Unpacking Perceptions of Data-Driven Inferences Underlying Online Targeting and Personalization

You are seeing this ad because you have recently browsed pages related to Food and Montreal.

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Advertisers use web activity to make inferences...
…which advertisers can use to target ads

Interests & remarketing

**Affinity audiences**

- Music Lovers
- News Junkies
- Nightlife Enthusiasts
- Outdoor Enthusiasts
- Pet Lovers
How does the method of targeting impact privacy attitudes?

How do the interests that are inferred and the accuracy of these inferences impact privacy attitudes?
Research Questions

How does the **method of targeting** impact privacy attitudes?

How do the **interests that are inferred** and the **accuracy of these inferences** impact privacy attitudes?
Study Setup: Simulated Ad
You are seeing this ad because...

the advertiser has inferred from your online activity that you are likely a woman between the ages of 18 and 24 and thinks women between the ages of 18 and 24 are likely to be interested in buying this product.
Targeting Explanations Reflect Prevalent Methods
Targeting Explanations Reflect Prevalent Methods

the advertiser has inferred that…

…visitors to this site… *(Visitors)*
…you… *(You)*
the advertiser has inferred that…

…visitors to this site… (Visitors)
…you… (You)

(Demographic)
the advertiser has inferred that…

...visitors to this site… (Visitors)
...you… (You)

(Demographic)

(Wrong Demographic)
Targeting Explanations Reflect Prevalent Methods

the advertiser has inferred that…

…visitors to this site… *(Visitors)*
…you… *(You)*

(Demographic) (Interest)

(Wrong Demographic)
Ads may be targeted by obvious connections
But algorithms can make unintuitive predictions
Targeting Explanations Reflect Prevalent Methods

the advertiser has inferred that...

...visitors to this site... (Visitors)
...you... (You)

(Demographic) (Interest)

(Wrong Demographic) (Unrelated Interest)
...the advertiser decided to purchase an ad on this site. **(Control)**

...the advertiser’s computer algorithms have determined that this ad would be effective. **(Algorithm)**
Reaction Statements—Likert Scale Responses
useful reason for targeting
Reaction Statements—Likert Scale Responses

useful reason for targeting

informative notification
Reaction Statements—Likert Scale Responses

**useful** reason for targeting

**informative** notification

would **like to know** when this targeting is used
Reaction Statements—Likert Scale Responses

**useful** reason for targeting

**informative** notification

would **like to know** when this targeting is used

**comfortable** with companies targeting for this reason
Reaction Statements—Likert Scale Responses

- **useful** reason for targeting
- **informative** notification
- Would **like to know** when this targeting is used
- **comfortable** with companies targeting for this reason
- **fair to target** for this reason
Reaction Statements—Likert Scale Responses

useful reason for targeting

informative notification

would like to know when this targeting is used

comfortable with companies targeting for this reason

fair to target for this reason

fair to collect information needed
useful reason for targeting

informative notification

would like to know when this targeting is used

comfortable with companies targeting for this reason

fair to target for this reason

fair to collect information needed

annoyed by this type of targeting
Planned Comparisons
Planned Comparisons

Visitors vs. You
Planned Comparisons

Visitors vs. You

Control vs. Algorithm

Algorithm vs. Interest
Planned Comparisons

- Visitors vs. You
- Control vs. Algorithm
- Algorithm vs. Interest
- Interest vs. Unrelated Interest
Planned Comparisons

- Visitors vs. You
- Control vs. Algorithm
- Algorithm vs. Interest
- Interest vs. Unrelated Interest
- Demographic vs. Wrong Demographic
More comfort with generalized targeting

Visitors
advertiser has inferred from general data that visitors to this site...

You
advertiser has inferred from your browsing data that you...

vs.
More comfort with generalized targeting

Visitors vs. You

advertiser has inferred from general data that visitors to this site...

advertiser has inferred from your browsing data that you...

More Fair to Target

More Comfortable
Ads targeted by “algorithms” more useful but less fair

Control
advertiser decided to purchase an ad on this site

vs.

Algorithm
advertiser’s computer algorithms determined this ad would be effective
Ads targeted by “algorithms” more useful but less fair

Control
advertiser decided to purchase an ad on this site

More Fair to Target

Algorithm
advertiser’s computer algorithms determined this ad would be effective

More Useful
Notifications invoking your own activity more informative

**Algorithm**

advertiser’s computer algorithms determined this ad would be effective

**vs.**

**Interest**

advertiser thinks you are interested in dogs and therefore likely to buy this product
Notifications invoking your own activity more informative

Algorithm

advertiser’s computer algorithms determined this ad would be effective

vs.

Interest

advertiser thinks you are interested in dogs and therefore likely to buy this product

More Informative
Related interest-based targeting more useful

Interest vs. Unrelated Interest
Related interest-based targeting more useful

Interest vs. Unrelated Interest

More Useful vs. More Informative

More Useful

More Informative

Dog

Cat

Radio

Guitar

?
Next: How do particular inferences and the accuracy of these inferences impact privacy attitudes?
Advertisers can target ads based off of many interests

- Affinity audiences
  - Music Lovers
  - News Junkies
  - Nightlife Enthusiasts
  - Outdoor Enthusiasts
  - Pet Lovers
Market leaders provide thousands of interests for advertisers to target.
Market leaders provide thousands of interests for advertisers to target
Targeting interests are sometimes revealed to users

One reason you're seeing this ad is that World Wildlife Fund wants to reach people who like their page.

