Investigating Ad Transparency Mechanisms in Social Media: A Case Study of Facebook’s Explanations

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Max Planck Institute for Software Systems
Surrounded by data-driven decision making systems

- Recommender systems
- Criminal risk assessment tools
- Credit scores
- Targeted advertising
We need more transparent systems

- Systems are often black boxes
- They use users' personal data at a massive scale
- They take decisions about users which can affect them
We need more transparent systems

- Systems are often black boxes
- They use users' personal data at a massive scale
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Explanations on how such systems work are important

Reflected in legislation:
  • GDPR
  • Loi pour une République numérique
But explanations are not trivial

- The systems they have to explain are complex

- Many design choices:
  - format, length, amount of details...

- What is a good explanation?
  - promotes trust
  - satisfy curiosity
  - deter malicious behavior
  - verify compliance
Our talk

Explanations for social media targeted advertising (focus on Facebook):

- targeted advertising in Facebook
- properties of explanations
- evaluation of Facebook's explanations
Targeted advertising in Facebook

- Targeted advertising is a method of delivering ads to specific audiences on social media platforms like Facebook.
- Facebook allows advertisers to target users based on various criteria such as demographics, interests, behaviors, and more.
- These ads are more likely to reach people who are interested in the advertised product or service.
- Targeted advertising improves the efficiency and effectiveness of marketing campaigns by ensuring that ads are seen by the right audience.
Targeted advertising in Facebook

Why am I seeing this ad?
How advertisers target users

Create Multiple Ad Sets in One Step
Add variables for locations, detailed targeting, age ranges and Custom Audiences to quickly create multiple ad sets at one time.

Create Multiple Ad Sets

Audience Size
Specific  Broad
Your audience selection is fairly broad.

Potential Reach: 230,000,000 people

Estimated Daily Results
Reach
5,100 - 32,000
The accuracy of estimates is based on factors like past campaign data, the budget you entered and market data. Numbers are provided to give you an idea of performance for your budget, but are only estimates and
Many attributes available for targeting

<table>
<thead>
<tr>
<th>Interests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business and industry</td>
</tr>
<tr>
<td>Entertainment</td>
</tr>
<tr>
<td>Family and relationships</td>
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<tr>
<td>Fitness and wellness</td>
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Many attributes available for targeting

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<td>Home</td>
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<td>Fitness and wellness</td>
<td>Life Events</td>
</tr>
<tr>
<td>Food and drink</td>
<td>Anniversary</td>
</tr>
<tr>
<td>Alcoholic beverages</td>
<td></td>
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<tr>
<td>Beer</td>
<td>Away from family</td>
</tr>
<tr>
<td></td>
<td>Away from hometown</td>
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Many attributes available for targeting

Detailed Targeting

INCLUDE people who match at least ONE of the following

Demographics > Life Events > Anniversary
  Anniversary within 30 days

Interests > Food and drink > Alcoholic beverages
  Beer

Add demographics, interests or behaviors  |  Suggestions  |  Browse

and MUST ALSO match at least ONE of the following

Demographics > Life Events
  Away from family

Add demographics, interests or behaviors  |  Suggestions  |  Browse

Narrow Further

EXCLUDE people who match at least ONE of the following

Interests > Additional Interests
  Gumbo

Add demographics, interests or behaviors  |  Browse
Many attributes available for targeting

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
Attributes can be invasive

<table>
<thead>
<tr>
<th>Homosexuality</th>
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<tr>
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<td></td>
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<tr>
<td>Anti-fascism</td>
<td></td>
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<tr>
<th>Income &gt;</th>
<th>Suggestions</th>
<th>Browse</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income &gt; 2. $50,000 - $74,999</td>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Income &gt; 3. $75,000 - $99,999</td>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Income &gt; 6. $150,000 - $249,999</td>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Income &gt; 4. $100,000 - $124,999</td>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Income &gt; 5. $125,000 - $149,999</td>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Income &gt; 1. $40,000 - $49,999</td>
<td>Demographics</td>
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Data on everyone

Out of 230M users (US):

• Politics (US): 179M
• Financial/Net worth/Liquid Assets: 74M
• Family & Relationships: 138M
Targeting advertising is a complex system
Targeting advertising is a complex system

Why did I receive this ad?

• Facebook inferred some attributes
• Advertiser used attributes to select audience
• Facebook matched the ad to me through auctions
Facebook provides ad explanations
Facebook provides ad explanations

![Facebook ad explanation](image_url)
Facebook provides ad explanations

Why Am I Seeing This Ad?

