Class 16: Experimental studies of contagion

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Sociology 204: Social Networks
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3/3 Emotional contagion


SAVEMONEY

How does the content you see on social media impact your emotions?

https://unsplash.com/search/photos/party?photo=uD0W-swVGgE

Simplify: How does seeing happy content from your friend impact you?

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- Seeing your friends doing happy things will make you happy (contagion)

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- Seeing your friends doing happy things will make you happy (contagion)
- Seeing your friends doing happy things will make you sad (relative deprivation)

Non-experimental approach:

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- Classify all posts as happy or sad based on the words that they use

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- Classify all posts as happy or sad based on the words that they use
- Count the proportion of your posts that are positive after your friends make positive posts

Non-Experimental approach falls victim to the Thanksgiving trap!

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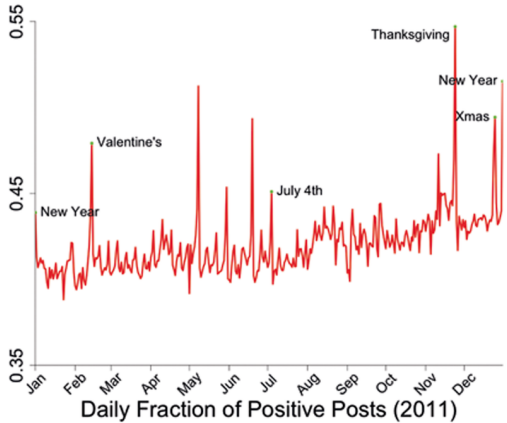

Coviello, et al 2014, Fig 1A

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You could work at Facebook.

https://www.wired.com/2015/03/facebook-moves-new-garden-roofed-fantasyland/

Experimental approach

Experimental evidence of massive-scale emotional contagion through social networks

Adam D. I. Kramer[a,1], Jamie E. Guillory[b,2], and Jeffrey T. Hancock[b,c]

[a]Core Data Science Team, Facebook, Inc., Menlo Park, CA 94025; and Departments of [b]Communication and [c]Information Science, Cornell University, Ithaca, NY 14853

http://doi.org/10.1073/pnas.1320040111

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

Experimental design:

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- posts randomly blocked from NewsFeed depending on condition (blocking not boosting)
- outcome: percentage of words posted that were positive or negative

This exact design requires cooperation from Facebook. More generally, many studies of social media's impact require cooperation from social media companies.

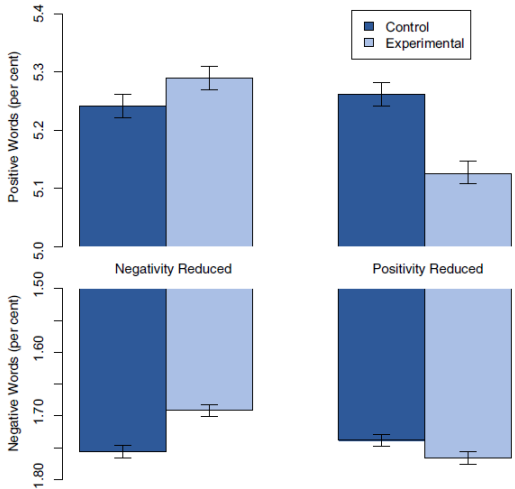
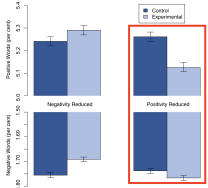
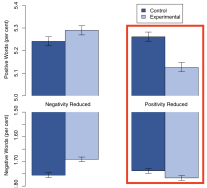


Fig. 1. Mean number of positive (*Upper*) and negative (*Lower*) emotion words (percent) generated people, by condition. Bars represent standard errors.



- % positive words in positivity reduced treatment: $\sim$ 5.13% (5.13 words per 100)
- % positive words in positivity reduced control: $\sim$5.27% (5.27 words per 100)
- Difference % positive words: $\sim$-0.14% (0.14 words per 100, 14 words per 10,000)



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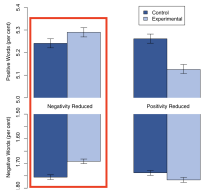
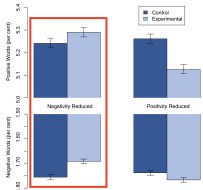
- % negative words in positivity reduced treatment: $\sim$1.76% (1.76 words per 100)
- % negative words in positivity reduced control: $\sim$1.74% (1.74 words per 100)
- Difference % negative words: $\sim$0.02% (0.02 words per 100, 2 words per 10,000)



