Quantitative Research

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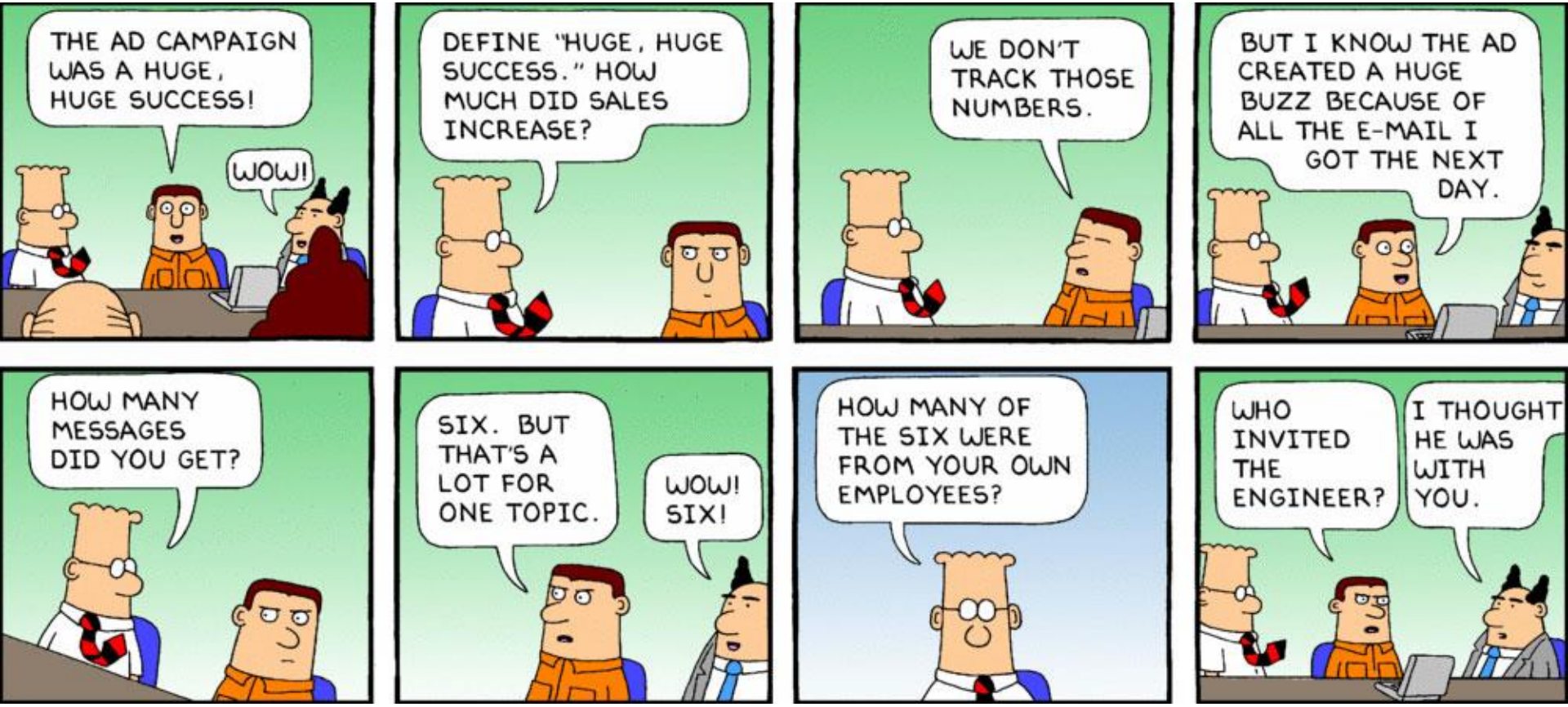
Two types or research

- Quantitative and qualitative
- Quantitative ~ quantity (measured amount)
- Qualitative~ quality (good or bad; yes or no)

What is the real difference between **quantitative** and **qualitative research**?

- Quantitative research generates numerical data or information which can be converted into numerical data.
- Qualitative Research generates non-numerical data.

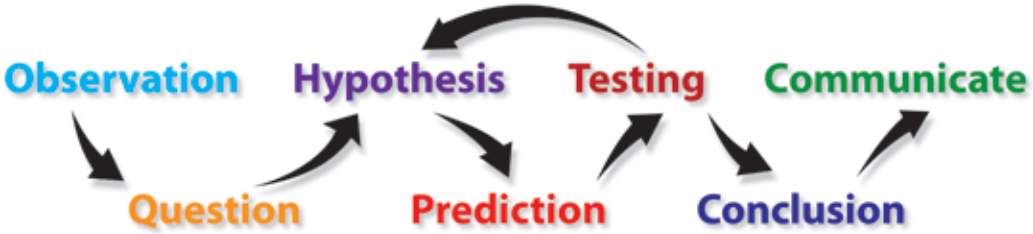
Does it have to be one or other? ...No and it can be both.....


