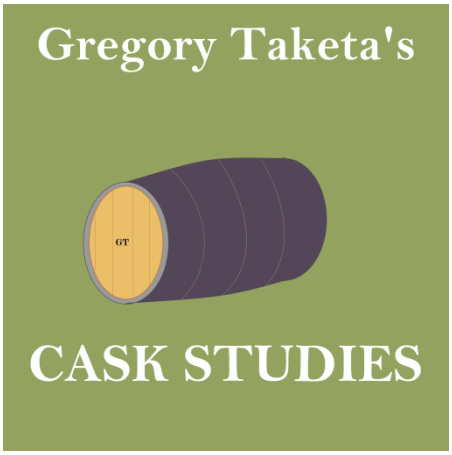
ANALYZE RESPONSIBLY

Welcome to Cask Studies, where you can properly age your skills without getting old. Even sour grapes can become fine wines here.



December 10, 2014

Be Skeptical With Statisticians (Comparing Common Methods)

Managers, by the end of this article, you will find that many of the statistics on which you rely could have the wrong conclusions, even if the sample is random and representative, and even if the analyst uses an academically-accepted method!

If there is nothing else I impart to you, I want to give you the idea that we help our stakeholders the best by insisting on the 2nd/3rd/nth opinion.

In this case study, you will find that 3 types of very brilliant, highly paid analysts will draw the WRONG conclusion, and it is up to people like you to offer new perspective towards a MORE ACCURATE conclusion. We get the best conclusions not with lone champions but with Champion Teams.

A Quick, Provocative Case

In the following data set, we will approach a familiar question: *Do abrasive people earn more money?* You have probably heard the bromide, "Nice guys [and gals] finish last." It is a topic of decades-long (if not millennia-long) research.

Gregory Taketa is the Data Decanter, serving refined, well-breathed data analysis while keeping out the sediments.

E-mail: greg@gregariousconsulting.com
See more of The Data Decanter at: http://gregariousconsulting.com

Although I am using fictional data in this table, they might not be far from the truth in a number of organizations.

For the most thorough experience, please download the MS Excel Spreadsheet (XLSX, 2010+)

20 employees are randomly selected from a Strategic Business Unit (SBU). We will assume for the sake of argument that this sample is large enough and representative of the SBU. Salaries are in $1,000s, and an Abrasive person is marked with a "1," while a Non-Abrasive person is marked with a "0." So respondent #6 is an abrasive person who earns $43,000 annually.

Looking at these data, do you think abrasive behavior is associated with higher pay? Notice that most abrasive folk are at the top, and they predominantly have high salaries. Let's see what 3 highly-paid analysts (possibly your hires) think.

Respondent	Salary	Abrasive
1	50	1
2	50	1
3	46	1
4	45	1
5	44	1
6	43	1
7	42	1
8	45	1
9	45	1
10	60	0
11	24	0
12	28	0
13	20	0
14	23	0
15	26	0
16	28	0
17	27	0
18	29	0
19	30	0
20	10	1

Analyst #1: The Descriptive Statistics Analyst (Most Common Type)

- Abrasive people on average earn $42K in this sample.
- Non-Abrasive people on average earn $29.5K in this sample.
- Abrasive behavior is associated with $12.5K higher pay on average.

The typical business analyst at a typical consultancy (paid $50K+) might argue that people make more money because of abrasive behavior. What about someone more rigid?

Analyst #2: The More Rigid Statistician (More Academic, Higher Paid)

- Analyst #1 has failed to account for whether that $12.5K difference is significant. If salaries are volatile (have high standard deviations), then the pay differences could simply be by random chance!
- A 2-population hypothesis test indicates that there is only 1.2% chance that Non-Abrasives make less money through sheer dumb luck.
- Therefore there is overwhelming evidence to infer that Non-Abrasives do earn less money than Abrasives.

The Statistician who conducted an hypothesis test also thinks that Abrasive behavior is associated with higher pay. What about someone who uses computer-based skills, like linear regression?

Analyst #3: The Linear Regression Analyst (Might Work in your Sales Ops or Marketing Department or Thereabouts)

- Although a low R-squared accounts for only 25% of actual data variation, a variable P-value suggests the Abrasive variable has a strong linear relationship with Salary (never mind; your analyst might be trying to sound smart).
- It is very likely that being abrasive has a relationship with salary, and on average, being abrasive is associated with a $12.5K gain in salary, all else equal.

The Linear Regression Analyst also thinks that people make more money because of being abrasive (yes, I know none of these things actually prove cause). And yes, I have read a very expensive report in which someone used linear regression in similar fashion.

Well, 3 highly paid folks with educations and different methods all converge on the same conclusion. What do you think?

Here's a Hint: They're All Wrong!

Although these 3 are experts of numbers and methodologies, you the manager have your own expertise. Since you might focus on things besides data, what do you think warrants further inquiry?

Could it be possible that some of those people in the SBU were paid more simply because of different professions or positions?

In this case, we simply have 10 managers and 10 non-managers. Otherwise, no major professional difference exists. It seems that 9 out of 10 managers are abrasive anyway. Are we confounded (unable to distinguish being a manager or being abrasive), or can we do something more?

Respondent	Salary	Abrasive	Manager
1	50	1	1
2	50	1	1
3	46	1	1
4	45	1	1
5	44	1	1
6	43	1	1
7	42	1	1
8	45	1	1
9	45	1	1
10	60	0	1
11	24	0	0
12	28	0	0
13	20	0	0
14	23	0	0
15	26	0	0
16	28	0	0
17	27	0	0
18	29	0	0
19	30	0	0
20	10	1	0

Collaborative Analysis

Since you thought of another variable, or factor, call back Analyst #3, who works in linear regression (which deals with variables). Inform the analyst of your input.

The New Results

- Being a manager is associated with $34.7K gain in salary, strictly for being a manager.
- Being abrasive is associated with $15.3K…loss in salary!

It seems that the managers were making money "in spite of" being abrasive, not "because of" being abrasive. At the risk of having mere outliers, the nice manager (respondent #10) was paid the highest here, and the nastiest non-manager (respondent #20) was paid the least.

The Taketa Takeaway

Analysts are expensive and educated, but taking their conclusions at face value, in spite of good sampling and their generally accepted methodologies, is dangerous. We need to employ diverse perspectives, including yours, in order to help our stakeholders the best. Analysis is not about an expert's work but about an expert team. Why not have me on board to help you create it?

Cheers!