An Empirical Analysis of Data Deletion and Opt-Out Choices on 150 Websites

Hana Habib, **Yixin Zou**, Aditi Jannu, Chelse Swoopes, Alessandro Acquisti, Lorrie Cranor, Norman Sadeh, Florian Schaub

Carnegie Mellon University

UNIVERSITY OF MICHIGAN

Privacy Choices Are Mandated

European
Union

The United
States

Examples of Privacy Choices

EMAIL PREFERENCES

Unsubscribe

Email Address:

Unsubscribe if you no longer wish to receive email updates from Lord & Taylor.

UNSUBSCRIBE

Submit Your Preference

○ Personalize Ads from Amazon
◉ Do Not Personalize Ads from Amazon for this Internet Browser

Submit

I would like to request the following regarding my personal information: *

○ Update it
Make changes described in comments field.

○ Limit its processing
Use it only for the services I requested.

○ Port it
Show me what I have shared and posted.

○ Access it
Show me what I have shared and posted, as well as what's been collected about me.

○ Restrict processing it
Stop using my personal information, which will end my ability to use the respective service(s).

◉ Delete it
Remove my personal information, which will end my ability to use the respective service(s).

User Attitudes and Behaviors

65% said it's "very important" to them to control what information is collected about them.

86% had taken steps to remove or mask their digital footprints.

Pew Research Center. 2016. The State of Privacy in Post-Snowden America.

Usability Issues of Privacy Choices

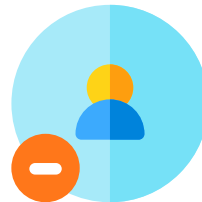| Large-scale measurement studies	Small-scale user studies
• Cranor et al., TWEB '16 • Libert, WWW '18 • Degeling et al., NDSS '19 • Zimmeck et al., PETS '19	• Komanduri et al., ISJLP '11 • Leon et al., CHI '12 • Ur et al., SOUPS '12

Our Study

Our Study…

A **manual, in-depth** content analysis of privacy choices on 150 websites.

