

Recitation #2

Critical thinking

3 comments

- Religious survey
- Sexual behavior examples as teaching material

Critical thinking

- Observing and recording data is the central aspect of social science
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- Sometimes, the data at hand is not ideal...
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- The question we will start addressing today is what can we learn from different types of data.

Correlation & causation

- Every day we see in the news claims such as:
 - People are happier in better weather
 - Boys who mature later suffer from depression
 - Runners outlive other athletes
 - Kids who breast feed have a higher IQ
 - There is a negative correlation between # of hours watching TV and grades in school
- These are reliable statistical relationships, but are they causal?
 - For each write down the cause for the effect

Examples:

- Women who exercise regularly have less natural miscarriages.
 - Can you deduce that exercise help reduce risk of natural miscarriages? Why
- *Famous conductors in the US live about 7 years longer than the average*
- Students who come to all the classes do better
 - Why? What is the story?

Correlation & causation

- Famous conductors in the US live about 7 years longer than the average.

A → B

A B

A B

A ↘ C ↗ B

↖ C ↗

A ← B

Interpreting correlations

- Sometime we have a very strong causal model
 - Good weather causes happiness...
- Sometime strong models can be wrong
 - Running prevents heart attacks
 - Making people run can cause heart attacks...
 - The “hot hand”

So???

- The only way to draw valid conclusions is to have a control group!
 - In the Uri Geller case we should have tested how many clocks were observed to start working by someone else..
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- In most cases, the only way to have a good control group is to conduct an experiment

Self-selection!

- Runners select themselves
- Famous conductors
- Berkeley.....

Dep.	Men		Women	
	Apply	Accepted	Apply	Accepted
A	1,000	60%	100	60%
B	1,000	30%	1,000	30%
Both	2,000	900	1,100	360
		= 45%		= 33%

5 year cholesterol experiment

- $P(\text{death}|\text{no treatment}) = 21\%$
- $P(\text{death}|\text{treatment}) = 21\%$
- What about regularity?
 - $P(\text{death}|\text{regularity}) = 15\%$
 - $P(\text{death}|\text{non regularity}) = 24.6\%$
- But now we have self selection again
 - For regulars $P(D|T) = P(D|\text{no } T) \sim 15\%$
 - For non regulars $P(D|T) = P(D|\text{no } T) \sim 26\%$

Experiments

- Are not a perfect method
- They are also susceptible to some problems
- Placebo
 - The Hawthorne effect
- Self fulfilling prophecies
- Desire to cooperate

Placebo I

- In 1794 Gerbi discovered that by squeezing a certain worm between the thumb and the finger of the right hand, and placing the fingers on a painful tooth, the pain went away for a year.
- Hundreds of patients were tested and 68% reported no pain for a year!

Placebo II

- In a study on the effects of birth control, three groups were used
 - The pill with warning of side effects
 - Placebo without warning of side effects
 - Placebo with warning of side effects
- Group #2 reported 6% side effects
- Groups #1 & #3 reported 20% side effects

Placebo III

- Old French medical book suggest to use new medicines as fast, when its healing power is the strongest
 - Probably when the physician believes in it the most

Placebo IV

- Study on the ability of vitamin C to prevent the common cold
 - 2 Groups randomly assigned
 - But it turns out that by opening the capsules the subjects could see if they were in the control or placebo group (the hint was people who dropped out).
- When testing only SS who did not know which group they were in, the treatment was not effective.
- When testing only SS who did know which group they were in, the treatment was effective

Placebo V

- The Hawthorne effect
 - In 1924 a study was done on effectiveness at work
 - The recommendation was to improve lighting condition
 - This helped for a while but not long term
 - Other changes had the same effect

Placebo -- summary

- Placebo strong effects
- Threatens the conclusions from many experiments
- Important to have a good control condition
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- Placebo is real
 - Opioids
 - Sensitivity
 - Attention

Self fulfilling prophecies

- Teachers who are told that some kids are very smart, find that these kids get better grades
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- Researchers who believed that they have genetically inferior rats found them to have a lower performances
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- Smart Hans ...

Desire to cooperate

- In many cases subjects want to help the experimenter.
 - If you tell subjects what is your hypothesis they will help you find it..
- This is why we prefer blind experiment
- Even better are double blind experiments
- Computer controlled experiments are another approach.

Summary

- People are bad measurement devices
- We observe and infer “rules” where there are non!
 - Correlations / causation
 - Self-selection
 - Placebo
 - Self fulfilling prophecies
- Statistics and research methods are here to protect us against ourselves