

# Experimental studies of contagion

Matthew J. Salganik

Social Network (Soc 204)  
Spring 2017  
Princeton University

April 24, 2017



Logistics:

- ▶ thanks for the feedback

## Logistics:

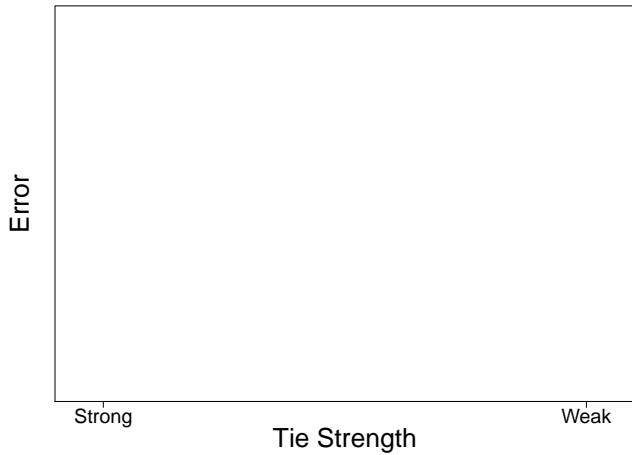
- ▶ thanks for the feedback
- ▶ homework due Wednesday (why excel and google form?)

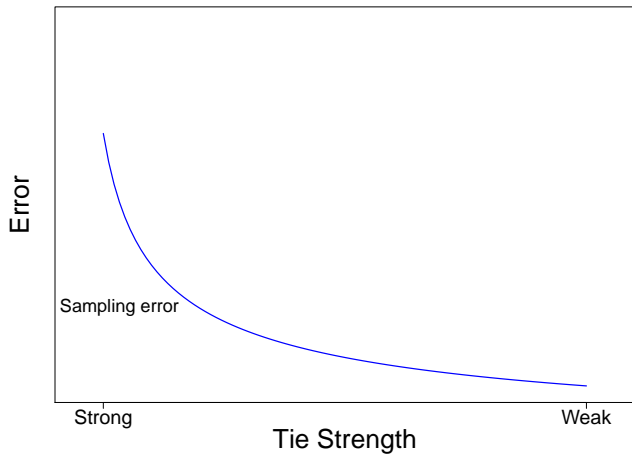
## Logistics:

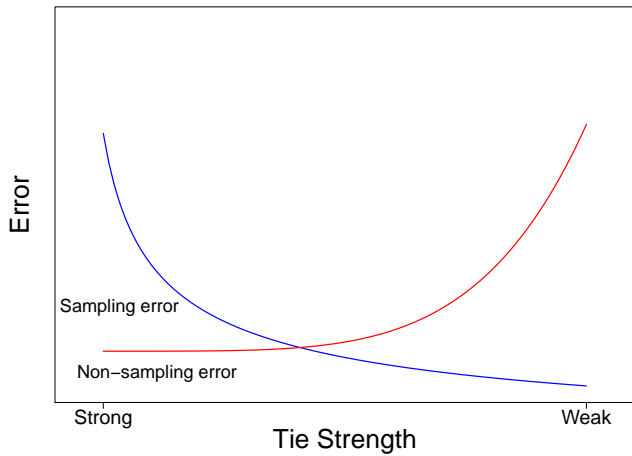
- ▶ thanks for the feedback
- ▶ homework due Wednesday (why excel and google form?)
- ▶ Next homework is to write an op-ed so you can read some op-eds for practice