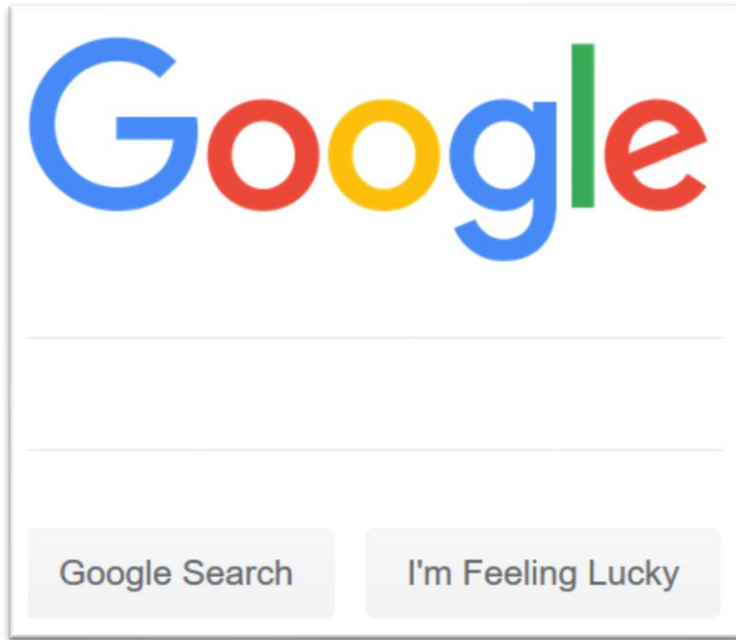Opt-outs for **email communications**

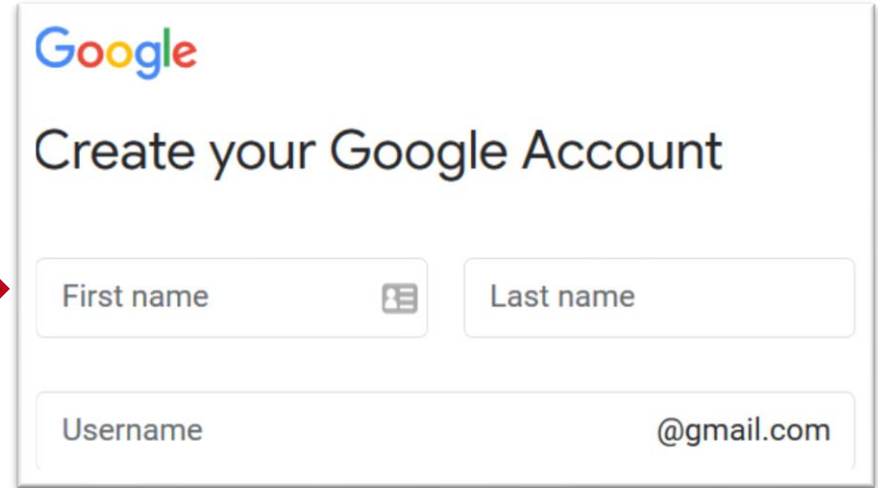Opt-outs for **targeted ads**

Choices for **data deletion**

Research Questions

1. **What** choices related to email communications, targeted advertising, and data deletion do websites offer?

2. **How** are websites presenting these privacy choices to their visitors, and what are the potential **usability** issues?
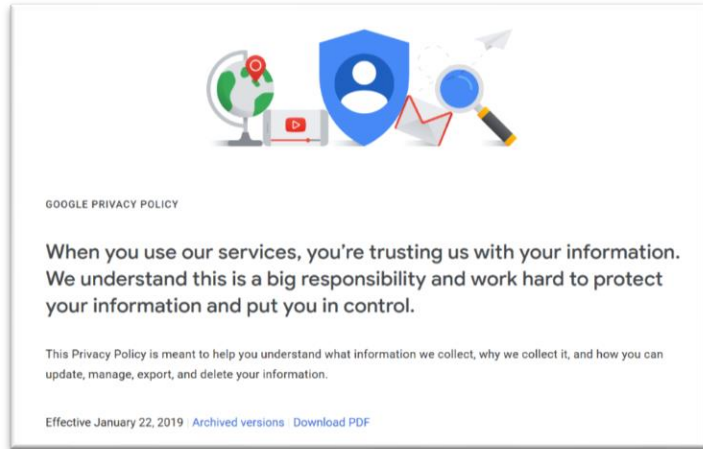
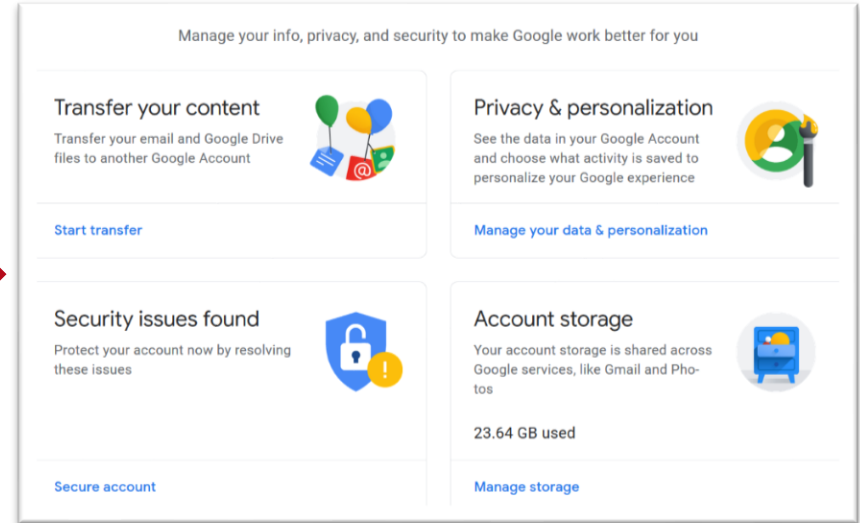# Analysis Procedure

1. Visit home page

2. Create a user account

Analysis Procedure

3. Visit privacy policy

4. Visit account settings

Analysis Template

Location

Privacy Policy? Account Settings? Other places?

Level of detail

Specific types of communications that can be opted out?

Link availability

One or multiple links? Broken or not?

Interaction path

Clicks? Form fields? Other user actions required?

Sampling Strategy

150 English-language websites sampled from Alexa's global **top 10,000** sites (Mar. 2018).

Category	Ranks
Top traffic (50)	1-200
Middle traffic (50)	201-5,000
Bottom traffic (50)	>5,000

All sites were analyzed between Apr. and Oct. 2018 ($\kappa = 0.82$).

