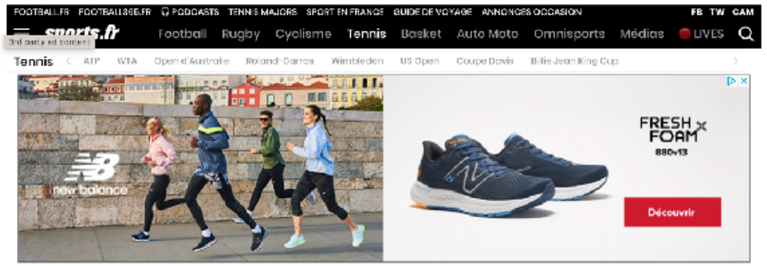
# Influence mechanisms in online advertising and micro-targeting

Oana Goga (CR CNRS, Inria CEDAR team, LIX—École Polytechnique)

Projet de recherche collective - Vers un droit neuroéthique?, 9 Nov 2023, Paris

# Traditional view of online advertising

Contextual

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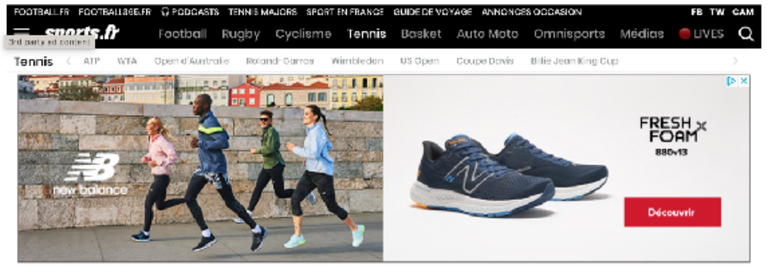


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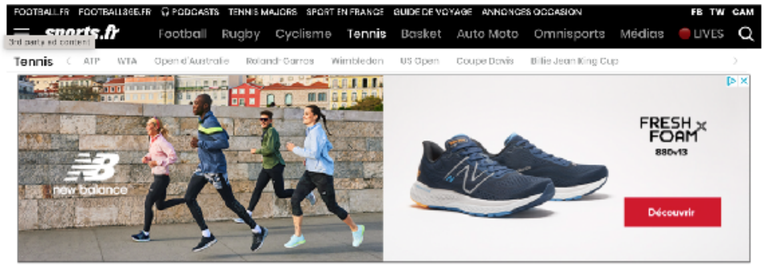


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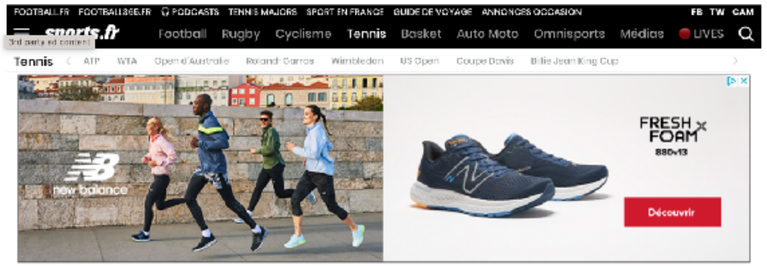


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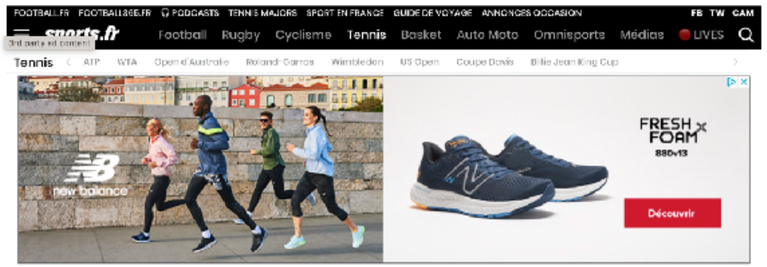


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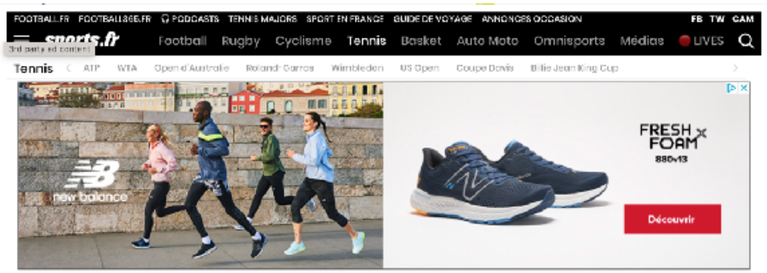


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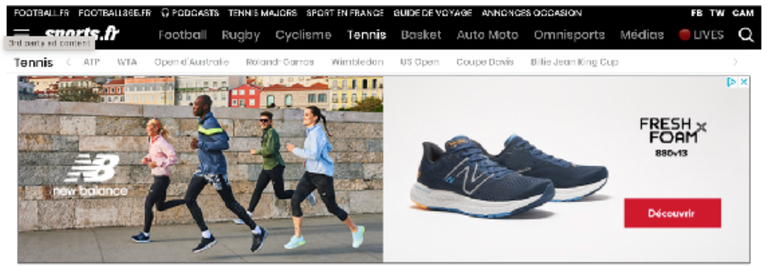


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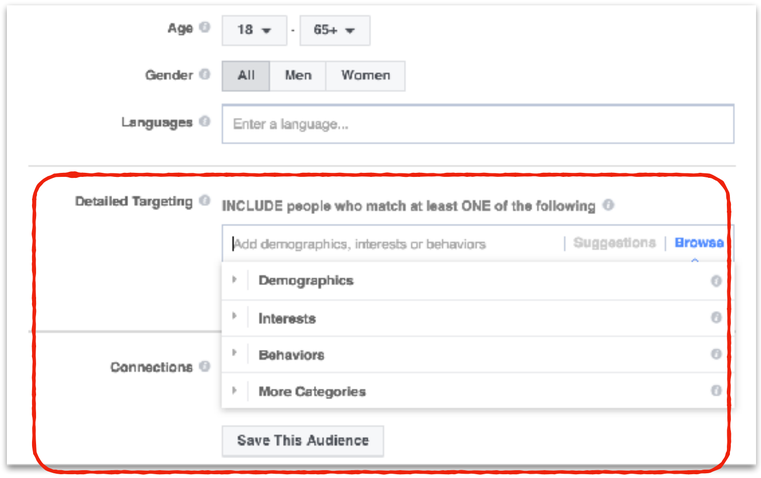
What is generally viewed as micro-targeting

# Mistake 1:
# Regulate only advertiser-driven micro-targeting

# Advertiser driven vs. algorithmic driven targeting

Advertiser driven micro-targeting

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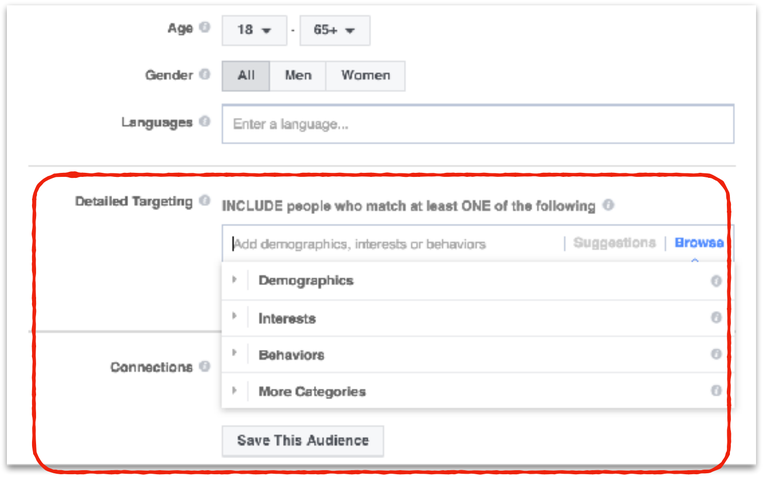
# Advertiser driven vs. algorithmic driven targeting

## Advertiser driven micro-targeting

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The advertiser lets the ad platform choose the right audience

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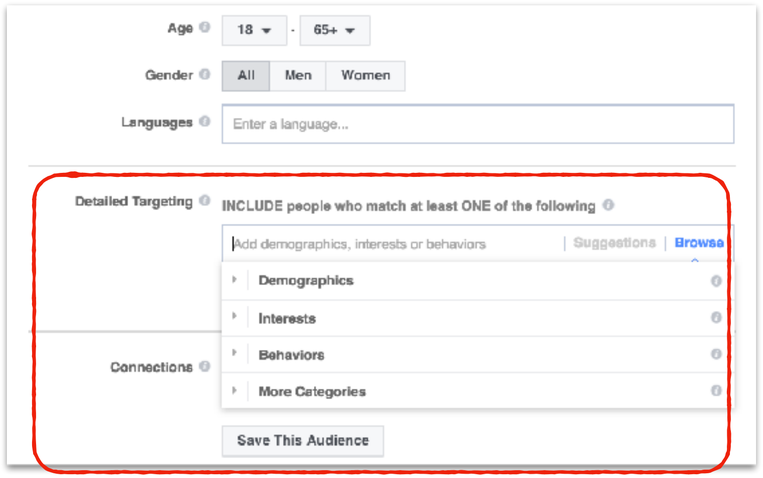


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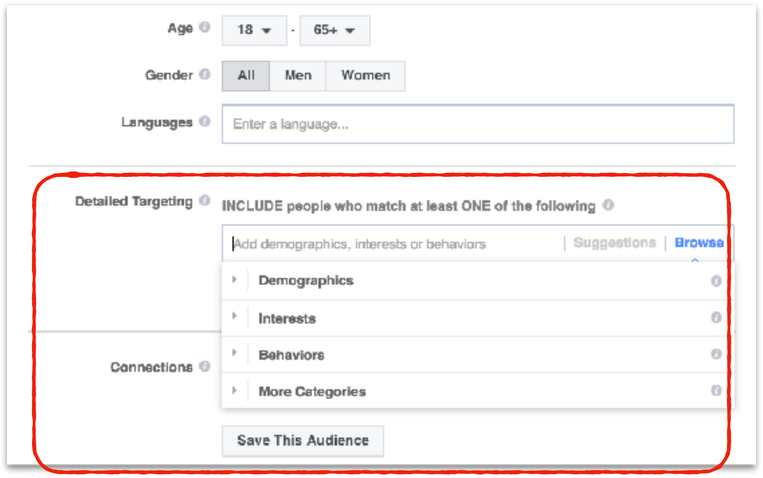


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# Options to regulate (political) advertising

## Considered by the European Commission (2020)

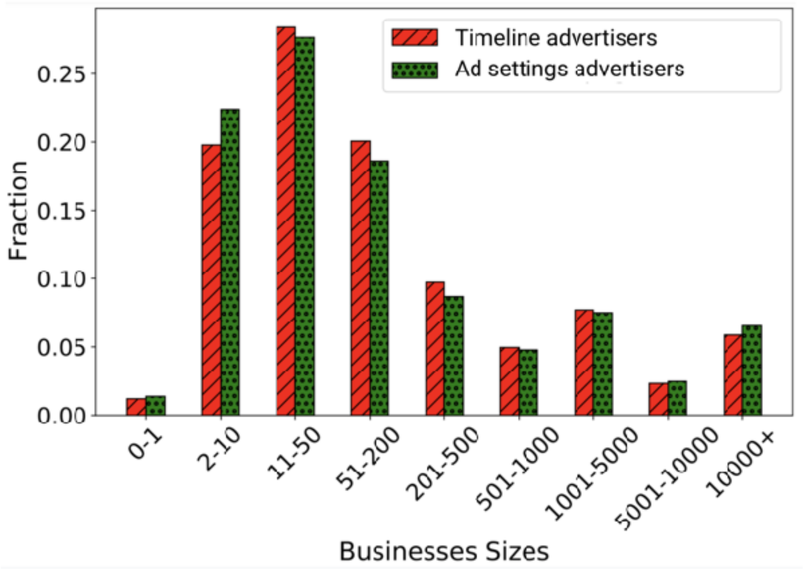
- Ban or restrict micro-targeting
  - But what is the economic impact on the ecosystem?
    - To which extent small and medium-sized businesses use micro-targeting?



"**Exploring the Online Micro-targeting Practices of Small, Medium, and Large Businesses",** Salim Chouaki, Islem Bouzenia, Oana Goga, Beatrice Roussillon. ACM Conference on Computer-Supported Cooperative Work and Social Computing (CSCW), 2022

# To which extent small businesses advertise on Fb?

Fraction of advertisers

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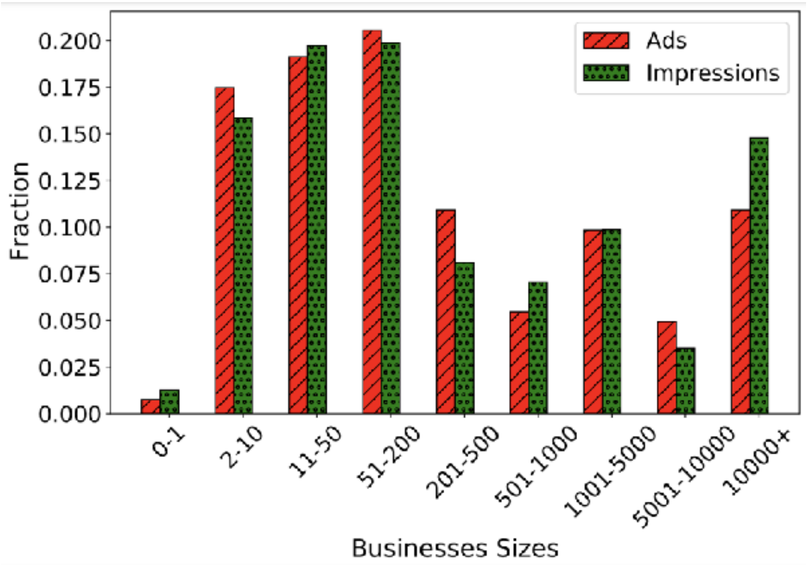

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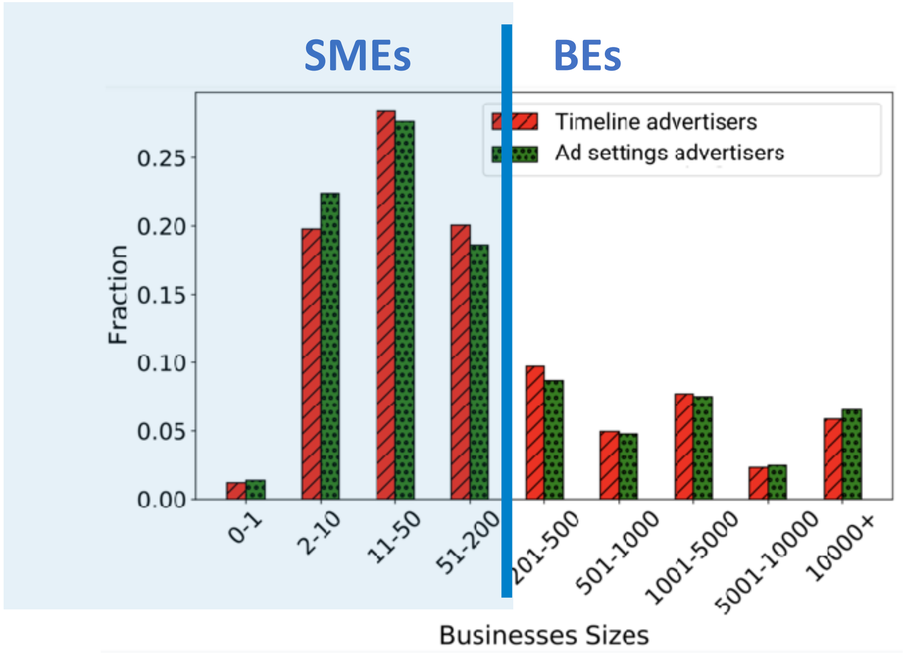


