

# AUDITING, MEASURING, AND BRINGING TRANSPARENCY TO TARGETED ADVERTISING ECOSYSTEMS

ATHANASIOS ANDREOU

- Targeted advertising is prevalent:
  - Facebook's ad revenue in 2016: 27B\$ (Source: *statista.com*)

- Very frequently black boxes
- Use users' personal data at a **massive** scale
- Have social and political impact:

HOW RUSSIAN FACEBOOK ADS  
DIVIDED AND TARGETED US  
VOTERS BEFORE THE 2016  
ELECTION

**Facebook Lets  
Advertisers Exclude  
Users by Race**

- **Transparency** on how these systems work is important
- Reflected in legislation (GDPR)

We focus on transparency in targeted advertising

# THIS TALK

1. TARGETED ADVERTISING IN FACEBOOK
2. AUDITING FACEBOOK TRANSPARENCY MECHANISMS (NDSS2018)
3. MEASURING THE FACEBOOK ADVERTISING ECOSYSTEM (NDSS2019)
4. BRINGING COLLABORATIVE TRANSPARENCY TO TARGETED ADVERTISING
5. ADANALYST- A TOOL TO HELP USERS MAKE SENSE OF THEIR ADS

# TARGETED ADVERTISING IN FACEBOOK

The image displays a collection of Facebook advertisements. At the top left, a 'Sponsored' ad for 'JavaScri' is visible, featuring a name 'Craig' and a 'Zé' badge. Below it is an ad for 'Pusher - Leader in Realtime Tech' from 'pusher.com'. To the right, a sponsored post from 'RichesMonts' promotes a recipe for 'Tarte Pommes Raclette', including a link to the recipe. Below this is an ad for 'Teneo' with the headline 'VISIBILITY AS A SERVICE' and a 'LEARN MORE' button. In the center, a large white box with blue text asks 'Why am I seeing this ad?'. To the right of this box are two product ads: 'RAINBOWPICK Lightweight Expandable Barrel' priced at \$16.99 with a 'Shop Now' button, and 'Metabolic Body Massage Cup' priced at \$9.99.

# HOW ADVERTISERS TARGET USERS

The screenshot displays the Facebook Ads targeting interface. On the left, a sidebar contains navigation options: Campaign (checked), Objective (checked), Ad Account (Create New checked), Ad Set (Page, Audience selected, Placements, Budget & Schedule), and Ad (Identity, Format, Text). A 'Close' button is at the bottom of the sidebar.

The main targeting area includes:

- Locations:** 'Everyone in this location' dropdown, 'United States' selected, 'Include' dropdown, and 'Type to add more locations' input.
- Age:** '18' - '65+' range.
- Gender:** 'All' selected, 'Men', 'Women' options.
- Languages:** 'Enter a language...' input.
- Detailed Targeting:** 'INCLUDE people who match at least ONE of the following'. A list of interests is shown: 'Transparency', 'Transparency (behavior)', 'Media transparency', 'Transparency and translucency', 'Extractive Industries Transparency Initiative', 'Lobbying in the United States', and 'Transparent'.
- Connections:** A section for additional targeting options.

On the right, a summary panel includes:

- Create Multiple Ad Sets in One Step:** A button to create multiple ad sets.
- Audience Size:** A gauge showing 'Your audience selection is fairly broad.' with 'Specific' and 'Broad' markers.
- Potential Reach:** 230,000,000 people.
- Estimated Daily Results:** Reach of 5,100 - 32,000.

