied, I have half of the chips remaining. I then showed her the bag and there were only crumbs in the bottom. I explained that I had eaten half of the chips. I had eaten the ones that were big and the small ones (crumbs) were left. I gave truthful information that half of the items were taken out but that left the impression that half of the volume of the chips remained when less than 1% of the volume remained.

Imagine that your homework on a given weekend is 4 multiple choice questions for AP stats and 4 Free Response questions for AP Statistics. Your parents will not let you go to a party until half of your homework is done. How could you mislead your parents using this technique to show half of your homework was done?