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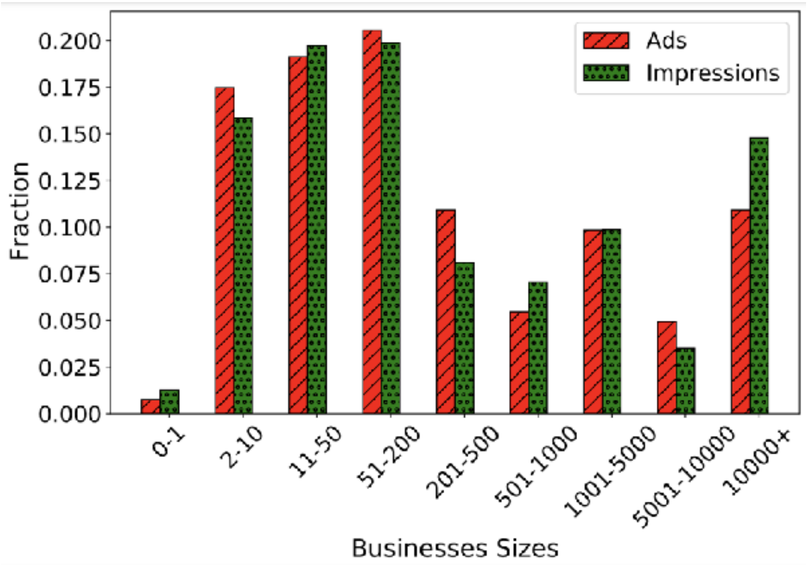

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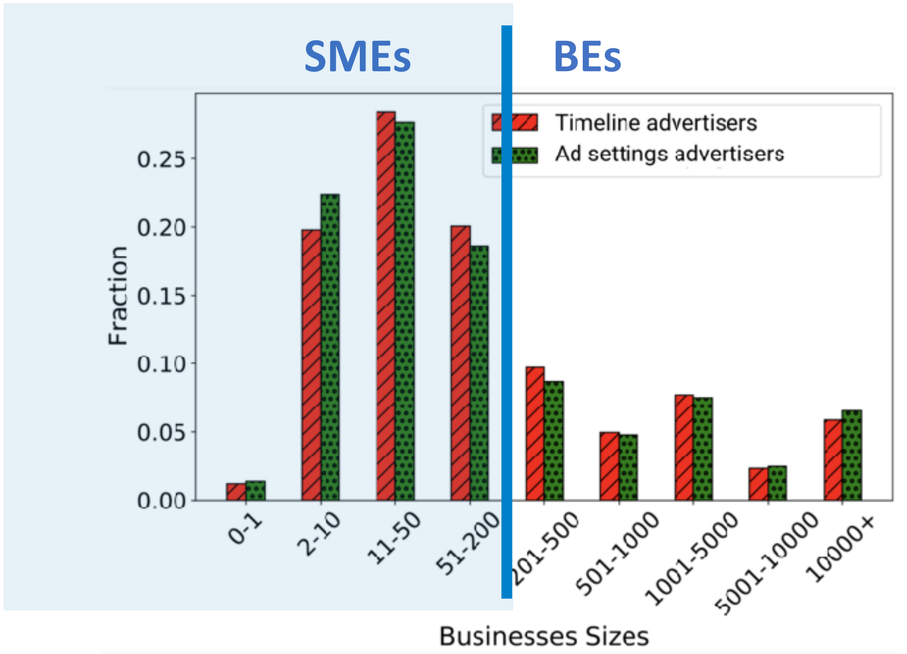


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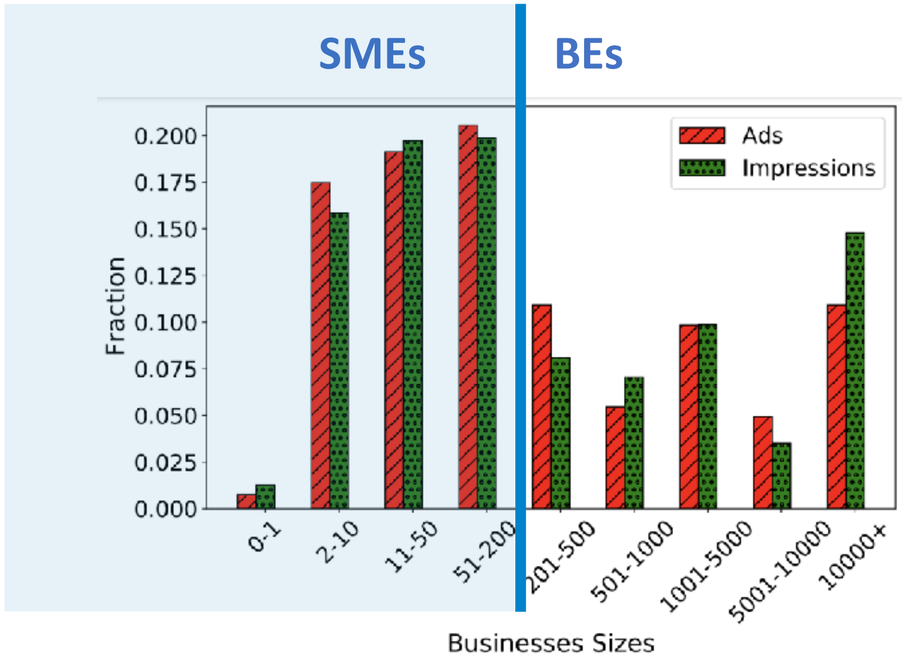


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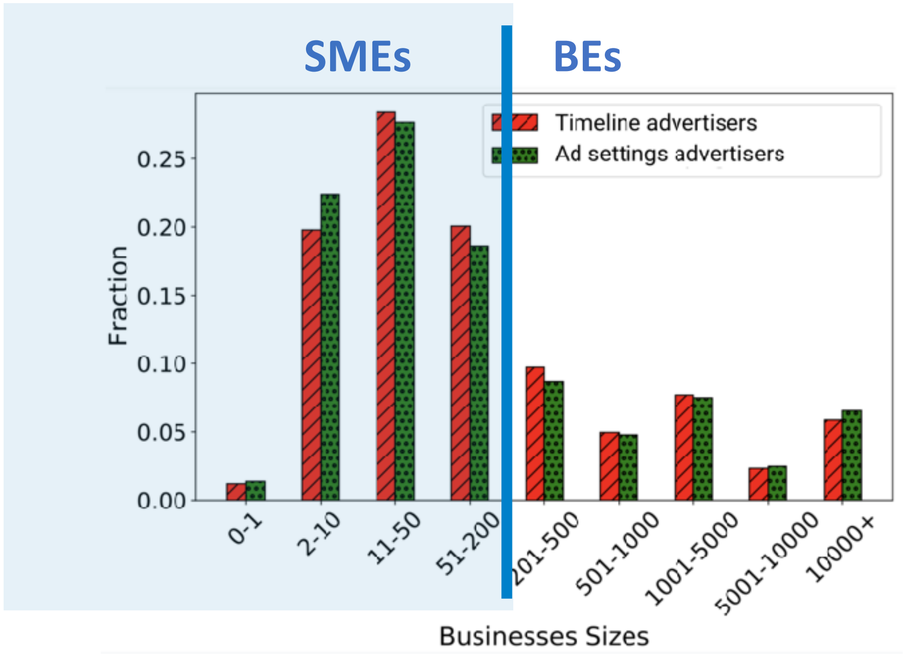


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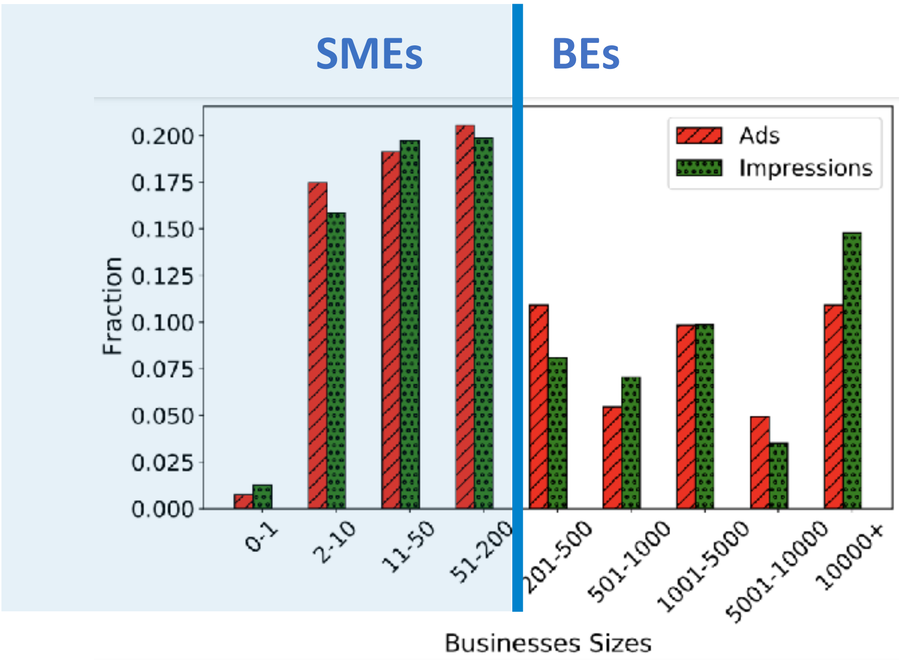


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Takeaway: Small and medium sized businesses do account for the majority of advertisers and are responsible for the majority of ad impression

- Important to assess the economic impact regulations would had on them

# Do businesses use micro-targeting?

| | SME (%) | BE (%) |
|---|---|---|
| **Advertiser-driven micro-targeting** | 27.7% | 30.5% |
| **Algorithmic-driven micro-targeting** | 72.3% | 69.5% |

# Do businesses use micro-targeting?

Advertiser-driven micro-targeting was only 79% in [NDSS'2019] !

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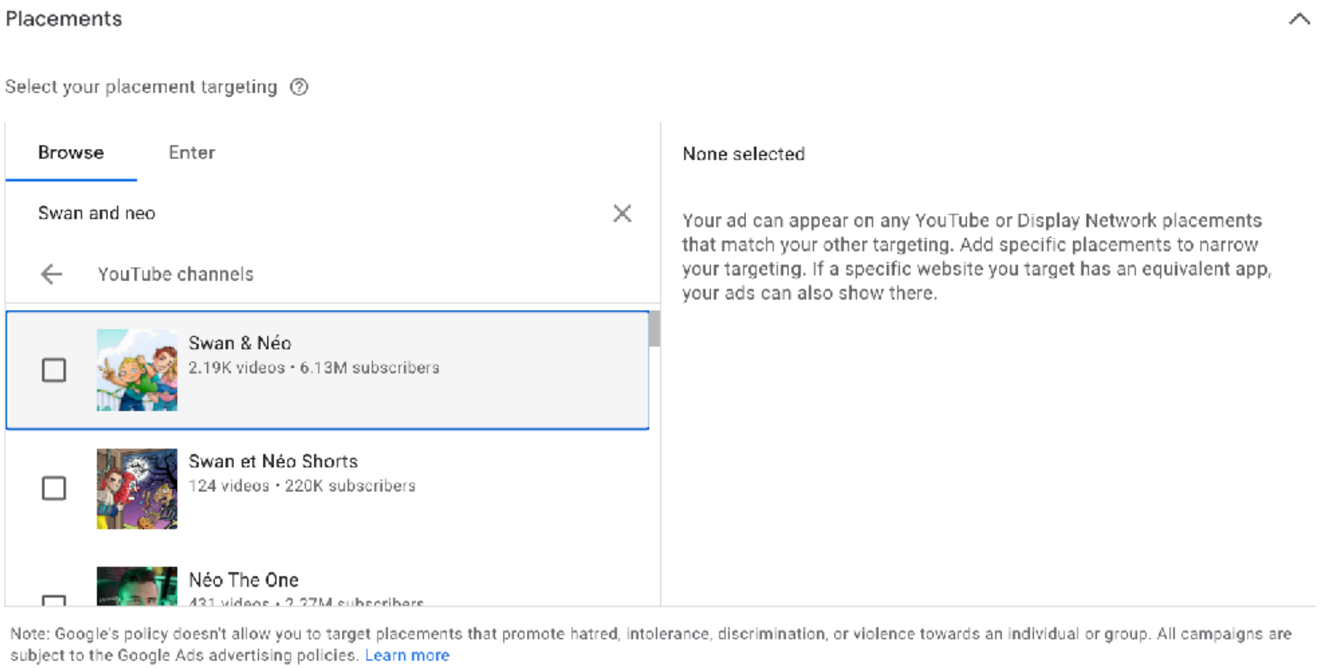
Takeaway: advertiser driven micro-targeting is being replaced by algorithmic driven micro-targeting

- How should we regulate algorithmic driven micro-targeting?

# Mistake 2:
# Contextual advertising is safe

# Can we target children with ads?




YouTube allows advertisers to place ads on precise videos



"**Marketing to Children Through Online Targeted Advertising: Targeting Mechanisms and Legal Aspects",** Tinhinane Medjkoune, Oana Goga, Juliette Senechal. ACM Conference on Computer and Communications Security (CCS), 2023

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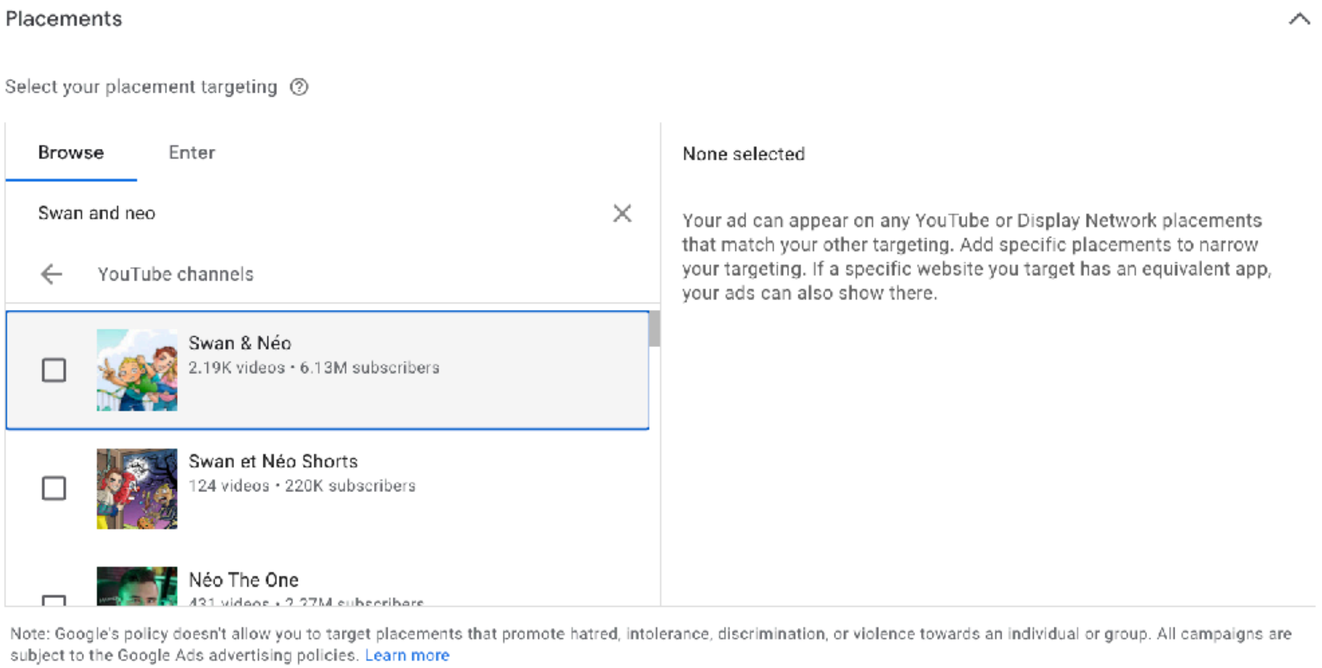


