

Introduction

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Example

Claim: Syracuse schools are better than Hamilton schools because they have twice as many National Scholarship finalists. What do you think?

Example (Is Colgate worth the money?)

A student compared the number of students who graduated in the last four years at Colgate, Dartmouth and UConn and who earn more than \$75,000 per year. The numbers are

Colgate	Dartmouth	UConn
1011	1240	2500

Should you have enrolled at UConn?

Numbers vs percentages

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Fact

Percentages are useful for comparing population of different sizes.

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- ➊ *compare it to something else*

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- ❶ *compare it to something else*
- ❷ *see if it is growing or decreasing*

Example

Fleischmann's Rapid Rise yeast claims that it rises 50% faster. If a pizza recipe says to let the dough rise 1 hour, how long should we let it rise with rapid rise yeast?

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- people with antibodies test positive 99% of the time.
- people without antibodies test negative 99% of the time
- 1.1 million out of 310 million Americans have HIV antibodies
- everyone was tested.

What fraction of those whose tests are positive are positive?

Some examples of “statistics gone wrong”

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Example

You have probably seen the TV commercial pitting one paper towel brand against another, where one piece of each type of paper towel is used to try to absorb the same amount of red juice. What is wrong with this comparison?

Example

A study conducted a few years back evaluated videotaped sessions of 1265 patient appointments with 59 primary-care physicians and 6 surgeons in Colorado and Oregon. This study found that physicians who **not** been sued for malpractice spent an average of 18 minutes with each patient, compared to 16 minutes for physicians who **had** been sued for malpractice. Is two minutes that important?

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Fact (Basic Idea)

If the treatment group has a different response, that response must have been caused by the treatment variable.

Experimental design

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Suppose that we want to study the effect of partying in college to lung cancer. Smoking is a **confoundly variable**, because those who party are more likely to smoke, and smoking is related to lung cancer.

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- ① *Placebo: a non-medical treatment, given to the control group so that they do not know which group they are in.*
- ② *Double blind experiment: neither the subjects nor the doctors who measure the responses should know who was in the treatment group and who was in the control group.*

Fact

Randomized controlled double blind experiment: Take a population, divide it randomly into two groups, compare the results and decide whether *chance* could have produced the result.

Ideal (gold standard) experiment

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Examples:

- *effects of gender on career path*
- *effects of black holes on nearby stars*
- *effects of minority status on income path*
- *effect of diet on health*