Data Science Applications to Politics and Policy

Week 2 Seminar

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GV4L3

Where we left off...

“File drawer problem”

Rob Seamans @robseamans · Dec 5, 2020

Replying to @fmg_twtr and @Scientific_Bird

I edited it slightly...

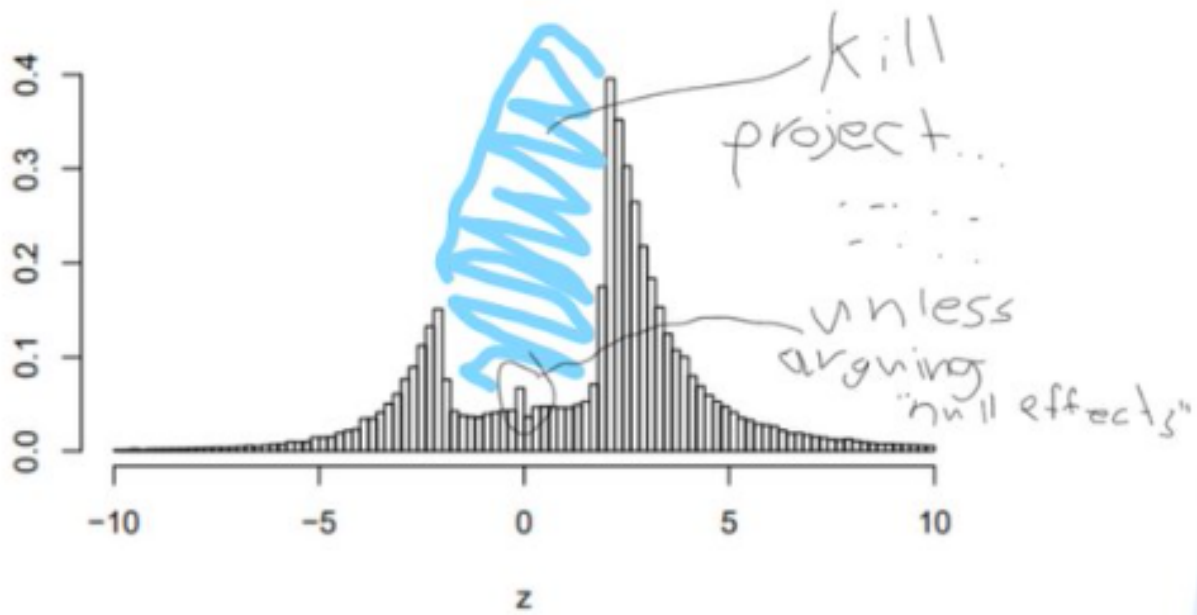


Figure 1: The distribution of more than one million z-values from Medline (1976–2019).

“File drawer problem”: Franco, Malhotra, Simonovits (2014)

In a known population of conducted studies (2002-2012): strong results 60pp more likely to be written up than null results, 40pp more likely to be published:

Table 3. Cross-tabulation between statistical results of TESS studies and their publication status (column percentages reported). Pearson χ^2 test of independence: χ^2 (6) = 80.3, $P < 0.001$.

	Null (%)	Mixed (%)	Strong (%)
Not written	64.6	12.2	4.4
Written but not published	14.6	39.0	34.1
Published (non–top-tier)	10.4	37.8	38.4
Published (top-tier)	10.4	11.0	23.1
Total	100.0	100.0	100.0

Update: Moniz, Druckman, Freese (2025)

In more recent studies (2012-2018): file drawer problem less present; still driven by researchers' decision to not write up or submit null results

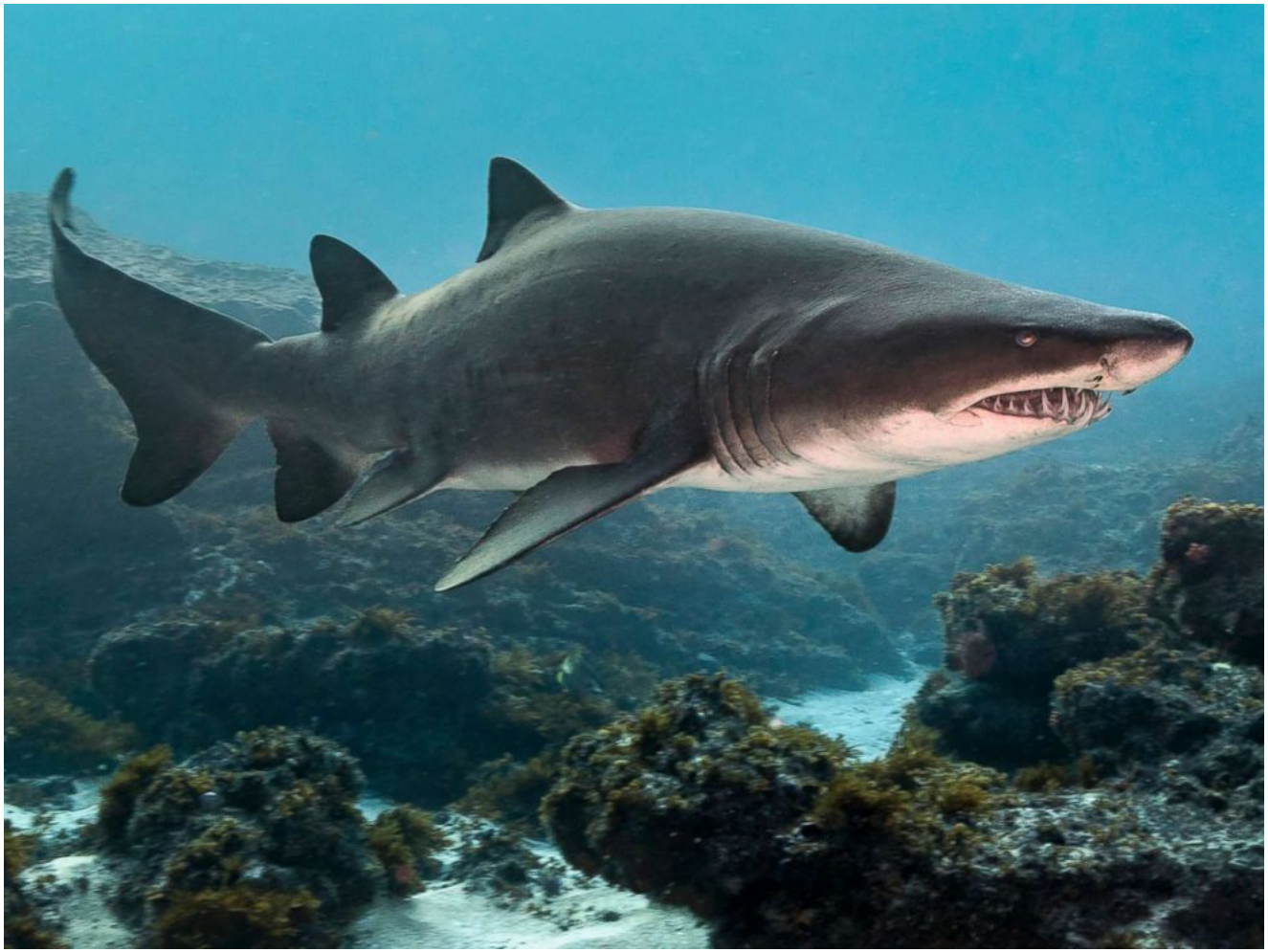
	TESS researchers (N = 107)		Persevering researchers (N = 268)	
	Statistically significant (N = 61)	Statistically insignificant (N = 46)	Statistically significant (N = 171)	Statistically insignificant (N = 97)
Not written	8.20%	28.26%	13.45%	41.24%
Written but not submitted	0.00%	15.22%	7.02%	13.40%
Submitted but not published	16.39%	10.87%	22.22%	9.28%
Published	75.41%	45.65%	57.31%	36.08%
Total	100.00%	100.00%	100.00%	100.00%