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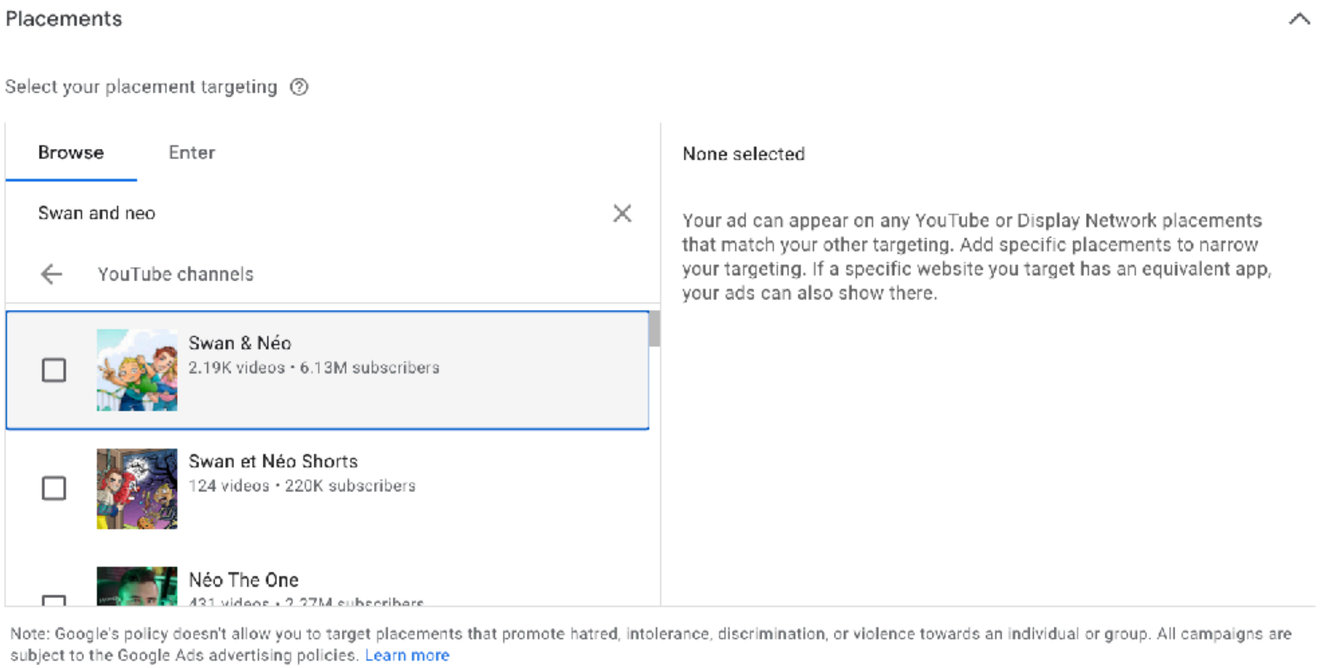


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Placement-based advertising is a form of contextual advertising



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# Regulations on children advertising

- The COPPA Act does not prohibit advertising to children
  - But data collection (e.g., tracking) is restricted from children under 13 years old without verifiable parental consent.
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Takeaway: Targeting children through contextual/placement-based advertising is legal

- Should this be allowed?
- Placement-based advertising can also be used in other contexts (health, misinformation) — placement-based advertising might be more problematic than profiling-based advertising

# Mistake 3:
# Consider advertising only in a commercial settings

# Advertising technology enables AI-driven information targeting

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  - to target (well chosen) information to specific groups of people (likely to accept it)

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Danger of weaponizing ad tech to engineer polarization, voter disengagement, voter manipulation (e.g., Cambridge Analytica, Russian Internet Research Agency)

# Mistake 4:
# Ignore translation between legal concepts and operationalizable definitions

# Increased transparency and restrictions on political ads

Ad platforms:

- Ad Libraries for political ads + restrictions (same-country policy, disclaimers, verification for advertisers or political content, restrictions on targeting)



"**Understanding the Complexity of Detecting Political Ads**." V. Sosnovik , O. Goga. The Web Conference (WWW), April 2021

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Vera Jourova (European Commission vice-president), Dec 2020



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Underlying assumption: we can differentiate political ads from the rest



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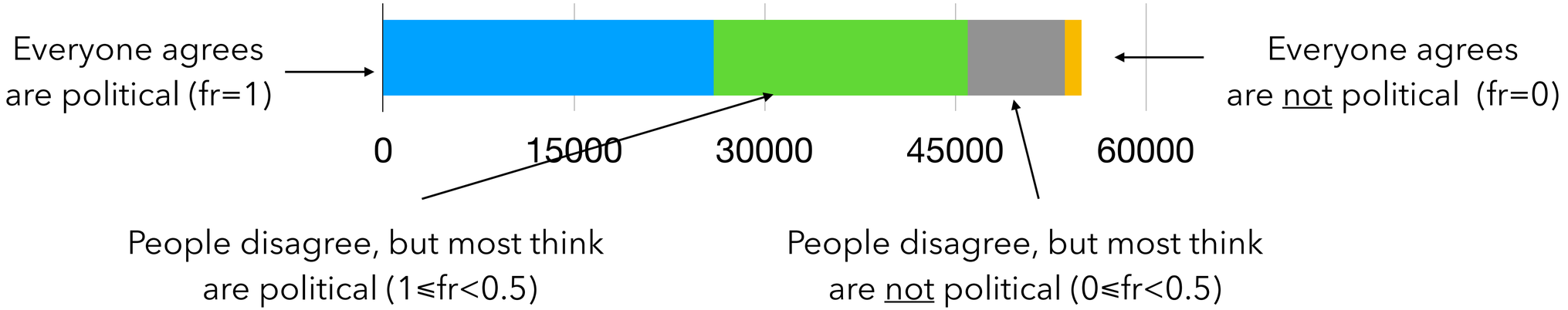

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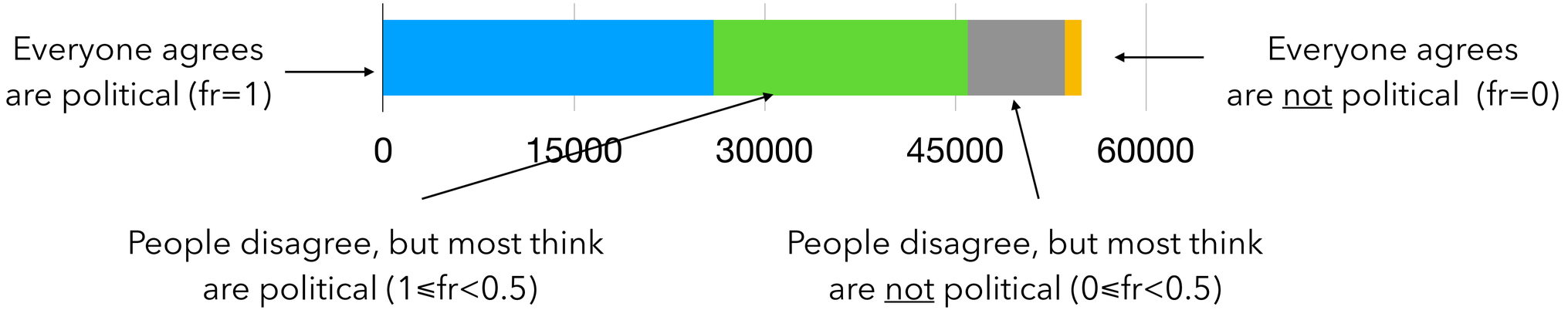


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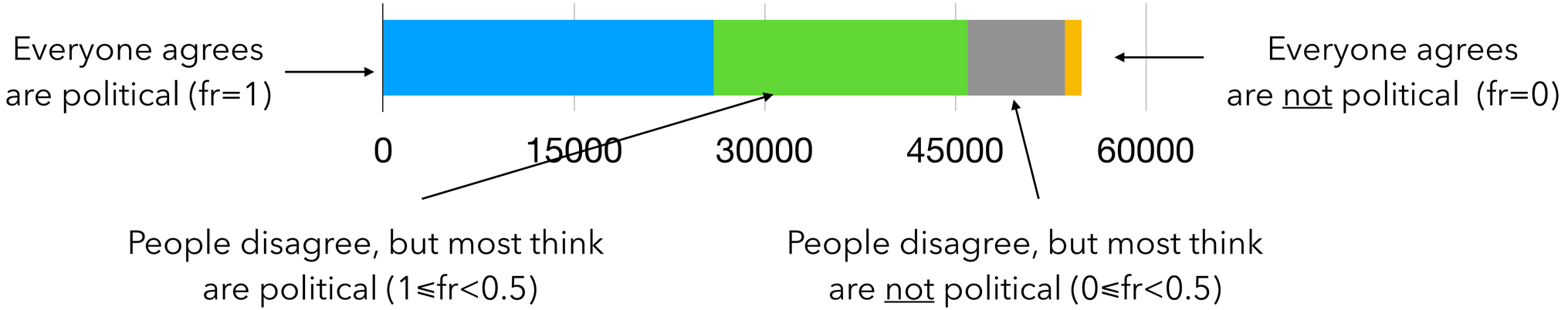


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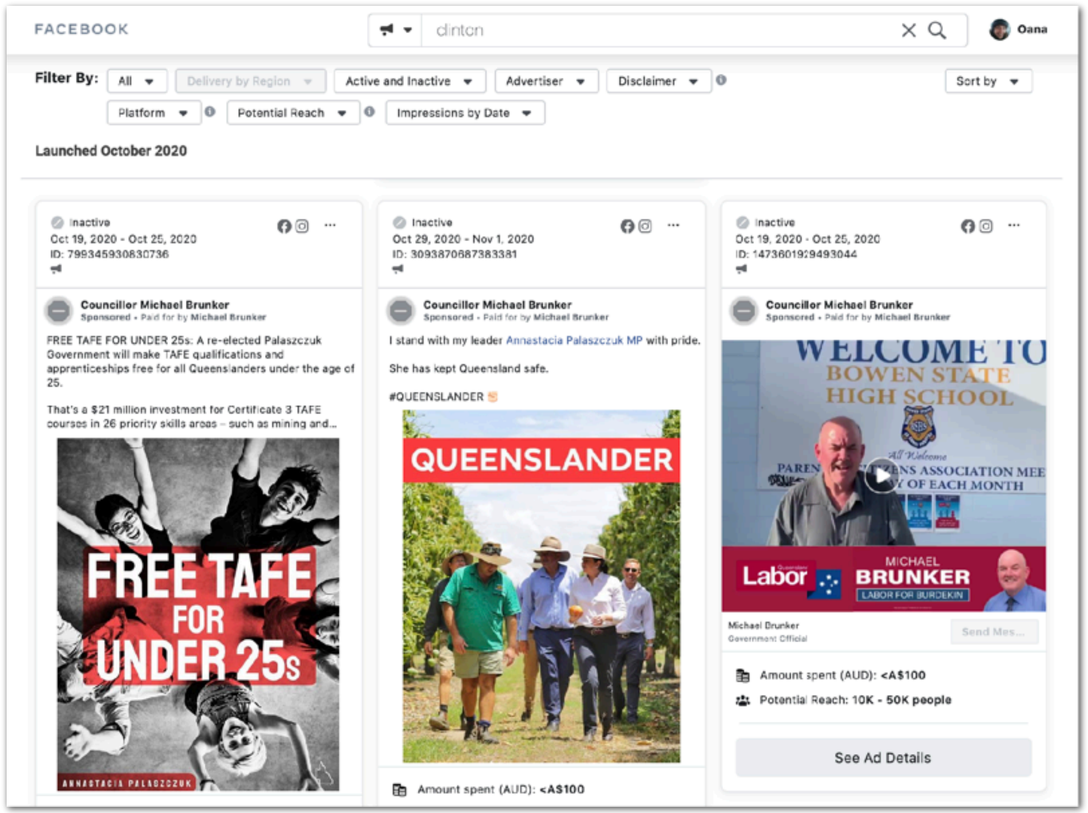
Takeaway: Ads about social issues are confusing

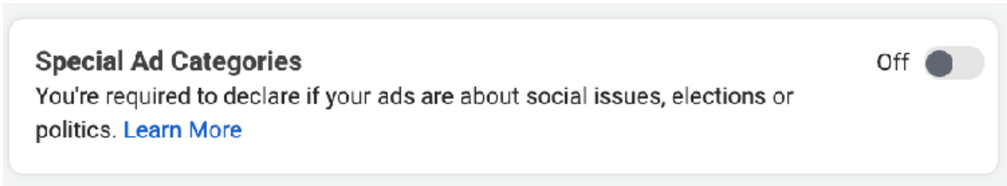
- Can we draw a line between political and humanitarian?
- Can we regulate political advertising if we do not agree what ads are political?

# Mistake 5: Not auditing transparency

# The Facebook Ad Library




- Central repository of political ads running on the platform
- Advertisers need to declare on a voluntary basis if they are sending political ads

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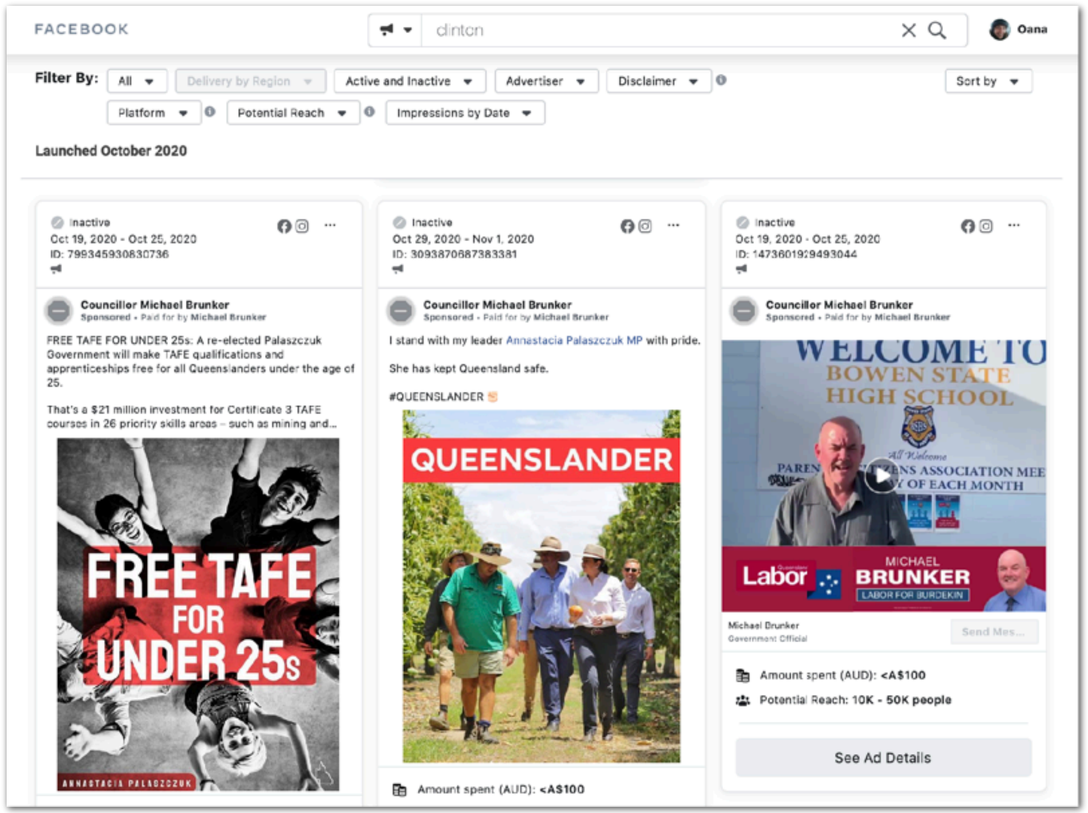


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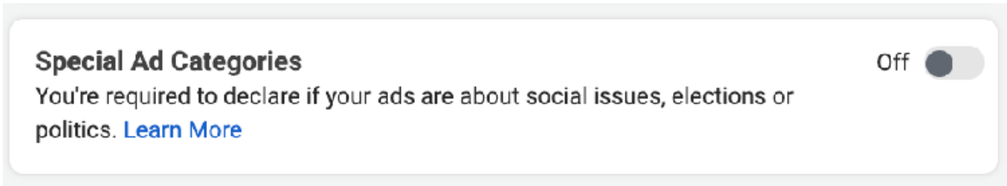


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How many political ads are missed by the Ad Library?

