Experimenting on Politics

Design Political Research: Week 10

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When should one use experiment

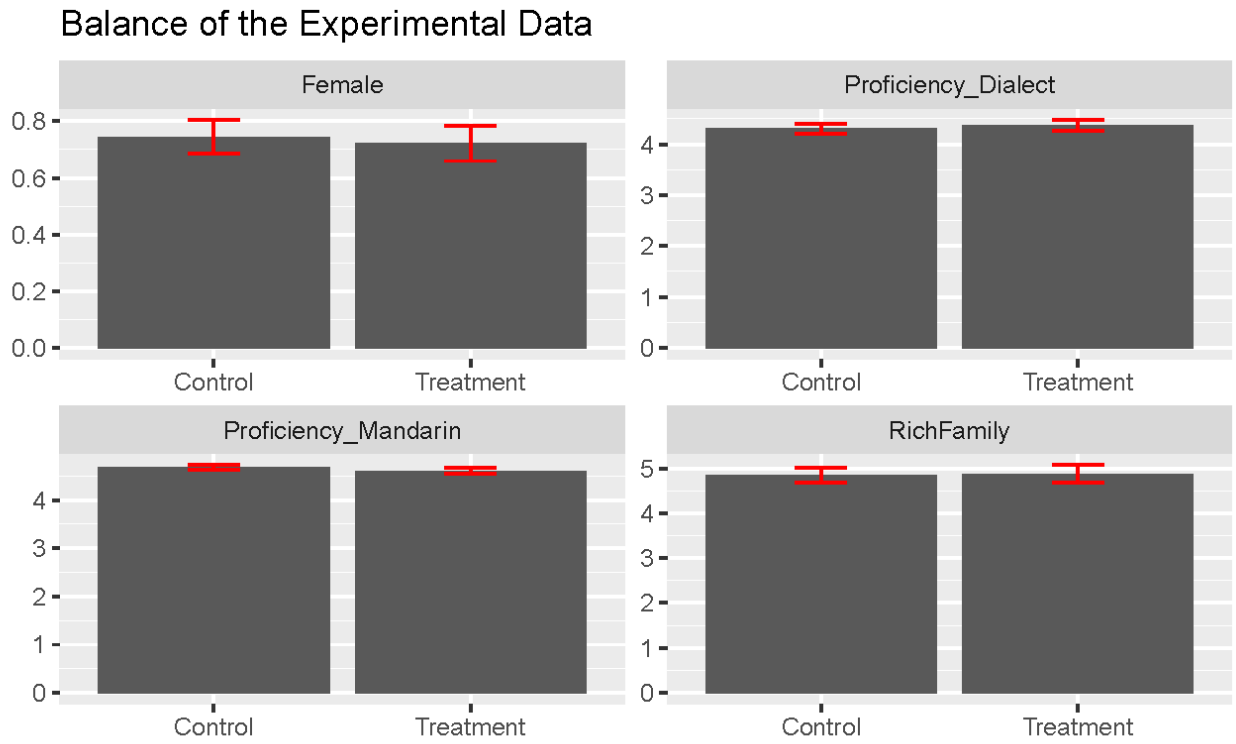
- Well-defined concept
- Clear-stated propositions
- Small-group interaction

Classical experiment

	Assignment	
Test	Stim.	NonStim.
Test	Stim.	NonStim.
Pretest	Treatment	Control
Posttest	Treatment	Control

- Do we always need pretest and posttest?
- Do we always need treatment and control groups?
- Double-blind?

What does randomization bring us?



The plot presents the means of each variable in the control and treatment groups. The whiskers are 95% confidence intervals. In every pair, the intervals overlap with each other. This suggests a good balance between the two groups of the experiment.

How about matching?

	Men		Women	
	African American	White	African American	White
Under 30 years	8	12	10	16
30 to 50 years	18	30	14	28
Over 50 years	12	20	12	22

Experimental group

6

7

etc.