## Logistics:

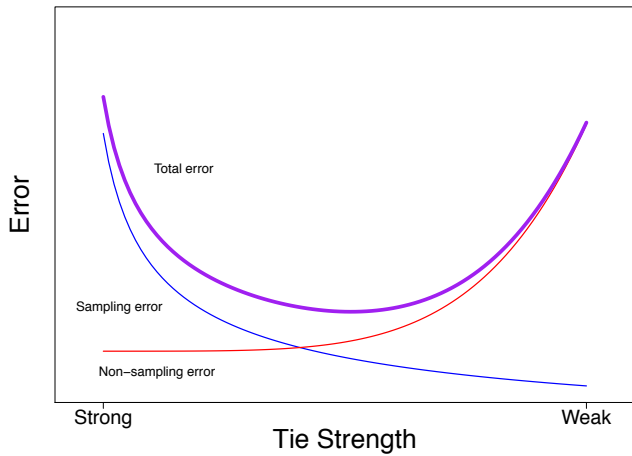
- ▶ thanks for the feedback
- ▶ homework due Wednesday (why excel and google form?)
- ▶ Next homework is to write an op-ed so you can read some op-eds for practice
- ▶ results from last homework











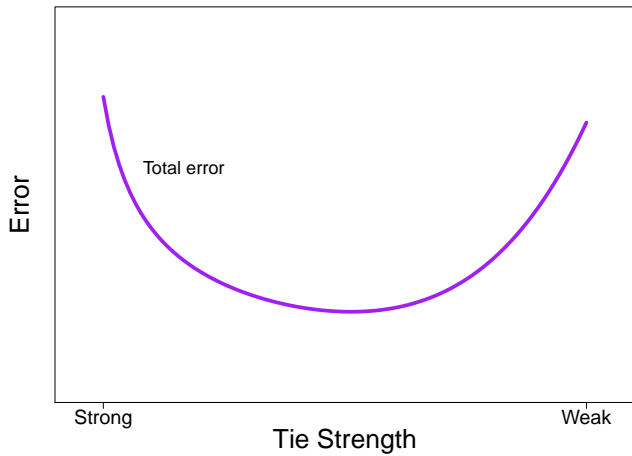
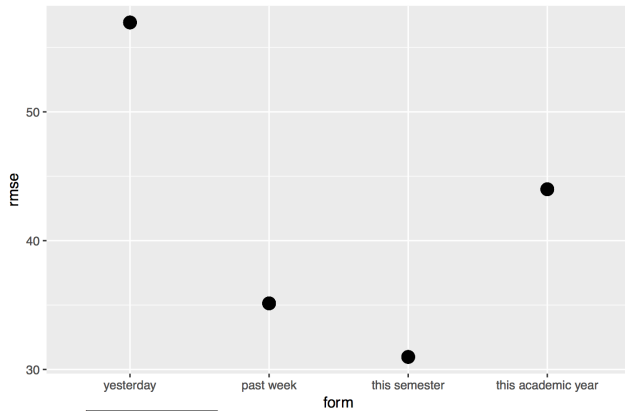
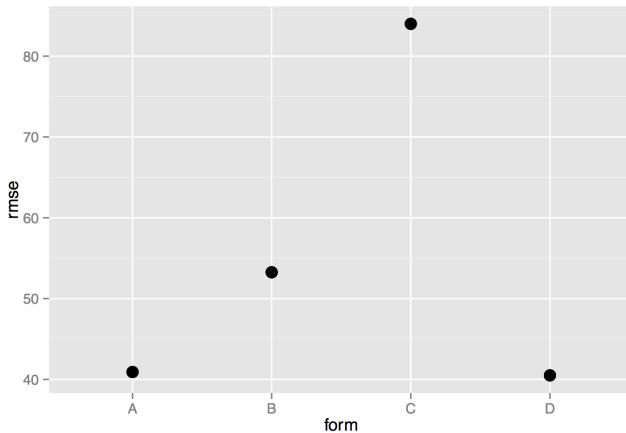


Figure 8: Root Mean Squared Error, by Form



Root mean squared error:



More research is needed . . . .

Vote:

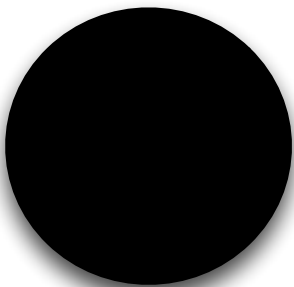
1. Nickerson (2008). Is voting contagious? Evidence from two field experiments. *American Political Science Review*.
2. LaCour and Green (2014). When contact changes minds: An experiment on transmission of support for gay equality. *Science*.
3. Kramer et al (2014) Experimental evidence of massive-scale emotional contagion through social networks. *PNAS*.