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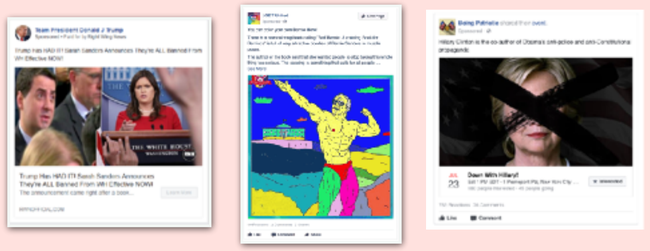
# Political ad detection

**Political ads (+)**



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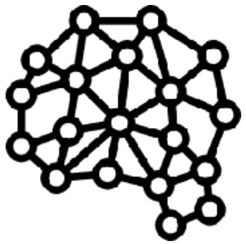

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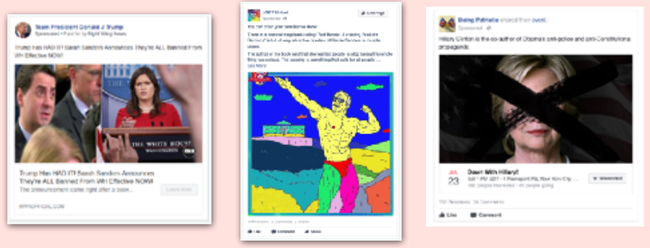

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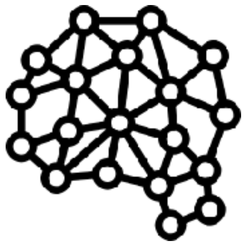

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**Non political ads (-)**

Fb timelines: 2% undeclared + 2% declared political ads — half of political ads we detected were missing from the Ad Library (in Brazil during the 2018 presidential election)

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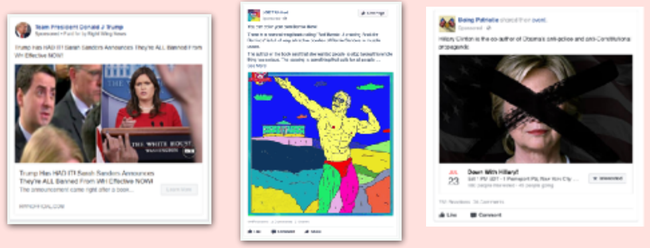

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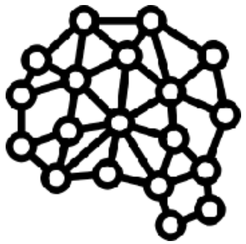

over 0.94 accuracy

**Non political ads (-)**

Fb timelines: 2% undeclared + 2% declared political ads — half of political ads we detected were missing from the Ad Library (in Brazil during the 2018 presidential election)

+ 20% of undeclared political ads were illegal

# Mistake 6:
# Ignore access to data

# Platform provided data and alternate data access

- Platform provided APIs: CrowdTangle API, Facebook Ad Library, FORT API, Twitter API, Twitter Ad Library, YouTube API, TikTok API
  - Only access to public data, problems with data completeness, rate limits, vetting process
  - None of the presented studies could be done with data available in these API

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  ▸ None of the presented studies could be done with data available in these API

- Alternate data sources
  - Mainly based on scraping and data donations
  - They are against the ToS of platforms, researchers have been pursued in justice

  ▸ Alternate data sources are necessary for auditing platforms, they should not be forbidden

# Thank you & Summary

1. There is a shift toward algorithmic-driven advertising — new risks
2. Contextual advertising at the granularity of a precise content is dangerous — needs more focus
3. Advertising technologies are increasingly being used to target information — risks of manipulation
4. Some regulations are impossible to implement because definitions are not operationalizable in practice
5. We need to audit what transparency platforms provide
6. We need access to data to understand risks

Thank you!

# Summary of contributions on online targeted ads

## Political advertising

1. (Behavior) Analysis of malicious political advertisers [FAT*'19]
2. (Audit) Audit platforms' political ad detection algorithms [WWW'20]
3. (Solution) Can we reliably split political from non-political ads? [WWW'21]
4. (Solution) Detecting policy-related political ads [WWW'23]
5. (Solution) EU online advertising regulations

**Supporting software:** AdAnalyst, CheckMyNews, Elections2022, PolAds

## Micro-targeting

1. (Audit) Does Facebook provide good ad explanations? [NDSS'18]
2. (Attacks) De-anonymize users through micro-targeting [S&P'18]

PET Award
The Caspar Bowden Award for Outstanding Research in Privacy

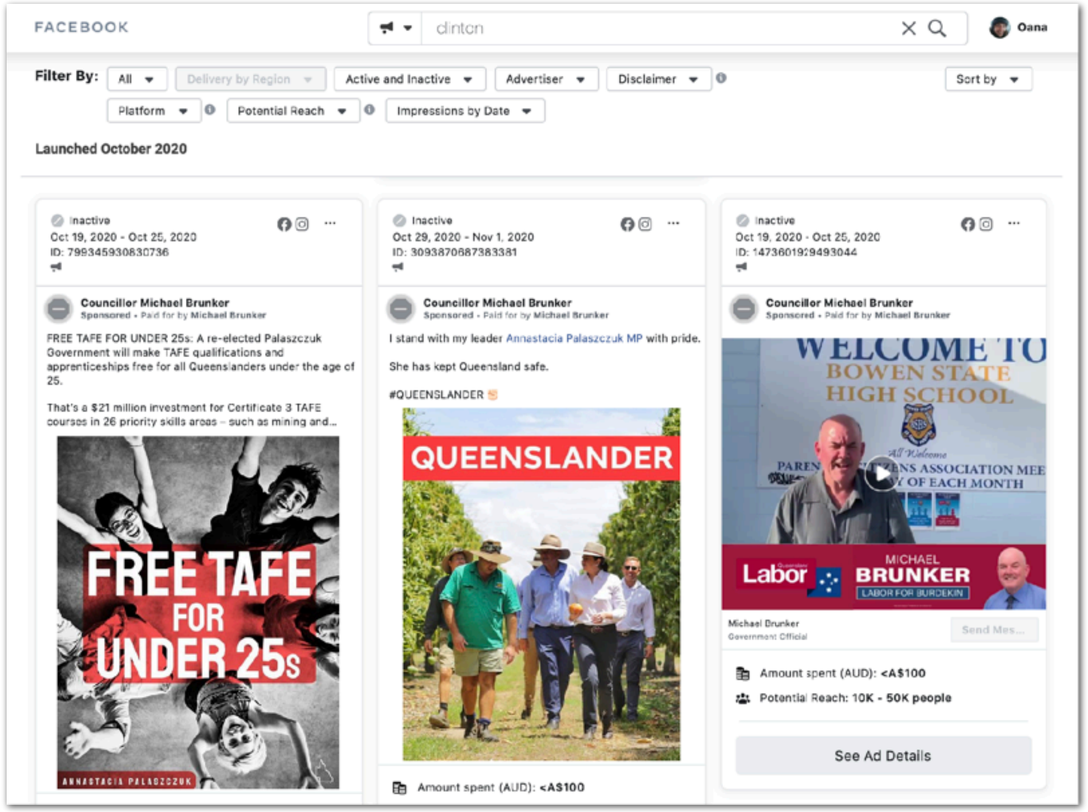
3. (Behavior) Characterization of Facebook advertisers [NDSS'19]
4. (Audit) Assess the quality of data supplied by data brokers [WWW'19]
5. (Behavior) Micro-targeting usage [CSCW'22]
6. (Solution) Collaborative ad transparency [S&P'23]

# Backup slides

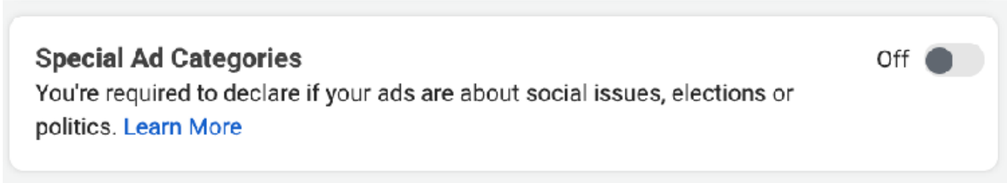
# Audit: Audit platforms' political ad detection algorithms

"**Facebook Ads Monitor: An Independent Auditing System for Political Ads on Facebook**."M. Silva, L. Santos de Oliveira, A. Andreou, P. Vaz de Melo, O. Goga, F. Benevenuto. **The Web Conference (WWW)**, April **2020**.

# The Facebook Ad Library




- Central repository of political ads running on the platform
- Advertisers need to declare on a voluntary basis if they are sending political ads

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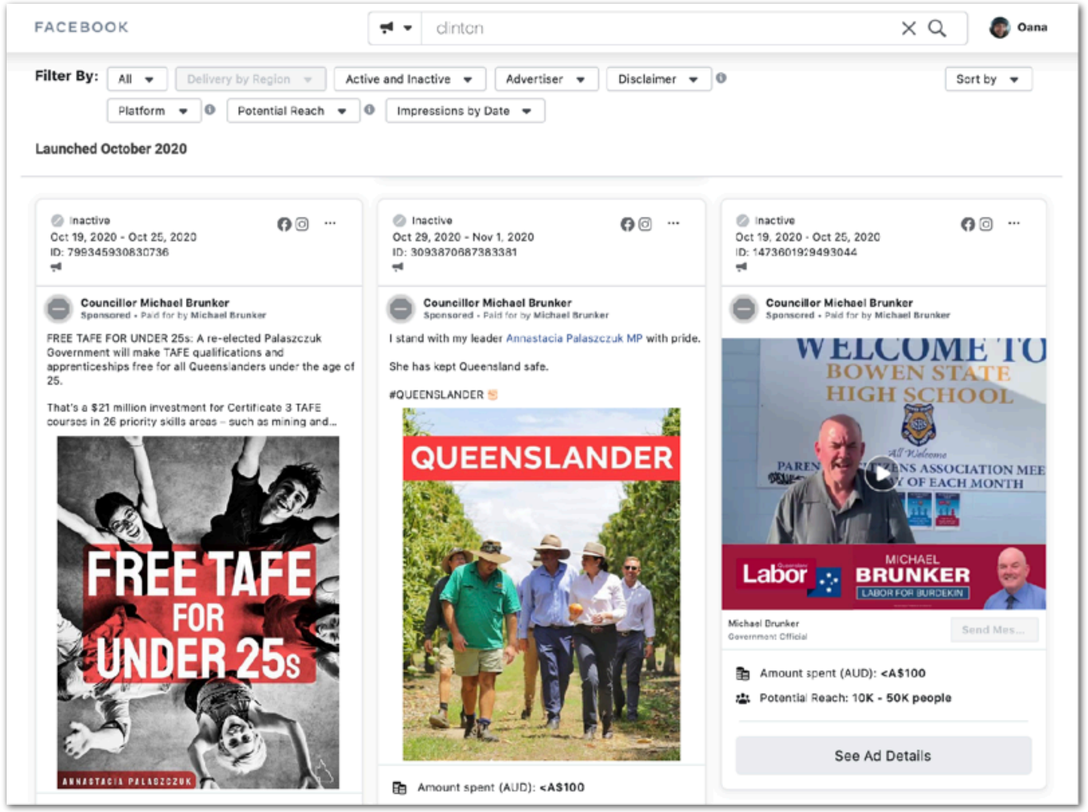


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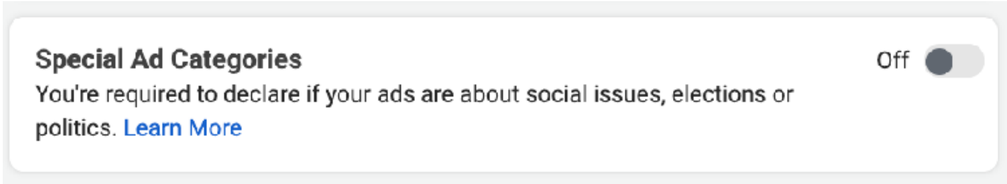


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How many political ads are missed by the Ad Library?

# Measurement methodology

Challenge: Limited access to data due to the closed nature of ad platforms — no access to what ads people see on Facebook

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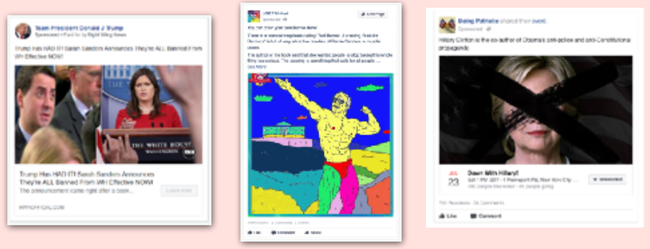
We designed a software tool to enable data donations, that captures the non-public content users are exposed to on social media

In 2018, over **2,000 Brazilian users** volunteered to install our tool (239k ads from 40k advertisers)

# Political ad detector

**Political ads (+)**



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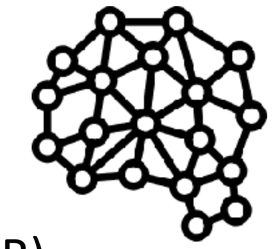

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(80% TPR for 1% FPR)

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[3 PhD students reviewed 10k random ads]

[Naive Bayes, Random Forest, Log. Regression, SVM, Gradient Boosting, Convolution Neural Networks (CNN); Word2Vec with 300 dimensions; 10 fold-cross validation]

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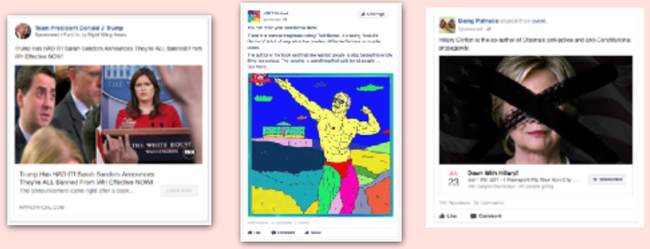

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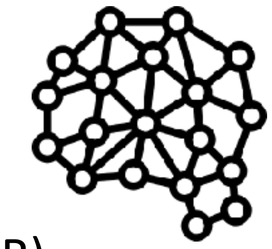

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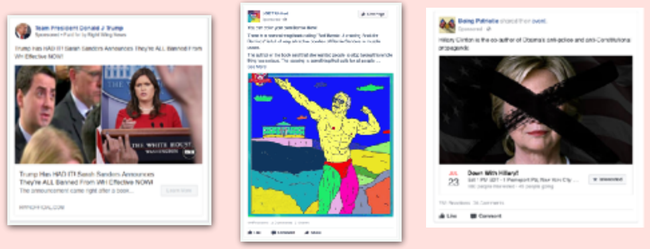

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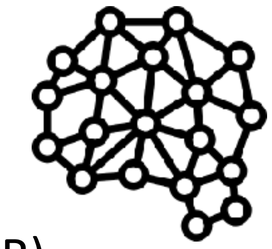

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+ 20% of undeclared political ads were illegal — How can countries ensure their sovereignty and enforce their legislation?

# Solution/design: Can we reliably detect political ads?

“**Understanding the Complexity of Detecting Political Ads**.” V. Sosnovik , O. Goga. **The Web Conference (WWW)**, April **2021**.

# What is a political ad?

- Made by, on behalf of, or about a candidate for public office, a political figure, a political party or advocates for the outcome of an election to public office; or
- About any election, referendum, or ballot initiative, including "go out and vote" or election campaigns; or
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facebook

Social issues: civil and social rights, crime, economy, education, environmental politics, guns, health, immigration, political values and government, security and foreign policy

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Political actors ads

Election ads

Issue ads

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Most current legislations only regulate ads from politicians! (except EU Code on Disinformation)

# Do people agree what ads are political?

- We analyze a dataset from ProPublica/Quartz — 55k ads labeled as political by at least one user or an advertiser; each ad has 3 labels

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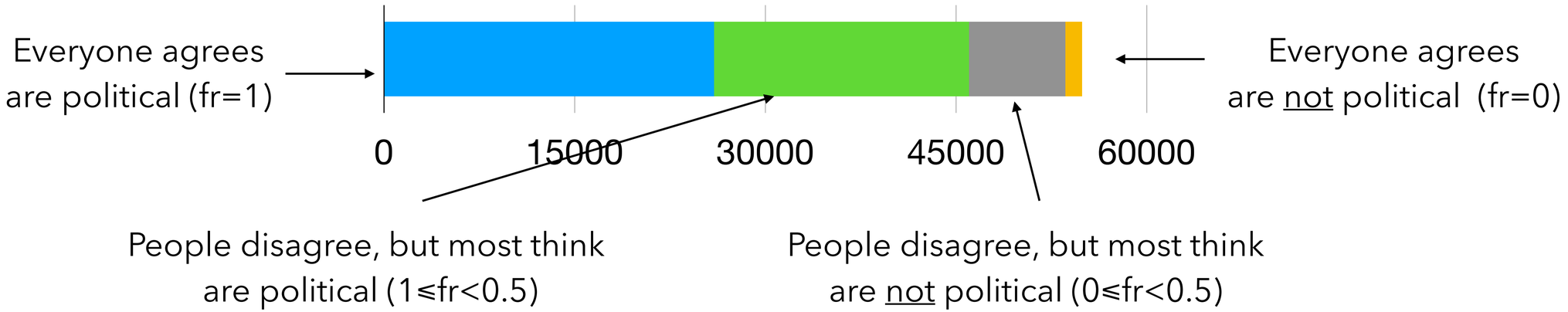

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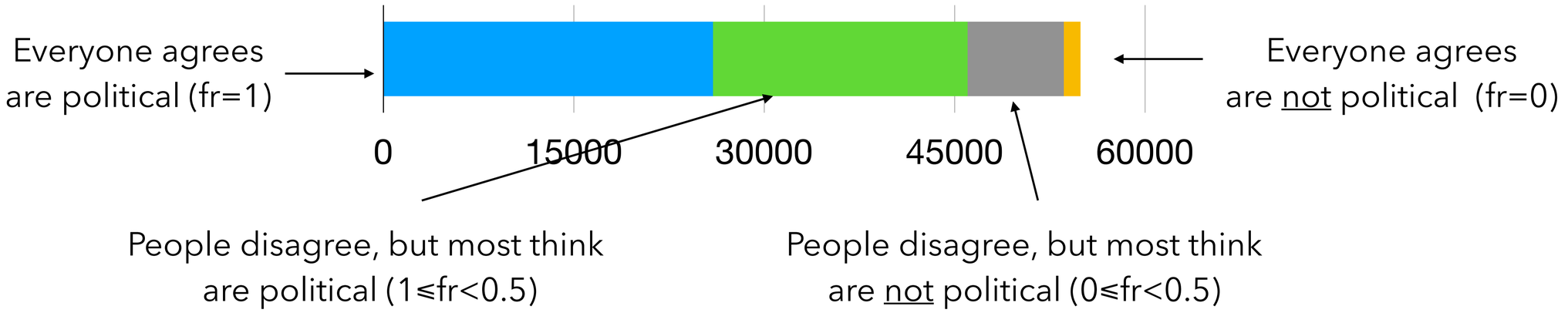


People disagree on more than 50% of ads!