# MANY ATTRIBUTES AVAILABLE FOR TARGETING

INCLUDE people who match at least ONE of the following ⓘ

|                |             |        |
|----------------|-------------|--------|
| Fascism        | Suggestions | Browse |
| <b>Fascism</b> | Interests   | ▲      |
| Anti-fascism   | Interests   | ▲      |

INCLUDE people who match at least ONE of the following ⓘ

|                      |             |        |
|----------------------|-------------|--------|
| Homosexuality        | Suggestions | Browse |
| <b>Homosexuality</b> | Interests   | ▲      |
| Same-sex marriage    | Interests   | ▲      |

INCLUDE people who match at least ONE of the following ⓘ

|   |              |        |
|---|--------------|--------|
| Income >                                    | Suggestions  | Browse |
| <b>Income &gt; 2. \$50,000 - \$74,999</b>   | Demographics | ▲      |
| <b>Income &gt; 3. \$75,000 - \$99,999</b>   | Demographics | ▲      |
| <b>Income &gt; 6. \$150,000 - \$249,999</b> | Demographics | ▲      |
| <b>Income &gt; 4. \$100,000 - \$124,999</b> | Demographics | ▲      |
| <b>Income &gt; 5. \$125,000 - \$149,999</b> | Demographics | ▲      |
| <b>Income &gt; 1. \$40,000 - \$49,999</b>   | Demographics | ▲      |



### What are the types of Partner Categories?

People in the market for a sports car, owners of luxury SUVs

Heavy cleaning supplies buyers, heavy hair care buyers

Credit card holders, likely investors

Discretionary spenders, seasonal spenders, brand buyers

### Prepare a file with your customer data

[Read best practices for preparing your customer data](#)

Identifiers you can use (15) [?](#)

- Email
- Phone Number
- Mobile Advertiser ID
- First Name
- Last Name
- ZIP/Postal Code
- City
- State/Province
- Country
- Date of Birth
- Year of Birth
- Gender
- Age
- Facebook App User ID
- Facebook Page User ID

### Create a Lookalike Audience

Find new people on Facebook who are similar to your existing audiences. [Learn more.](#)

**Source** [?](#)

[Create New](#) ▼

**Location**  [Browse](#)

**Number of Audiences** [?](#)

**Audience Size** [?](#)  0 1 2 3 4 5 6 7 8 9 10 % of countries

[Hide Advanced Options](#) ▲

If you measure revenue per conversion or lifetime value for people in different audiences, you can create separate lookalikes with different ranges of similarity to your source. This allows you to bid differently for audiences with different conversion values. [Learn more.](#)



# FACEBOOK HAS EXPLANATIONS



### About This Facebook Ad ✕

**Why Am I Seeing This Ad?** Options ▾

One reason you're seeing this ad is that Leibniz wants to reach people interested in Ferrero SpA, based on activity such as liking Pages or clicking on ads.

There may be other reasons you're seeing this ad, including that Leibniz wants to reach people ages 25 and older who live or were recently in Germany. This is information based on your Facebook profile and where you've connected to the internet.

Let us know if this topic interests you

Ferrero SpA 😊 😞

[Manage Your Ad Preferences](#)

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**Tell Us What You Think**

Was this explanation useful? [Yes](#) [No](#)

[Learn more about Facebook Ads](#)

# AUDITING FACEBOOK TRANSPARENCY MECHANISMS (NDSS2018)

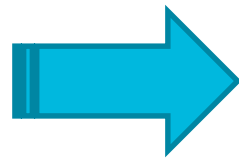
- Do explanations show all the attributes?
  - Completeness
- Are they correct?
  - Correctness
- Are they personalized?
  - Personalization
- Do similar ads show similar explanations?
  - Determinism
- Are explanations for users consistent?
  - Consistency

## ○ Browser extension to collect ads from Facebook timeline

- 35 users for 5 months
- 26K unique ads and explanations

## ○ Controlled experiments targeting users with ads

- We targeted users
- We collected explanations
- 96 successful experiments



Ground truth

### About This Facebook Ad ✕

**Why Am I Seeing This Ad?** Options ▾

One reason you're seeing this ad is that [Leibniz](#) wants to reach people interested in [Ferrero SpA](#), based on activity such as liking Pages or clicking on ads.

There may be other reasons you're seeing this ad, including that [Leibniz](#) wants to reach people ages 25 and older who live or were recently in [Germany](#). This is information based on your Facebook profile and where you've connected to the internet.