- % positive words in negativity reduced treatment: $\sim$5.29% (5.29 words per 100)
- % of positive words in negativity reduced control: $\sim$5.23% (5.23 words per 100)
- Difference % positive words: $\sim$0.06% (0.06 words per 100, 6 words per 10,000)



- % positive words in negativity reduced treatment: ∼5.29% (5.29 words per 100)
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- Difference % positive words: ∼0.06% (0.06 words per 100, 6 words per 10,000)

- % negative words in negativity reduced treatment: ∼1.69% (1.69 words per 100)
- % negative words in negativity reduced control: ∼1.76% (1.76 words per 100)
- Difference % negative words: ∼-0.07% (0.07 words per 100, 7 words per 10,000)

How much should you trust these results? Internal and external validity

Internal validity:

- Was the randomization delivered correctly?
- Was the outcome measured correctly on the right people?

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Designing and Deploying Online Field Experiments

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https://arxiv.org/pdf/1409.3174v1.pdf

External validity

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

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- Is word counts a good way to quantify the emotional content of posts? ("I am so so happy" vs "I wish I was happy")

Probably a bad measure of a bad signal

Three other important things about this experiment

- unintended impact of treatment

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

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Your treatment can effect your outcome, but also many other outcomes

We also observed a withdrawal effect: People who were exposed to fewer emotional posts (of either valence) in their News Feed were less expressive overall on the following days, addressing the question about how emotional expression affects social engagement online. This observation, and the fact that

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Imagine that you work at Facebook and your metric was to increase engagement. Would you adjust the NewsFeed to show more emotional content, either accidentally or intentionally?

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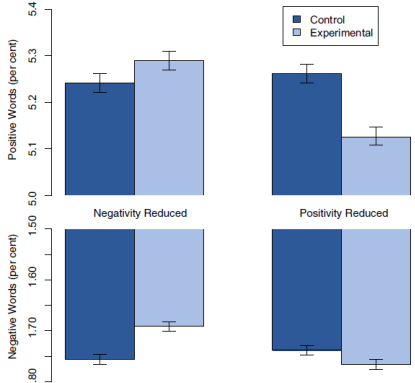
- unintended impact of treatment
- “significance”



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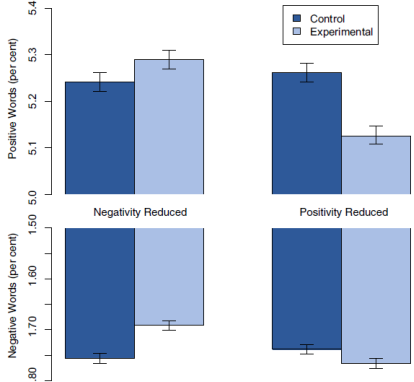
- Are differences that size possible due to chance? (statistical significance)



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- Are differences that size possible due to chance? (statistical significance)
- Are differences that big important? (practical importance)

Although these data provide, to our knowledge, some of the first experimental evidence to support the controversial claims that emotions can spread throughout a network, the effect sizes from the manipulations are small (as small as $d = 0.001$). These effects nonetheless matter given that the manipulation of the independent variable (presence of emotion in the News Feed) was minimal whereas the dependent variable (people's emotional expressions) is difficult to influence given the range of daily experiences that influence mood (10). More importantly, given the massive scale of social networks such as Facebook, even small effects can have large aggregated consequences (14, 15): For example, the well-documented connection between emotions and physical well-being suggests the importance of these findings for public health. Online messages influence our experience of emotions, which may affect a variety of offline behaviors. And after all, an effect size of $d = 0.001$ at Facebook's scale is not negligible: In early 2013, this would have corresponded to hundreds of thousands of emotion expressions in status updates per day.

Three other important things about this experiment

- unintended impact of treatment
- "significance"
- ethics of running this kind of experiment

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

Stop complaining about the Facebook study. It's a golden age for research

Duncan J Watts

We should *insist* that Facebook do experiments on the decisions it's already making for us. Anything else would be unethical

https://www.theguardian.com/commentisfree/2014/jul/07/facebook-study-science-experiment-research

Chapter 6, Ethics: `http://www.bitbybitbook.com/en/ethics/`

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- Not perfect:
  - potential problems with internal validity
  - potential problems with external validity
  - potential problems with ethics

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- experimental approaches can measure the effect we have on each other
- voting is contagious & emotional valence of word use is contagious
- two designs: 1) intervene and spillover; 2) edge-control
- some of these experiments raise ethical questions (e.g., Kramer et al.)

Going viral

Have you ever said that something was going viral?

- What do viral cascades look like?: Goel, S. et al. (2016). The structural virality of online diffusion. *Management Science*

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- Can they be predicted?: Cheng et al. (2014) Can cascades be predicted? *WWW*