Title
subtitle

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Individual Causal Effect

Individual causal effects are defined as a contrast of the values of counterfactual outcomes.

Counterfactual outcome

Such as $Y^{a=1}$ and $Y^{a=0}$, which may not actually ((occur.
Only one of those outcomes is observed for each individual, and all other counterfactual outcomes remain unobserved.

This paper only considers Neyman's model where each subject has only two potential responses.

Average Causal Effect

The intention-to-treat parameter (b_{ITT})

b_{ITT} is the average response if all subjects are assigned to treatment, minus the average response if all subjects are assigned to control.

Sometimes b_{ITT} is called the average causal effect or the average treatment effect.

Remark

b_{ITT} needs to be estimated!

Untenable Model Asumptions

- In randomized or obeserved experiments for causal inference, data are often analyzed using regression models.

- Regression model needs its assumptions but randomization does not justify regression models.
  In fact the assignment variable (to treatment or control) and the error term in the model will generally be strongly related.

- Wrong model assumptions usually bring wrong conlusions!