P-hacking

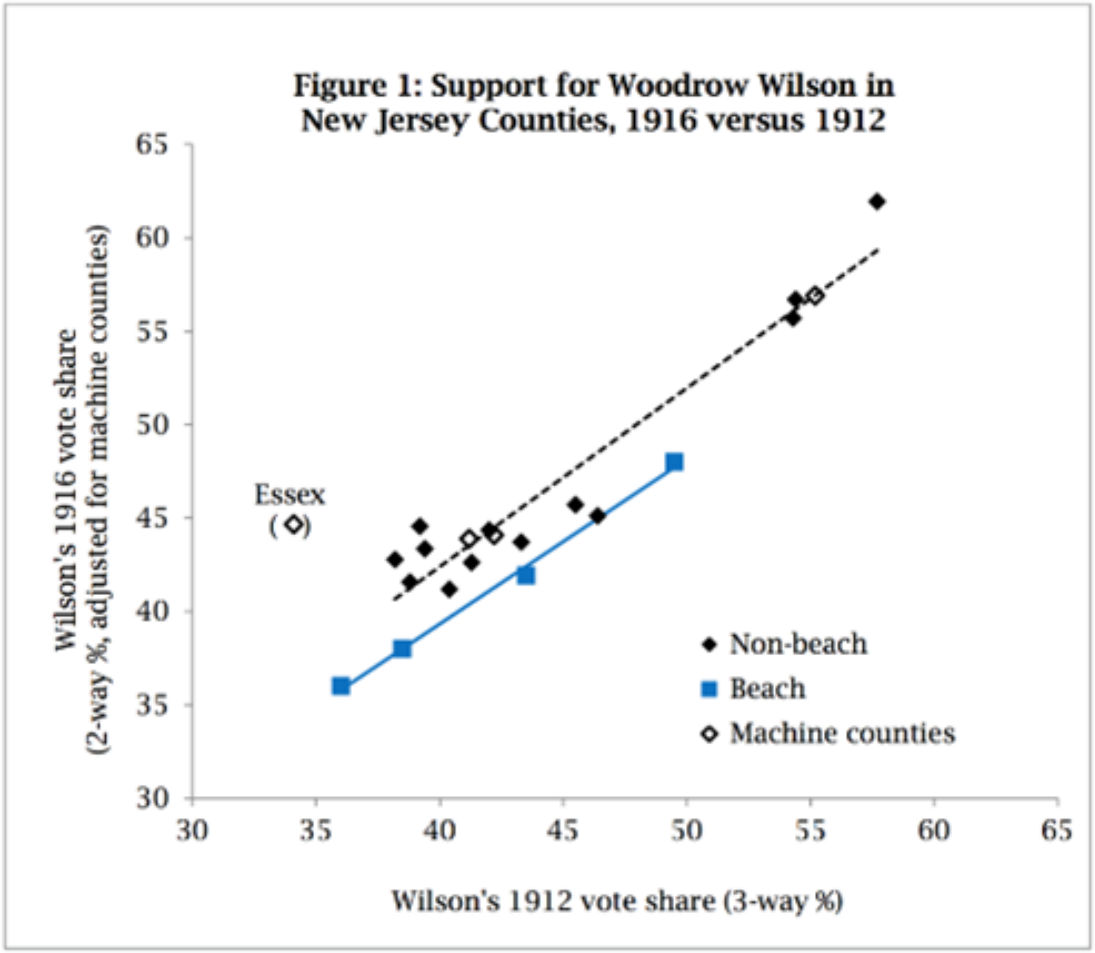
"If you torture the data long enough, it will confess." - Ronald Coase

- **Opportunity:** Researchers have many "degrees of freedom" in the design and analysis of a study $\rightarrow$ p-hacking (may not always be intentional, see Gelman & Loken 2013)
- **Motive:** Researchers have incentives (from journals, tenure requirements, etc.) to find statistical significance
- **Result:** Biased evidence base (also contributes to replication crisis)

Shark attacks and voting (Achen & Bartels 2017)



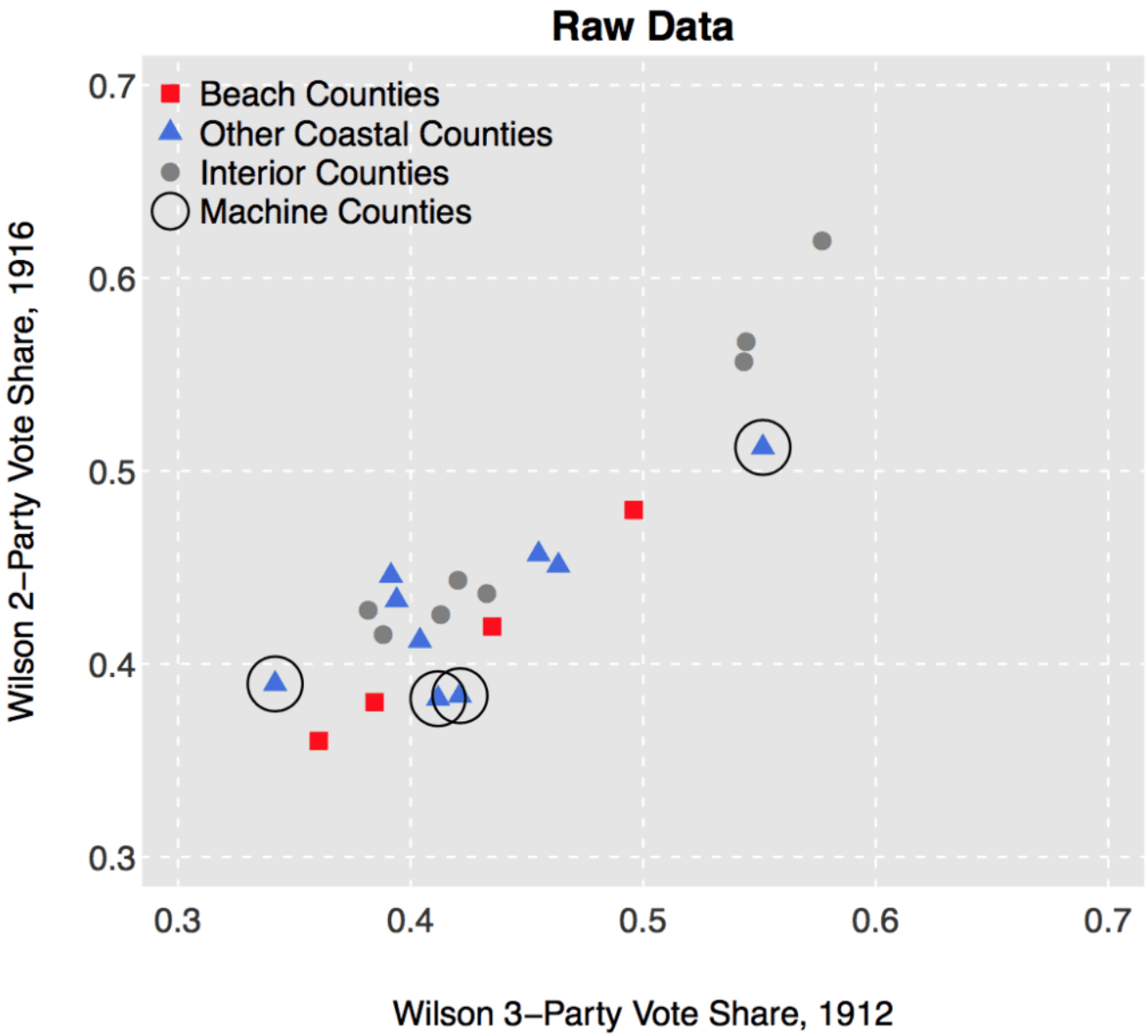
Shark attacks and voting (Achen & Bartels 2017)