# Background

It is hard to make causal claims without an experiment. Here we are going to see three *field* experiments.

Is voting contagious?







$$P_1 \Leftrightarrow P_2$$

$$\begin{array}{c} \textit{Treatment} \\ \downarrow^T \\ P_1 \xrightarrow{S} P_2 \end{array}$$

Contagion effect:  $\alpha = \frac{S}{T}$

Note that there is nothing specific in this design to voting. This could be any intervention.

**TABLE 1. Possible Outcomes under placebo protocol**

		Probability of Event Occurring	Voting Rate of Answerer	Voting Rate of Person Who Did Not Answer Door
GOTV	Door Answered	$\pi$	$\mu_1 + T$	$\mu_2 + S$
	No Answer	$1 - \pi$	N.A. <sup>a</sup>	$\mu_3$
Recycling	Door Answered	$\pi$	$\mu_1$	$\mu_2$
	No Answer	$1 - \pi$	N.A.	$\mu_3$

<sup>a</sup> N.A. = Not applicable.

What is the role of the recycling intervention?

**TABLE 3. Treatment Effect among Contacted Households**

	Denver		Minneapolis		Pooled	
	Direct	Secondary	Direct	Secondary	Direct	Secondary
Percent Voting in GOTV Group	47.7% (3.0)	42.4% (2.9)	27.1% (3.1)	23.6% (3.0)		
Percent Voting in Recycling Group	39.1% (2.9)	36.9% (2.9)	16.2% (2.7)	17.3% (2.7)		
Estimated Treatment Effect	<b>8.6%</b> <b>(4.2)</b>	<b>5.5%</b> <b>(4.1)</b>	<b>10.9%</b> <b>(4.1)</b>	<b>6.4%</b> <b>(4.1)</b>	<b>9.8%</b> <b>(2.9)</b>	<b>6.0%</b> <b>(2.9)</b>
P-Value	0.02	0.09	<0.01	0.06	<0.01	0.02

*Note.* Numbers in parentheses represent standard errors. P-values test the one-tailed hypothesis. Pooled estimates are weighted averages of results for both cities.

Note on application:

Note on application:

- ▶ Need to count the spillover (if you generate 100 direct votes, you also generate about 60 indirect votes)

## Note on application:

- ▶ Need to count the spillover (if you generate 100 direct votes, you also generate about 60 indirect votes)
- ▶ no idea about mechanism so hard to design more contagious treatments



## Note on application:

- ▶ Need to count the spillover (if you generate 100 direct votes, you also generate about 60 indirect votes)
- ▶ no idea about mechanism so hard to design more contagious treatments
- ▶ evidence is from low-salience primary election, so results might be different in presidential election

# When contact changes minds: An experiment on transmission of support for gay equality

Motivated by the contact hypothesis (think back to Cowan's paper on abolition)

Motivated by the contact hypothesis (think back to Cowan's paper on abolition)

Design generalizes Nickerson

- ▶ 4 treatments (same-sex marriage and recycling with gay and straight canvassers)

Motivated by the contact hypothesis (think back to Cowan's paper on abolition)

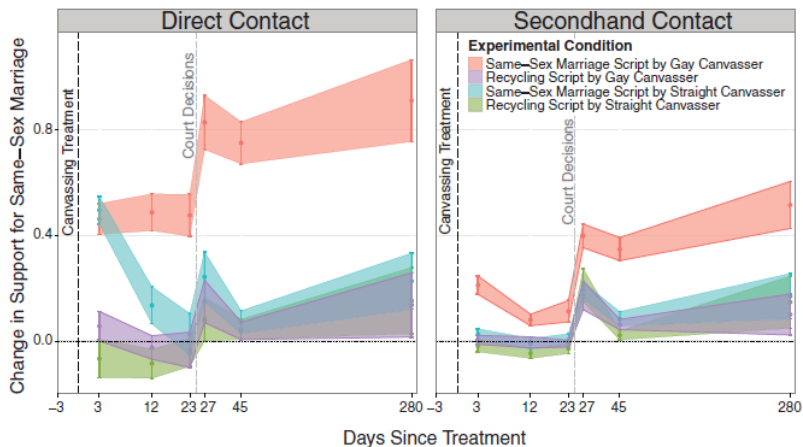
Design generalizes Nickerson

- ▶ 4 treatments (same-sex marriage and recycling with gay and straight canvassers)
- ▶ change measured in an apparently unrelated survey