THE AD CAMPAIGN WAS A HUGE, HUGE SUCCESS!
WOW!
DEFINE "HUGE, HUGE SUCCESS." HOW MUCH DID SALES INCREASE?
WE DON'T TRACK THOSE NUMBERS.
BUT I KNOW THE AD CREATED A HUGE BUZZ BECAUSE OF ALL THE E-MAIL I GOT THE NEXT DAY.
HOW MANY MESSAGES DID YOU GET?
SIX. BUT THAT'S A LOT FOR ONE TOPIC.
WOW! SIX!
HOW MANY OF THE SIX WERE FROM YOUR OWN EMPLOYEES?
WHO INVITED THE ENGINEER?
I THOUGHT HE WAS WITH YOU.

Research is research

Research is about discovering something new or generating new knowledge.

To recap:



- Starts with an observation.
- Then most importantly a question.
- Then an hypothesis which is testable (or part of it is).
- Experimentation - gives results (often-always involves some statistical analysis) which confirms hypothesis or causes you to reject it. Non-subjective analysis....

Qualitative....fair comparison...objective?

A **B**

Figure 2. Floral spikes from polyploid and diploid *L. ·intermedia taxa.* *A. Spikes are left to right CSU 144 (polyploid), 'Grosso', 'Abrialii', and 'Seal' (diploids). B. Spikes are left to right CSU153 (polyploid), 'Grosso', 'Abrialii', and 'Seal' (diploids).*

Quantitative- we measure it.

Species/ hybrid	Variety	Spike weight (g)
L. angustifolia		
	Hidcote (CSU 8)	0.49 (0.35-0.64)
	Bee	0.69 (0.50-0.87)
	Lavenite Petite	0.49 (0.36-0.63)
	C7/103	0.36 (0.25-0.47)
	C6/24	1.13 (0.77-1.49)
	C3/2	1.10 (0.78-1.41)
	C2/6/B	1.28 (0.91-1.64)
	C2/4/K	0.91 (0.66-1.16)
	C3/2/3	0.75 (0.53-0.96)
L.* x *intermedia		
	G4 p2ex2 (CSU144)	1.66 (1.20-2.12)
	G7 p2ex2 (CSU 148)	1.56 (1.11-2.01)
	S3 p24ex4 (CSU 139)	1.00 (0.70-1.30)
	S3 p14ex4 (CSU153)	1.76 (1.27-2.24)
	Abrialli	0.93 (0.66-1.19)
	Seal	0.91 (0.63-1.18)
	Hidcote Giant	0.89 (0.64-1.15)
	Impress Purple	0.83 (0.60-1.06)
	Grosso (CSU 20)	0.62 (0.44-0.80)

Errors are +/- standard error of the mean

Statistics is used to remove subjectivity

How is sex determined?

- Hypothesis: Random segregation of X and Y into sex cells ..... or morals of the individual involved?
- Experimental. Count males and females in sample of the population.
- Males= 5 Females=6 (n=11)
- Statistical test is called Chi^2

Probability- it is all in the numbers...

Chi^2 test comes up with a number which if above a standard number we reject our hypothesis. If below we accept it. *Highly dependent on numbers*

Does cranberry juice prevent UTIs?

Null hypothesis' is just opposite of the real one

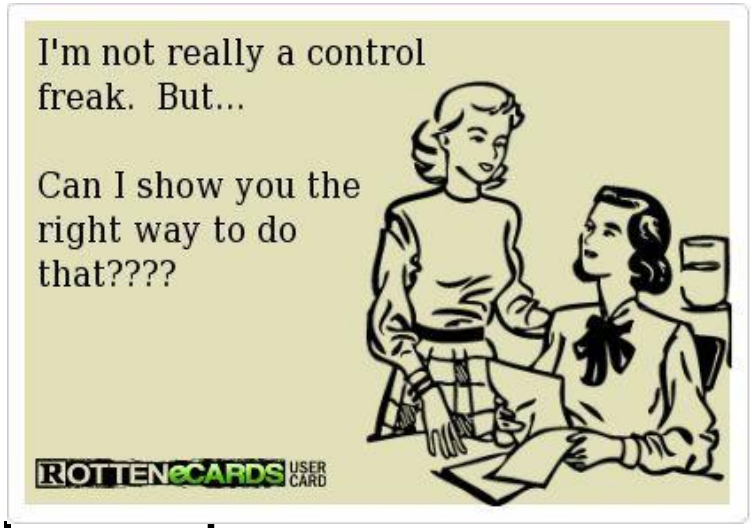
Experiment or trial....

