How the News Media Activate Public Expression and Influence National Agendas

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University of Vermont, 4/30/2018

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Based on joint work with Benjamin Schneer and Ariel White (Science 2017)

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Statistical Problems: We Can’t Randomize

• Statistical Problems
  • Randomization: usually impossible
  • Endogeneity: media outlets compete for readers

• Clever Research Designs (trying to approximate randomization)
  • New TV tower. Some behind hill, in radio shadow
  • Before/after studies of “surprise” media events
  • Roll out of Fox News to some towns and not others
  • Many others…

• But we still can’t randomize
  • Assumptions: better, but unavoidably dubious
    ⇝ “Profound biases,” > 600% difference from truth
  • Estimands: different, of sometimes questionable relevance
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• What we’d do without constraints
  • Sign up many news media outlets
  • Randomize news content and timing for each
  • Control collaboration to induce cross-outlet correlations

• Why is this plan so hard for media outlets?
  • Need to take actions few (if any) have ever before agreed to
  • Outlets are competitors: trying to scoop each other
  • Must share information with us (even if not with each other)
  • Need numerous agreements, technical infrastructure for large scale collaboration & data collection, extensive coordination, high levels of trust

• More specifically, to randomize
  • Journalists require: total control over what’s published & when
  • Scientists require: total control over what’s published & when
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Our Approach:

- Build trust: 5 years of negotiating & communicating
- Develop incentive compatible research design: both get 100%, no compromises ⇝ solve a political problem technologically
- Convince 48 media outlets to let us experiment on them
- Whenever possible, choose realism (even if inconvenient)
- Stick close to outlets' standard operating procedures
- Embed treatment within ordinary routines ⇝ More expensive, logistically complicated, and time-consuming, but more generalizable
- Goal: Build platform to continue experiments
- A work of political science

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Individual-level Effects
Outcome variable: individual knowledge and opinion
Effects: Persuasion, attitude formation, diffusion, gatekeeping, priming, issue framing, etc.
Measurement: survey research

Collective Effects: Impact on the national conversation
Outcome variable: activated public opinion, views of all those trying to express themselves publicly about policy and politics
Classic definition of public opinion, predating survey research
Measurement
Previously: hallway conversations, “water-cooler events”, soapbox speeches in public squares, editorials, etc.
Now: 750M public social media posts/day
Target population: different than survey research!
Surveys: pop quizzes of everyone, even uninformed & inactive
Social media: counts only activated opinion
Democracies: Can ignore individuals, but collective expression sets agendas
Autocracies: Ignore criticism, but censor expression about collective action
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Setup

• Signup for 48 small media outlets (and >12 others just for info)
• 17 for trial runs, 33 in experiment, 2 in both
• Median size: The Progressive, 50,000 subscribers
• Examples: Establish 11 broad policy areas
• Rules: (a) major national importance; (b) interest to outlets
• race, immigration, jobs, abortion, climate, food policy, water, education policy, refugees, domestic energy production, and reproductive rights
• Using 11 rather than 1: more representative; larger \( n \) needed
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- Signup 48 small media outlets (& > 12 others just for info)
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  ![Magazines](image)

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• We choose a policy area (1 of 11)
• Outlets volunteer for a pack of 2–5 (with our approval), following “project manager” protocol (e.g., Panama Papers)
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Randomization

• Matched Pair Randomization

  • Select pair of weeks: matched on similarity of predicted news

  • One coin flip: which week is treatment and which control

  • Treatment week: publish & promote articles (usually Tuesday)

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  (Ex post: Predictions accurate; flips, news shocks uncorrelated)
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![Calendar of September 2015](calendar_image)
Randomization

Matched Pair Randomization

- **Select pair of weeks:** matched on similarity of *predicted* news
- **One coin flip:** which week is treatment and which control

---

**SEPTEMBER 2015**

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![Calendar showing the treatment and control weeks]
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- Treatment Week: 8th
- Control Week: 14th
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![September 2015 Calendar]

*Ex post: Predictions accurate; flips, news shocks uncorrelated*
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Reasoning

- Cf. complete randomization: more power, efficiency, & “political” robustness; less bias, model dependence, & research costs; SEs as much as 600% smaller (Imai, King, Nall 2008)
- Few experiments/outlet: Less interference; more heterogeneity
- Nation as unit of treatment: no spillover, more cost
- (**Ex post**: Automated text analysis & qualitative evidence: indistinguishable from normal publications & practices; no outlet received a single complaint)
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Quantities of Interest (& observable implications)
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Random Treatment → Articles Published → Pageviews → Posts on Subject → Posts in Policy Area
Quantities of Interest (& observable implications)

- Random Treatment

- Articles Published

- Pageviews

- Posts on Subject

- Posts in Policy Area

• Intervention

Research Design
Quantities of Interest (& observable implications)