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.
Facebook provides ad explanations

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Explanations for social media targeted advertising (focus on Facebook):

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- properties of explanations
- evaluation of Facebook's explanations
Desired properties of explanations

- Do explanations show all the attributes? 
  completeness

- Are they correct? 
  correctness

- Are they personalized? 
  personalization

- Do similar ads show the same explanations? 
  determinism

- Are explanations for users consistent 
  consistency
Completeness of explanations

User

Interests:
• Koalas
• Kangaroos
• Wallabies
• ...

Ad

Target users interested in Koalas AND Kangaroos

Complete explanation:
• You received this ad because the advertiser wants to target users interested in Koalas And Kangaroos

Anything less is incomplete:
• incomplete explanations are not inherently bad.
• they can be succinct, useful and ultimately preferable for such explanations
Correctness of explanations

<table>
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<th>Ad</th>
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<td><strong>Target users interested in</strong></td>
</tr>
<tr>
<td>• Koalas</td>
<td><em>Koalas AND Kangaroos</em></td>
</tr>
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<td>• Wallabies</td>
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</tr>
<tr>
<td>• ...</td>
<td></td>
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- **Incorrect explanation:**
  - *You received this ad because the advertiser wants to target users interested in Wallabies*

- **Misleading explanation:**
  - *You may have received this ad because the advertiser wants to target users interested in Wallabies*
Explanations for social media targeted advertising (focus on Facebook):

- targeted advertising in Facebook
- properties of explanations
- evaluation of Facebook's explanations
Measurement methodology

- Chrome extension to collect ads from Facebook timeline:
  - 35 users for 5 months
  - 26K unique ads and explanations
Measurement methodology

Chrome 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
Examples of explanations

**Interests:**

- *One reason you are seeing this ad is that Acer wants to reach people interested in Electronic Music, based on activity such as linking pages, or clicking on ads*
Examples of explanations

**Interests:**
- One reason you are seeing this ad is that Acer wants to reach people interested in **Electronic Music**, based on activity such as linking pages, or clicking on ads.

**Data Brokers:**
- One reason you're seeing this ad is that CANAL France wants to reach people who are part of an audience created based on data provided by Acxiom. Facebook works with data providers to help businesses find the right audiences for their ads. Learn more about data providers.
Are explanations complete?

- We see only one attribute

Controlled experiments to verify:
- e.g. target users interested in Instant messaging AND Mobile Phones
- "...wants to reach people interested in Instant messaging..."

Which attribute appears?
- Depends on attribute type (e.g. Demographics>Interests>Behaviors)
- Depends on reach (least unique attribute appears)
Are explanations complete?

Data Brokers attributes:
- *part of an audience created based on data provided by Acxiom.*

No mention of the attribute used:
- Income data, home ownership, home type?
Are explanations complete?

Data Brokers attributes:
- part of an audience created based on data provided by Acxiom.

No mention:
- Income data, home ownership, home type?

Facebook explanations are not complete!
Are explanations correct?

Controlled experiments to test correctness:

- We targeted users without specifying location
- Location always appeared as potential attribute
Are explanations correct?

**Why Am I Seeing This Ad?**

One reason you’re seeing this ad is that *fifty-five* wants to reach people interested in **Online advertising**, based on activity such as liking Pages or clicking on ads.

There may be other reasons you’re seeing this ad, including that fifty-five wants to reach **people ages 23 to 55 who live or were recently in France**. This is information based on your Facebook profile and where you’ve connected to the internet.

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- **Facebook explanations can be misleading!**
- **We targeted users without specifying location**
- **Location always appeared as potential attribute**
Need for rigorous explanations

Incomplete explanations:
  • malicious advertiser can conceal sensitive/discriminatory attributes
  • by adding a common popular attribute to the targeting audience

Misleading explanations:
  • fail to capture accurately the reasons why a user is targeted

Establishing properties can help create better explanations
Conclusions & open questions

- We defined desired properties for explanations
- Current Facebook explanations are **incomplete & misleading**

How to design better explanations?
- How to choose the most important attributes to show?
- What do users want to see in an explanation?
A step towards more transparency

- AdAnalyst: A tool to help you make sense of the ads you receive on Facebook
  - Enhance transparency by aggregated statistics
  - Enhance transparency in a collaborative way

Disable your AdBlocker on Facebook
Thank you very much

Questions?