

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

Athanasios Andreou, Giridhari Venkatadri, Oana Goga,
Krishna P. Gummadi, Patrick Loiseau, Alan Mislove



Northeastern
University



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
- They take decisions about users which can affect them

- **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

Sponsored Create Ad



JavaScript

Pusher - Leader in Realtime Tech
pusher.com
Building awesome realtime apps with JavaScript



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teneo.net
Increase Performance Insight and Speed Up Troubleshooting Without Committing to Extra Capi...

 **RichesMonts**
Sponsored · €


Like Page ...

Presque aussi fine qu'une crêpe et plus riche en pommes que le cidre : notre tarte fine aux pommes et à la raclette est idéale pour renouveler la chandeleur !


La recette : <http://bit.ly/TartePommesRaclette>

See Translation



 **RainbowPick**
Sponsored · *

Like Page ...




Lightweight Expandable Barrel

4L

RAINBOWPICK

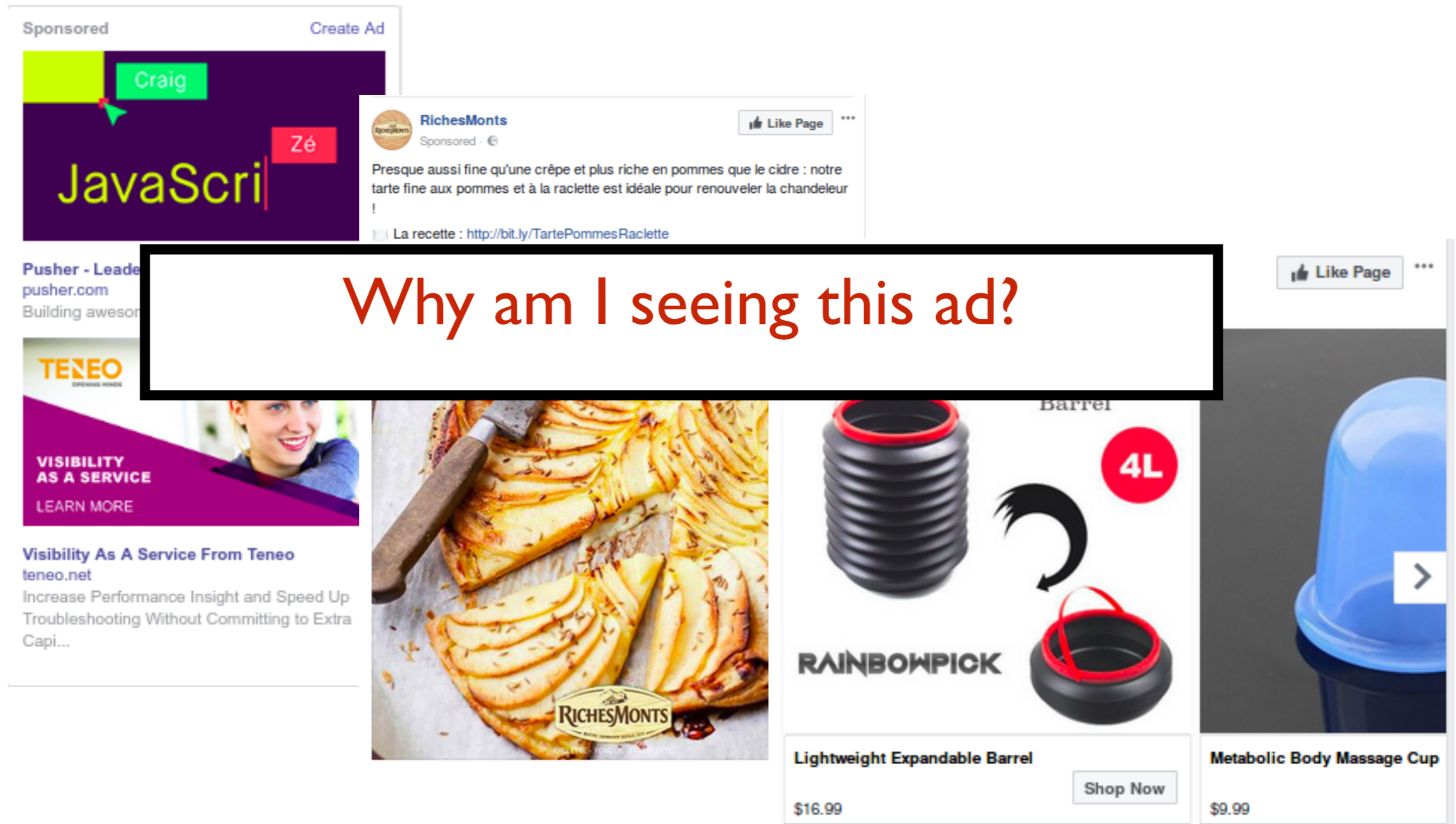
Lightweight Expandable Barrel
\$16.99 Shop Now



