Seminar 3 10.00-11.00

ATE simulation – why not a t-test?

What's the difference between the ATE, ATT, ATC

Marginal and conditional associations in a DAG. What are they?

The SUTVA assumption: what is it?

Do we need replication to generalize from a single RCT in one population to another population?

How do we decide what is a mediator, what is a confounder, what is a moderator and what is a covariate?

Everything in the world is changing so fast so RCTs/ causal inference is crap & it isn't scalable anyway.

Sherman & Berk's experiment

Better to balance on observables – gender/marital status et?

Balance versus control – which preferable?

Non compliance – does this invalidate the experiment?

Doesn't address other theories – ie RAT

A study with observational data would be better.

Seminar 3 11.00-12.00

You say that causality can be observed…" No I didn't, I really didn't…

Will there ever be cases when assignment to treatment/control depends only on observables?

Is it possible to know there is no baseline difference or differential treatment effect?

What is the 'true effect'? How is it related to bias?

ATE is crap, what we want are individual causal effects.

Can I treat a categorical variable as a covariate?

How do we deal with contamination/spill-over?

How do we assess the value or utility of RCT results if they can't be applied to other contexts?

What is the problem of interaction?

What is Bayesian analysis?

What does the "weight of the evidence" mean?

Seminar 3 12.00-13.00

What are the standards we should use to judge the value of a qualitative study?

How should a qualitative researcher approach generalizability?

Is it problematic to ignore emotions?

Deterrence theory assumes rationality. Is that reasonable?

General confusion about DAGs. When are the building blocks relevant?

Inter-disciplinarity & causality – would it help?

Generalized scepticism about the relevance of RCTs "in the real world".

Difference between association and causation.

Do people doing observational studies bother about causation?

What is a Bayesian analysis?

More training of police officers needed as to how the experiment should work.

More/different treatments needed.

How problematic is non compliance?

Victim reports or police reports – bias? Combine them?

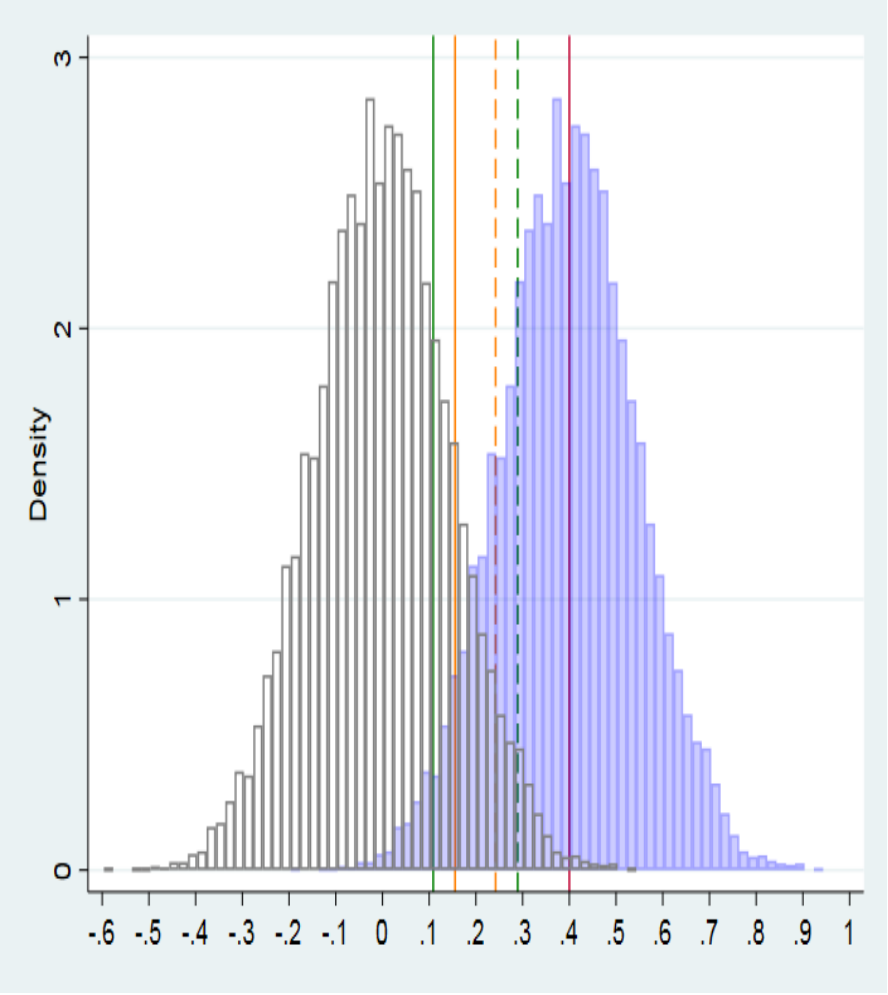
Why no control variables?