"A dramatic series of shark attacks in NJ in 1916... voters significantly punished the incumbent president at the polls"

Achen, C., & Bartels, L. (2017). *Democracy for Realists*. Princeton University Press.

Fowler & Hall 2018: Re-analysis of Achen & Bartels



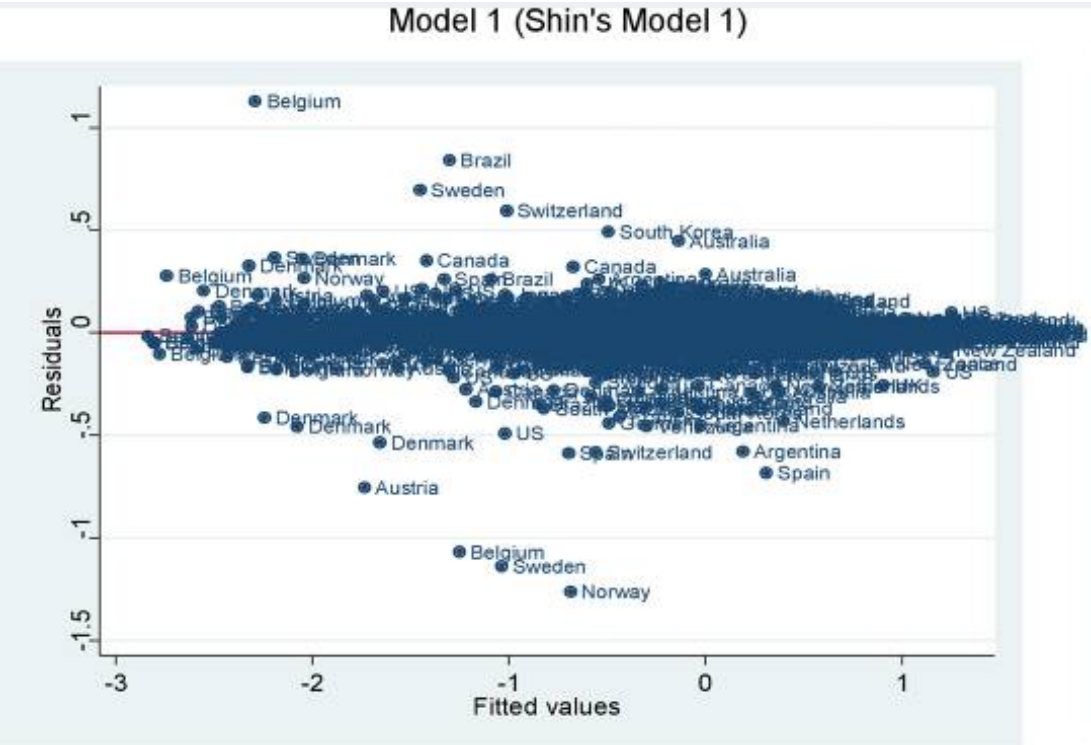
Critique of Achen & Bartels (Fowler & Hall 2018)

- Correlation: election results from different counties are not independent events (can inflate our sense of the "true" sample size)
- 'Forking paths': many different ways to analyze the data (e.g., choice of how to treat "outliers")

"We assemble data on every fatal shark attack in U.S. history and county-level returns from every presidential election between 1872 and 2012, and we find little systematic evidence that shark attacks hurt incumbent presidents or their party."

Fowler, A., & Hall, A. B. (2018). Do shark attacks influence presidential elections? Reassessing a prominent finding on voter competence. *The Journal of Politics*, 80(4), 1423-1437.

Critique of Shin 2019 (Choi 2022)



- Takeaway: OLS slope + *p*-value can be **highly sensitive** to one influential case.
- Choi (2022) argues Norway drives the "oil wealth → restrictive immigration" finding in a published claim.
- Lesson for us: always run **influence diagnostics** (leverage/Cook's D) and test robustness (e.g., robust regression).

