

Randomized Experiments

Introduction to Quantitative Social Science

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Randomized Controlled Trials (RCT)

- Randomize!
- Key idea: **Randomization** of the treatment makes the treatment and control groups “identical” *on average*
- The two groups are similar in terms of *all* (both observed and unobserved) characteristics
- Can attribute the average differences in outcome to the difference in the treatment

$$\text{Sample Average Treatment Effect (SATE)} = \frac{1}{n} \sum_{i=1}^n \{Y_i(1) - Y_i(0)\}$$

- Randomized experiments as the gold standard
- Double-blind experiments: **Placebo effects** and **Hawthorne effects**

Changing Minds on Gay Marriage

- Question: Can we effectively persuade people to change their minds?
- It's a million dollar question for political campaigns, companies, NGOs, etc.
- Psychological studies show it's not easy

- Two Randomized Control Trials in Los Angeles (2013)
- Timed around the Supreme Court decision to legalize gay marriage in California
- **Contact Hypothesis**: outgroup hostility diminishes when people from different groups interact with one another
- M. J. LaCour and D. P. Green (2015). "When contact changes minds: An experiment of transmission of support for gay equality." *Science*.

Study Design

- Randomized treatment:
 - gay ($n = 22$) vs. straight ($n = 19$) canvassers with similar characteristics
 - same-sex marriage vs. recycling scripts (20min conversation)
 - a total of 4 treatments: 2×2 factorial design
 - control group: no canvassing
- Persuasion scripts are the same except one important difference:
 - gay canvassers: they would like to get married but the law prohibits it
 - straight canvassers: their gay child, friend, or relative would like to get married but the law prohibits it
- What is the recycling script for? \rightsquigarrow **Placebo effect**
- Outcome measured via unrelated **panel survey**: self-reported support for same-sex marriage
- Why did they use a “unrelated” survey? \rightsquigarrow **Hawthorne effect**

The Data

- Data file: `gay.csv`

Name	Description
<code>study</code>	Source of the data (1 = Study1, 2 = Study2)
<code>treatment</code>	Five possible treatment assignment options
<code>wave</code>	Survey wave (a total of 7 waves)
<code>ssm</code>	5 point scale on same-sex marriage, higher scores indicate support.

- Load the data and create a cross-tabulation by `study` and `wave`:

```
gay <- read.csv("data/gay.csv")
table(gay$study, gay$wave)
##
##      1      2      3      4      5      6      7
## 1 9507 8465 8651 8672 8339 9013 6560
## 2 2441 2132 2113 2171      0      0 1528
```

- Let's focus on the baseline survey in Study 1:

```
study1.wave1 <- subset(gay, (study == 1) & (wave == 1))
```

- Examine the distribution of treatments:

```
prop.table(table(study1.wave1$treatment))  
##  
##                               No Contact  
##                               0.551  
##           Recycling Script by Gay Canvasser  
##                               0.110  
##           Recycling Script by Straight Canvasser  
##                               0.109  
##           Same-Sex Marriage Script by Gay Canvasser  
##                               0.121  
## Same-Sex Marriage Script by Straight Canvasser  
##                               0.109
```

What Do We Expect if Randomization is Done Properly?

```
tapply(study1.wave1$ssm, study1.wave1$treatment, mean)

##                               No Contact
##                               3.04
##           Recycling Script by Gay Canvasser
##                               3.13
##           Recycling Script by Straight Canvasser
##                               3.01
##           Same-Sex Marriage Script by Gay Canvasser
##                               3.03
##           Same-Sex Marriage Script by Straight Canvasser
##                               3.10
```

Estimate the SATEs 3 Days Later (Wave 2)

```
study1.wave2 <- subset(gay, (study == 1) & (wave == 2))
## estimated SATEs
tapply(study1.wave2$ssm, study1.wave2$treatment, mean)[-1] -
  mean(study1.wave2$ssm[study1.wave2$treatment ==
    "No Contact"])

##           Recycling Script by Gay Canvasser
##                               0.0678
##           Recycling Script by Straight Canvasser
##                               -0.0353
##           Same-Sex Marriage Script by Gay Canvasser
##                               0.0999
## Same-Sex Marriage Script by Straight Canvasser
##                               0.1222
```

- What is the effect of gay canvasser? What about the effect of script?