Metabolic Body Massage Cup
\$9.99

Targeted advertising in Facebook

Sponsored Create Ad



Why am I seeing this ad?

RichesMonts
Sponsored · €
Presque aussi fine qu'une crêpe et plus riche en pommes que le cidre : notre tarte fine aux pommes et à la raclette est idéale pour renouveler la chandeleur !
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How advertisers target users

Campaign

- Objective ✓

Ad Account

- Create New ✓

Ad Set

- Page
- Audience**
- Placements
- Budget & Schedule

Ad

- Identity
- Format
- Text

Close

Locations ⓘ **Everyone in this location** ▼

United States

📍 **United States**

📍 Include ▼ | Type to add more locations | **Browse**

[Add Locations in Bulk](#)

Age ⓘ 18 ▼ - 65+ ▼

Gender ⓘ **All** Men Women

Languages ⓘ Enter a language...

Detailed Targeting ⓘ **INCLUDE** people who match at least **ONE** of the following ⓘ

Transparency | **Suggestions** | **Browse**

Transparency (behavior)	Interests
Media transparency	Interests
Transparency and translucency	Interests
Extractive Industries Transparency Initiative	Interests
Lobbying in the United States	Interests
Transparent	Interests


Connections ⓘ

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



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

▼	Interests	ⓘ
▶	Business and industry	<input type="checkbox"/>
▶	Entertainment	<input type="checkbox"/>
▶	Family and relationships	<input type="checkbox"/>
▶	Fitness and wellness	<input type="checkbox"/>
▼	Food and drink	<input type="checkbox"/>
▼	Alcoholic beverages	
	Beer	<input type="checkbox"/>

Many attributes available for targeting

▼ Interests ?	
▶ Business and industry	<input type="checkbox"/>
▶ Entertainment	<input type="checkbox"/>
▶ Family and relationships	<input type="checkbox"/>
▶ Fitness and wellness	<input type="checkbox"/>
▼ Food and drink	<input type="checkbox"/>
▼ Alcoholic beverages	
Beer	<input type="checkbox"/>

▼ Demographics ?	
▶ Education	
▶ Financial	
▶ Home	
▼ Life Events	
▶ Anniversary	
Away from family	<input type="checkbox"/>
Away from hometown	<input type="checkbox"/>

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**

Interests

- Business and industry
- Entertainment
- Family and relationships
- Fitness and wellness
- Food and drink
 - Alcoholic beverages
 - Beer

Many attributes available for targeting

acxiom.

experian™



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

What are the types of Partner Categories?

Attributes can be invasive

INCLUDE people who match at least ONE of the following ⓘ

Homosexuality	Suggestions	Browse
Homosexuality	Interests	▲
Same-sex marriage	Interests	

Attributes can be invasive

INCLUDE people who match at least ONE of the following ⓘ

Homosexuality	Suggestions	Browse
Homosexuality		Interests
Same-sex marriage		Interests

INCLUDE people who match at least ONE of the following ⓘ

Fascism	Suggestions	Browse
Fascism		Interests
Anti-fascism		Interests

Attributes can be invasive

INCLUDE people who match at least ONE of the following ⓘ

Homosexuality	Suggestions	Browse
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Same-sex marriage		Interests

INCLUDE people who match at least ONE of the following ⓘ

Fascism	Suggestions	Browse
Fascism		Interests
Anti-fascism		Interests

INCLUDE people who match at least ONE of the following ⓘ

Income >	Suggestions	Browse
Income > 2. \$50,000 - \$74,999		Demographics
Income > 3. \$75,000 - \$99,999		Demographics
Income > 6. \$150,000 - \$249,999		Demographics
Income > 4. \$100,000 - \$124,999		Demographics
Income > 5. \$125,000 - \$149,999		Demographics
Income > 1. \$40,000 - \$49,999		Demographics