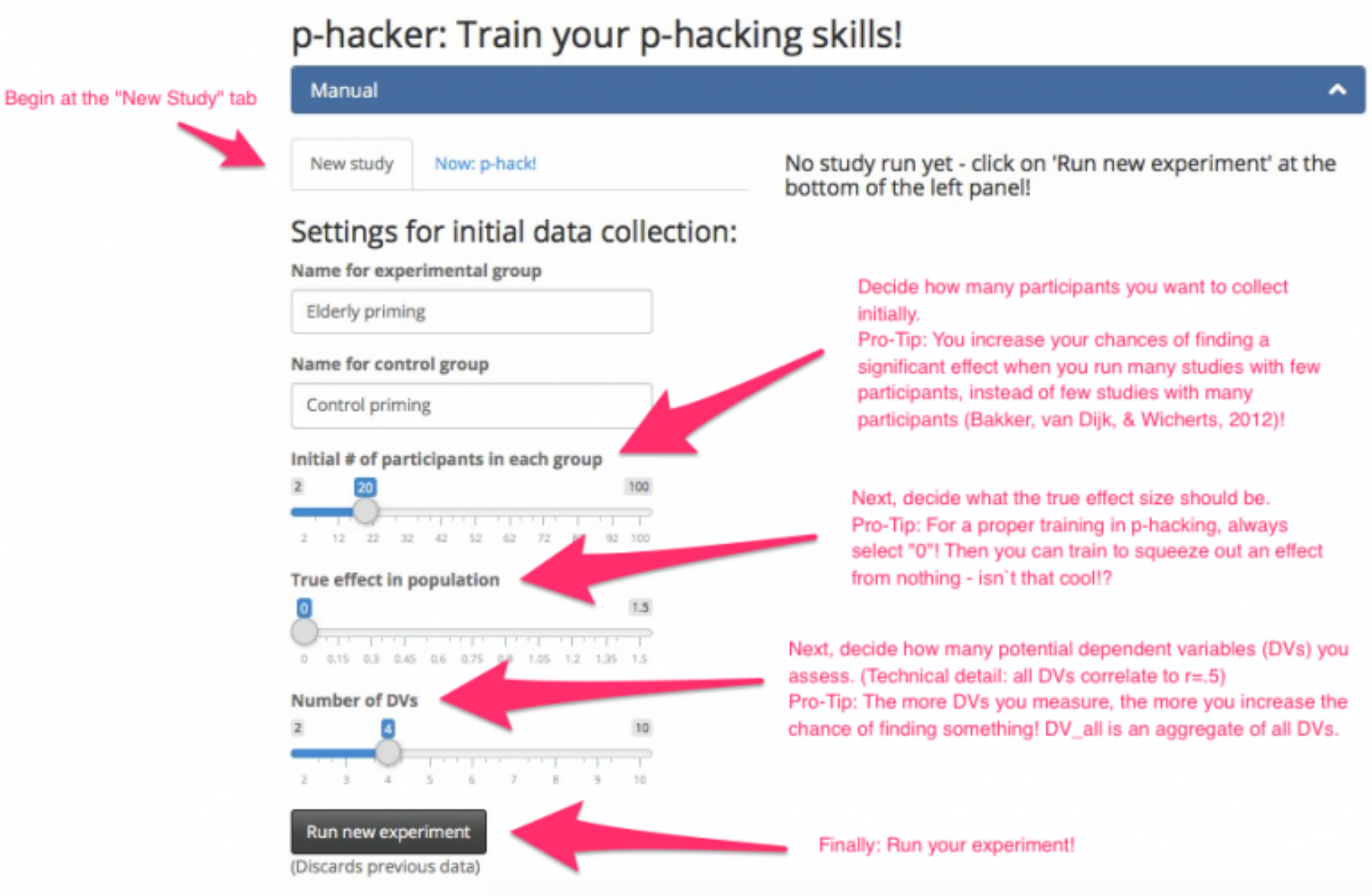
Choi SW. Outlier analysis: Natural resources and immigration policy. *PLoS One.* 2022 Jan 13;17(1):e0261533.

Activity

Go to
http://shinyapps.org/apps/p-hacker/

Schönbrodt, F. D. (2016). p-hacker: Train your p-hacking skills!

Set up your study



Inspect results of your study

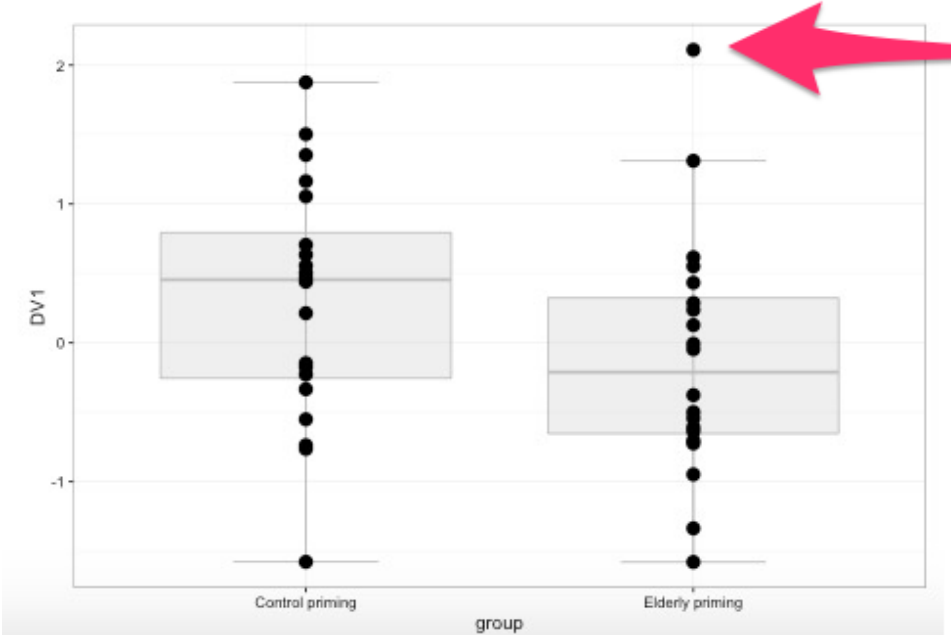
Tests for each DV

Name	N	Statistic	p-Value	Sign.	Actions
DV1	40	F(1, 38) = 2.26	p = .141		
DV2	40	F(1, 38) = 0.38	p = .543	ns	Save
DV3	40	F(1, 38) = 0.03	p = .859	ns	Save
DV4	40	F(1, 38) = 0.73	p = .400	ns	Save
DV_all	40	F(1, 38) = 0.1	p = .750	ns	Save

Not too bad! p = .14 in your first DV is a clear trend towards significance. (Discard the other DVs, focus on DV1)