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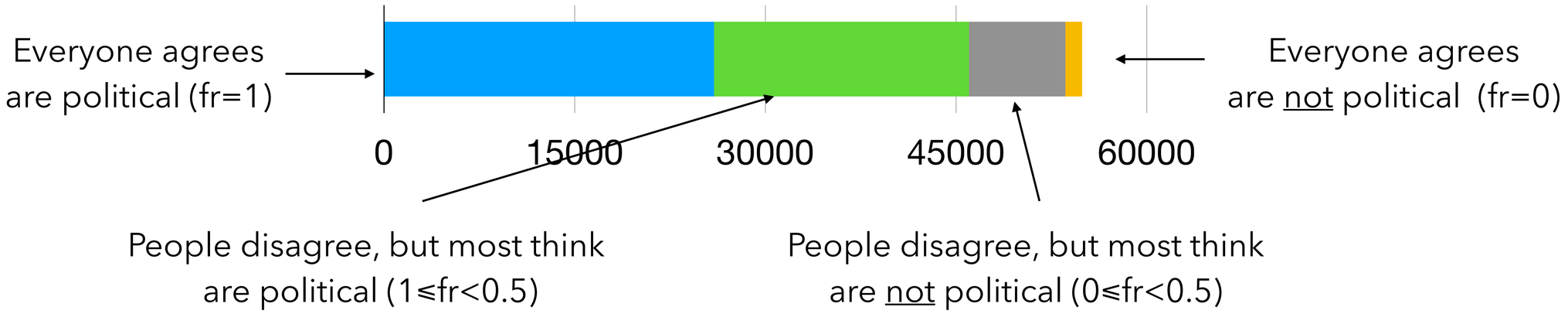
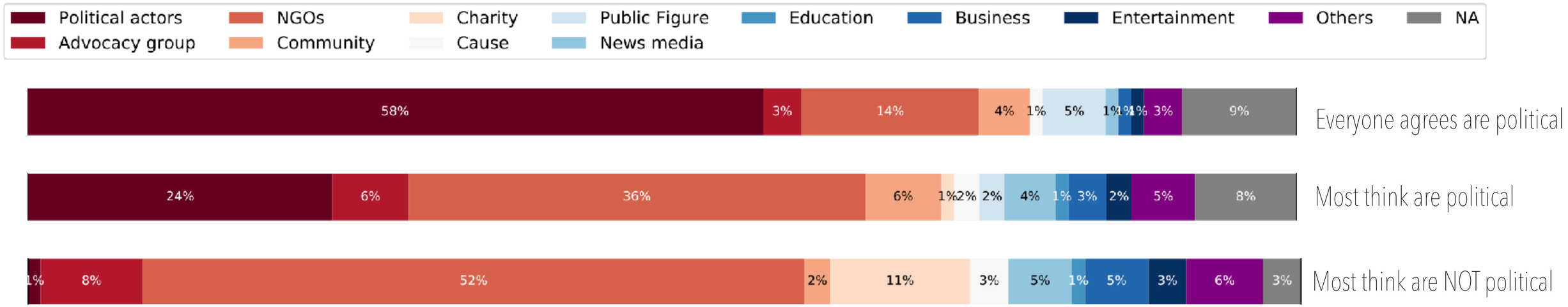



People disagree on more than 50% of ads!

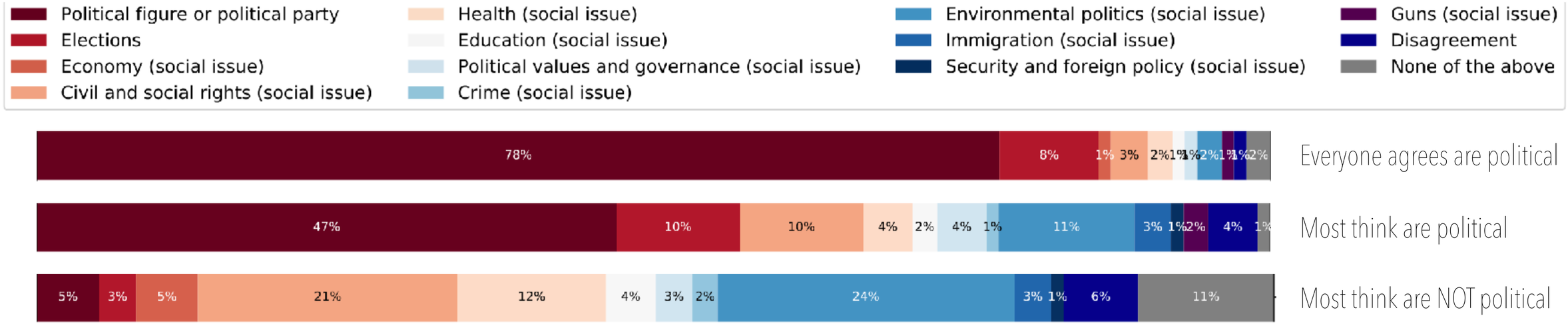
What are the characteristics of the ads on which users agree and the ones on which they disagree?

# Analysis of advertisers




- People agree that ads from NGOs and Businesses can be political
  - Electoral legislation should not regulate ads only from political actors

# Analysis of ad content




- Users agree that some social issue ads are political
  - Definitions of political ads should include them
- But issue ads also lead to disagreement! … why?

# The problem with social issue ads

- Some issue ads have highly political content
- Some issue ads are non-political and address humanitarian issues
  - Can we draw a line between political and humanitarian? Understandable by both humans and algorithms?
  - Restrictions on political ads can harm humanitarian ads; should they be subject to the same restrictions?

https://facebookads.imag.fr/

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https://facebookads.imag.fr/

**What about definitions based on intent and consequences?**

**What metrics can capture the goodness?**

# Behavior: How do malicious advertisers behave?

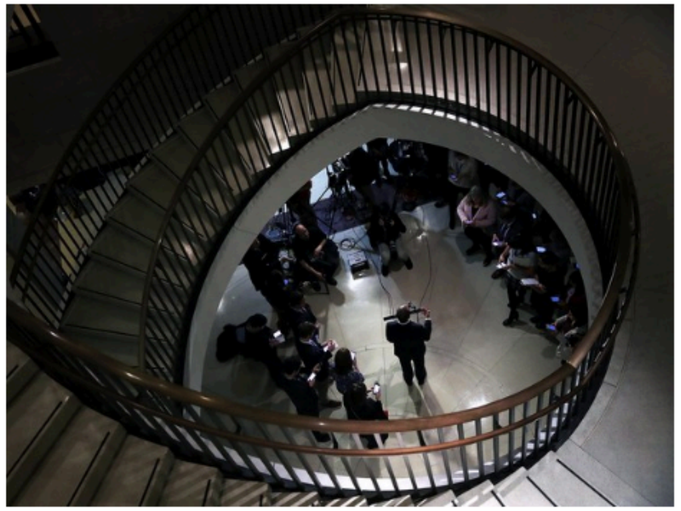
**On Microtargeting Socially Divisive Ads: A Case Study of Russia-Linked Ad Campaigns on Facebook** F. Ribeiro, K. Saha, M. Babaei, L. Henrique, J. Messias, O. Goga, F. Benevenuto, K. P. Gummadi, E. M. Redmiles **ACM Conference on Fairness, Accountability, and Transparency** (ACM FAT*, now FAccT), January 2019

# The Internet Research Agency ad campaigns

## Background

ISSIE LAPOWSKY BUSINESS 05.10.18 10:00 AM

### HOUSE DEMOCRATS RELEASE 3,500 RUSSIA-LINKED FACEBOOK ADS

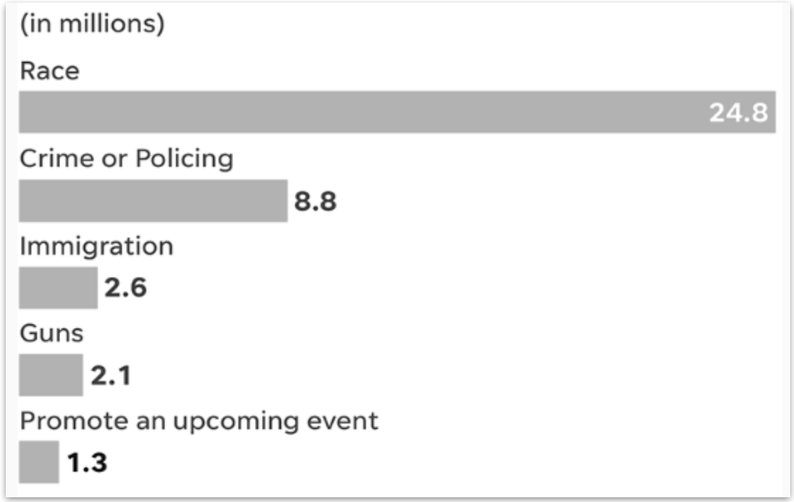


WIN MCNAMEE/GETTY IMAGES

**ON THURSDAY, DEMOCRATS** on the House Intelligence Committee published more than 3,500 Facebook and

| | |
|---|---|
| Ad ID | 664 |
| Ad Text | "People can tolerate two homosexuals they see leaving together, but the next day they're smiling, holding hands, tenderly embracing one another, then they cannot be forgiven. It is not the departure for pleasure that is unacceptable, it is waking up happy."<br><br>~Michel Foucault, philosopher and social critic.<br><br>#lgbt #homophobia #Foucault #society #queerquote |
| Ad Landing Page | https://www.facebook.com/LGBT-United-839497472793277/ |
| Ad Targeting | Location - Living In: United States<br>Age: 18 - 65+<br>Placements: News Feed on desktop computers or News Feed on mobile devices<br>People Who Match: People who like LGBT United, Friends of connections: Friends of people who are connected to LGBT United |
| Ad Impressions | 374 |
| Ad Clicks | 26 |
| Ad Spend | 99.95 RUB |
| Ad Creation Date | 06/23/15 07:02:40 AM PDT |
| Ad End Date | 06/24/15 07:02:39 AM PDT |

Detailed ad information

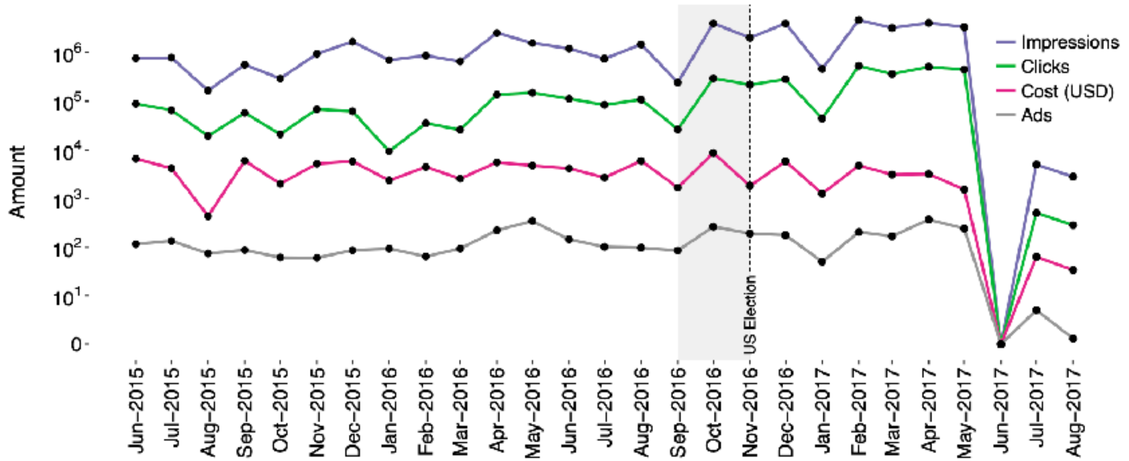



Sensitive issues

https://eu.usatoday.com/story/news/2018/05/11/what-we-found-facebook-ads-russians-accused-election-meddling/602319002/

# Characteristics

## Timeline




Campaign run over 2 years
(relevant for definitions of political ads)

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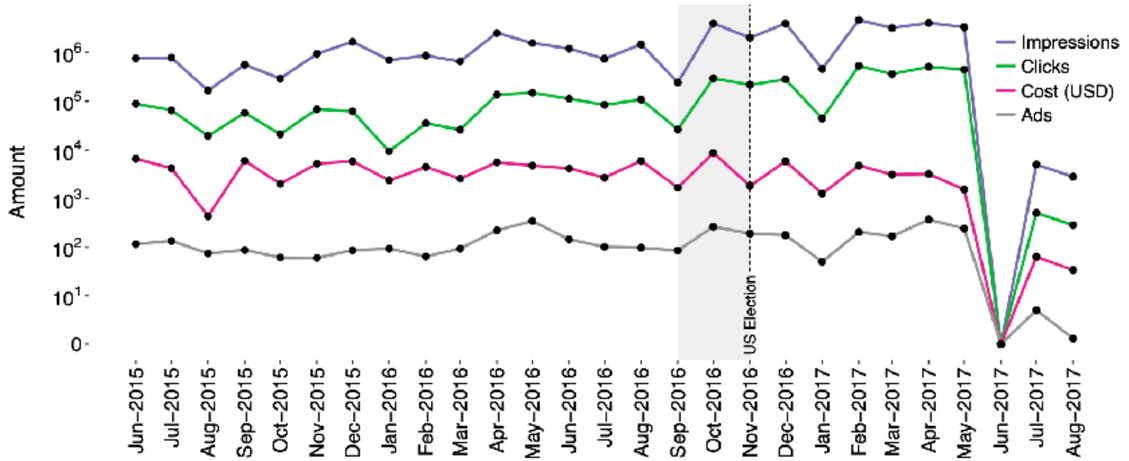


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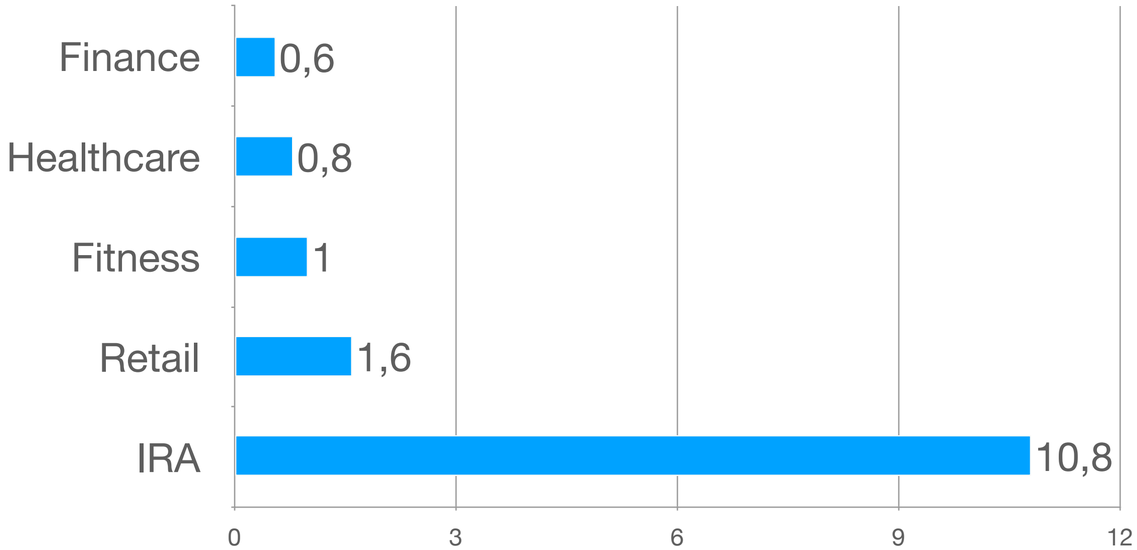


10-20 times higher CTR than industry average!