Amazon Alexa Top Sites: https://www.alexa.com/topsites

Website Locations
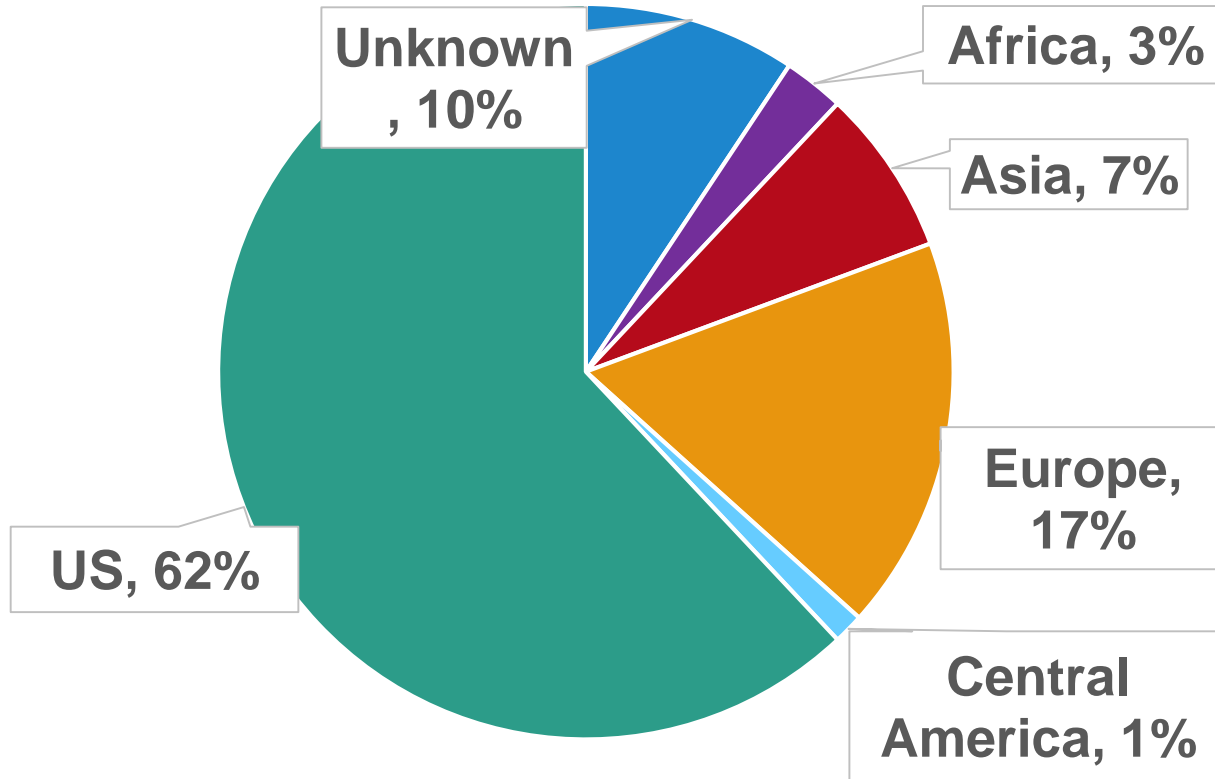
Analysis only shows the status quo for **US-based users**.

What did we find for website privacy choices?

Findings of Website Privacy Choices

Presence

Description

Usability

Findings of Website Privacy Choices

Presence

Privacy choices **commonly offered** on all websites across different traffic tiers.