Does cranberry juice prevent UTIs?

- A.....Hypothesis for example: Cranberry juice (250mL) once daily will reduce the incidence of UTIs in women aged 30-50. Testable?
- B.....Null hypothesis- Cranberry juice has no effect on incidence of UTIs.

You may think 'A' but scientifically you try and disprove your own hypothesis as best you can experimentally. You try and prove 'B'.

Controls



Controls are IMPORTANT in any experimentation.

- What sort of controls for my lavender polyploids? ...variability within the controls.....
- What sort of controls for the Cranberry juice study?
- Water?..... Why not?
- Often the majority of the data might come from the controls to robustly prove your treatment works.

Variables

Independent variables

- Something we change...chromosome number or drink in morning....
- Treatment groups

Dependent variables

- Something that changes in response to our change We measure it? What do we measure? Can be multiple things and as much as possible sometimes...flower or seed weight.... UTIs over time period....others?

Causality

Just because there is a relationship between variables does mean that one causes the other. Observational .....

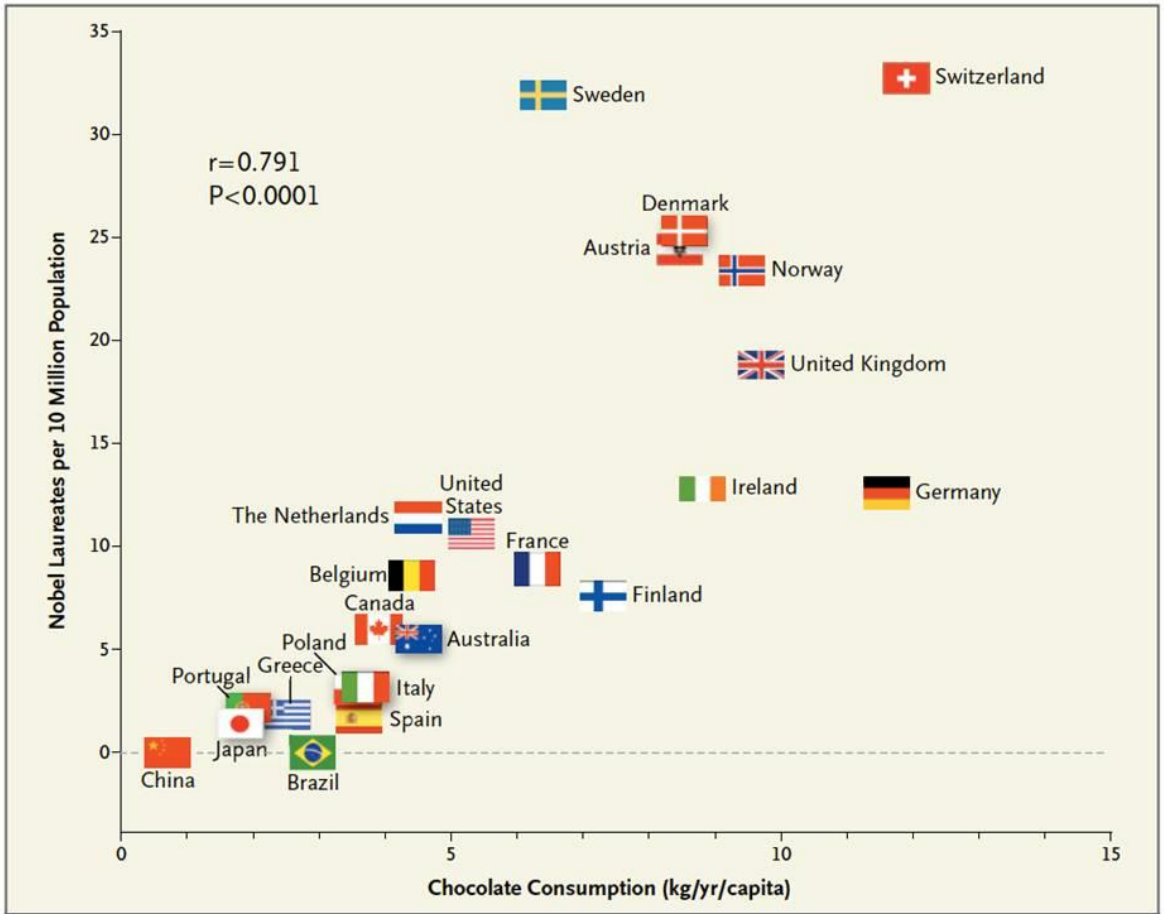
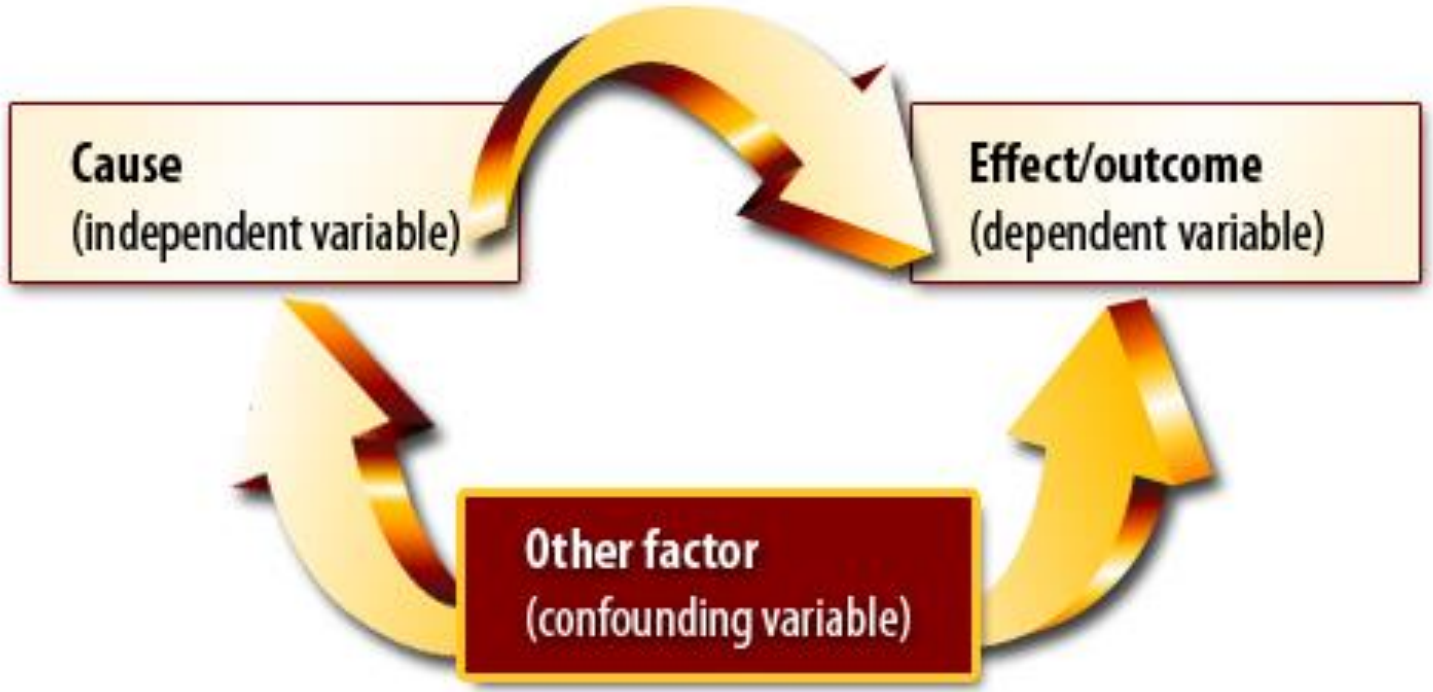


Figure 1. Correlation between Countries' Annual Per Capita Chocolate Consumption and the Number of Nobel Laureates per 10 Million Population.

Care.... but if we only change one thing ...



Quantitative research – *things to think about*

So you have thought of a project

- What is testable?
- What data will you get?
- Ethics?
- How many in a treatment group 5 or 50,000?
- Experimental designs?
- Control groups?
- Randomised and blind?
- What sort of stats should you do?
- *****Speak to a statistician early....before you do anything...
- Then do it.....

Quote of the day

Quantitative research is not 'the be all and end all'... It is reductionist and you can suffer from OCD with controls.....