There may be other reasons you're seeing this ad, including that World Wildlife Fund wants to reach **people ages 18 and older who live in the United States**. This is information based on your Facebook profile and where you've connected to the internet.
How do the interests that are inferred and the accuracy of these inferences impact privacy attitudes?
Survey Design

237 Mechanical Turk respondents
Survey Design

237 Mechanical Turk respondents

160 Google AdWords categories
Categories & Reaction Statements

Home & Garden

→ Gardening & Landscaping
Categories & Reaction Statements

Home & Garden
→ Gardening & Landscaping

accuracy of inference
comfortable with inference
usefulness of inference for personalization
Interest in topic increases comfort

With increase in interest…

10x more likely to be more comfortable with personalization

3x more likely to find personalization more useful
Personalized advertising policy principles

**Prohibited categories**

- Personal hardships
- Alcohol
- Gambling
- Health
- Religious belief
- Sexual interests
Distribution of comfort with personalization

I would be **comfortable with a company personalizing my web experience** based on an inference about my level of interest in *topic*.
Practice suggests bimodal distribution

I would be *comfortable with a company personalizing my web experience* based on an inference about my level of interest in *topic*.
Some categories at extremes of comfort

I would be **comfortable with a company personalizing my web experience** based on an inference about my level of interest in *topic*.
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Related categories can vary in sensitivity

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Results Summary

How does the method of targeting impact privacy attitudes?

- Visitors
  - More fair to target
  - More comfortable

- You
  - Control
    - More fair to target
  - Algorithm
    - More informative

- Interest
  - Algorithm
    - More useful

How do particular inferences and their accuracy impact privacy attitudes?

- Interest
  - More useful
  - More informative

- Unrelated Interest
  - vs.

Interest in topic → Comfort with personalization
Perceived usefulness
Proposal: advertising network transparency

Your ad preferences
Learn what influences the ads you see and take control over your ad experience.

Your interests
Choose an interest to preview examples of ads you might see on Facebook or remove it from your ad preferences.

Dog

Advertisers you've interacted with
With your contact info Whose website or app you've used Whom you've visited
Proposal: advertising network transparency

We inferred you are interested in **dogs** because you visited web pages related to this topic, including:

- “Here are the Most Dog-Friendly Restaurants in the United States” on Southern Living
Proposal: advertising network transparency

You’re seeing this ad because World Wildlife Fund chose to target this ad towards people who may be interested in dogs.

We inferred you are interested in dogs because you visited web pages related to this topic, including:

“Here are the Most Dog-Friendly Restaurants in the United States” on Southern Living
Proposal: ad targeting interface with sensitivity

Users may be able to see that you are targeting to dating and personals.

We have found that users are very uncomfortable with this targeting, and recommend choosing a different category.
Recommendations: user-installed tools
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How does the method of targeting impact privacy attitudes?

How do particular inferences and their accuracy impact privacy attitudes?

Interest in topic → Comfort with personalization Perceived usefulness
You are seeing this ad because the advertiser has inferred from general data that visitors to this site… *(Visitors)*

you… *(You)*

...are likely a man ages 18-24 and thinks men ages 18-24 are likely to be interested in buying this product. *(Demographic)*

...are likely interested in dogs and thinks people interested in dogs are likely to be interested in buying this product. *(Interest)*

...are likely women ages 65-70 and thinks women ages 65-70 are likely to be interested in buying this product. *(Wrong Demographic)*

...are likely interested in Music Equipment & Technology and thinks people interested in Music Equipment & Technology are likely to be interested in buying this product. *(Unrelated Interest)*
Study 2: Inference Category Sensitivity

Results

We would expect some categories to be clearly sensitive or non-sensitive...
Study 2: Inference Category Sensitivity

Methodology: Inference Categories

Arts & Entertainment>Celebrities & Entertainment News
Arts & Entertainment>Comics & Animation
Events & Listings>Clubs & Nightlife
Events & Listings>Live Sporting Events
Movies>Action & Adventure Films
Movies>Documentary Films
Movies>Romance Films
Music & Audio>Podcasting
Music & Audio>Christian & Gospel Music
Music & Audio>Rap & Hip-Hop
Performing Arts>Broadway & Musical Theater
TV & Video>TV Comedies
TV & Video>TV Soap Operas
Autos & Vehicles>Bicycles & Accessories
Autos & Vehicles>Hybrid & Alternative Vehicles
Autos & Vehicles>Motorcycles
Vehicle Parts & Accessories>Engine & Transmission
Autos & Vehicles>Vehicle Shopping
Cosmetic Procedures>Cosmetic Surgery
Face & Body Care>Make-Up & Cosmetics
Face & Body Care>Unwanted Body & Facial Hair Removal
Fitness>Bodybuilding
Hair Care>Hair Loss

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