Experiments on Social Media

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Introduction

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- Study properties and features of the platform
- High ecologically valid setting to study human behavior

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Some example studies: Levy (2021), Allcott et. al (2020, 2022), Guriev et. al (2023), Aridor (2025), Beknazar-Yuzbashev et. al (2022), Larsen et. al (2023)

This talk: A practical guide to conducting these types of studies

Introduction

Typical components of a social media experiment

- Recruit participants (**Social Media Ads**, **Labs/Online Samples**)
- Generates an intervention (**Manipulate experience at individual level**)
- Analyzes social media data (**Posts/time spent**, **Behavioral outcome**)

Can use social media for all of those or only some subset

A relevant analogy is running a small business:

- Successful marketing campaign to recruit users (good targeting, messaging)
- Maintaining and running an active intervention (good IT management)
- Manage participant communication to minimize attrition (good customer service)

This talk: Focus on each component separately

Overview

1. Recruitment

2. Interventions

3. Limitations and Challenges

4. Conclusion and the Future of Social Media

Benefits of Social Media Samples

Accessing a **broad sampling** frame

- 2 billion reachable users via ads (120k on Prolific, 26 million on YouGov)
- Typically not “professional" survey takers
- Particularly useful in developing countries with limited reach by survey panels (e.g., Aghajanian et al. 2021, Rosenweig-Zhou 2021, Singh et. al 2022)

Targeting niche sets of users

- **Direct**: Geography, interests, demographics
- **Indirect**: “Lookalike" audiences to an existing set of users
- Examples: Political activists (Jäger 2017), French high school seniors (Hakimov et. al 2022), LGBTQ young adults (Guillory et al 2018), voters in local elections (Sances 2018)

Mechanisms of Advertising on Social Media

Typical sequence of events for setting advertisements:

(1) Advertiser **buys ad** on Facebook/Instagram/Audience Network
(2) Advertiser **places "pixel"** on their website
(3) When a **consumer "converts"**, data and ID sent back to Meta
(4) Data used to **measure and optimize distribution**

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Important considerations:

Choose to optimize for impressions/clicks/conversions (see Neundorf et. al 2023 for differences in selection)
Targeting typically improves over time: **delivery optimization**
Placement of tracking pixel on "success" (e.g., end of survey, software installation) **determines optimization**

Recruitment Challenges

Representativeness

"Black box" selection due to delivery optimization (Rosenzweig et al. 2020)
Boas et. al (2020) show similar selection to crowd-sourced platforms
Solution: Quota sampling (e.g., see Allcott et al 2020)

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More granular targeting is typically costlier
Ad design can lead to a tradeoff between costs and representativeness
Higher in recent years due to privacy regulation

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Sample Quality: No one vouching for participants

Possible fraudulent and duplicated responses
Higher chances of "low quality" participants

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Key Idea: Each individual gets their “own" version of Facebook, TikTok, Amazon, etc.

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Physical: Conlon et. al (2023) measure second-choice diversion from *overall* product removal

Digital: Aridor (2025) measures second-choice diversion from *individual* product removal

Experimenter POV: Interested in the effect of **X** on **Y**

X: Induce *individual* level variation in X via platform features or external software

Y: Measure *individual* level of Y via the platform directly, external software, or surveys

Z: Sometimes can only move Z that moves X

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Enables conducting platform experiments *without* platform cooperation

Technical Preliminaries

API: Directly pull data from the platforms

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Private: Users opt-in to see private posts / take actions
Challenges: Only available on a few platforms

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- Read and write arbitrary HTML/JS into a page
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Mobile Phone Apps: Extract time (and some content) on phones

- Typically only Android phones enable 3P software
- Extraction of time spent on apps (limited content)
- Limited interventions (app restrictions)

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Selenium bots: Imitate real users

- Explicitly code routine of user interactions
- Useful for extracting information from sites with dynamic JS

Useful Open-Source Software Tools

Browser Extensions: Webmunk (Farronato-Fradkin-Karr 2024)

Allows for modification of content (e.g., Farronato et. al, 2025 modify Amazon search rankings)
Tracks browsing behavior, prompts users to complete tasks
Build on top of core abstractions (no need to replicate core functionality)
Reference: `http://www.webmunk.org`

Mobile Phones (Time Use): Phone Dashboard (Allcott-Gentzkow-Song 2022)

Control and set limits on time on applications
Reference: `https://github.com/Phone-Dashboard`

