Building Apps and Bots for Social Research

Bamberg Summer Institute in Computational Social Science

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Many thanks to Chris Bail for providing material for this lecture

Apps

Recall the weaknesses of digital trace data

- incomplete
- inaccessible
- non-representative
- drifting
- algorithmic confounding
- dirty
- sensitive

What are the alternatives?

- survey response rates continue to drop
- many important questions require longitudinal/relational/qualitative data
- digital trace data have a number of major advantages in comparison to conventional sources (big, always on, non-reactive)

Apps can address limitations of digital trace data

- incomplete
- inaccessible
- non-representative
- drifting
- algorithmic confounding
- dirty
- sensitive

Example: the Viralgorithm

40% of all organizations contacted installed the app

Social media survey apps (SMSA)

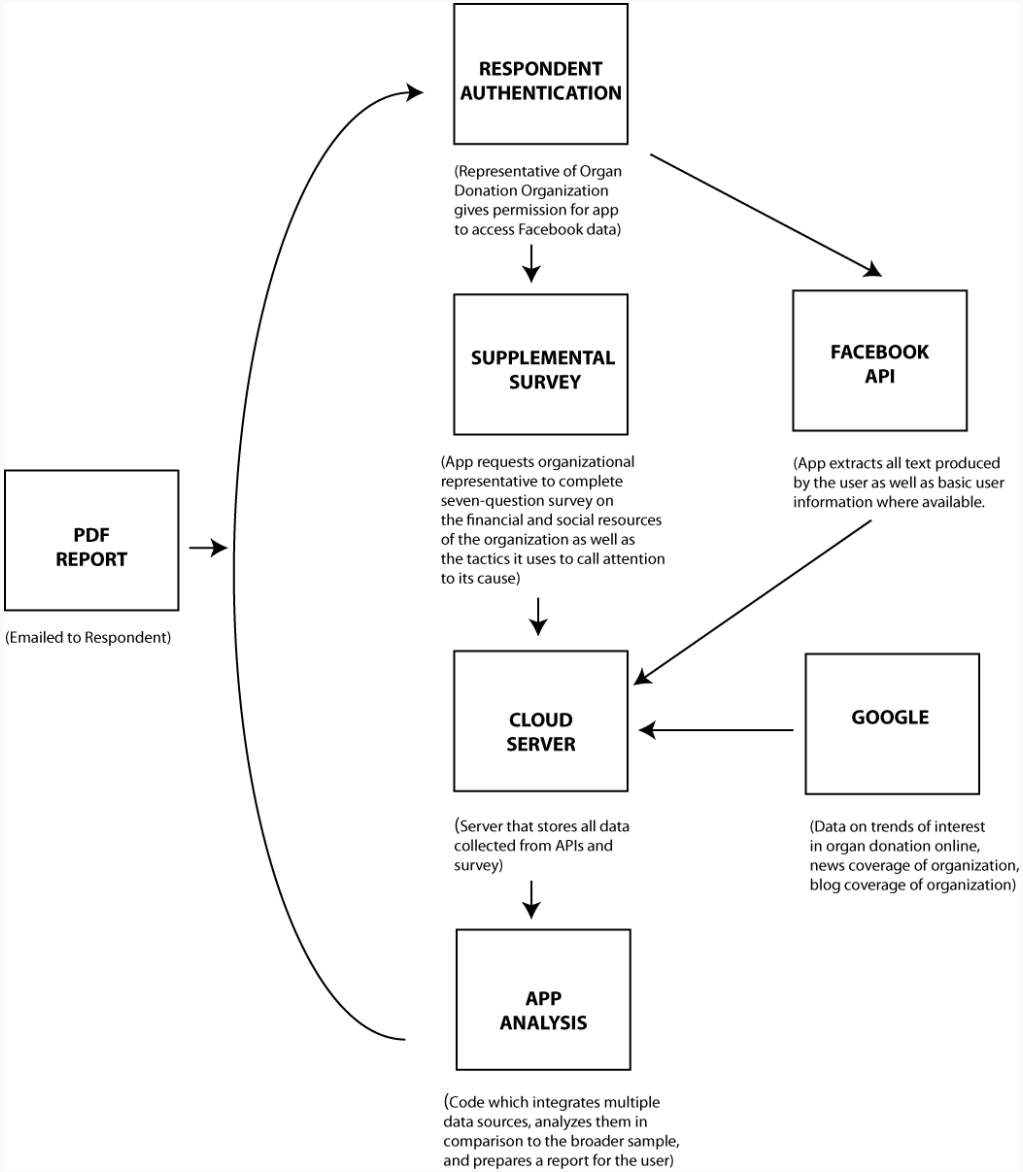
A web or mobile-based tool built by researchers in order to:

- collect public and/or private data produced by social media users from an API
- collect supplemental information from such users (e.g. demographics) using more conventional survey methods
- offer something back to the user as an incentive to share their data (e.g. analysis or financial incentives)

For additional information, see:

Bail, Christopher A. 2015. "Taming Big Data: Using App Technology to Study Organizational Behavior on Social Media." Sociological Methods and Research: 1-29

Workflow of Viralgorithm



More examples

Bail, Christopher A. 2016. “Combining Network Analysis and Natural Language Processing to Examine how Advocacy Organizations Stimulate Conversation on Social Media.” Proceedings of the National Academy of Sciences, 113:42 11823-11828

Bail, Christopher A. 2016. “Emotional Feedback and the Viral Spread of Social Media Messages about Autism Spectrum Disorders.” American Journal of Public Health 106(7): 1173-1180

Bail, Christopher A., Taylor W. Brown, and Marcus Mann. 2017. “Channeling Hearts and Minds: Cognitive-Emotional Currents and Public Deliberation on Social Media.” American Sociological Review, 82(6) 1188-1213

Challenges of building apps

- significant coding skills required (html, css, cloud-computing, reactive programming)
- competitive environment for attention (apps are no longer “new”)
- concerns about data sharing/privacy
- compelling incentives are hard to identify and particularly challenging for studies of sensitive topics; financial incentives may be an important option going forward.

Building apps with R Shiny

Shiny is a tool that enables people to build, compile, and host interactive web apps

`https://shiny.rstudio.com/`

Building apps with R Shiny

- Advantages:
  - takes care of many technical details in the background
  - excellent tutorials available (`https://shiny.rstudio.com/tutorial/`)
  - many example apps to learn from (`https://shiny.rstudio.com/gallery/`)
- Main disadvantage: does not run natively on mobile platforms
- Some alternatives: Python kivy, Google Flutter

Shiny example app

```
install.packages('shiny')
```

```
library(shiny)
runExample("01_hello")
```

Bots

Example: anti-racism bots

Fig. 3 Treatments. **a** The treatment—black bot. **b** The bot applying the treatment—white bot

Munger, Kevin. 2017. "Tweetment Effects on the Tweeted: Experimentally Reducing Racist Harassment." Political Behavior.

Example: anti-racism bots

"I conduct an experiment which examines the impact of group norm promotion and social sanctioning on racist online harassment. I employ an intervention designed to reduce the use of anti-black racist slurs by white men on Twitter. I collect a sample of Twitter users who have harassed other users and use accounts I control ("bots") to sanction the harassers. By varying the identity of the bots between in-group (white man) and out-group (black man) and by varying the number of Twitter followers each bot has, I find that subjects who were sanctioned by a high-follower white male significantly reduced their use of a racist slur."

Using bots to study social media & polarization

Bail, Christopher, Lisa Argyle, Taylor Brown, John Bumpuss, Haohan Chen, M.B. Fallin Hunzaker, Jaemin Lee, Marcus Mann, Friedolin Merhout, and Alexander Volfovsky. 2018. “Exposure to Opposing Viewscan Increase Political Polarization: Evidence from a Large-Scale Field Experiment on Social Media.” Proceedings of the National Academy of Sciences. 155(37): 9216-9221