Description

Usability

Privacy Choices Are Common
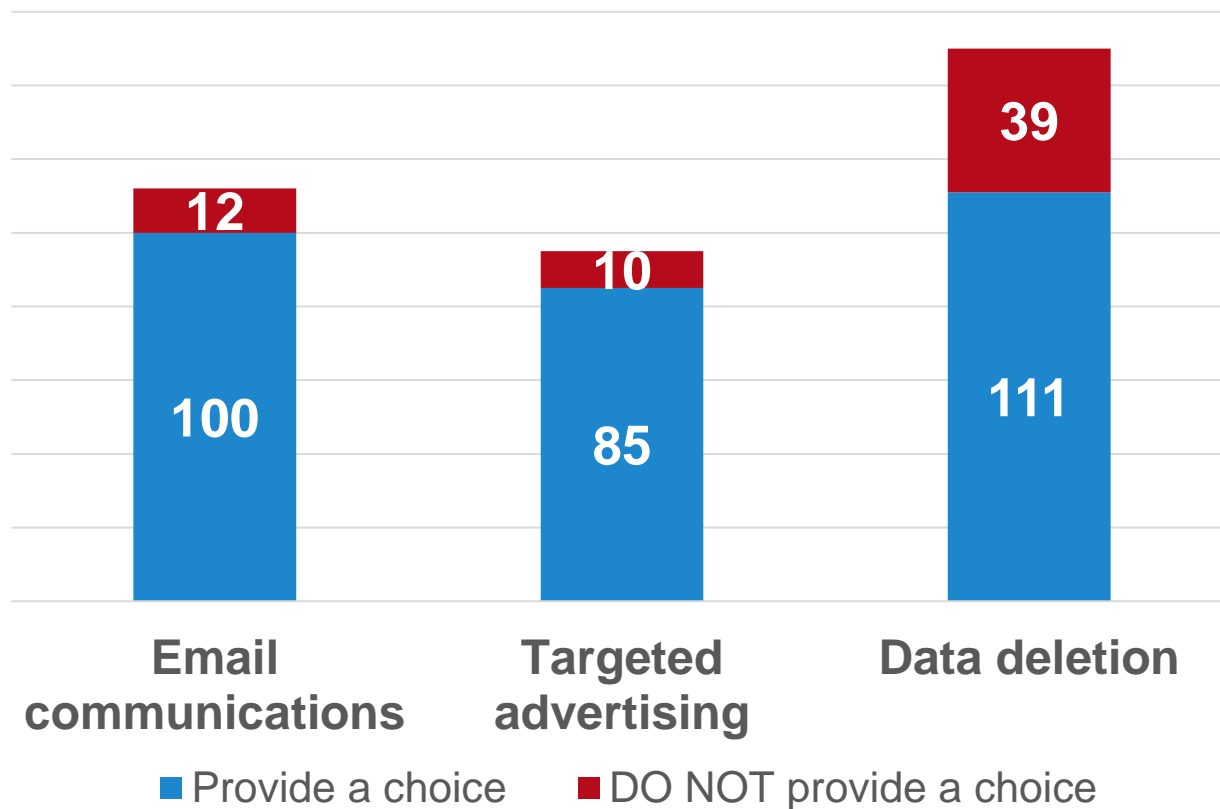
Other opt-outs:

- Web analytic services (21)
- Third-party sharing (17)
- Do-Not-Track (8)
- Cookies (5)

