

# Econ 211

Prof. Jeffrey Naecker

Wesleyan University

# Research Transparency

# LaCour and Green (2014)

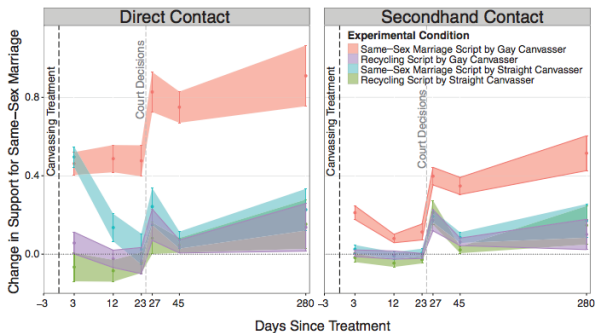
- ▶ We saw that the “echo chamber effect” can make it difficult for people’s opinions to change?
- ▶ But forcing “cross-cutting” interactions might sway opinions
- ▶ La Cour and Green (2014) report an experiment attempting to change opinions on gay rights via canvassing

# LaCour and Green (2014)

- ▶ We saw that the “echo chamber effect” can make it difficult for people’s opinions to change?
- ▶ But forcing “cross-cutting” interactions might sway opinions
- ▶ La Cour and Green (2014) report an experiment attempting to change opinions on gay rights via canvassing
  - ▶ Initial baseline survey of opinions of voters in Los Angeles
  - ▶ Send either gay or straight canvasser to discuss gay rights with each voter for 22 minutes on average
  - ▶ Measure opinions on gay rights again with delay of 3 weeks, 5 weeks, and 9 months
  - ▶ Also measure opinions of people in the same household who did not talk directly to canvasser
  - ▶ Outcome: response on scale of 1-100, where 1=very cold and 100=very warm to idea of gay rights (thermometer scale)

# Reported Results

- ▶ Both gay and straight canvassers were able to increase support for same-sex marriage
- ▶ Effect from gay canvassers persisted (or even increased) over time
- ▶ Gay canvassers also had an effect on other members in household



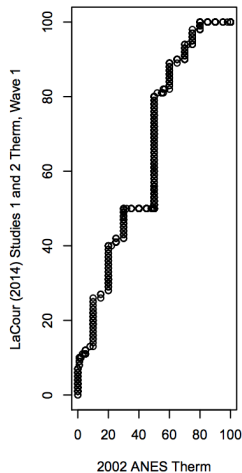
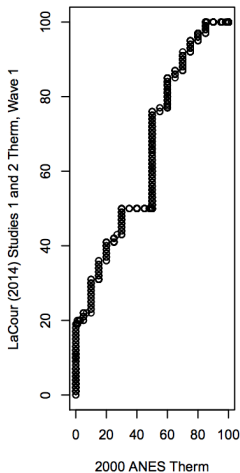
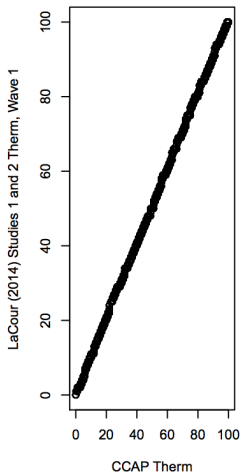
# Just One Problem

- ▶ All the results reported by LaCour and Green (2014) were fabricated
- ▶ The deception appears to have been perpetrated entirely by LaCour (a graduate student at the time)
  - ▶ Canvassing was actually carried out as described by a non-profit (at great expense of time and money)
  - ▶ However, pre- and post-canvassing responses (allegedly collected via online surveys sent to the canvassed households) were entirely made up by LaCour
  - ▶ LaCour even fabricated the research grants that he supposedly used to fund the surveys