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

The image shows a Facebook advertisement for Leibniz biscuits. The ad features a yellow box of 'LEIBNIZ KEKS MIT WEISSER SCHOKOLADE & ZITRONEN-KÄSEKUCHEN GESCHMACK' and a box of 'LEMON CHEESECAKE STYLE KNACKFRISCHGARANTIE'. A bowl of yellow liquid is also visible. A white arrow points to a biscuit with the text 'frischer Lemon-Cheesecake-Geschmack'. A menu overlay is visible on the right side of the ad, listing various options:

- Save post**
Add this to your saved items
- Hide ad**
See fewer ads like this
- Report ad**
Mark ad as offensive or inappropriate
- Why am I seeing this?**
- Create Similar Ad**
- Turn on notifications for this post**
This ad is useful
- Embed**
- More options**

The ad header includes the Leibniz logo, the name 'Leibniz', and the text 'Sponsored · Like Page'.

Facebook provides ad explanations

The image shows a Facebook advertisement for Leibniz biscuits. At the top left, the Leibniz logo is displayed next to the text 'Leibniz Sponsored'. Below this, the ad text reads: 'Weckt Frühlingsgefühle schon im Winter', 'Cheesecake Style mit weißer Schokolade', and 'See Translation'. The main visual is a photograph of a yellow box of 'LEIBNIZ KEKS MIT WEISSER SCHOKOLADE & ZITRONEN-KÄSEKUCHEN GESCHMACK' and a box of 'LEMON CHEESECAKE STYLE KNACKFRISCHGARANTIE'. In the foreground, there are several biscuits, one of which is labeled 'CHOCO LEIBNIZ'. A white arrow points to the text 'frischer Lemon-Cheesecake-Geschmack' at the bottom right of the image. A white menu is overlaid on the right side of the ad, with the option 'Why am I seeing this?' circled in red. Other menu options include 'Save post', 'Hide ad', 'Report ad', 'Create Similar Ad', 'Turn on notifications for this post', and 'Embed'.

Leibniz Sponsored

Weckt Frühlingsgefühle schon im Winter
Cheesecake Style mit weißer Schokolade
See Translation

LEIBNIZ KEKS MIT WEISSER SCHOKOLADE & ZITRONEN-KÄSEKUCHEN GESCHMACK

LEMON CHEESECAKE STYLE KNACKFRISCHGARANTIE

CHOCO LEIBNIZ

frischer Lemon-Cheesecake-Geschmack

- Save post
- Hide ad
- Report ad
- Why am I seeing this?**
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- More options

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



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.

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Our talk

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

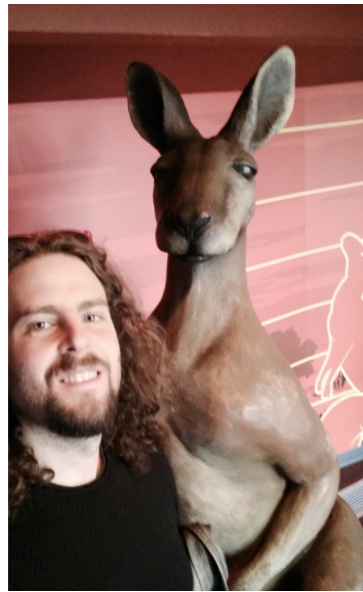
- targeted advertising in Facebook
- **properties of explanations**
- evaluation of Facebook's explanations

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

User



Interests:

- Koalas
- Kangaroos
- Wallabies
- ...

Ad

Target users interested in Koalas AND Kangaroos

● **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*

Our talk

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

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- **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



Ground truth

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 mentions

- Income d

Facebook explanations are not complete!

Are explanations correct?

Why Am I Seeing This Ad?

Options ▼

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.

- 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?

Options ▼

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.

Facebook explanations can be misleading!

- Controlled
- 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
 - <http://adanalyst.mpi-sws.org/>
 - Enhance transparency by aggregated statistics
 - Enhance transparency in a collaborative way

Disable your AdBlocker on Facebook

Thank you very much

Questions?