Choose DV to plot

DV1



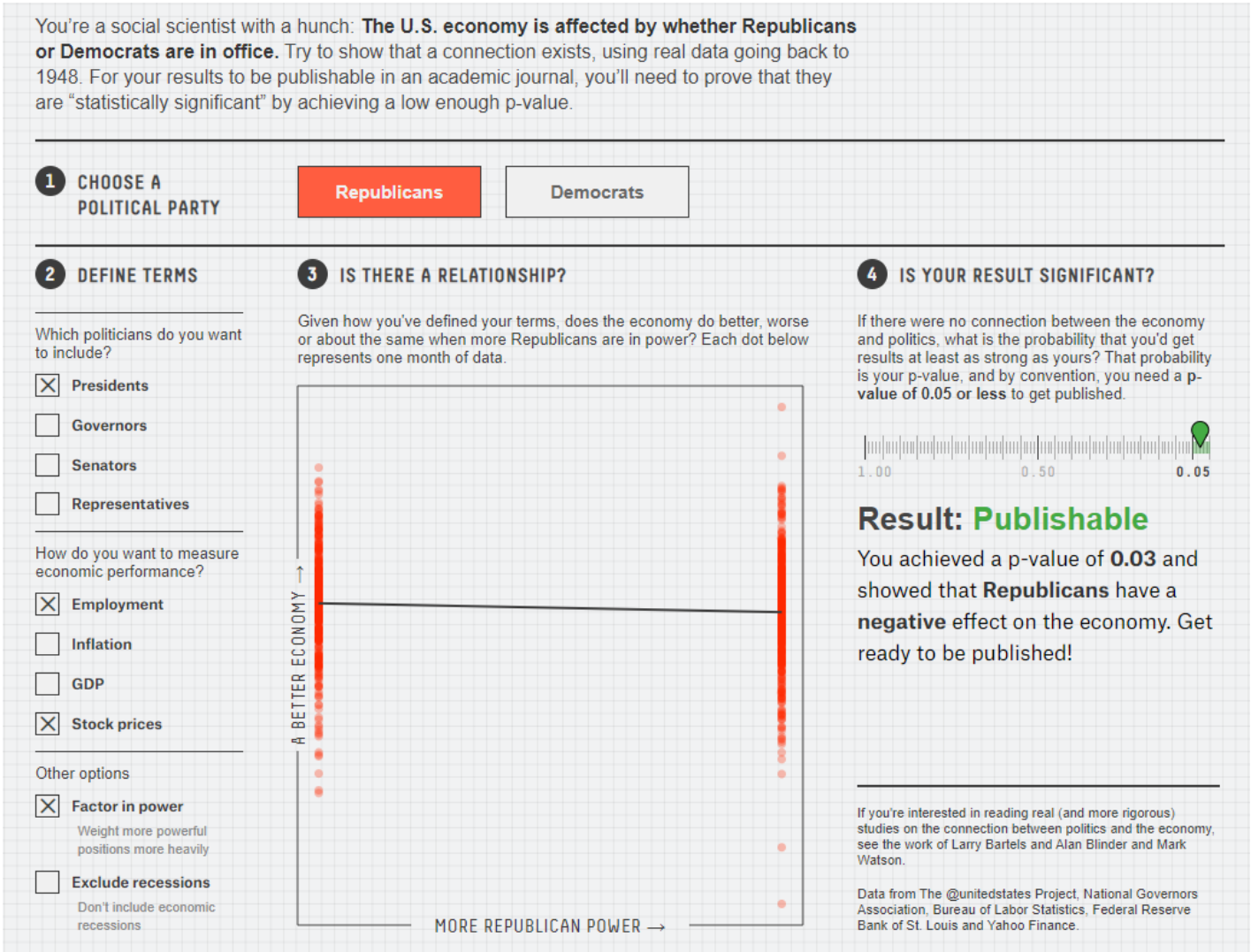
Here's a clear outlier (you can justify its exclusion with the box plot rule).

Try to click on a data point to exclude it!

Can’t get a significant result? “Now p-hack!”

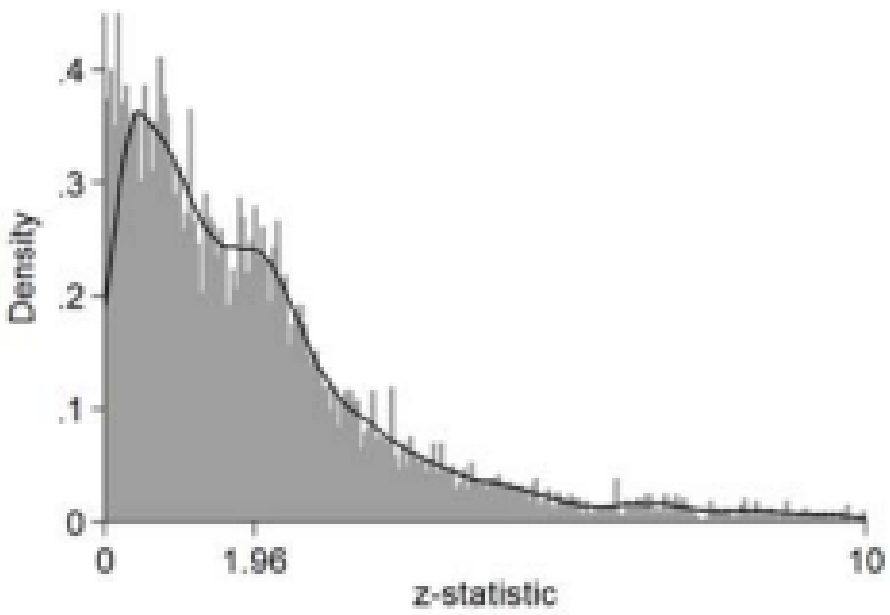
A similar tool

See also https://projects.fivethirtyeight.com/p-hacking/

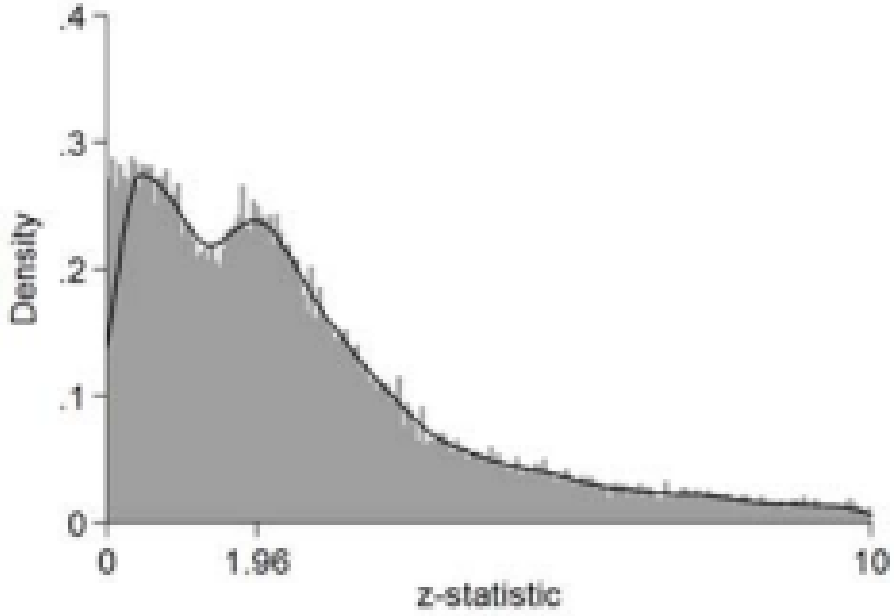


Brodeur et al. (2016)

Evidence of P-Hacking:



(a) Lab. experiments or RCT data.



(b) Other data.

Wicherts et al. (2016)

Identify 34 key researcher degrees of freedom (see article for full list):

Table 1
Checklist for different types of degrees of freedom in the planning, executing, analyzing, and reporting of psychological studies

Code	Related	Type of Degrees of Freedom
		Hypothesizing
T1	R6	Conducting explorative research without any hypothesis
T2		Studying a vague hypothesis that fails to specify the direction of the effect
		Design
D1	A8	Creating multiple manipulated independent variables and conditions
D2	A10	Measuring additional variables that can later be selected as covariates, independent variables, mediators, or moderators
D3	A5	Measuring the same dependent variable in several alternative ways
D4	A7	Measuring additional constructs that could potentially act as primary outcomes
D5	A12	Measuring additional variables that enable later exclusion of participants from the analyses (e.g., awareness or manipulation checks)
D6		Failing to conduct a well-founded power analysis
D7	C4	Failing to specify the sampling plan and allowing for running (multiple) small studies

...