- Random Treatment
- Articles Published
- Pageviews
- Posts on Subject
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- Intervention

- Social media: Crimson Hexagon, Inc.; Methods: readme, 2010; readme2, 2018
Quantities of Interest (& observable implications)

Random Treatment • Articles Published • Pageviews • Posts on Subject • Posts in Policy Area

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Introduction

Research Design

Results

Supporting Analyses

Implications
Main Causal Effect: Public Expression in Policy Areas

- **Red Dots:** model-based estimate (assumes linearity over days)
- **Open circles:** model-free estimate (no model, higher variance)
- **Causal effects:**
  - 1st day: 19.4% increase,
  - Total: 62.7% increase
- **Context:**
  - 3 small media outlets have huge effect on the national conversation
Main Causal Effect: Public Expression in Policy Areas

Results
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Effect on the national conversation in major policy areas is national
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Effect on the national conversation in major policy areas is national
Causal Heterogeneity: Leave-One-Outlet-Out

- Red Dots: Original (model-based) estimates
- Open circles: same, with one outlet dropped from any packs

Results: no dominant outlet; high heterogeneity

Results
Causal Heterogeneity: Leave-One-Outlet-Out

Jackknife Estimation on Policy Area Effects

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High Experimental Compliance

- Articles published by pack in policy area
- What's the goal?
- Causal effect on # articles: 2.94
- Pageviews (on subject of articles, relative to a day's volume)
- Causal effect on # pageviews: 969.6% (52,223 views) increase
- \[\Rightarrow\] high compliance

Supporting Analyses
High Experimental Compliance

• # Articles published by pack in policy area
High Experimental Compliance

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  - What’s the goal? Average # media outlets per pack:

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High Experimental Compliance

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Causal Effect on Subject of Articles

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<td>Total Effect</td>
<td>Change in Number of Posts</td>
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- **Red Dots:** model-based estimate (assumes linearity over days)
- **Open circles:** model-free estimate (no model, higher variance)

Causal effects:
- 1st day: 454% increase,
- Total: 1,666% increase
Causal Effect on Subject of Articles

Supporting Analyses
Causal Effect on Subject of Articles

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Causal Effect on Subject of Articles

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Other Supporting Analyses

• More Results

• Opinion change: 2.3% change in direction of article opinion

• Large news media outlets: Observational evidence, >15x effect

• Robustness checks

• # of unique authors: little change from effect on posts

• Removing bots, retweets: No real change

• Week 1 to 2 spillover, noncompliance: No evidence

• Treatment articles: representative of all on complexity, type
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• Small outlets: very large average effects on pageviews, agenda (subject & policy), opinion change

• Larger outlets: even bigger average effects

• Heterogeneous effects: large, highly variable viral patterns

• Implications: for individual journalists
  • Remarkable power; serious responsibility; not just another job

• Implications: for ecosystem of media outlets
  • Control over editorial boards and mastheads
  • Balance and diversity of outlet opinion
  • Effects of fake news
    • Impact on agendas, elections, public policy, discourse

• Journalism jobs: 25% drop in last decade

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  • We wrote a paper, built a platform, & showed how others can

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Notation and Quantities of Interest

• Outcome Variable: $y_{ped}$, # social media posts in policy area $p (p = 1, \ldots, 11)$
• Experiment $e (e = 1, \ldots, E)$
• Day of and after intervention ($d = 1, \ldots, 6$)

• Treatment Variable: $T_{ped}$, instruction to pack (of 2-5 outlets) to write, publish, and promote articles, like a project manager

• Treated weeks: $T_{pe1} = \ldots = T_{pe6} = 1$
• Control weeks: $T_{pe1} = \ldots = T_{pe6} = 0$

• Quantities of Interest
  • Absolute Increase: $\lambda_d = \text{mean}_{p,e}[y_{ped}(1)] - \text{mean}_{p,e}[y_{ped}(0)]$
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Estimation Approaches

• Model-Based Approach
  - Transform outcome variable for normality & homoskedasticity:
    \[ z_{ped} = \ln(y_{ped} + 0.5) \]

  - The Model:
    \[ E(z_{ped} | T_{ped}) = \beta_0 + \beta_p T_{ped} + \eta_d + \gamma_d T_{ped} \]
    - \( \beta_0 \): constant term
    - \( \beta_p \): fixed effects for the 11 policy areas
    - Assume linearity over days:
      \[ \eta_d = \eta_0 + \eta_1 d \]
      \[ \gamma_d = \gamma_0 + \gamma_1 d \]

  - Assume conditional independence over \( p, e, d \)

• Model-Free Approach:
  - Drop linearity & conditional independence assumptions
  - Regress \( z_{ped} \) on \( T_{ped} \) separately for each \( d \)
  - Equivalent to difference in means for each day
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