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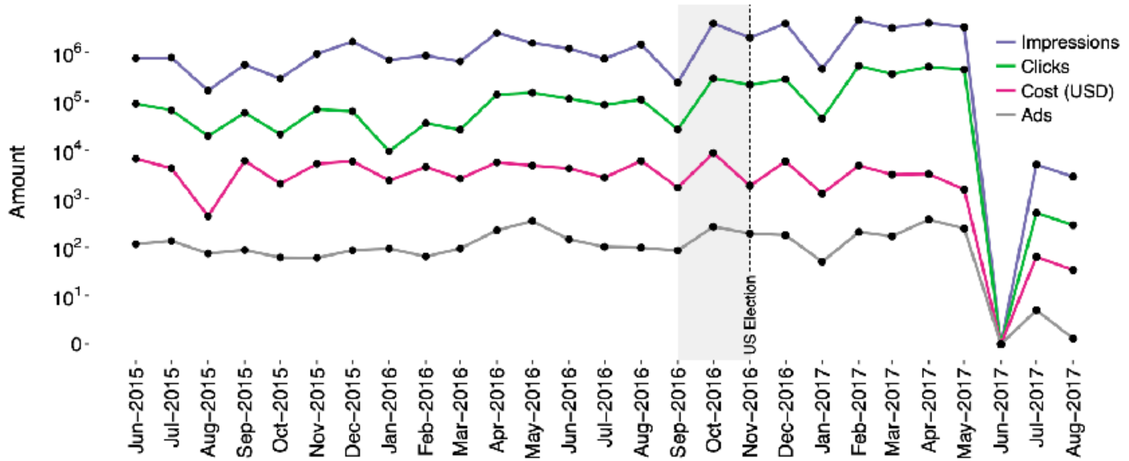


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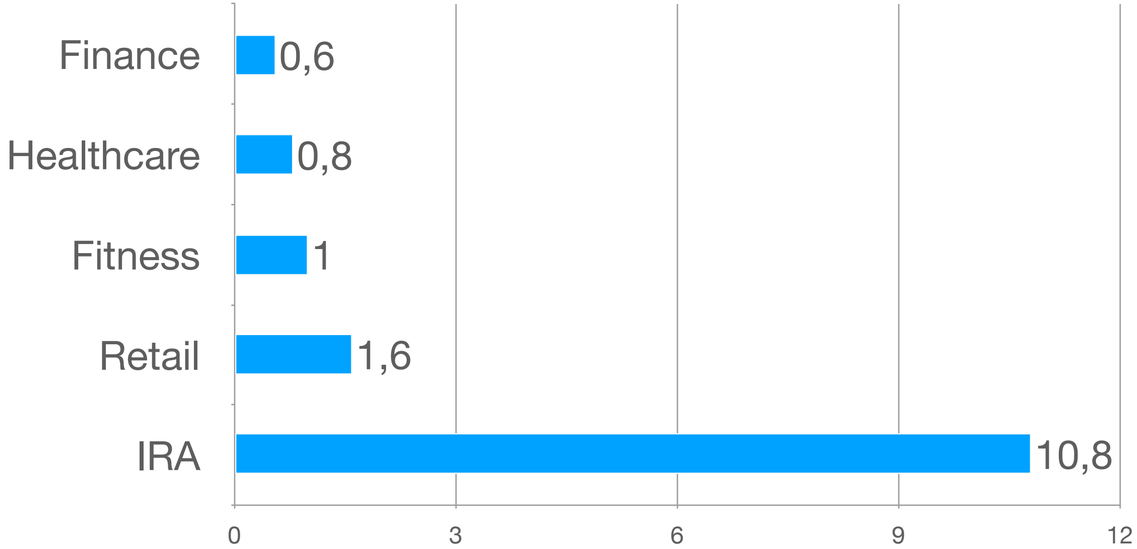


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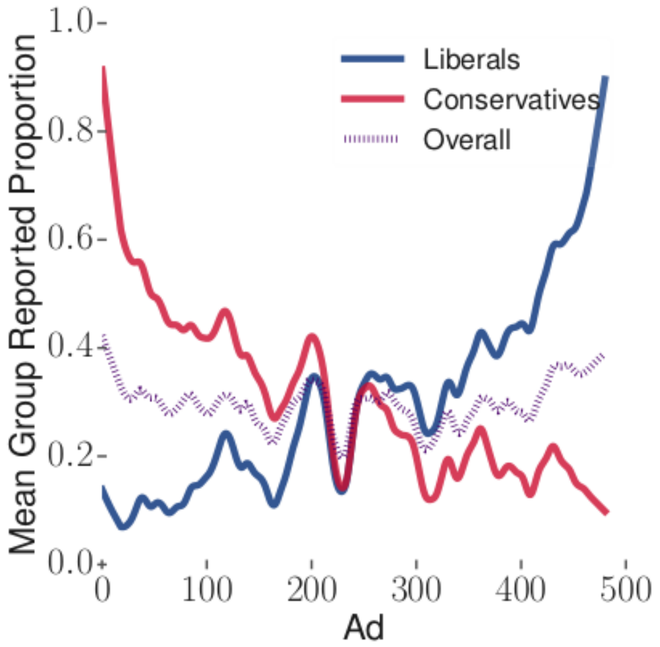
Efficient micro-targeting

CTR as a proxy to determine malicious advertising?

# Can we rely on crowd reports?

## Reporting

Some social media platforms allow you to report content by clicking “report”. Would you report tis ad (e.g., mark it as inappropriate or offensive). Yes, No, I don’t know



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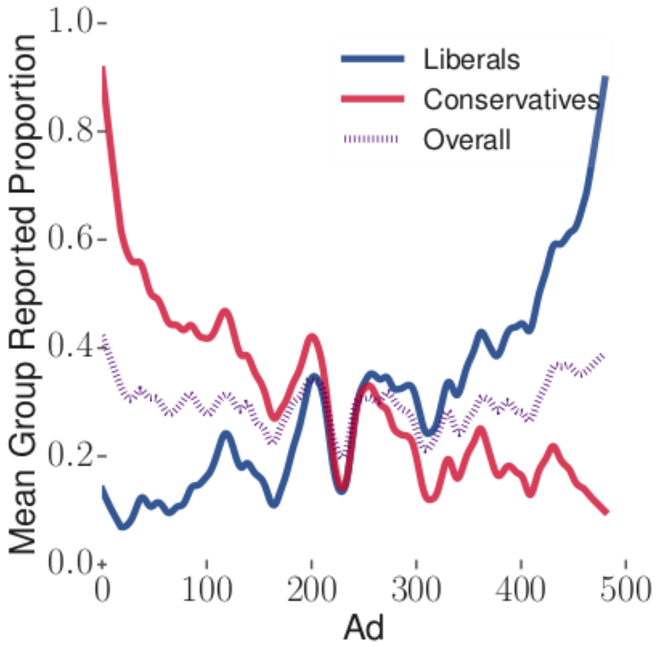
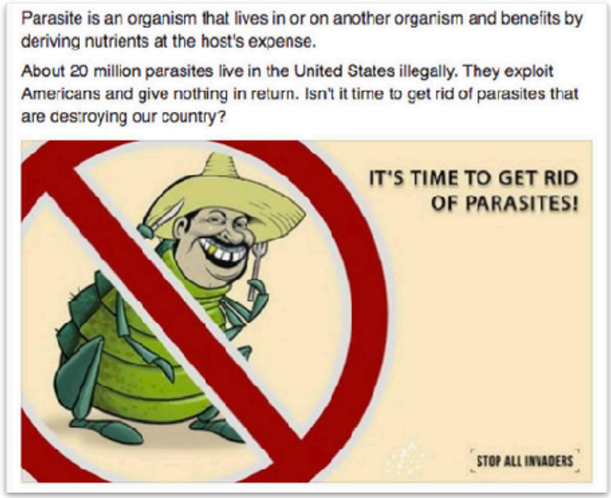


Conservatives would report, but not Liberals




Liberals would report, but not Conservatives

# Learning from past malicious ad campaigns

To detect malicious ad campaigns

- We cannot rely on crowd reports — ads well targeted are less likely to be reported
- Click though rate and divisiveness could be useful proxies
  - What other dimensions we could consider?

# Solution: EU online advertising regulation

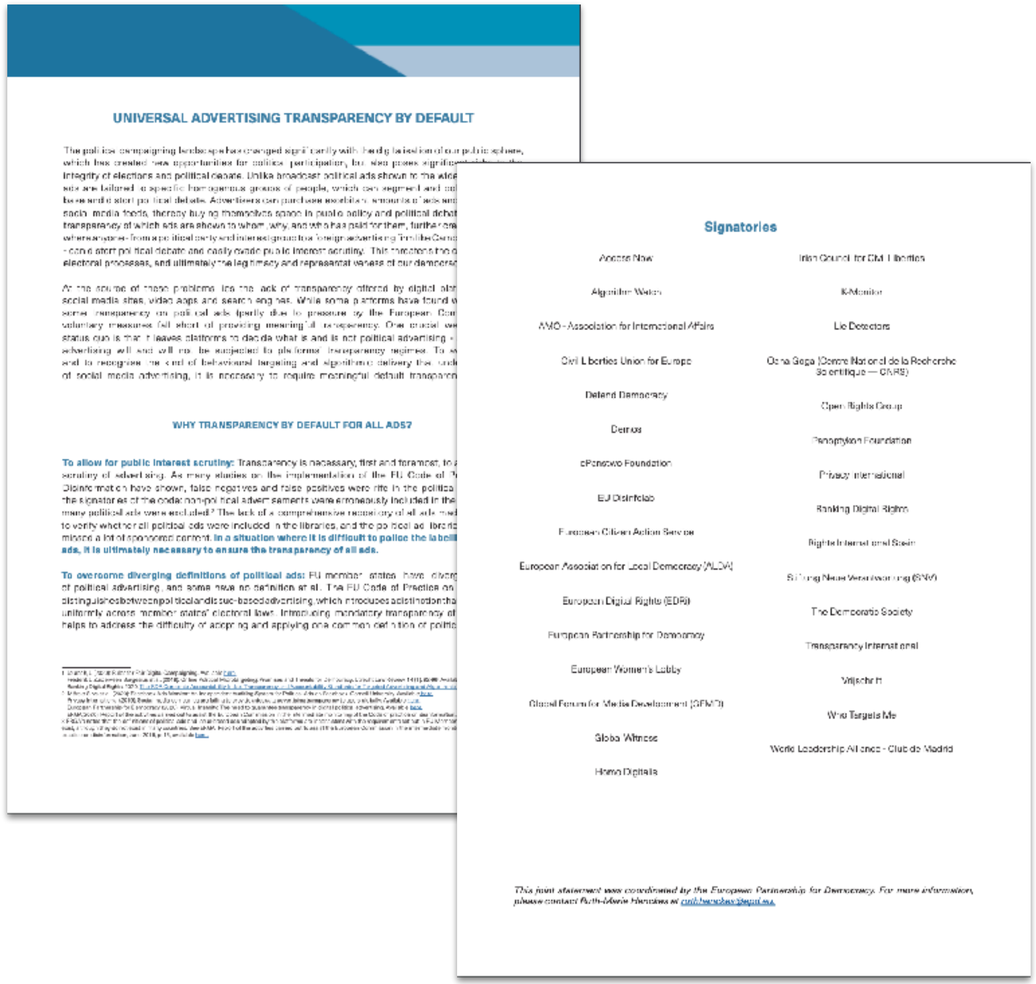
# European law

# European law

1.**Digital Services Act (DSA)**

"Universal advertising transparency by default" statement written together with civil societies and submitted to Digital Services Act (DSA) consultation 2020

- increase the transparency and accountability for all users
- access to data to the whole research community


UNIVERSAL ADVERTISING TRANSPARENCY BY DEFAULT

WHY TRANSPARENCY BY DEFAULT FOR ALL ADS?

Signatories

Access Now
Algorithm Watch
AMO - Association for International Affairs
Civil Liberties Union for Europe
Defend Democracy
Demos
cPensowo Foundation
EU Disinfolab
European Citizen Action Service
European Association for Local Democracy (ALDA)
European Digital Rights (EDRi)
European Partnership for Democracy
European Women's Lobby
Global Forum for Media Development (GFMD)
Globe Witness
Homo Digitalis
Irish Council for Civil Liberties
K-Monitor
Lie Detectors
Open Rights Group
Panoptykon Foundation
Privacy International
Ranking Digital Rights
Rights International Spain
The Democratic Society
Transparency International
Wilschrift
Who Targets Me
World Leadership Alliance - Club de Madrid

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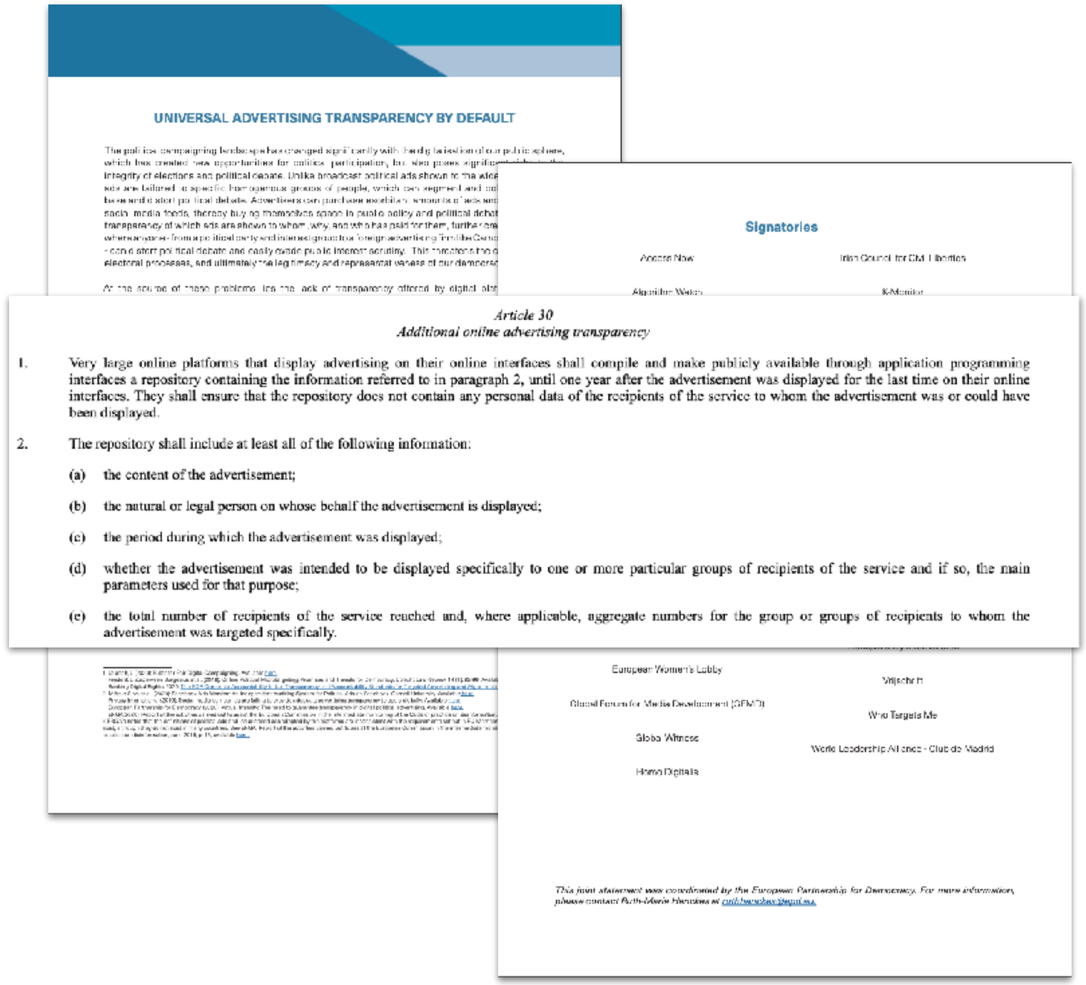