Misconduct & Fraud: Rare(?) but serious

- **Includes**: Falsifying some or all data and/or results, as well as plagiarism and other forms of misconduct
- **Result:** False or biased evidence base
- **Note**: Fabrication of data (e.g., LaCour & Green 2014) less common than other “questionable research practices"

LaCour & Green 2014

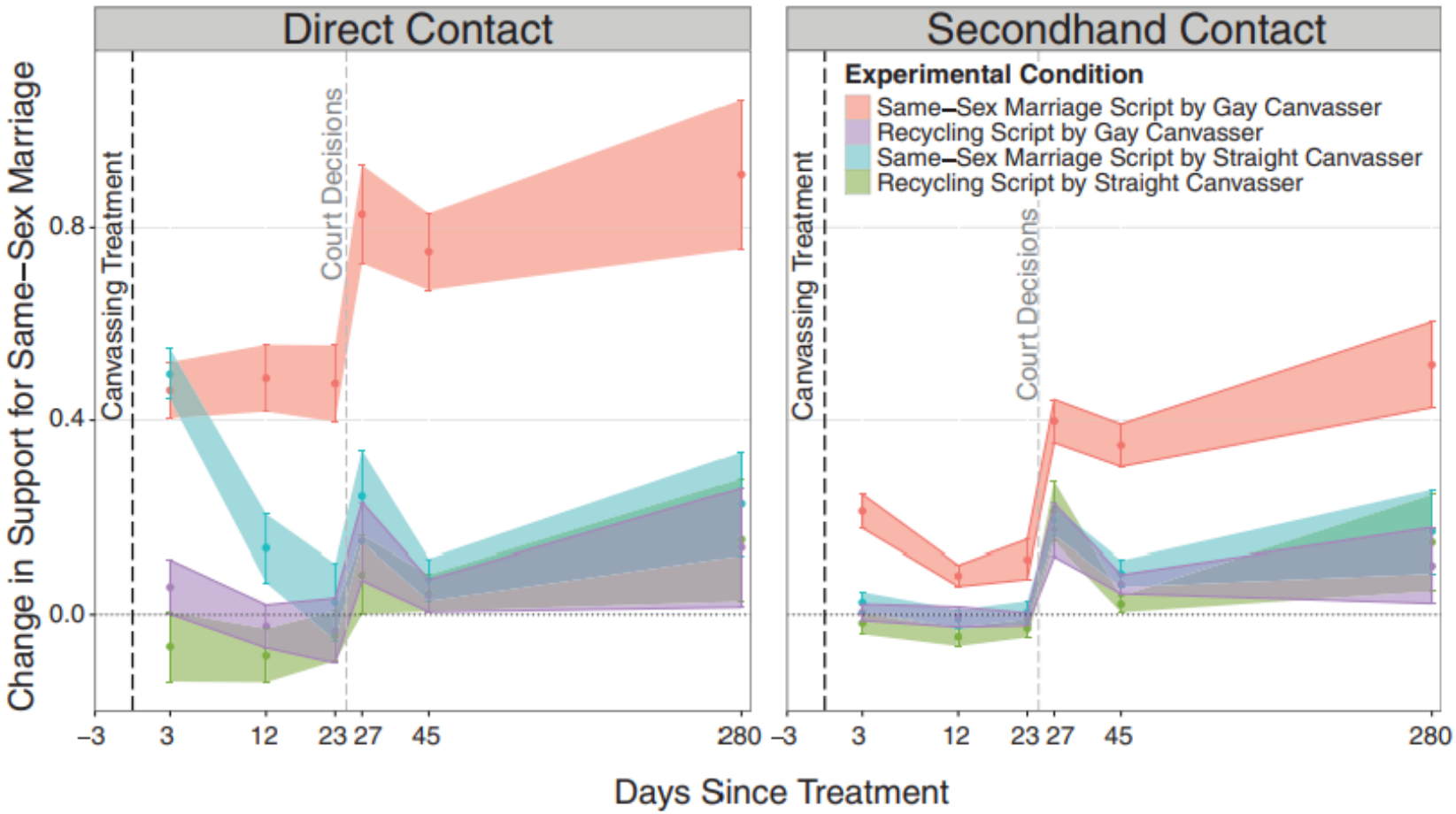


Fig. 1. Direct and secondhand effects on support for same-sex marriage, by assigned message and messenger, and time since treatment. The first vertical dashed line represents the canvassing intervention, which was administered between Internet survey waves 1 and 2. The second vertical dashed line represents the U.S. Supreme Court decisions striking down California's ban on same-sex marriage. The *y* axis is opinion change between the baseline survey and subsequent survey waves, with higher scores indicating more support for same-sex marriage. Points represent mean values, and bars display

Fraud in Dishonesty Studies (Shu, Mazar, Gino, Ariely, & Bazerman (2012))

SIGN AT THE BOTTOM

Shu et al. 10.1073/pnas.1209746109

Form **3305** (Rev. June 2010)
Center for Decision Research

Research Study Tax Return

For the period June 1, 2010, through August 30, 2010

Keep a copy of this return for your records.

OMB No. 1515-0111

Write Clearly | Name | PID | For Administrative Use Only

Address (Number, street, and room or suite number)

City, State, and ZIP code

T
FF
FP
I
TL

Part 1 Please fill out the questions below to compute your taxed payment.

1. Please enter the payment you received on the problem solving task ($1 per correct matrix you solved in the other room) ▶ | 1 |
2. Tax on payment: Please enter the equivalent of a 20% tax on your payment (i.e., 20 cents for every dollar earned) ▶ | 2 |
3. Please subtract the value specified in box 2 from value specified in box 1 ▶ | 3 |

Part 2 Participants will be compensated for extra expenses they have incurred in order to participate in this study. In Part 2, you are asked to estimate the costs incurred in order to participate. These costs will be deducted from your tax return.

1. Please estimate the time it took you to come to the lab. You will be compensated $8.10 per minute, up to a 2 hour maximum ▶ | 4 |
2. Please estimate the cost of your commute, if any, to come to the lab. You will be compensated up to a maximum of $12 ▶ | 5 |
3. Please add the value specified in box 4 and the value specified in box 5 ▶ | 6 |

Part 3 Please compute your final payment.

