

U4D6_T Critical Analysis

Friday, April 20, 2018

9:36 PM

[Is there a reproducibility crisis in science? - Matt Anticole](#)

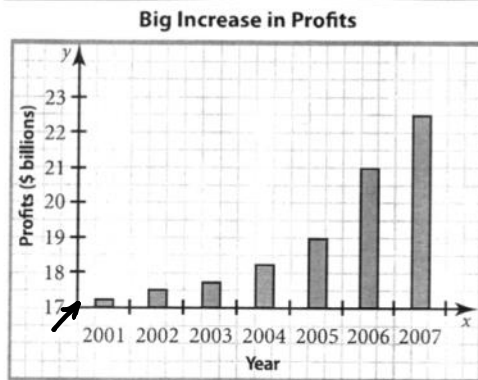


U4D6_T
Critical An...

Unit 4 Lesson 6 Critical Analysis

Assess the validity of conclusions presented in the media by examining sources of data to determine whether they are authoritative, reliable, unbiased, and current.

The headline for the following graph says “Big Increase in Profits”. Suggest reasons why this headline may or may not be true.



Scale * doesn't start at zero on y-axis
+ counting by 0.5 billion to stretch the bars.

Author? Is it an independent researcher?

Current? Data is 10 years out of date...
what has happened since?

Biases in Analyzing and Reporting the Statistics

Types of Statistics

- **Descriptive** reliable

Statistics used to describe or summarize the characteristics of known data.

Example – Based on the Census of school data, the average (mean) height of our class is 171 cm.

- **Inferential** can be unreliable

Statistics that treats known data as a sample and uses it to draw conclusions about a larger population.

Example – Based on a sample of a grade 12 class of 20 students, the average (mean) height of students at Waterloo Oxford is 171 cm.

Critical Analysis of Statistical Claims

When analyzing statistical claims the following five questions should be asked:

- 1. Is there a bias in the sample?

4 Types of Bias:

- sampling
- measurement
- response
- non-response

- 2. Is the author of the report a reliable researcher?

↗ check their reputation

- Look for independent researcher with no stake in the results
- E.g. Stats Canada is a good source

- 3. What is the original source of the data?

- Primary
- Secondary

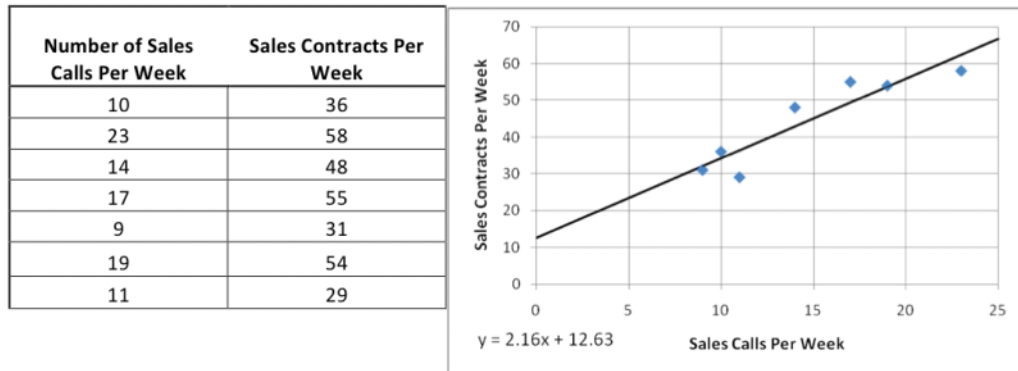
- 4. the data still relevant in today's environment?

The older the data, the less reliable
(studies are repeated over time)

- 5. Was there a bias in analyzing the data?
 - Identifying a correlation that doesn't exist
 - It must take into account all data

Case Study #1

A sales manager tracked the number of sales calls made by her sales team and the resulting number of sales contracts.



Using linear regression she found the equation for the line of best fit to be $Y=2.16C + 12.63$. She presented this data to the sales team and explained that the more sales calls they made, the better their sales would be. Therefore she told them to double the number of calls they made per week so that the number of sales contracts would double.

Perform a critical analysis of these conclusions:

- 1. Is there a bias in the sample?
census \Rightarrow good sample.

 \Rightarrow "implies that"
- 2. Is the author of the report a reliable researcher?
Bonuses, promotions may be at stake.
Not a reliable researcher.
- 3. What is the original source of the data?
Good primary data
(Actual data from company records).
- 4. Is the data still relevant in today's environment? current so yes. ✓
- 5. Was there a bias in analyzing the data?

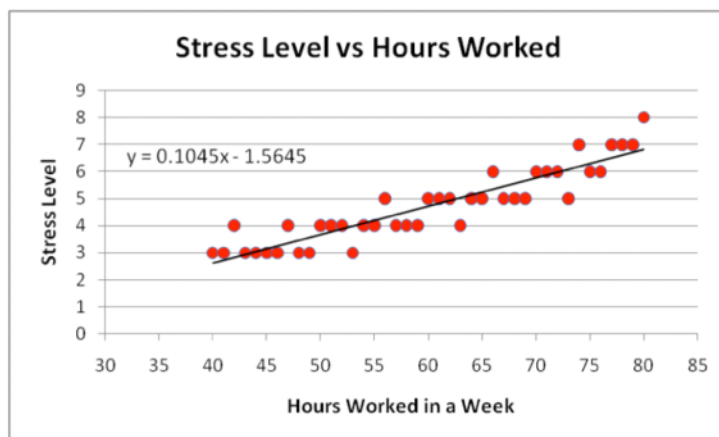
Cause and Effect Relationship? Other factors?

According to the line of best fit, the contract will not double with doubled calls.

Case Study #2

A stress management clinic in a city of 250,000 people wanted to find out whether there is a relationship between the number of hours worked in a week and job stress level.

- They hired an outside agency to collect the data.
- The agency randomly selected 2500 adults who work in the city.
- They asked them to state the number of hours they work per week and to rate their level of job stress from 1 to 10.



The clinic concluded:

There is a strong positive correlation between the number of hours people work per week and their stress level on the job. We believe that an increase in working hours is likely to cause an increase in stress level.

Is this a valid conclusion? Use the following questions to guide you in your answer.

- 1. Is there a bias in the sample? *No
Sample good!*
- 2. Is the author of the report a reliable

- 2. Is the author of the report a reliable researcher? *independent ✓*
**check reputation*
- 3. What is the original source of the data?
Primary data
- 4. Is the data still relevant in today's environment? *Current ✓*
- 5. Was there a bias in analyzing the data?
 - *too many professions grouped together*
 - *stress can come from profession, family problems, overwork, finances, etc.*

Practice: Pg.251-253 # 1,2,3,6,7,8 (Check answers Pg.550 4.5)

Review work period next class.
Test the class after that.