Motivated by the contact hypothesis (think back to Cowan's paper on abolition)

Design generalizes Nickerson

- ▶ 4 treatments (same-sex marriage and recycling with gay and straight canvassers)
- ▶ change measured in an apparently unrelated survey
- ▶ change measured over time



**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 95% bootstrap confidence intervals.

## Irregularities in LaCour (2014)

David Broockman, Assistant Professor, Stanford GSB (as of July 1),  
[dbroockman@stanford.edu](mailto:dbrookman@stanford.edu)

Joshua Kalla, Graduate Student, UC Berkeley, [kalla@berkeley.edu](mailto:kalla@berkeley.edu)

Peter Aronow, Assistant Professor, Yale University, [peter.aronow@yale.edu](mailto:peter.aronow@yale.edu)

May 19, 2015



## Irregularities in LaCour (2014)

*David Broockman, Assistant Professor, Stanford GSB (as of July 1),  
[dbroockman@stanford.edu](mailto:dbrookman@stanford.edu)*

*Joshua Kalla, Graduate Student, UC Berkeley, [kalla@berkeley.edu](mailto:kalla@berkeley.edu)*

*Peter Aronow, Assistant Professor, Yale University, [peter.aronow@yale.edu](mailto:peter.aronow@yale.edu)*

*May 19, 2015*

## Response to Irregularities in LaCour and Green (2014)

Michael J. LaCour

University of California, Los Angeles

May 29, 2015

## Irregularities in LaCour (2014)

David Broockman, Assistant Professor, Stanford GSB (as of July 1),  
[dbroockman@stanford.edu](mailto:dbroockman@stanford.edu)

Joshua Kalla, Graduate Student, UC Berkeley, [kalla@berkeley.edu](mailto:kalla@berkeley.edu)

Peter Aronow, Assistant Professor, Yale University, [peter.aronow@yale.edu](mailto:peter.aronow@yale.edu)

May 19, 2015

## Response to Irregularities in LaCour and Green (2014)

Michael J. LaCour  
University of California, Los Angeles

May 29, 2015

[http://stanford.edu/~dbroock/broockman\\_kalla\\_aronow\\_lg\\_irregularities.pdf](http://stanford.edu/~dbroock/broockman_kalla_aronow_lg_irregularities.pdf)

[http://retractionwatch.com/wp-content/uploads/2015/05/LaCour\\_Response\\_05-29-2015.pdf](http://retractionwatch.com/wp-content/uploads/2015/05/LaCour_Response_05-29-2015.pdf)

# Editorial retraction

**Marcia McNutt**

Editor-in-Chief

*Science*, with the concurrence of author Donald P. Green, is retracting the 12 December 2014 Report “When contact changes minds: An experiment on transmission of support for gay equality” by LaCour and Green (1).

The reasons for retracting the paper are as follows: (i) Survey incentives were misrepresented. To encourage participation in the survey, respondents were claimed to have been given cash payments to enroll, to refer family and friends, and to complete multiple surveys. In correspondence received from Michael J. LaCour’s attorney, he confirmed that no such payments were made. (ii) The statement on sponsorship was false. In the Report, LaCour acknowledged funding from the Williams Institute, the Ford Foundation, and the Evelyn and Walter Haas Jr. Fund. Per correspondence from LaCour’s attorney, this statement was not true.

In addition to these known problems, independent researchers have noted certain statistical irregularities in the responses (2). LaCour has not produced the original survey data from which someone else could independently confirm the validity of the reported findings.

Michael J. LaCour does not agree to this Retraction.