1. Please add the value specified in box 3 and the value specified in box 6. This is the amount of your final payment for today's session ▶ | 7 |

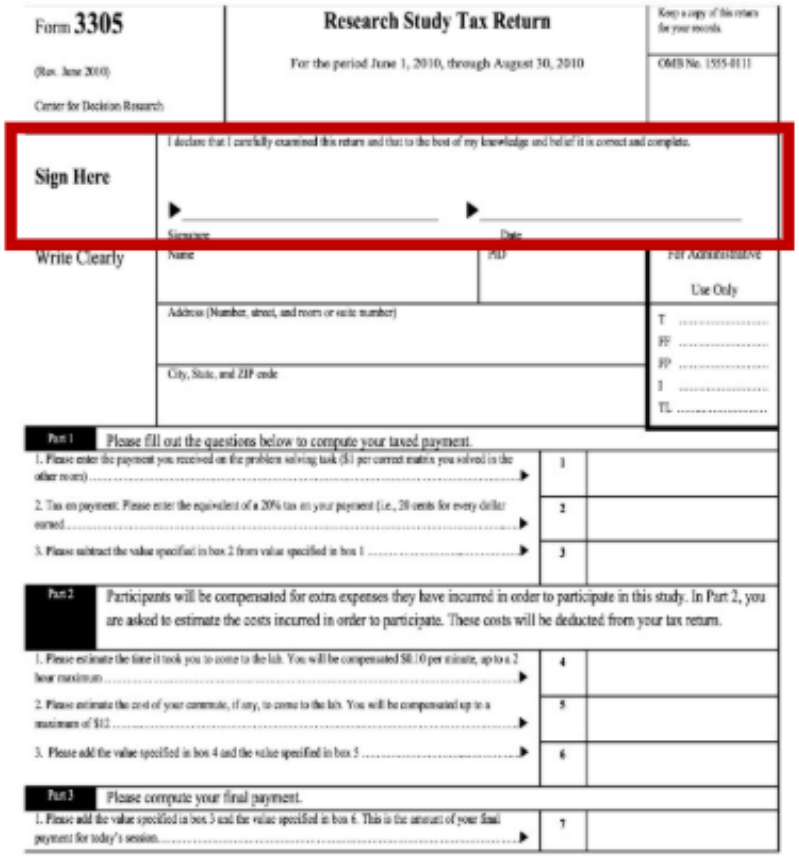
Sign Here

I declare that I carefully examined this return and that to the best of my knowledge and belief it is correct and complete.

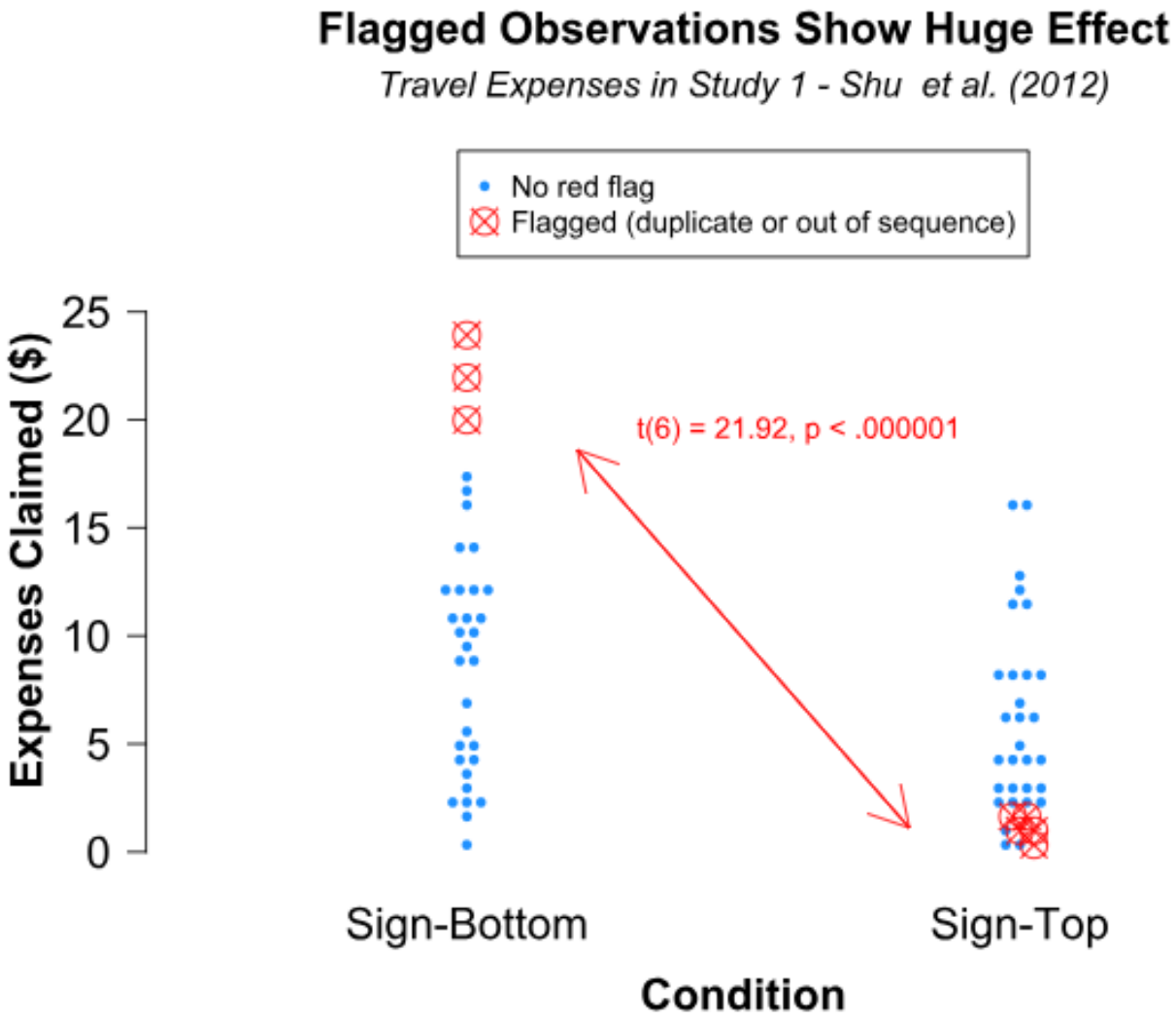
▶ Signature ▶ Date

Fig. S1. Tax form used in experiment 1, signature-at-the-bottom condition.

SIGN AT THE TOP



Suspicious observations drive effect



https://datacolada.org/109

Excel ruins research

Ziemann *et al. Genome Biology* (2016) 17:177
DOI 10.1186/s13059-016-1044-7

Genome Biology

COMMENT Open Access

Gene name errors are widespread in the scientific literature

Mark Ziemann[1], Yotam Eren[1,2] and Assam El-Osta[1,3*]

Abstract

The spreadsheet software Microsoft Excel, when used with default settings, is known to convert gene names to dates and floating-point numbers. A programmatic scan of leading genomics journals reveals that approximately one-fifth of papers with supplementary Excel gene lists contain erroneous gene name conversions.

Keywords: Microsoft Excel, Gene symbol, Supplementary data

Abbreviations: GEO, Gene Expression Omnibus; JIF, journal impact factor

The problem of Excel software (Microsoft Corp., Redmond, WA, USA) inadvertently converting gene symbols to dates and floating-point numbers was originally described in 2004 [1]. For example, gene symbols such as frequently reused. Our aim here is to raise awareness of the problem.