Using bots to study social media & polarization

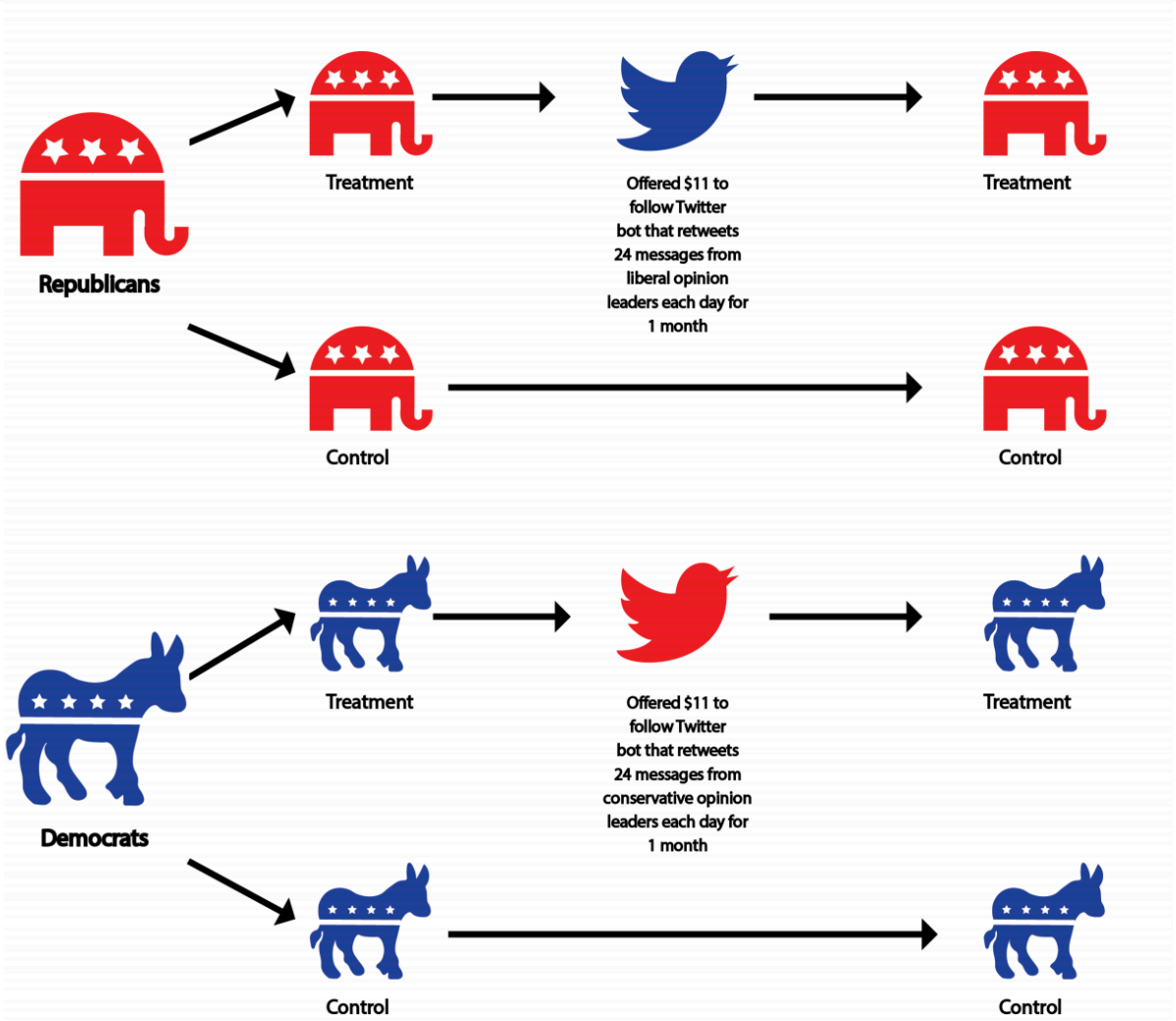
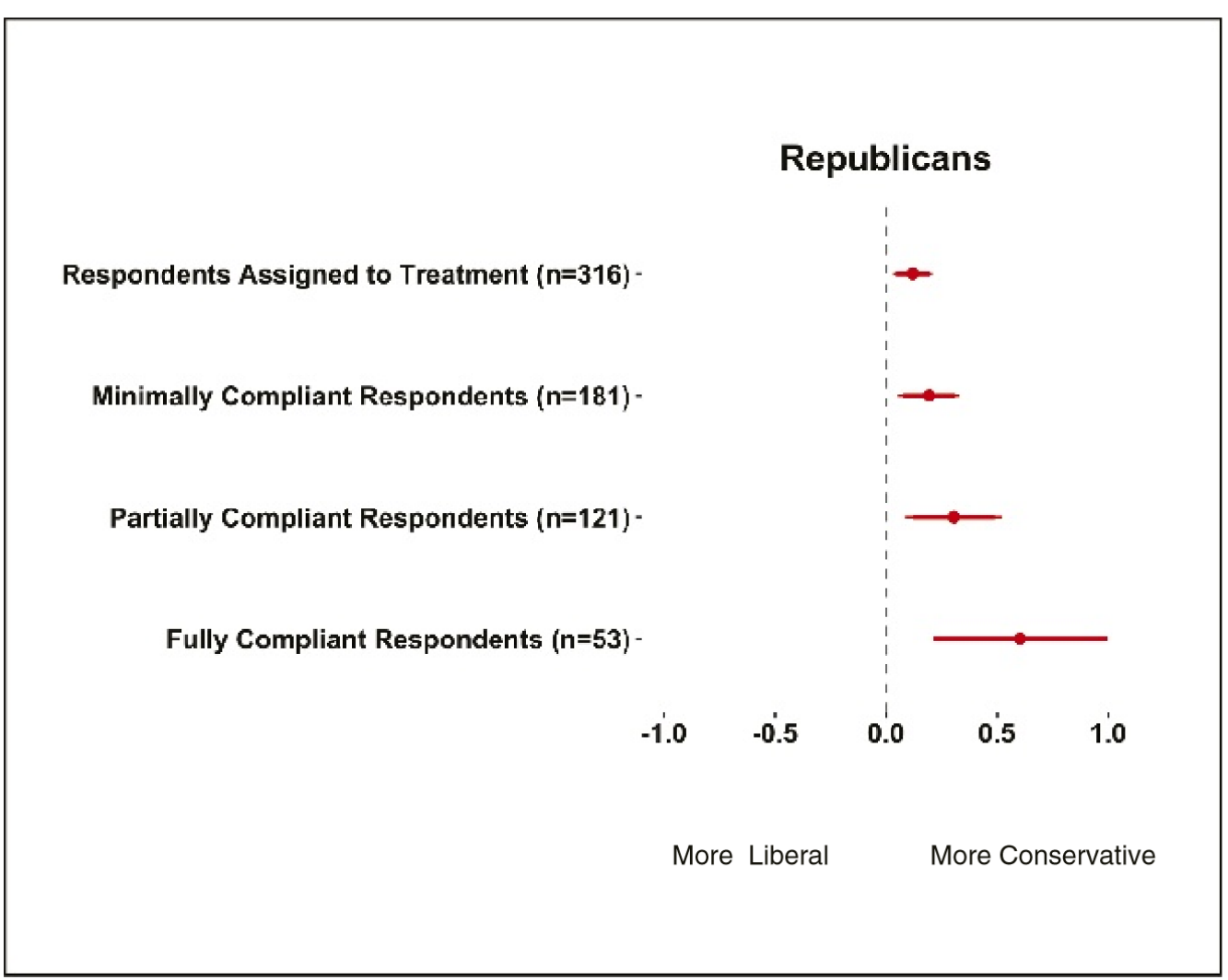