Legend: ■ Provide a choice ■ DO NOT provide a choice

Location of Privacy Choices

■Account Settings Only ■Privacy Policy Only ■More Than One Location

Location of Privacy Choices

Location of Privacy Choices
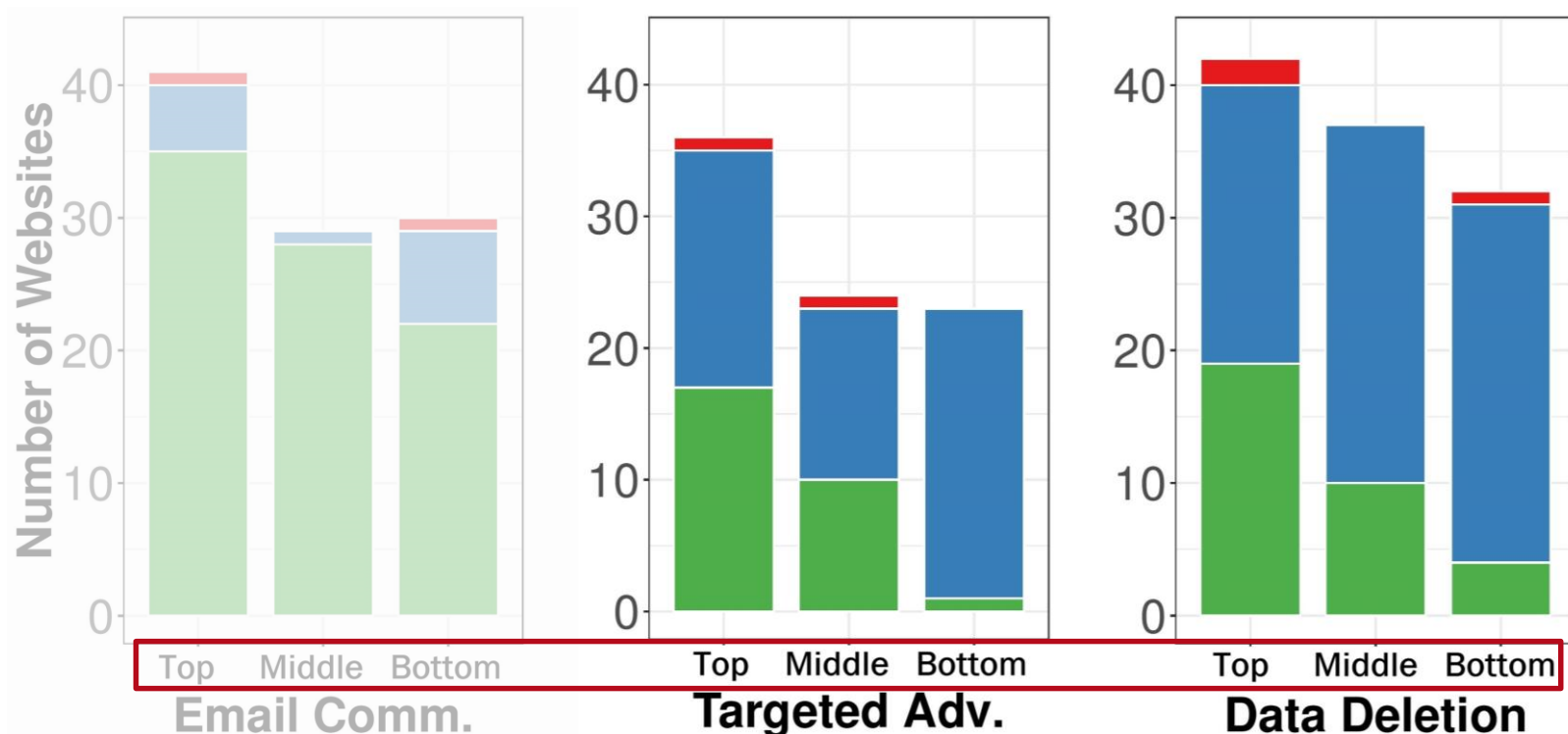
Findings of Website Privacy Choices

Presence

Description   💡 Privacy choices text has **poor readability**.

Usability

Poor Readability in Text Description

Flesch-Kincaid Grade Level (FGL) scores

Categories	Mean
Email Communications	13.89
Targeted Advertising	13.72
Data Deletion	14.28
Privacy Policies Overall	10.20

Text requires university-level reading abilities!

Findings of Website Privacy Choices

Presence

Description 💡 **No dominant wording** for section headings.

Usability

No Dominant Wording for Headings

N-Gram	Email Communications	Targeted Advertising	Data Deletion
your choic*	11	9	10

"*" is a place holder for one or more letters that follow the beginning pattern.

No Dominant Wording for Headings

N-Gram	Email Communications	Targeted Advertising	Data Deletion
opt out	**13**	7	2

"*" is a place holder for one or more letters that follow the beginning pattern.

No Dominant Wording for Headings

N-Gram	Email Communications	Targeted Advertising	Data Deletion
third part*	0	**14**	2

"*" is a place holder for one or more letters that follow the beginning pattern.

No Dominant Wording for Headings

N-Gram	Email Communications	Targeted Advertising	Data Deletion
your right*	9	2	**20**

"*" is a place holder for one or more letters that follow the beginning pattern.

No Dominant Wording for Headings

N-Gram	Email Communications	Targeted Advertising	Data Deletion
your choic*	11	9	10
opt out	13	7	2
third part*	0	14	2
your right*	9	2	20

(!) No single n-gram occurred in >20 analyzed policies.

"*" is a place holder for one or more letters that follow the beginning pattern.

Various Headings for Data Deletion

box   Your Choices

NETFLIX   Data Subject's rights

Linked in   4.2 Rights to Access and Control Your Personal Data

facebook   How can I manage or delete information about me?

Findings of Website Privacy Choices

Presence

Description   💡 **Ambiguity** in what happens after exercising the choice.

Usability

Ambiguity in Targeted Ads Opt-outs

Among 80 sites that offered targeted ads opt-outs:

50%

did not specify if it also applies to **tracking**.

90%

did not specify if it works across multiple **browsers** or **devices**.

Ambiguity in Data Deletion Choices

Among 108 sites that offered data deletion:

83% did not describe **when** the account would be permanently deleted.

Findings of Website Privacy Choices

Presence

Description

Usability

Exercising privacy choices requires **many actions**.