## REFERENCES

1. M. J. LaCour, D. P. Green, *Science* **346**, 1366 (2014).
2. D. Brookman, J. Kalla, P. Aronow, “Irregularities in LaCour (2014)” (2015); [http://stanford.edu/~dbroock/broockman\\_kalla\\_aronow\\_lg\\_irregularities.pdf](http://stanford.edu/~dbroock/broockman_kalla_aronow_lg_irregularities.pdf)

Published online 28 May 2015  
10.1126/science.aac6638

<http://dx.doi.org/10.1126/science.aac6638>

Good overviews of what happened:

- ▶ Good overview by Jesse Singal in NY Magazine:  
<http://nymag.com/scienceofus/2015/05/how-a-grad-student-uncovered-a-huge-fraud.html>
- ▶ This American Life (with links to audio):  
<https://www.thisamericanlife.org/blog/2015/05/canvassers-study-in-episode-555-has-been-retracted>
- ▶ Interview with LaCour:  
[https://www.nytimes.com/2015/05/30/science/michael-lacour-gay-marriage-science-study-retraction.html?\\_r=0](https://www.nytimes.com/2015/05/30/science/michael-lacour-gay-marriage-science-study-retraction.html?_r=0)

What can we learn from this?

# **Durably reducing transphobia: A field experiment on door-to-door canvassing**

**David Broockman<sup>1\*</sup> and Joshua Kalla<sup>2</sup>**

<http://science.sciencemag.org/content/352/6282/220>

# Testing Theories of Attitude Change with Online Panel Field Experiments\*

David E. Broockman<sup>†</sup>    Joshua L. Kalla<sup>‡</sup>    Jasjeet S. Sekhon<sup>§</sup>

April 7, 2016

[https://www.gsb.stanford.edu/faculty-research/  
working-papers/  
testing-theories-attitude-change-online-panel-field-experi](https://www.gsb.stanford.edu/faculty-research/working-papers/testing-theories-attitude-change-online-panel-field-experiments)

# Experimental evidence of massive-scale emotional contagion through social networks



What is the effect of the Facebook Newsfeed on you?

- ▶ seeing lots of happy things can make you happy
- ▶ seeing lots of happy things can make you sad



This design works by changing the edge, not by intervene and spillover

## Experimental design:

- ▶ 700,000 people

## Experimental design:

- ▶ 700,000 people
- ▶ four arms: positive posts reduced vs control, negative posts reduced vs control

## Experimental design:

- ▶ 700,000 people
- ▶ four arms: positive posts reduced vs control, negative posts reduced vs control
- ▶ blocking not boosting

## Experimental design:

- ▶ 700,000 people
- ▶ four arms: positive posts reduced vs control, negative posts reduced vs control
- ▶ blocking not boosting
- ▶ post scored as positive or negative if they had one positive or negative word as defined by LIWC (e.g., good, sad, etc)

## Experimental design:

- ▶ 700,000 people
- ▶ four arms: positive posts reduced vs control, negative posts reduced vs control
- ▶ blocking not boosting
- ▶ post scored as positive or negative if they had one positive or negative word as defined by LIWC (e.g., good, sad, etc)
- ▶ outcome: proportion of words posted that were positive or negative

## Experimental design:

- ▶ 700,000 people
- ▶ four arms: positive posts reduced vs control, negative posts reduced vs control
- ▶ blocking not boosting
- ▶ post scored as positive or negative if they had one positive or negative word as defined by LIWC (e.g., good, sad, etc)
- ▶ outcome: proportion of words posted that were positive or negative