Estimate the SATE Right After the Court Decision (Wave 5)

```
study1.wave5 <- subset(gay, (study == 1) & (wave == 5))
## ATE
tapply(study1.wave5$ssm, study1.wave5$treatment, mean)[-1] -
  mean(study1.wave5$ssm[study1.wave5$treatment ==
    "No Contact"])

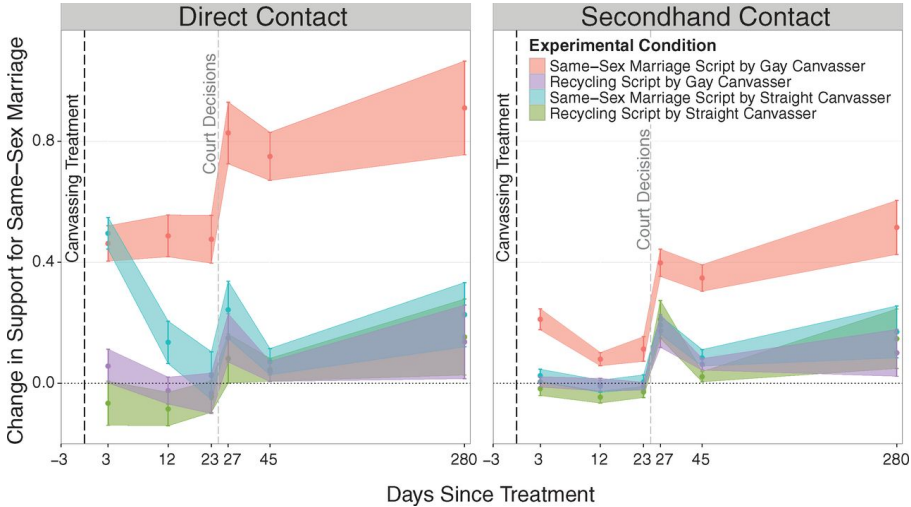
##           Recycling Script by Gay Canvasser
##                               0.0782
##           Recycling Script by Straight Canvasser
##                               -0.1055
##           Same-Sex Marriage Script by Gay Canvasser
##                               0.1479
##           Same-Sex Marriage Script by Straight Canvasser
##                               0.0986
```

Estimate the SATE 9 Months Later (Wave 7)

```
study1.wave7 <- subset(gay, (study == 1) & (wave == 7))
## ATE
tapply(study1.wave7$ssm, study1.wave7$treatment, mean)[-1] -
  mean(study1.wave7$ssm[study1.wave7$treatment ==
    "No Contact"])

##           Recycling Script by Gay Canvasser
##                               0.1182
##           Recycling Script by Straight Canvasser
##                               -0.1478
##           Same-Sex Marriage Script by Gay Canvasser
##                               0.0594
##           Same-Sex Marriage Script by Straight Canvasser
##                               -0.0425
```

Big and Lasting Effects of Persuasion



Retraction and Media Coverage

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SCIENCE 359 COMMENTS

Doubts About Study of Gay Convassers Rattle the Field

By BENEDICT CAREY and PAM BELLUCK MAY 25, 2015



Donald P. Green, left, a co-author of a challenged study by Michael LaCour, right, from Mr. LaCour's Facebook page.

Assignments

- 1 Sections 2.5 – 2.7 of QSS Chapter 2
 - Learn about observational studies
 - Learn about descriptive statistics such as standard deviation
 - Don't just read. Try all the commands on your own

- 2 Exercises:
 - In-class exercise: Efficacy of Small-class Size in Early Education
 - Pre-class exercise: [Tutorial2: Causality II](#)