Mobile Phones (Screen Content): Princeton-SMART

Collects second-by-second screenshots of content
Combination of OCR plus accessibility data
Reference: `https://www.screenlake.com/princeton-smart`

Different Types of Interventions

Encourage change in time use

Manual deactivation: Allcott et. al (2020) encourage account deactivation

Software restrictions: Aridor (2025), Allcott et. al (2022) use third-party software to restrict access at application-level

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Encourage installation of third-party software

Beknazar-Yuzbashev et. al (2022) measure the effect of toxic content
Farronato et. al (2025) measure degree of Amazon self-preferencing
Higher compliance costs, wider scope of interventions

Different Types of Interventions (Continued)

Manipulate Experience through platform features

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Implemented by the researcher, no experimenter demand

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Algorithmic Audits

Brown et al. (2022) randomize the initial YouTube view a consumer watches
Can use selenium bots to randomize feedback and observe changes in algorithm

Collecting Data and Compliance

We can use the same tools to collect data for analysis and assessing compliance

API: Directly operated by the platform

Data: Burtch et. al (2022) randomly give peer awards and extracts Reddit posts
Compliance: Levy (2021) monitors compliance with following FB pages

Challenges with API: Instability over time

Platforms may remove posts (content moderation)
Platform policies highly variable (e.g., X and Reddit)
“Unofficial" APIs are a gray area in terms of whether data can be used

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Third-Party Software: Browser extensions, mobile phones

Extensions: Browsing history (Levy 2021), time spent (Aridor 2025), posts / ads observed by individuals (Beknazar-Yuzbashev et. al 2022)
Mobile Phones: Time spent (Allcott et. al 2022, Aridor 2025), keyword content (Reeves et. al 2021)

Challenges with Third-Party Software: external validity

Higher chance of self-selection into studies
Most usage is on mobile, but harder to collect on mobile

Collecting Data and Compliance (Continued)

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Manually collected data: valuable, but high labor costs

Agan et. al (2023) collect posts by recording via Zoom
Collis et. al (2021), Lin et. al (2023) incentivize participants to export data

Survey Data: traditional and requires joining to platform ID

Allcott et. al (2020) measure valuations and political attitudes
Challenge: Especially for time-spent, survey measures can be noisy (e.g., Ernala et. al (2020) find a correlation of 0.42 using internal FB data)
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External Sources: Link to social media data

Voting: Bond et. al (2012) join FB users to public voters
Vaccinations: Larsen et. al (2023) use county-level vaccination data

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Tradeoff: Data quality, representativeness, feasibility

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Limitations and Challenges

Power: More difficult with low effect size interventions

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Overcoming power limitations

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- Enables within-participant designs (List et. al 2011)
- Temporally granular data eases testing dynamics of treatment effects

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Attrition: Typically comparable with other field experiments

Ghanem et. al (2023) report a mean attrition of 15% among 88 field experiments
Threaten internal validity when select out based on potential outcomes

Overcome attrition

Postponing treatment to a relatively late stage
Conducting multiple survey waves to identify attriters (Allcott et. al 2020)

Limitations and Challenges (Continued)

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Reasonable to expect given the social nature of platforms
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Partial vs. general equilibrium

e.g., effects on mental health: Allcott et. al 2020 – individual deactivation, Braghieri-Levy-Makarin 2022 – staggered rollout

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Short-term effects: difficult to measure “long term" interventions

Limitations and Challenges (Continued)

External Validity: Differences from target population

Often recruited sample will not be representative
Targets: nationally representative sample and representative of *platform* users
Nationally representative sample: reweight on demographics
Platform: American Trends Panel or manual approach (e.g., Barberá (2016) sampled random Twitter users and hand-coded demographic information)

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Ethics: Impacts consent, intervention, and outcomes

Facebook's Emotion Contagion Study (Kramer et. al 2014) measured the effect of hiding posts with positive/negative words on subsequent emotions of posting

Heavily criticized (no informed consent, large potential risk, no opting out)