# How Was This Discovered?

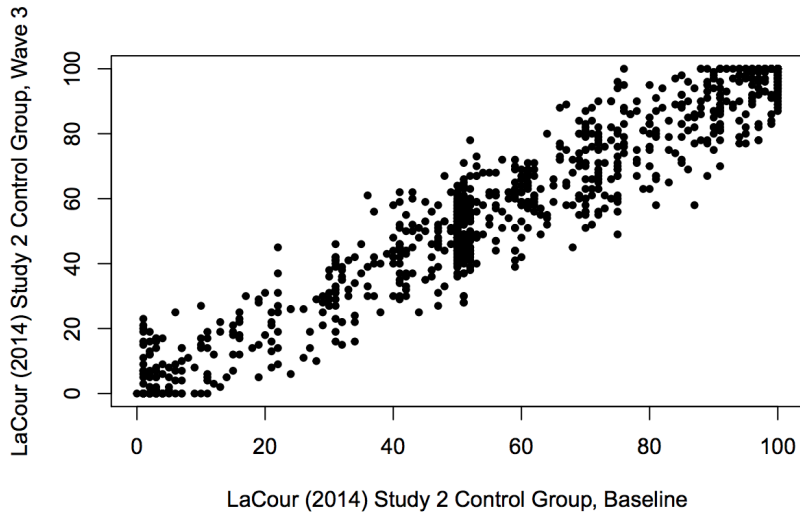
- ▶ Two researchers, Josh Kalla and David Broockman, attempted to replicate LaCour and Green's methods, but with the goal of reducing transphobia
- ▶ However, did not get responses rates to follow-up surveys that were similar to LaCour
- ▶ Suspicious, they investigated individual response data from LaCour (which was published along with paper)
- ▶ They found several suspicious trends in data:
  - ▶ Initial survey responses were remarkably similar to responses from another well-known paper that used same thermometer scale
  - ▶ Follow-up responses were much more highly correlated with initial responses than usually seen in literature
  - ▶ Follow-up responses seemed to be created by taking initial responses and adding positive random numbers

# LaCour Data Nearly Identical to Other Study





# LaCour Baseline vs Follow-up



# This Has Happened Before

- ▶ This is not the only time such fabrication has happened, unfortunately
  - ▶ One social psychology researcher in the Netherlands believed to have fabricated data in over 50 published papers
  - ▶ Not just social science: A Japanese anesthesiologist believed to have fabricated data in at least 172 papers
  - ▶ Hundreds of examples across all major research fields

# Reinhart and Rogoff

- ▶ Reinhart and Rogoff (2009) reported that countries with debt above 90% of GDP have lower growth
- ▶ Paper was influential for policy during great recession and financial crisis
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- ▶ However, other economists could not replicate results
- ▶ Turns out Reinhart and Rogoff used Excel for data analysis, and didn't select the right cells of the spreadsheet when crunching their numbers
- ▶ After correcting their errors, no apparent threshold at 90%

# Research Integrity More Broadly

- ▶ The above are extreme and (hopefully) rare example
- ▶ However, even seemingly benign choices by researcher can call results into question
  - ▶ Choice of which data to use: throw out outliers, focus on subsample analysis, pilot several designs of experiment
  - ▶ Choice of which regressions to run and which variables to include
  - ▶ Choice of which statistical tests to use
- ▶ These issues put under the general umbrella of *p-hacking*
- ▶ Also called *research degrees of freedom* or *the garden of forking paths*

# Motivating Example

- ▶ Suppose you are running a simple experiment
  - ▶ Randomly assign people to either hot or cold room
  - ▶ Ask whether they would like \$10 now (impatient) or \$11 tomorrow (patient)
- ▶ Suppose your sample size is  $N = 2$  individuals, one to each treatment
- ▶ Suppose you find that the person in the hot room takes the patient option and the person in the cold room takes the impatient option
- ▶ Can you conclude that warmer rooms cause people to act more patient?

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- ▶ Can you conclude that warmer rooms cause people to act more patient?
  - ▶ No; even if temperature has no effect on patience, there is a 50% chance of getting the result we did
  - ▶ This is because there is 50% chance that we just happened to select the more patient person for the hot treatment
  - ▶ Thus in this example, the  $p$ -value is 0.5

# Hypothesis Testing

- ▶ More generally, are testing whether we can accept or reject a certain hypothesis
- ▶ Typically, the *null hypothesis* predicts that there will be no difference between our treatments, while the *alternate hypothesis* predicts there will be a difference
- ▶ In temperature example:
  - ▶ Null hypothesis: temperature has no effect on patience
  - ▶ Alternate hypothesis: temperature causes people to act more patient



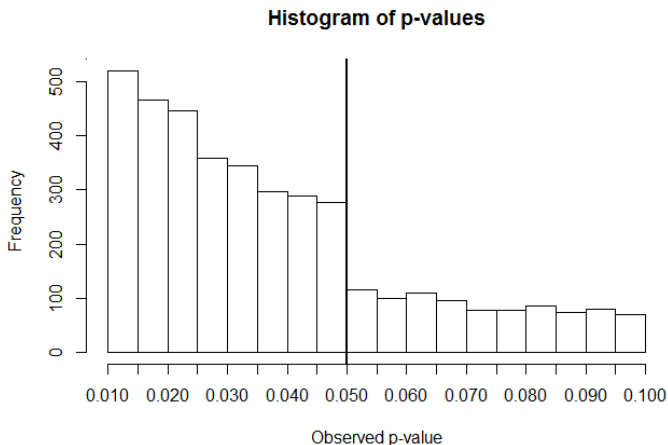
# $p$ -values

- ▶ The  $p$ -value measures the probability of getting the observed result *under the null hypothesis*
  - ▶ A  $p$ -value close to 0 means that there is only a small likelihood that results are due to chance
  - ▶ A  $p$ -value close to 1 means that there is a high likelihood that results are due to chance
- ▶ For historical and largely arbitrary reasons, a  $p$ -value of 0.05 or less is considered “statistically significant”
- ▶ If we look at  $p$ -values across an entire field, distribution should be smooth