Figure 1: Overview of Research Design

Using bots to study social media & polarization



How to build bots in R

Simple example:

```
library(rtweet) # assumes credentials are loaded
for (i in 1:24){
  # search for 50 recent tweets about computational social science
  css_tweets <- search_tweets("Computational Social Science",
                              n = 50, include_rts = FALSE)
  # randomly pick one tweet id
  lucky_tweet <- sample(css_tweets$status_id, 1)
  # post retweet
  post_tweet(retweet_id = lucky_tweet)
  # wait for 1 hour (3600 seconds)
  Sys.sleep(3600)
}
```

Making a bot interactive

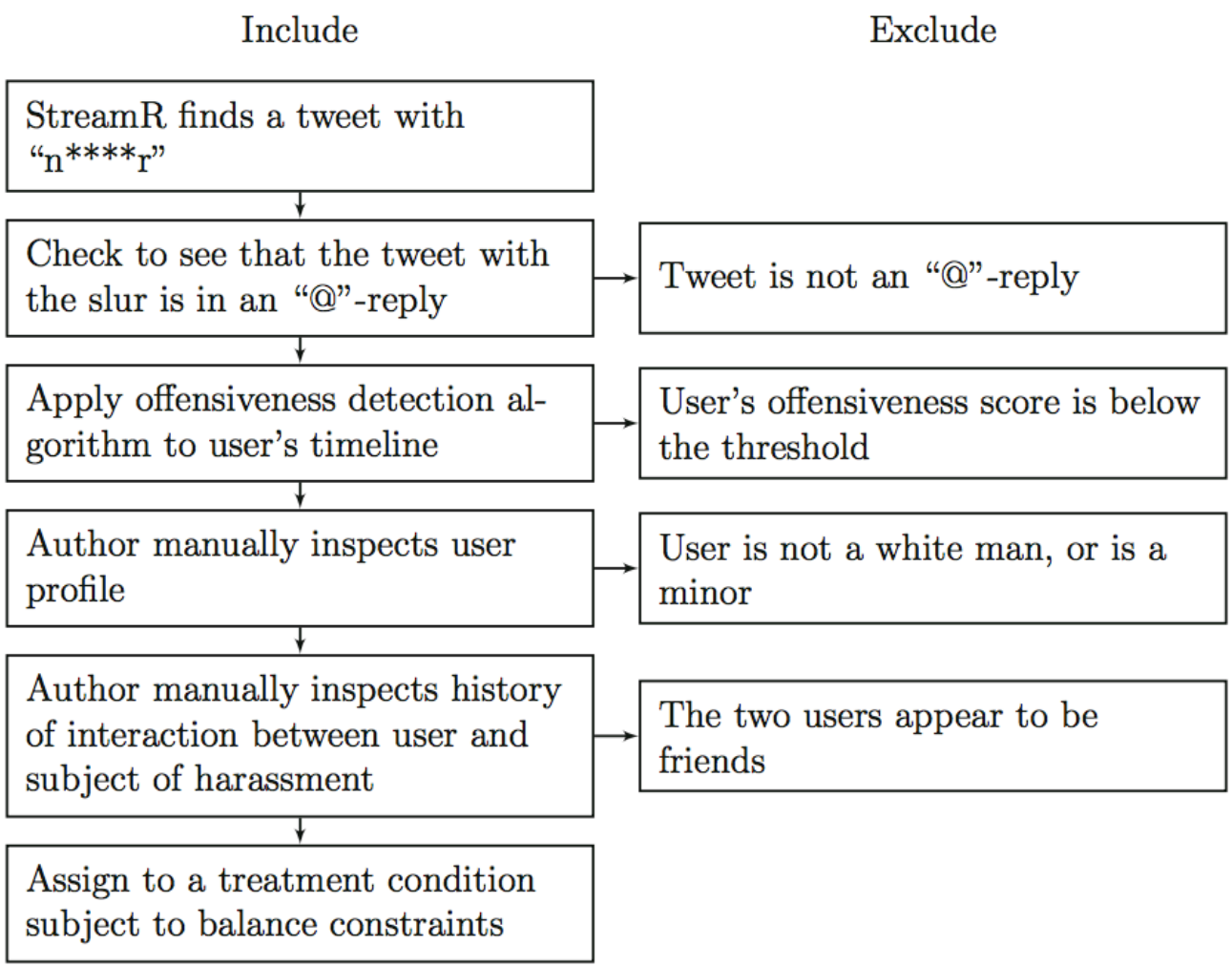


Fig. 1 Sample selection process: This flowchart depicts the decision process by which potential subjects were discovered, vetted and ultimately included or excluded

Run Rstudio in the cloud (e.g. for hosting shiny apps or bots)

Tutorial by Chris Bail:

`https://cbail.github.io/Running_R_in_the%20Cloud.html`

Building apps and bots for social research

- apps and bots can be used to adress many shortcomings of digital trace data
- high risk, high reward
- be mindful of ethical issues in app & bot-based research

Questions?