Average Number of Actions

Actions we counted:

- Clicks
- Hovers
- Checkboxes
- Form fields

Average number for the **shortest path**:

5.3 for email opt-outs and data deletion choices.

3.2 for targeted ads opt-outs.

SUBSCRIBE   LOG IN

Request Form

Please use this form to initiate processing your personal data request.

To unsubscribe from any marketing or newsletter emails from the New York Times, please select the 'unsubscribe' link at the bottom of each email.

To change or cancel your subscription, please contact Customer Care

I would like to request the following regarding my personal information: *

○ **Update it**
Make changes described in comments field.

○ **Limit its processing**
Use it only for the services I requested.

○ **Port it**
Show me what I have shared and posted.

○ **Access it**
Show me what I have shared and posted, as well as what's been collected about me.

○ **Restrict processing it**
Stop using my personal information, which will end my ability to use the respective service(s).

○ **Delete it**
Remove my personal information, which will end my ability to use the respective service(s).

Please select the New York Times Company products and services for which you would like to us to review and apply your personal data request towards: *

Choose the area to which your request applies:

34

Findings of Website Privacy Choices

Presence

Description

Usability

Multiple links leading to different opt-out tools.

Links to Multiple Opt-outs

Personalization

Personalized ads

You will always see ads on Twitter ba
may further personalize ads from Tw
activity with other online activity and

1. Twitter i

Pe

devices you've used to log in. Wh
other inferences about your identity,
or email addresses and phone numb

Personalize based on the places

Twitter always uses some informatio
show you more relevant content. When this setting is enabled, Twitter may also personalize your
experience based on other places you've been.

Advertisers and Other Ad Partners

Advertising revenue allows us to support and improve our services. We use the information described in this Privacy Policy to help make our advertising more relevant to you, to measure its effectiveness, and to help recognize your devices to serve you ads on and off of Twitter. Our ad partners and affiliates share information with us such a ... , and content v ... ers, also enable us ... chnology.

Twitter ad ... sing (also referred t ... out of interest-based advertising at https://optout.aboutads.info. In addition, our ads policies prohibit advertisers from targeting ads based on categories that we consider sensitive or are prohibited by law, such as race, religion, politics, sex life, or health. Learn more about your privacy options for interest-based ads here and about how ads work on our services here.

If you are an advertiser or a prospective advertiser, we process your personal data to help offer and provide our advertising services. You can update your data in your Twitter Ads dashboard or by contacting us directly as described in this Privacy Policy.

1. Twitter implemented
2. DAA

Managing your privacy settings

We are committed to offering you meaningful privacy choices.

...est-based ads on and off of Twitter, there are several ways to

...onalization and data settings and adjust the **Personalize ads**

implemented

...g partners, including Google, to market Twitter's own ...advertisers, including through the delivery of interest-based ...page apply to interest-based ads served by or on Twitter; they ...ompanies off of Twitter, including on Twitter's behalf. You can ...erest-based ads from other companies at ...optout.aboutads.info and www.networkadvertising.org/choices. If you are on the web, you can also opt ...Google Analytics by installing Google's opt-out browser add-on, and opt out of interest-based ...e ads using Google's Ads Settings.

Privacy Policy

Account Settings   "About Ads" page

36

Findings of Website Privacy Choices

Presence

Description

Usability

Poor design choices.

Promotional Emails

Send me notifications from the following categories and new categories as they become available.

- ☑ Amazon Cloud Cam
- ☑ Amazon Invites
- ☑ Alexa
- ☑ Amazon Appstore
- ☑ Amazon Books - physical stores
- ☑ Amazon Dash Button
- ☑ Amazon Echo
- ☑ Amazon Family
- ☑ Amazon Fresh
- ☑ Amazon Game Studios
- ☑ Amazon Home Services
- ☑ Amazon Marketplace
- ☑ Amazon Move
- ☑ Amazon Music Unlimited
- ☑ Amazon News
- ☑ Amazon Outfit Compare
- ☑ Amazon Partners
- ☑ Amazon Pop-Ups
- ☑ Amazon Prime Marketing Communications
- ☑ Amazon Registry Services
- ☑ Amazon Returns
- ☑ Amazon Reviews
- ☑ Amazon Seller App
- ☑ Amazon Surveys

- ☑ Friends & Social Networks
- ☑ Furniture
- ☑ General Offers
- ☑ Grocery
- ☑ Health & Personal Care
- ☑ Home, Garden & Pets
- ☑ Industrial & Scientific
- ☑ Jewelry
- ☑ Kindle & Fire Devices
- ☑ Kindle Books
- ☑ Kindle eperiodicals
- ☑ Local Services
- ☑ MP3 Downloads
- ☑ Magazine Subscriptions
- ☑ Movies & TV
- ☑ Music
- ☑ Musical Instruments
- ☑ News
- ☑ Office Products & Supplies
- ☑ PillPack
- ☑ Prime Music
- ☑ Prime Now
- ☑ Prime Student
- ☑ Prime Video
- ☑ Restaurants

How do we improve website privacy choices?