This exact design requires cooperation from Facebook



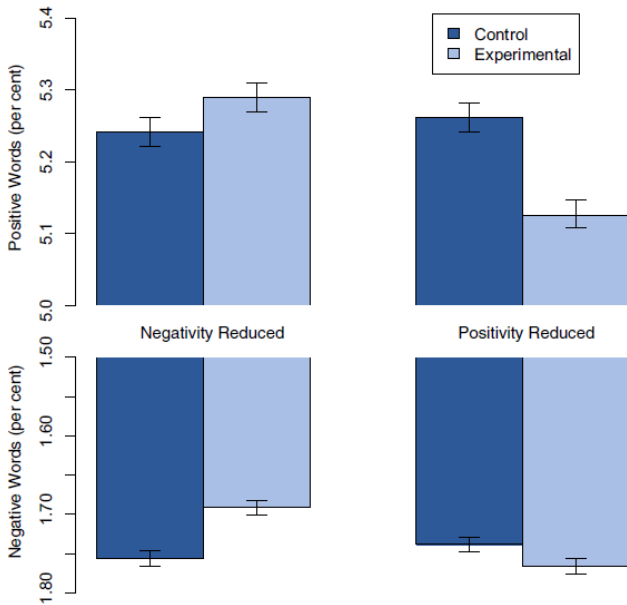


Fig. 1. Mean number of positive (*Upper*) and negative (*Lower*) emotion words (percent) generated people, by condition. Bars represent standard errors.

People who had positivity reduced and people who had negativity reduced, posted fewer words.

Scientific concerns:

- ▶ Are Facebook posts a good measure of how we feel?

Scientific concerns:

- ▶ Are Facebook posts a good measure of how we feel?
- ▶ Is the LIWC a good way to quantify the emotional content of posts?

The Opinion Pages | OP-ED CONTRIBUTOR

# Should Facebook Manipulate Users?

Jaron Lanier on Lack of Transparency in Facebook Study

---

By JARON LANIER JUNE 30, 2014

[https://www.nytimes.com/2014/07/01/opinion/  
jaron-lanier-on-lack-of-transparency-in-facebook-study.  
html](https://www.nytimes.com/2014/07/01/opinion/jaron-lanier-on-lack-of-transparency-in-facebook-study.html)

Even more writing:

[http://laboratorium.net/archive/2014/06/30/the\\_  
facebook\\_emotional\\_manipulation\\_study\\_source](http://laboratorium.net/archive/2014/06/30/the_facebook_emotional_manipulation_study_source)

## Summary:

- ▶ experimental approaches can measure the effect we have on each other

## Summary:

- ▶ experimental approaches can measure the effect we have on each other
- ▶ intervene and spillover or edge-control

## Summary:

- ▶ experimental approaches can measure the effect we have on each other
- ▶ intervene and spillover or edge-control
- ▶ some of these experiments raise ethical questions (e.g., Kramer et al.)



## Summary:

- ▶ experimental approaches can measure the effect we have on each other
- ▶ intervene and spillover or edge-control
- ▶ some of these experiments raise ethical questions (e.g., Kramer et al.)
- ▶ scientists are people

Going viral

Have you ever said that something was going viral? Can you think of examples?

## Viral video

From Wikipedia, the free encyclopedia

A **viral video** is a **video** that becomes popular through a **viral process** of Internet sharing, typically through video sharing websites, **social media** and email.<sup>[1][2]</sup> Viral videos often contain humorous content and include televised comedy sketches, such as *The Lonely Island's* "Lazy Sunday" and "Dick in a Box", Numa Numa<sup>[3][4]</sup> videos, *The Evolution of Dance*,<sup>[5]</sup> *Chocolate Rain*<sup>[6]</sup> on YouTube; and web-only productions such as *I Got a Crush... on Obama*.<sup>[7]</sup> Some eyewitness events have also been caught on video and have "gone viral"<sup>[8]</sup> such as the *Battle at Kruger*.<sup>[9]</sup> More recently, the *Kony 2012* video by *Invisible Children, Inc.* became the most viral video in history<sup>[10]</sup> with over 34,000,000 views on the first day of its upload on 5 March 2012<sup>[11]</sup> and now has over 100,000,000 views as of late 2013. Another recent example is *Gangnam Style* by *PSY*. As of June 2014, the music video has been viewed over 2 billion times on YouTube, which in turn makes it the most viewed video in the history of the site.

What do viral cascades look like?  
Can they be predicted?

<http://bit.ly/socnet204>

Next class:

- ▶ Going viral