# European law

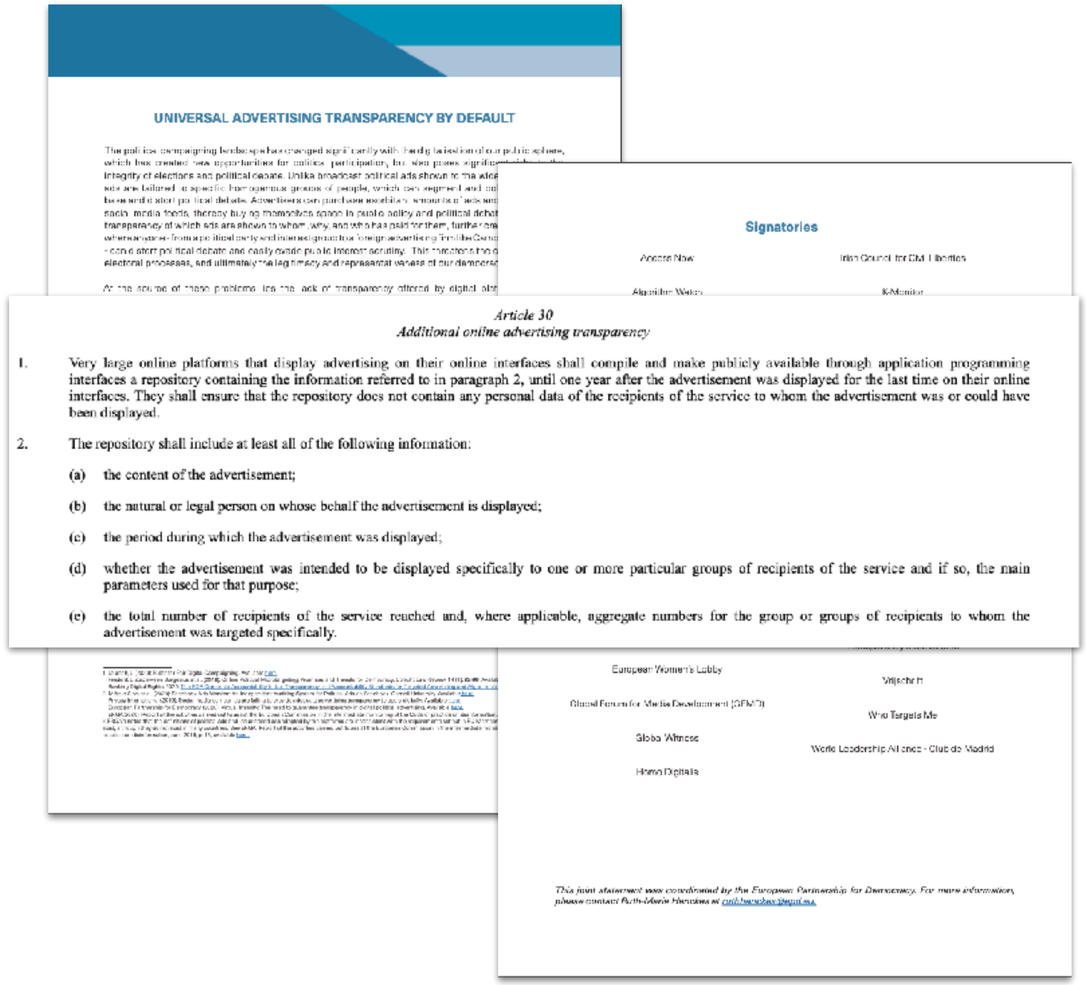
1.**Digital Services Act (DSA)**

"Universal advertising transparency by default" statement written together with civil societies and submitted to Digital Services Act (DSA) consultation 2020

- increase the transparency and accountability for all users
- access to data to the whole research community

2. **European Democracy Action Plan (EDAP)**

- Definition of political ads
- Click through rate



# Summary of my contributions on online targeted ads

## Political advertising

1. (Behavior) Analysis of malicious political advertisers [FAT*'19]
2. (Audit) Audit platforms' political ad detection algorithms [WWW'20]
3. (Solution) Can we reliably split political from non-political ads? [WWW'21]
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5. (Solution) EU online advertising regulations

**Supporting software:** AdAnalyst, CheckMyNews, Elections2022, PolAds

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PET Award
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# Behavior: Regulations and Micro-targeting usage

"**Exploring the Online Micro-targeting Practices of Small, Medium, and Large Businesses**"
Salim Chouaki, Islem Bouzenia, Oana Goga, Beatrice Roussillon, **ACM Conference on Computer-Supported Cooperative Work and Social Computing** (**CSCW**), **2022**

# Options to regulate (political) advertising

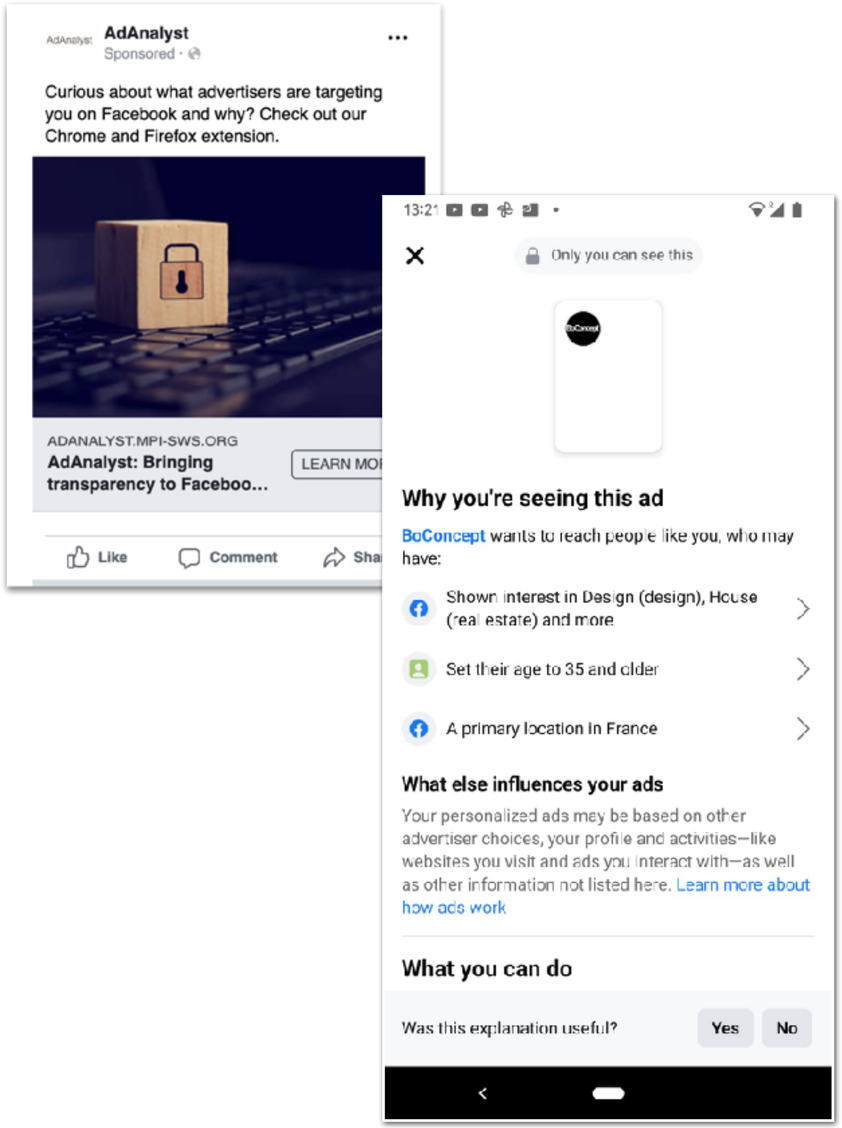
## Considered by the European Commission

- Ban or restrict micro-targeting
  - But what is the economic impact on the ecosystem?
    - To which extent small and medium-sized businesses use micro-targeting?
- Ban or restrict web tracking

# Measurement methodology

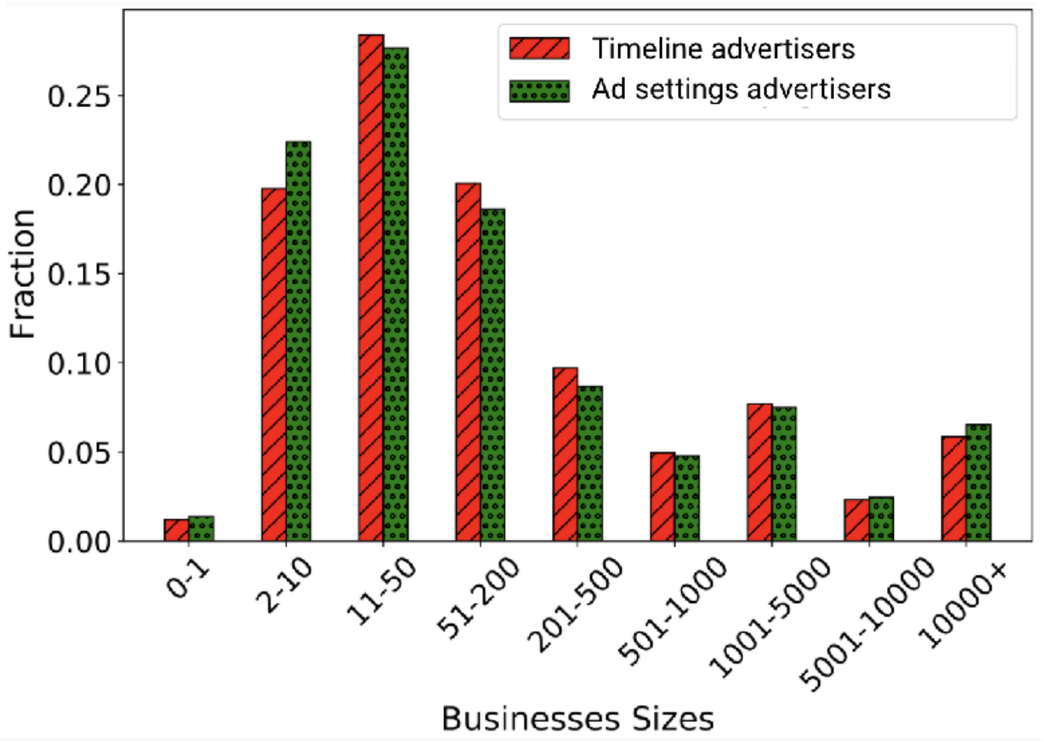
- Use AdAnalyst to collect a set of ads + how ads were targeted
  - Recruited 890 US users on Prolific to install it
  - 102k ads
- Information about the business size of advertisers
  - Method to match Fb advertisers with LinkedIn businesses

Info about 79k advertisers

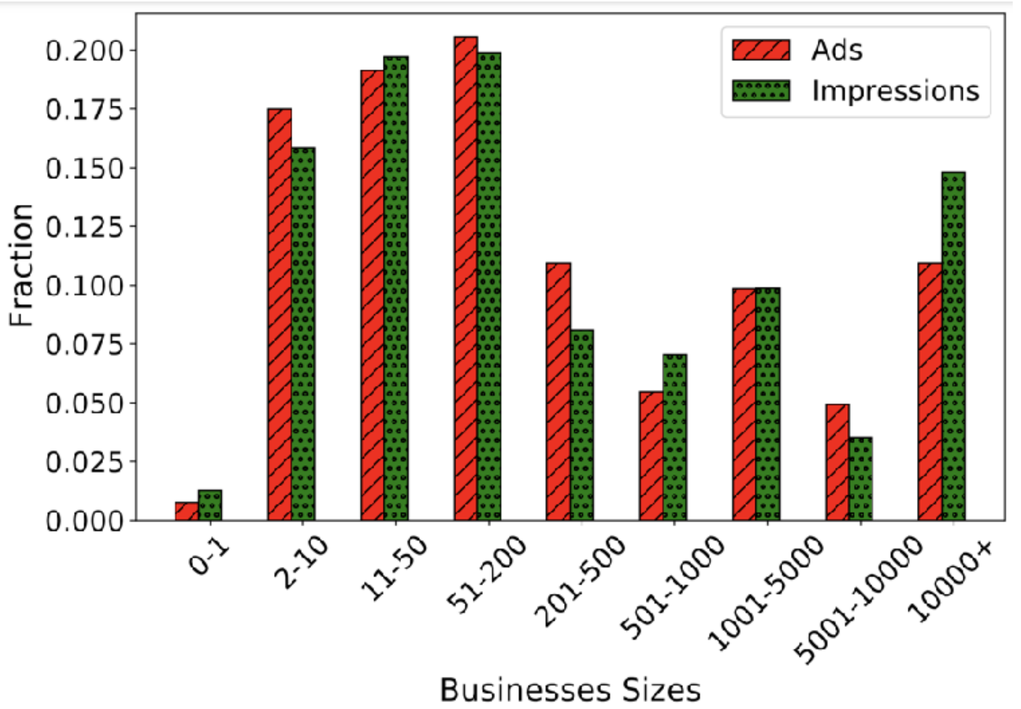


# To which extent small businesses advertise on Fb?

Fraction of advertisers




Fraction of ad impression



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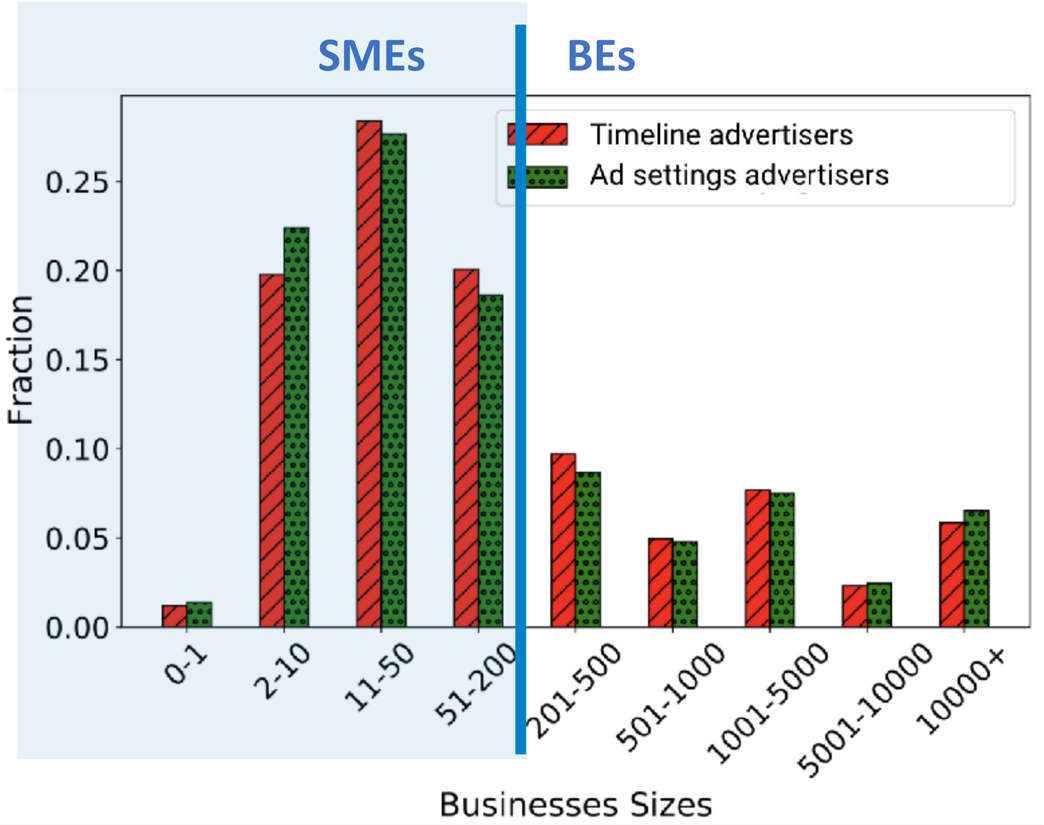
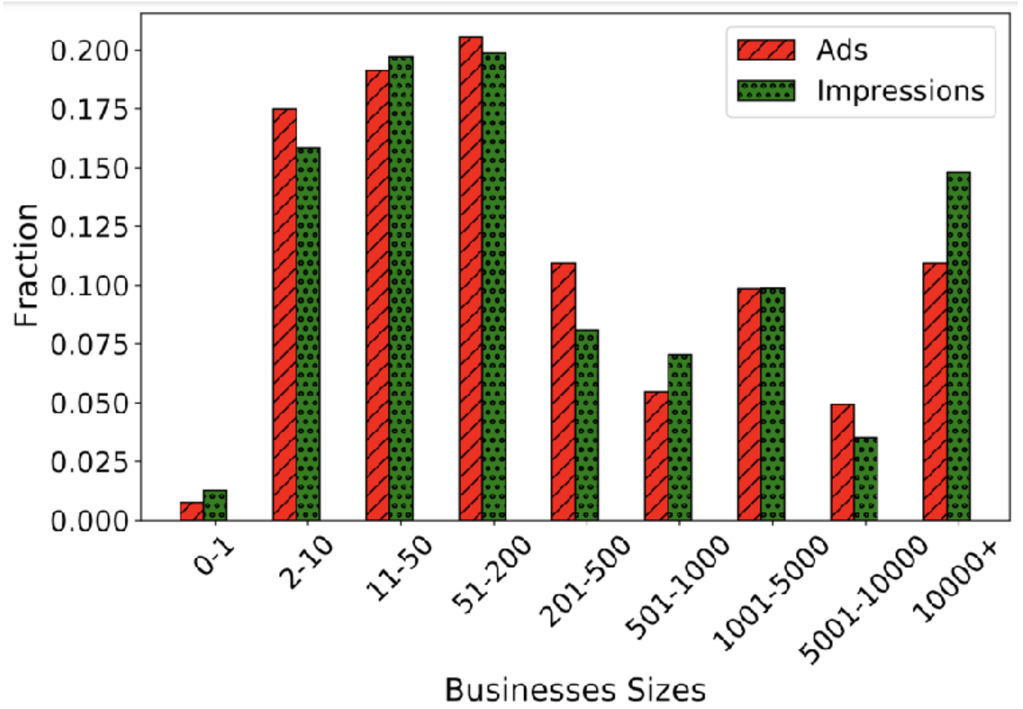