Let us know if this topic interests you

Ferrero SpA

[Manage Your Ad Preferences](#)

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**Tell Us What You Think**

Was this explanation useful? [Yes](#) [No](#)

[Learn more about Facebook Ads](#)

## ○ Are explanations complete?:

- 61 Controlled experiments (e.g. target users interested in **Instant messaging AND Mobile Phones**)
- Only **one** attribute appears in the explanation (e.g. **Instant messaging**)

## ○ Which attribute appears?

- Depends on attribute type (e.g. Demographics>Interests>Behaviors)
- Depends on audience size (**least unique** attribute appears)

## ○ Explanations are incomplete

## ○ Incomplete explanations:

- malicious advertiser can conceal sensitive/discriminatory attributes
- by adding a common popular attribute to the targeting audience

**Establishing properties can help create better explanations**

# MEASURING THE FACEBOOK ADVERTISING ECOSYSTEM (NDSS2019)



## ○ Questions:

- Who are the advertisers?
- How are they targeting users?

## ○ Dataset:

- More than 600 users, 200K ads, 40K advertisers
- Across the globe

## ○ Who are the advertisers?

- ~10% from sensitive categories such as **News and Politics, Finance, Medical Health...**
- 38.9% of ads come from **unverified** advertisers

## ○ How are they targeting users?

- 21% of ads use **Data Brokers, PII-based and Lookalike Audiences**
- **North America vs Europe** (e.g. for PII-based 6 vs 2%)
- Advertisers from **News and Politics** tailor their ads over time, users and attributes

**Need for extra transparency!**

# BRINGING COLLABORATIVE TRANSPARENCY TO TARGETED ADVERTISING

- Group users that received the same ad together
- Infer targeting from group properties of users that received the same ad:
  - which attributes do users that received the same ad share?
  - how can we use them?


# ADANALYST- A TOOL TO HELP USERS MAKE SENSE OF THEIR ADS

- <https://adanalyst.mpi-sws.org>
- Enhance transparency by aggregated statistics
- Who else received this ad?

Ads

Check your daily unique ad consumption, by clicking on any date in the calendar!

| October 2017 |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|
| Su           | Mo | Tu | We | Th | Fr | Sa |
| 1            | 2  | 3  | 4  | 5  | 6  | 7  |
| 8            | 9  | 10 | 11 | 12 | 13 | 14 |
| 15           | 16 | 17 | 18 | 19 | 20 | 21 |
| 22           | 23 | 24 | 25 | 26 | 27 | 28 |
| 29           | 30 | 31 |    |    |    |    |



Minimalist, Elegant & Trendy watch! kickstarter.com  
? When you pick out a watch ☺, you want it to be attractive but not gaudy? ? The Widdenbur...

Time: 04/10/2017 23:00  
Advertiser: Widdenburg  
Advertiser category: Jewelry/Watches  
Explanation: One reason you're seeing this ad is that Widdenburg added you to a list of people they want to reach on Facebook. They were able to reach you because you're on their customer list or you've provided them with your contact information off of Facebook. There may be other reasons you're seeing this ad, including that Widdenburg wants to reach people ages 18 to 40 who live or were recently in Germany. This is information based on your Facebook profile and where you've connected to the internet.  
Compact explanation: PII-based targeting  
Users also received this ad for: PII-based targeting  
The advertiser tar-~~geted~~ other users with: PII-based targeting

Time: 04/10/2017 23:00  
Advertiser: ...

**AdAnalyst**  
A tool to help you make sense of the ads you receive on Facebook  
[Install Now](#)

Disable adblockers and anti-tracking!  
Set Facebook in French or English!

- We audited Facebook transparency mechanisms and identified weaknesses
- We show how are advertisers targeting users and found concerning practices
- We bring more transparency to users in a collaborative way
- We provide users with a tool that helps them make sense of their ads

# Questions?