# Research Degrees of Freedom

- ▶ Consider all the choices we made when running the temperature experiment:
  - ▶ What temperature to make the rooms
  - ▶ What size prizes to use
- ▶ And choices made when analyzing the data:
  - ▶ Throw out responses from that one subject that fell asleep
  - ▶ Maybe we should control for gender, or GPA, or income, or ...
- ▶ If we make these choices in an attempt to get  $p = 0.05$  (even subconsciously), then these are all ways of  $p$ -hacking

# Visualization of p-hacking



Data: 3627 p-values reported in 3 different psychology journals, from Masicampo and LaLande (2012)

## Returning to Example

- ▶ Now suppose sample size was  $N = 100$ , with 50 people in each treatment
- ▶ Suppose you find that all 50 people in the hot room take the patient option and all 50 people in the cold room take the impatient option
- ▶ Now can you conclude that temperature has an effect on patience?

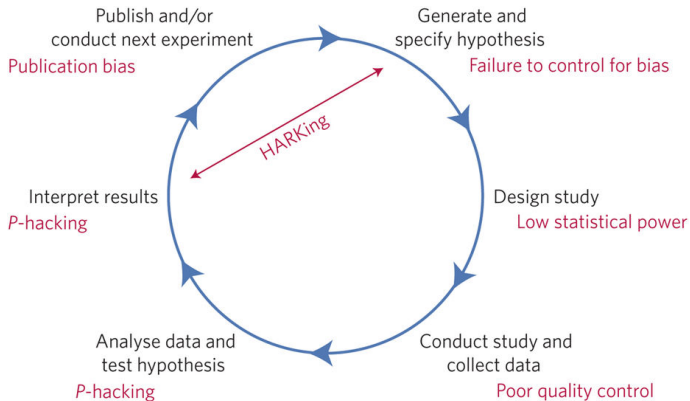
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- ▶ Suppose you find that all 50 people in the hot room take the patient option and all 50 people in the cold room take the impatient option
- ▶ Now can you conclude that temperature has an effect on patience?
  - ▶ Almost certainly yes: getting this result by chance if the null was true is extremely unlikely
  - ▶ If we assume that people are equally likely to be patient or impatient under null, then getting this result is like flipping 50 heads in a row on a fair coin
  - ▶ Thus the  $p$ -value is essentially 0

# Other Transparency Issues

- ▶ Publication bias
  - ▶ Journals have a tendency to favor studies with statistically significant results
  - ▶ This leads to *publication bias*: significant results are published more quickly and in higher-status journals
  - ▶ Also causes *file drawer effect*: researchers don't even try to publish null (non-significant) results
- ▶ HARKing (Hypothesizing After the Results are Known)
  - ▶ Ideally, hypothesis should be generated *before* experiment is run or data are analyzed
  - ▶ However, researchers often generate hypothesis/theory *after* data are analyzed to make it seem like they predicted the results all along

# Overview



Source: Munafo et al (2017)

# Reproducibility vs Replication

- ▶ A study is *reproducible* if the exact same results can be re-generated using the exact same data set and (intended) methods
  - ▶ LaCour fabrication is not reproducible since data don't exist
  - ▶ Reinhart and Rogoff also not reproducible since methods not executed as intended
- ▶ A study is *replicable* if the results can be re-generated using similar data and methods
  - ▶ Replications attempt to verify the underlying theory and/or methods
  - ▶ Studies that are fully reproducible may still not replicate
  - ▶ In recent replication projects, only about 40% of psych studies and about 60% of econ studies replicated



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3. Encourage pre-analysis plans (also know as pre-registration)
  - ▶ Force researchers to register experimental designs and analysis plans (eg which regressions to run) before running experiment
  - ▶ Would alleviate p-hacking and file-drawer effect

# Coda

- ▶ Recall that Broockman and Kalla were attempting to replicate LaCour and Green's canvassing methods to reduce transphobia
- ▶ Their paper was recently published in Science (same journal that publish now-discredited LaCour and Green paper)
- ▶ Data: 1825 voters in Florida
- ▶ What they found:
  - ▶ Both transgender and non-transgender canvassers effective at changing opinions
  - ▶ These changes lasted at least 3 months
  - ▶ Key seems to be forcing respondents to do "perspective-taking" rather than logical or legal arguments