Interaction variables and orthogonality.

Effects of causes

Randomisation

Simple simulation example



We need the distribution of outcomes assuming the average TE=0.

P value = $P(D|H_0)$.

$P(TE >= 0.155 | H_0) = 0.14$.

Observing a estimate as large or larger than 0.155 wouldn't be that unusual if TE is really 0. So would be odd to regard the estimate we get from this one experiment as strong evidence against H_0.

When TE=0, 5% of experiments produce estimates >= 0.24 and 2.5% >=0.29.

Treatment Effects

Average treatment effect (ATE) $E[\delta] = E[Y^1 - Y^0]$

Average treatment effect for the treated (ATT) $E[\delta|D = 1] = E[Y^1 - Y^0|D = 1]$

Average treatment effect for the controls (ATC) $E[\delta|D = 0] = E[Y^1 - Y^0|D = 0]$

ATT = average treatment effect for those that typically are (choose to be) treated based on counterfactual comparison.

In a well designed experiment, ATE should (over many replications) be the same for those randomized to the treatment and those randomized to the controls.

Q. Is there any reason to expect this in observational data?

Classical inference

P(D | H)

Bayesian Inference

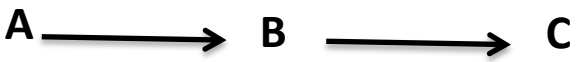
$$P(H|E) = \frac{P(E|H) \cdot P(H)}{P(E)}$$

DAGs

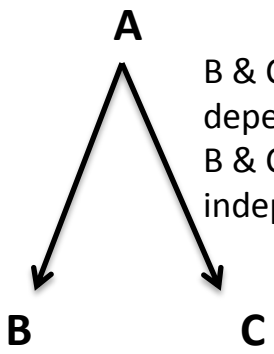
Building blocks

Conditional Independence

1. Chain of mediation



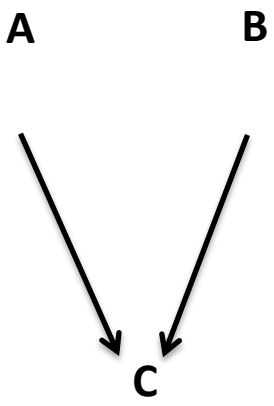
A & C are marginally dependent;
A & C are conditionally independent.



B & C are marginally dependent;
B & C are conditionally independent.

2. Mutual dependence

3. Collider (Mutual Causation)



A & B are marginally independent;
A & B are conditionally dependent.

Stable Unit Treatment Value Assumption (SUTVA)

SUTVA is the assumption that the value of Y for individual i exposed to treatment d **does not depend on the way the individuals are assigned to treatments**.

Table 2.2: A Hypothetical Example in Which SUTVA is Violated

Treatment assignment patterns	Potential outcomes	
$\begin{bmatrix} d_1=1 \\ d_2=0 \\ d_3=0 \end{bmatrix}$ or $\begin{bmatrix} d_1=0 \\ d_2=1 \\ d_3=0 \end{bmatrix}$ or $\begin{bmatrix} d_1=0 \\ d_2=0 \\ d_3=1 \end{bmatrix}$	$y_1^1=3$ $y_2^1=3$ $y_3^1=3$	$y_1^0=1$ $y_2^0=1$ $y_3^0=1$
$\begin{bmatrix} d_1=1 \\ d_2=1 \\ d_3=0 \end{bmatrix}$ or $\begin{bmatrix} d_1=0 \\ d_2=1 \\ d_3=1 \end{bmatrix}$ or $\begin{bmatrix} d_1=1 \\ d_2=0 \\ d_3=1 \end{bmatrix}$	$y_1^1=2$ $y_2^1=2$ $y_3^1=2$	$y_1^0=1$ $y_2^0=1$ $y_3^0=1$