ATHK1001 Evidence tutorial

week of 25 April, 2016

Learning Outcomes

Understand: IV vs DV, Confound, Controlled variable

IV vs DVs. 1-min video (https://www.youtube.com/watch?v=rU7l5FkIHus)

Confounds. 3-min video (https://www.youtube.com/watch?v=B7QdNYLp_E0)

Study elements

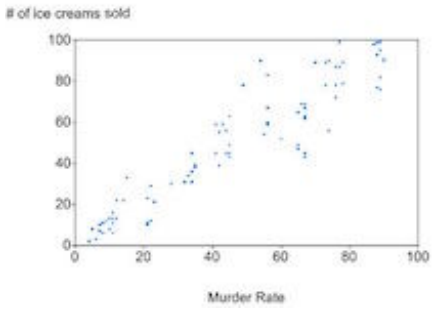
Term	Definition	Murder - ice cream relationship	Self-quiz - exam relationship	Liberals - Darks relationship
Dependent variable (DV)	The behavior or outcome that is measured. It is expected to change as a result of changes in the IV.			
Independent variable (IV)	Variable with two or more levels chosen by the researcher. Changes in the IV are expected to be related to changes in the DV.			
Confound (Bruce mentioned “omitted variables”, which he used to mean confound)	Variable that changes with the IV. The DV could be affected by both the IV and/or the			

	confound, so we cannot conclude that the IV was affected by the DV.
Controlled variable (in an experiment)	Varies, but is not different for the different levels of the IV. Any effects it has will “cancel out”.

As you go through the examples below, fill out the three right columns of the table.

Confounds

Over the year, murder rates and ice cream sales are highly positively correlated. That is, as murder rates rise, so does the sale of ice cream.



Like any correlation between one variable (X) and another (Y), there are three possible explanations:

1. X causes Y
2. Y causes X
3. A **third factor** is involved.

Which explanation is most plausible? _____

Under the third-factor explanation, what could the third factor be and what might its relationship to the others?

._____

_____

How could we test this explanation? _____

_____

Can you think of any way, even if implausible that murder rate could cause ice cream sales or vice versa?

_____

_____

Confound: Consider a relationship between two variables, X and Y, with higher levels of X associated with higher level of Y. A confounding variable is an extraneous variable that is statistically related to (or correlated with) the X. This means that as X changes, the confounding variable changes along with it.

Above, we referred to the confound as a **third factor**.

Correlation and causation

For A groups to discuss

A lecturer finds that online self-quiz completion rate is highly positively correlated with final exam mark.

On the basis of this evidence, the lecturer says to the students, “You should complete the self-quiz because it will significantly improve your chances of getting a good exam grade.”

Describe a plausible alternative explanation of the evidence

_____

On your alternative explanation, what causes what? _____

How might you determine which theory is correct?

._____

_____

If you have time remaining, try to conceive of a *second* alternative explanation.

._____

For B groups to discuss

Students in the Sydney University Liberal Club compare their course marks to the students of Sydney University's Dark Alternative Society and a t-test indicates that the Liberals get significantly higher marks.

The Liberals conclude that they work harder than the Dark Alternatives, are smarter than them, or both.

Describe a plausible alternative explanation of the evidence

_____

On your alternative explanation, what causes what? _____

How might you determine which theory is correct?

-_____

_____

Finding things out, with Facts, Stats, Logic, and Science

You will see several statements. For each, write down:

1. What kind of evidence would be relevant to evaluate each claim.
2. An experiment would be important to settle the issue.
3. An experiment is possible / feasible / impossible.
4. Whether the most straightforward relevant evidence would be a correlation or some other sort of evidence.
5. Whether it's a correlational study or an experiment that you're thinking of, write down two specific variables you'd examine the link between.
6. Any major confounds?

7. What can be done to address the confounds?

Divide into groups, each group getting one or two of the below. Describe the kind of evidence that would be relevant to the numbered statements below (p.91 of Fundamentals of Critical Thinking has similar material).

1. Background: The police give more tickets to drivers of red cars. Statement to evaluate: The reason is that red cars attract attention, so the police are more likely to notice a red car violating the law.
2. Driving a car is much more dangerous than flying in a commercial airliner
3. Crystal meth (ice) is the drug of choice on the streets today.
4. Humanities classes at the University of Sydney are marked more leniently than science classes.
5. Background: Male drivers have significantly more accidents than female drivers. As a result, insurance companies in many countries charge males more. Statement to evaluate: Males are worse drivers than females.

Remember

- Experiment versus quasi-experiment versus simple correlation
- Quasi-experiments are sometimes referred to as natural experiments
- Only a controlled experiment can definitively establish causality