Control group

6

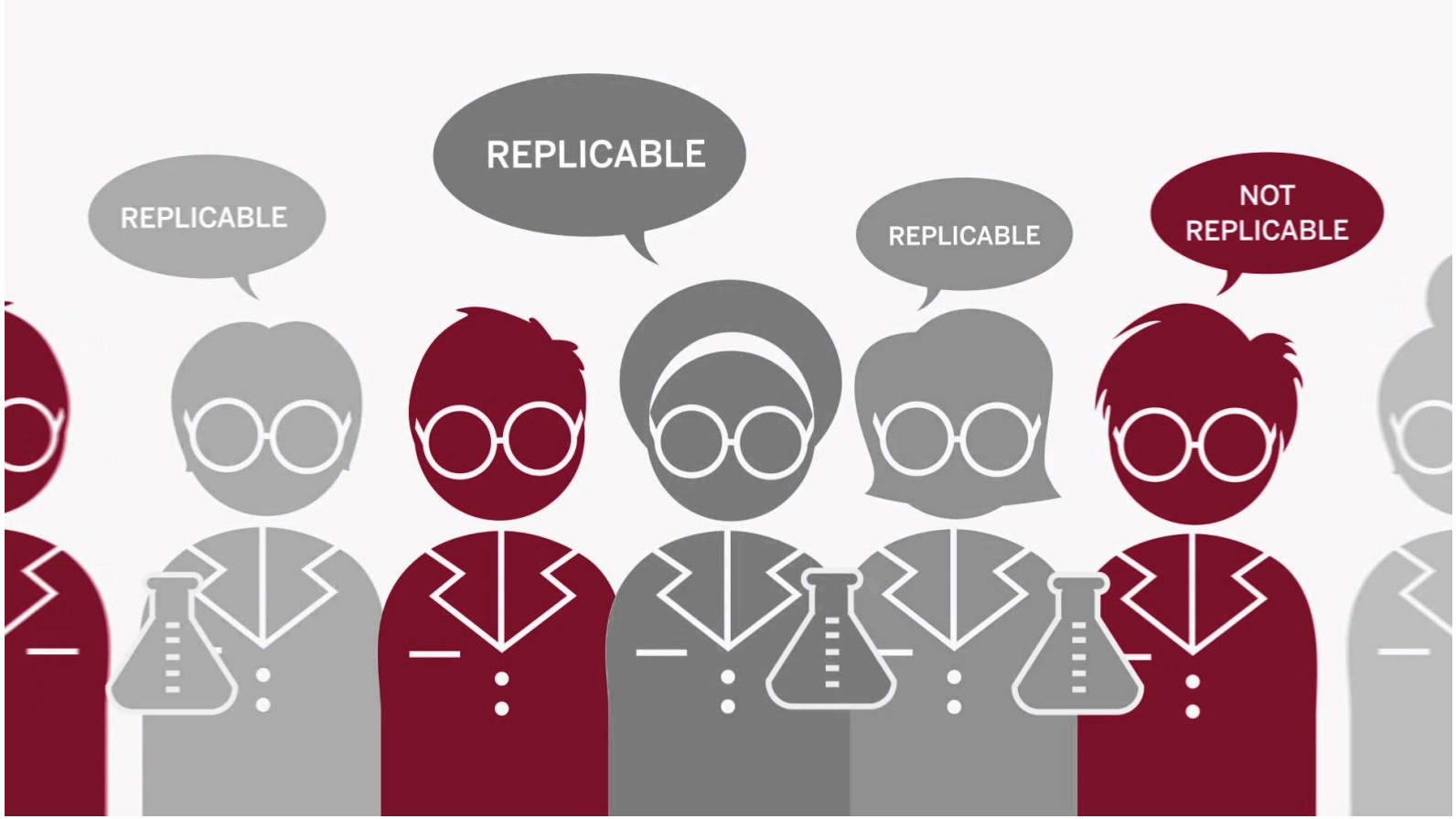
7

etc.

Validity

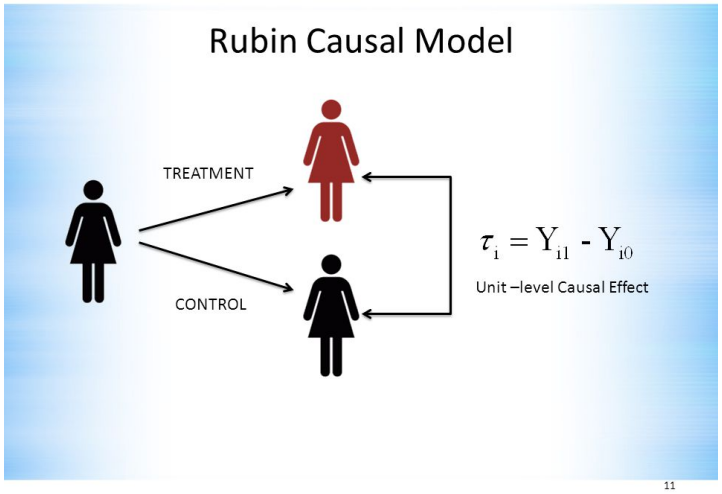
- Internal Validity
  - Construct validity
  - Causal validity
  - Statistical validity

External vs. Ecological Validity



How do experiments define causality?