Given data sensitivity, ethical considerations are a first-order part of design

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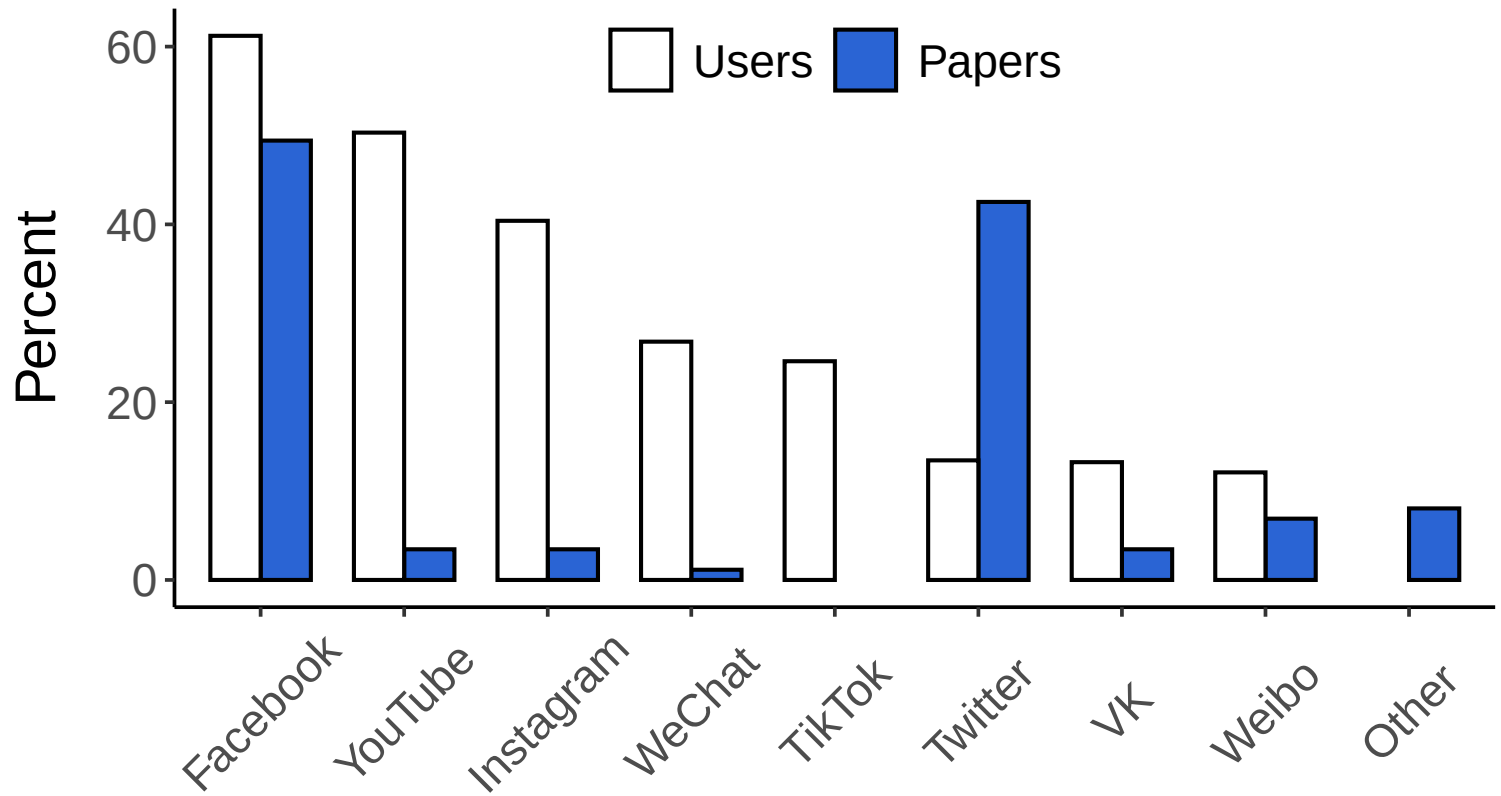
Open Questions across the life cycle of content

Existing evidence mostly focused on Facebook and Twitter (emerging work on platforms like TikTok)



Open Questions across the life cycle of content

Shift toward new platforms (TikTok), reflects a transition from content personalized by users to content that is completely algorithmically curated

- Does this reflect a technological improvement in real-time recommendations?
- Does it reflect a maturing market with diversification (Aridor, Forthcoming)?
- Does this change entail an increase of entertainment at the expense of news on social media, diminishing political effects?

There is a shift in business models (towards subscriptions/decentralization):

- Will the rise in subscriptions decrease the prevalence of harmful content?
- What will the effects be on small businesses that benefit from ads?

Open Questions across the life cycle of content

There are many ongoing policy discussions and regulatory developments:

- What data can platforms share to comply with regulations while protecting user privacy?
- What are the impacts of regulation on individuals and society at-large, and do these regulations have disparate effects across groups?

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While involved, lower barriers to entry relative to platform cooperation

- Many mentioned papers are on tight budgets or by junior authors