We downloaded and screened supplementary files from 18 journals published between 2005 and 2015 using a suite of shell scripts. Excel files (.xls and.xlsx suffixes) were converted to tabular separated files (tsv) with ssconvert (v1.12.9). Each sheet within the Excel file was converted to a separate tsv file. Each column of data in the tsv file was screened for the presence of gene symbols. If the first 20 rows of a column contained five or more gene symbols, then it was suspected to be a list of gene symbols, and then a regular expression (regex) search of the entire column was applied to identify gene symbol errors. Official gene symbols from Ensembl version 82, accessed November 2015, were obtained for *Arabidopsis thaliana*, *Caenorhabditis elegans*, *Drosophila melanogaster*, *Danio rerio*, *Escherichia coli*, *Gallus gallus*, *Homo sapiens*, *Mus musculus*, *Oryza sativa* and *Saccharomyces cerevisiae* [2]. The regex search used was

Is extrasensory perception (ESP) real?

Journal of Personality and Social Psychology
2011, Vol. 100, No. 3, 407–425

0022-3514/11/$12.00 DOI: 10.1037/a0021524

Feeling the Future: Experimental Evidence for Anomalous Retroactive Influences on Cognition and Affect

Daryl J. Bem
Cornell University

The term *psi* denotes anomalous processes of information or energy transfer that are currently unexplained in terms of known physical or biological mechanisms. Two variants of psi are *precognition* (conscious cognitive awareness) and *premonition* (affective apprehension) of a future event that could not otherwise be anticipated through any known inferential process. Precognition and premonition are themselves special cases of a more general phenomenon: the anomalous retroactive influence of some future event on an individual's current responses, whether those responses are conscious or nonconscious, cognitive or affective. This article reports 9 experiments, involving more than 1,000 participants, that test for retroactive influence by "time-reversing" well-established psychological effects so that the individual's responses are obtained before the putatively causal stimulus events occur. Data are presented for 4 time-reversed effects: precognitive approach to erotic stimuli and precognitive avoidance of negative stimuli; retroactive priming; retroactive habituation; and retroactive facilitation of recall. The mean effect size (*d*) in psi performance across all 9 experiments was 0.22, and all but one of the experiments yielded statistically significant results. The individual-difference variable of stimulus seeking, a component of extraversion, was significantly correlated with psi performance in 5 of the experiments, with participants who scored above the midpoint on a scale of stimulus seeking achieving a mean effect size of 0.43. Skepticism about psi, issues of replication, and theories of psi are also discussed.

Fraud?

"I would start one [experiment], and if it just wasn't going anywhere, I would abandon it and restart it with changes. . . I didn't keep very close track of which ones I had discarded and which ones I hadn't. . . .I was probably very sloppy at the beginning. I think probably some of the criticism could well be valid. I was never dishonest, but on the other hand, the critics were correct."

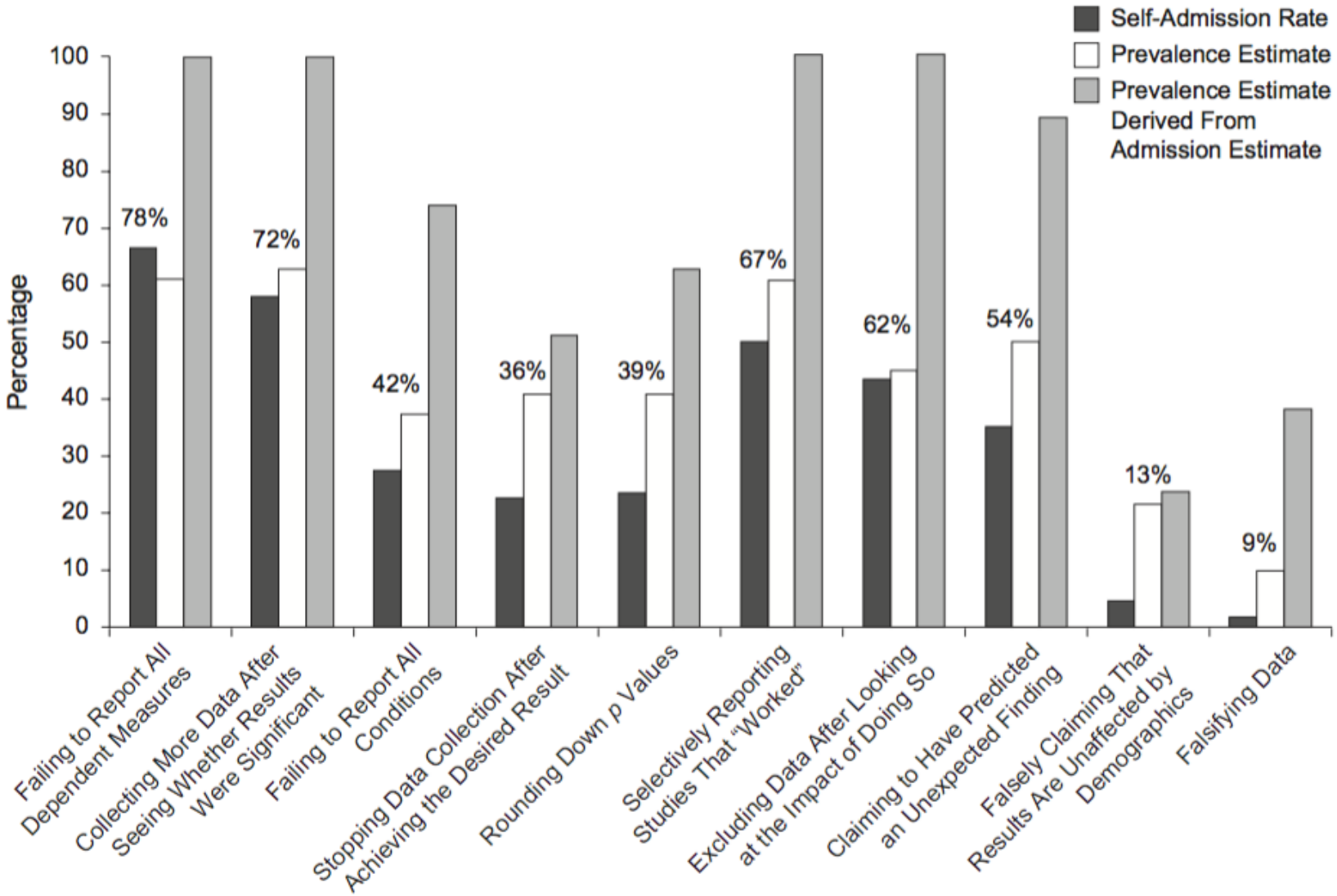
–Daryl Bem

"I'm all for rigor, but I prefer other people do it. I see its importance—it's fun for some people—but I don't have the patience for it."

–Daryl Bem, quoted in Slate Magazine

John et al. (2012)

Survey of 2000 psychologists on questionable practices:



What about solutions?

- **Transparency:** Pre-registration, open data, open code
- **Reproducibility:** Making data and code available
- **Replication:** Direct replications, pre-registered replications
- **Incentives:** Journals, funders, universities, etc.
- **Training:** Teaching good research practices
- **Tools:** Software to detect p-hacking, etc.
- **Punishment:** Retraction, job loss, etc.
- **Whistleblowing:** Encouraging reporting of misconduct