- Rubin's causal model:
  - Treatment effect:



  - ATE: $E(\tau_i) = E(Y_{i1}) - E(Y_{i0})$

Averaged treatment effect among the treated

- Why do we care?
- $E(\tau_i|T_i = 1) = E(Y_{i1}|T_i = 1) - E(Y_{i0}|T_i = 1)$

Experimental assumptions

1. Independence
2. Exclusion restriction
3. Stable Unit Treatment Value Assumption (SUTVA)
4. Montonicity
5. Nonzero causal effects of assignment on treatment

Independence

Definition

Subject will have the same effect regardless which group they are in.

Violation

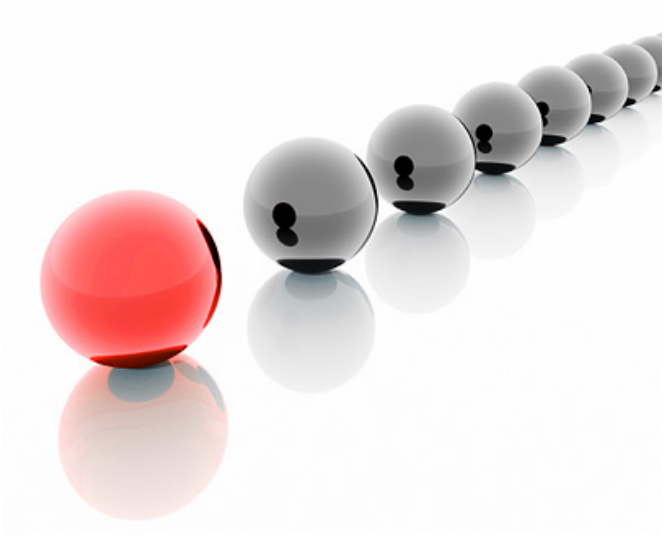
- Nonrandom assignment
- Non-double-blind design

$$
\begin{aligned}
Assumption: & E(Y_{i1}|T_i = 1) = E(Y_{i1}|T_i = 0); \\
& E(Y_{i0}|T_i = 1) = E(Y_{i0}|T_i = 0). \\
ATE: & E(\tau_i) = E(Y_{i1}|T_i = 1) - E(Y_{i0}|T_i = 0).
\end{aligned}
$$

Exclusion restriction

Definition

Only treatment can make effects.



Violation

- Subjects change their behaviors
- Third party effects

SUTVA

Definition

The effect of stimulus on one subject is affected by other subjects.

Violation (e.g., Herd Effect)

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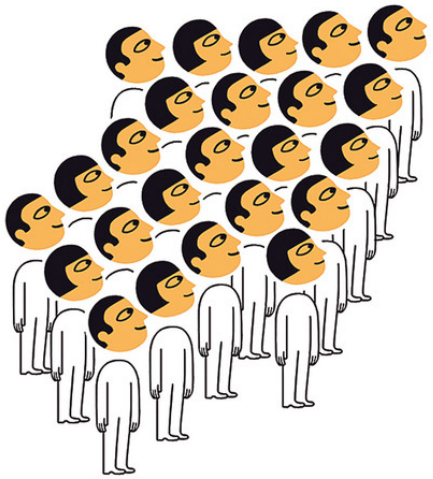

Montonicity and nonzero causal effects

Definition

- The probability the subject is treated is at least as great when the subject is in the treatment group as when the subject is in the control group.
- The treatment assignment has an effect on the probability that at least some subjects are treated.

Violation

- Operation errors
- Third-party effects

Field Experiment

- Subject: sample from the target population
- Pro: Ecological validity
- Con: Internal and external validity

Natural Experiment

- Stimulation: It just happened.
- Pro: Ecological and external validity
- Con: Internal validity