Over 70% of advertisers are SMEs

Fraction of ad impression



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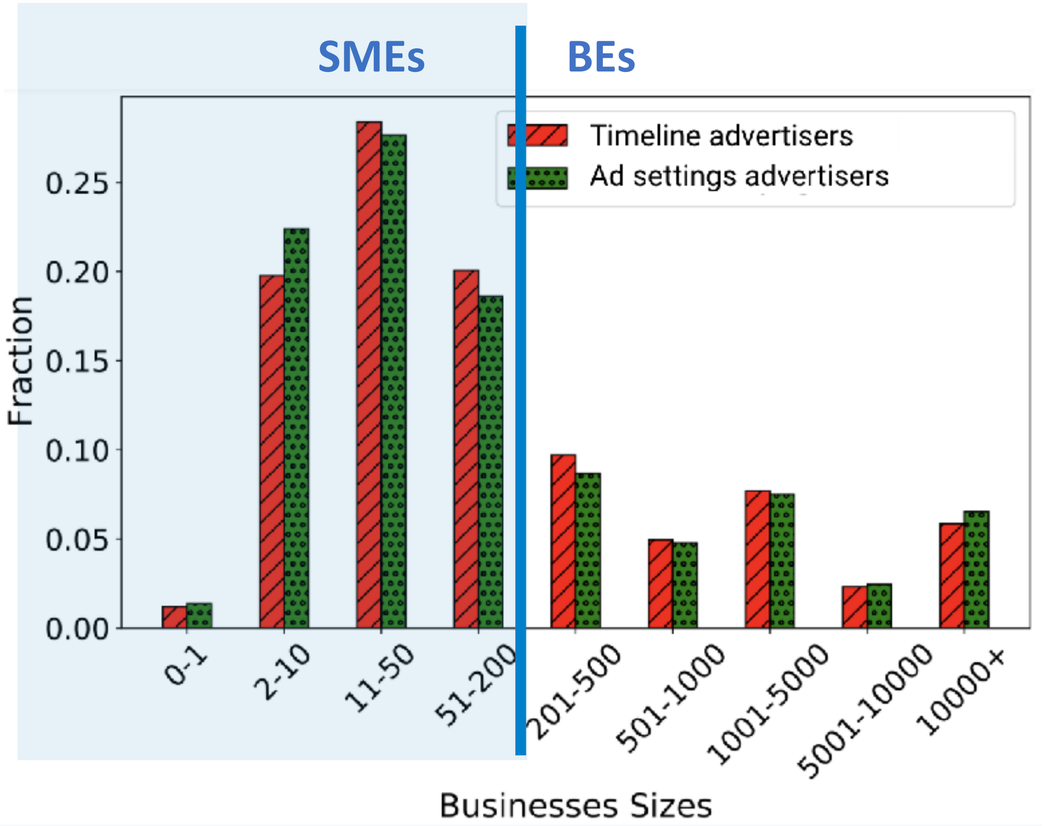


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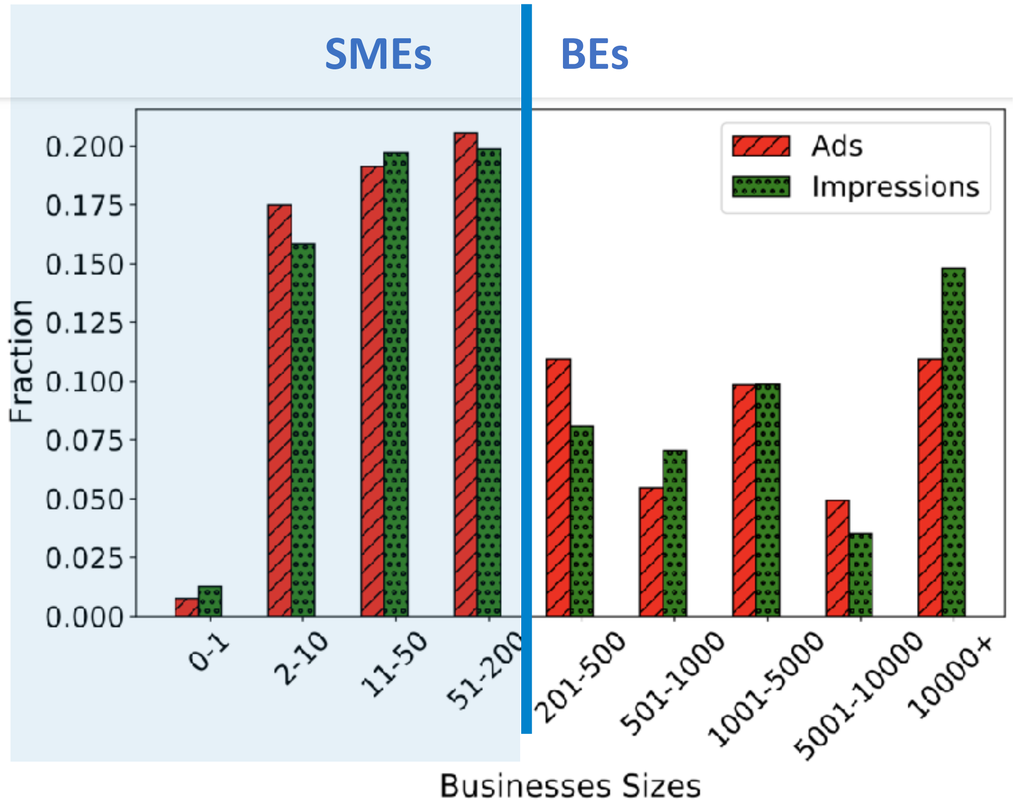


57% of ad impressions are from SMEs

# Do businesses use micro-targeting?

| | Targeting type | SME (%) | BE (%) |
|---|---|---|---|
| **Generic targeting** | Generic targeting only | 72.3% | 69.5% |
| **Advertiser-driven micro-targeting** | Attribute based micro-targeting | 12.0% | 15.1% |
| | Custom audience-based micro-targeting | 6.9% | 6.8% |
| | Lookalike audiences | 8.8% | 8.6% |

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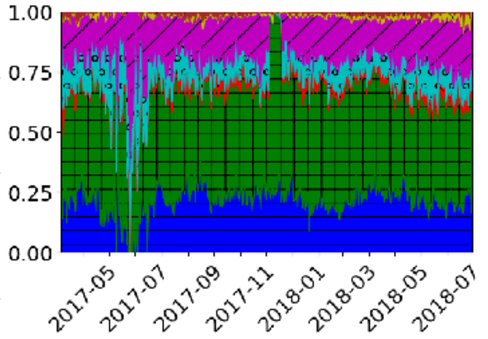
# Do businesses use micro-targeting?

Generic targeting was only 19% in [NDSS'2019] !

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# Does this mean that micro-targeting is not useful?

… NO …

… advertiser driven micro-targeting is being replaced by algorithmic driven micro-targeting

*“During ad set creation, you chose a target audience ... and an optimization event ... We show your ad to people in that target audience who are likely to get you that optimization event”.*

*“Each time there’s an opportunity to show an ad to someone, an ad auction takes place to determine which ad to show”.*

***Facebook terms of services***

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How should we regulate algorithmic driven micro-targeting?

# Options to regulate (political) advertising

## Considered by the European Commission

- Ban or restrict micro-targeting
  - But what is the economic impact on the ecosystem?
    - To which extent small and medium-sized businesses use micro-targeting?
- Ban or restrict web tracking
  - Where is web tracking used in advertising on Facebook?

# The role of web tracking in Facebook's micro-targeting

- Not used for attribute-based micro-targeting

> *"Ads they click; Pages they engage with; Activities people engage in on Facebook related to things like their device usage, and travel preferences; Demographics like age, gender and location; The mobile device they use and the speed of their network connection."*
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- Used only for the pixel-based custom-audience micro-targeting technique
  - Only 2.6% of the ads sent by SMEs and 2.7% of the ones sent by BEs used the Facebook pixel

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- Used only for the pixel-based custom-audience micro-targeting technique
  - Only 2.6% of the ads sent by SMEs and 2.7% of the ones sent by BEs used the Facebook pixel

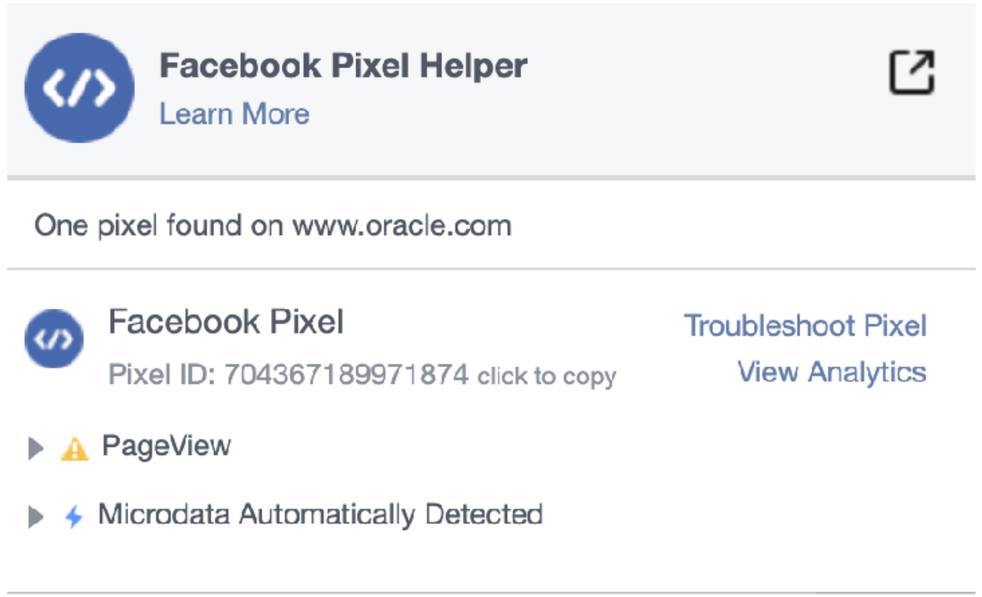
- Used for algorithmic ad optimization

*"Interests are determined based on activity on Facebook, such as Pages or posts that people like, posts or comments they make and activity off Facebook from apps they use and websites they visit."*

***Facebook terms of services***

# Usage of Facebook pixel

| | Total | SME (%) | BE (%) |
|---|---|---|---|
| **Checked websites** | 600 | 61 | 39 |
| **Websites with Facebook pixels** | 458 (76%) | 81 | 69 |



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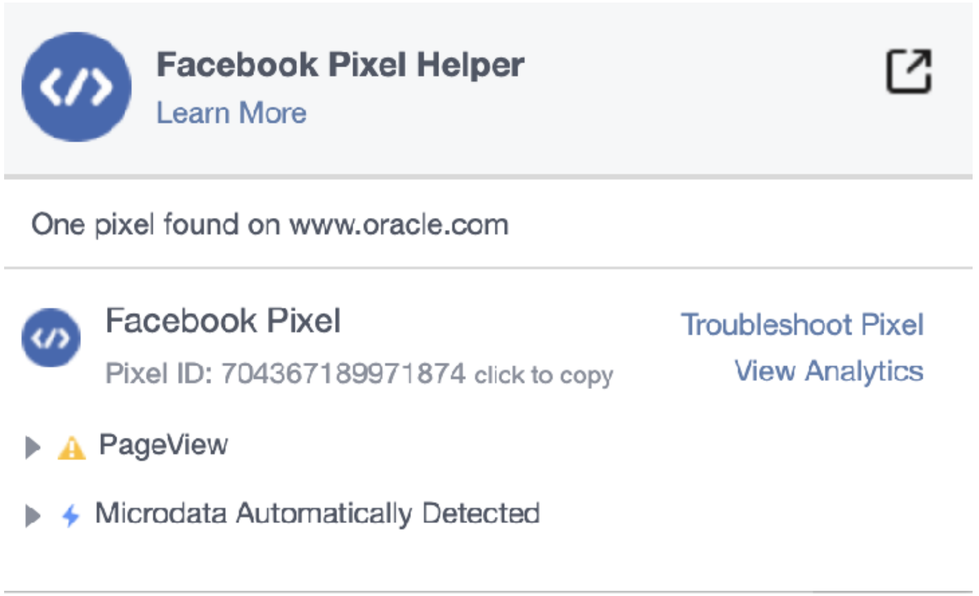



Advertisers allow Fb to track their users, but do not directly exploit it (<7%).

# Implications

- Small and medium sized businesses do account for the majority of advertisers and are responsible for the majority of ad impression
  - Important to assess the economic impact regulations would had on them
- Shift from advertiser-driven to algorithmic-driven advertising
  - New risks?
- A majority of advertisers we checked allow Facebook to track users that visit their websites without exploiting it
  - Does this lead to market unfairness?

# Takeaways

- For safer online platforms we need access to data
  - Use the law to get access to data — Article 40 of DSA
  - Build systems that ask citizens to donate data about what they see online
- Lawmakers developing new regulations
  - We need data on the effectiveness and economic impact of restrictions
- Crucial need for assessing systemic risks with online platforms

# Thank you! Questions?

# (Research) Perspectives

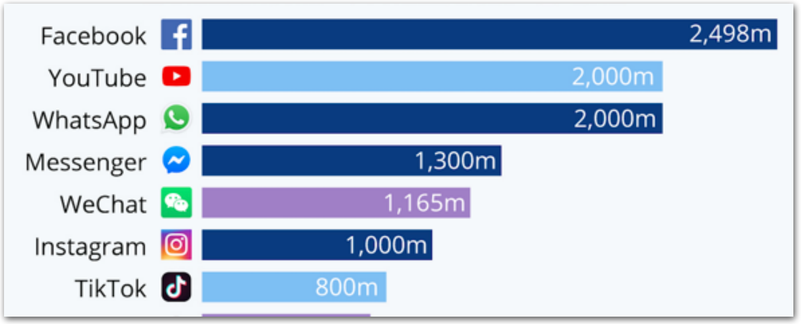
- Universal ad libraries is the first step
  - … but we still need to reliably detect political ads (restrictions from countries legislation); identify malicious ad campaigns; and decide what kind of transparency we need for algorithmic driven micro-targeting?

- Can we measure the impact of information targeting? In which conditions a targeted message can change the opinion, preferences, voting behavior of a person?

# Background on online advertising

The basics:

- Anyone (with a credit card) can be an advertiser
- Fb has over 250k attributes available to micro-target users
  - “anti-abortion movements” , “cancer awareness”
- Facebook has 2.5 billion users, Youtube has 2 billion users




The observation:

- Shift from using ad tech for promoting products to potentially interested people
  - to target (well chosen) information to specific groups of people (likely to accept it)