

Week 1: Welcome to statistics and data

3. Statistics to illuminate

Stat 140 - 04

Mount Holyoke College

Dr. Shan Shan

Slides posted at <http://sshanshans.github.io/stat140>

1. Summary to the admission example

A table of counts, based on data from UC Berkely's graduate admission process in 1973.

	Men	Women
Accepted	533	113
Denied	663	336
Total	1198	449

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Proportion of male applicants who were accepted out of the total male applicants is $533/(533 + 663) \approx .445 \approx 45\%$.

Proportion of female applicants who were accepted out of the total female applicants is $113/(113 + 336) \approx .25 \approx 25\%$.

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We observed that the acceptance rate for men is almost 20 percentage points higher than the acceptance rate for women (44.5% vs. 25.2%).

Let's proceed to dig a little deeper. The data actually came from two different programs, let's call them A and F. This table show the counts for these two programs separately.

	M(accpt)	M(denied)	W(accpt)	W(denied)
ProgA	511	314	89	19
ProgF	22	351	24	317
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Within A, the proportion of male applicants who were accepted out of the total male applicants who applied for A is $511/(511 + 314) = 511/825 \approx .619 \approx 62\%$

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In summary,

Program A, men: $511/(511+314) = 511/825 \approx .619 \approx 62\%$

Program A, women: $89/(89+19) = 89/108 \approx .824 \approx 82\%$

Program F, men: $22/(22+351) = 22/373 \approx .059 \approx 6\%$

Program F, women: $24/(24+317) = 24/341 \approx .070 \approx 7\%$

This is very strange!

Hint: think about what's the difference between program A and program F?

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Let' look at the data table more carefully.

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What's the acceptance rate for program A:

$$(511 + 89)/(511 + 314 + 89 + 19) \approx 64\%$$

What's the acceptance rate for program F:

$$(22 + 24)/(22 + 351 + 24 + 317) \approx 5\%$$

Hint: think about what's the difference between program A and program F?

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Total	533	665	113	336

How many men applied for program A? $511 + 314 = 825$

How many women applied for program A? $89 + 19 = 108$

How many men applied for program F? $22 + 351 = 373$

How man women applied for program F? $24 + 317 = 341$

The odds is because more women applied for the program that is difficult to get into.

This explains how it happens that women have a higher acceptance rate than men in both programs but a lower acceptance rate than men when the programs are combined.

A phenomenon where a trend appears in several different groups of data, but disappears or reverses when they are combined.

HW01: find another example of the Simpson's paradox.

Tutorial exercise: For the rest of the class

Work on mini-project 1

Goal: practice using R markdown to produce report

Let me know if you have any questions

You are allowed to leave once you are done.

Tips:

- ▶ Each one of you work on your own markdown file first.
Then copy your write up to a shared google doc with your group and collaboratively edit the google doc together.
- ▶ Figure out a time to meet outside of class first.
- ▶ Read the grading guidelines carefully, and let me know if I can help clarify.