Improving Website Privacy Choices

Planning	Determining **what** to do
Translation	Determining **how** to do it
Physical action	**Doing it**
Assessment	Determining **outcomes** via feedback

Andre et al. The user action framework: A reliable foundation for usability engineering support tools. *International Journal of Human-Computer Studies*, 54(1):107–136, 2001.

Improving Website Privacy Choices

Planning

Standardize section headings in privacy policies.

Translation

Physical action

Assessment

Standardize Policy Section Headings

FACTS	WHAT DOES [NAME OF FINANCIAL INSTITUTION] DO WITH YOUR PERSONAL INFORMATION?
Why?	Financial companies choose how they share your personal information. Federal law gives consumers the right to limit some but not all sharing. Federal law also requires us to tell you how we collect, share, and protect your personal information. Please read this notice carefully to understand what we do.
What?	The types of personal information we collect and share depend on the product or service you have with us. This information can include: ■ Social Security number and [income] ■ [account balances] and [payment history] ■ [credit history] and [credit scores]
How?	All financial companies need to share customers' personal information to run their everyday business. In the section below, we list the reasons financial companies can share their customers' personal information; the reasons [name of financial institution] chooses to share; and whether you can limit this sharing.

Improving Website Privacy Choices

Planning

Translation

💡 Simplify the process of learning opt-outs.

Physical action

Assessment

Personalization

Personalized ads

You will always see ads on Twitter ba[...]
may further personalize ads from Tw[...]
activity with other online activity and[...]

Managing your privacy settings
We are committed to offering you meaningful privacy choices.

[...]est-based ads on and off of Twitter, there are several ways to

[...]onalization and data settings and adjust the **Personalize ads**

Advertisers and Other Ad Partners

Advertising revenue allows us to support and improve our services. We use the information described in this Privacy Policy to help make our advertising more relevant to you, to measure its effectiveness, and to help recognize [...] tion with us such a[...] , and content v[...] ers, also enable us[...] chnology.

Twitter ad[...] sing (also referred t[...] ut of interest-based advertising at https://optout.aboutads.info. In addition, our ads policies prohibit advertisers from targeting ads based on categories that we consider sensitive or are prohibited by law, such as race, religion, politics, sex life, or health. Learn more about your privacy options for interest-based ads here and about how ads work on our services here.

If you are an advertiser or a prospective advertiser, we process your personal data to help offer and provide our advertising services. You can update your data in your Twitter Ads dashboard or by contacting us directly as described in this Privacy Policy.

P[...]
T[...]
devices you've used to log in. When [...]
other inferences about your identity, [...]
or email addresses and phone numb[...]

Personalize based on the places [...]

Twitter always uses some informatio[...]
show you more relevant content. When this setting is enabled, Twitter may also personalize your
experience based on other places you've been.

[...]g partners, including Google, to market Twitter's own [...] advertisers, including through the delivery of interest-based [...]age apply to interest-based ads served by or on Twitter; they [...]ompanies off of Twitter, including on Twitter's behalf. You can [...]erest-based ads from other companies at optout.aboutads.info and www.networkadvertising.org/choices. If you are on the web, you can also opt out of Google Analytics by installing Google's opt-out browser add-on, and opt out of interest-based Google ads using Google's Ads Settings.

1. Twitter i[...]

1. Twitter implemented
2. DAA

[...]implemented

Unify multiple choice mechanisms into a single interface.

Help users distinguish different opt-out tools.

44

Improving Website Privacy Choices

Planning

Translation

Physical action 💡 Reduce number of actions to exercise choices.

Assessment

Reduce Number of User Actions

Please select the New York Times Company products and services for which you would like to us to review and apply your personal data request towards: *

Choose the area to which your request applies:

NYTimes.com, The New York Times newspapers, International edition, NY ⌄

Please provide the following additional information to help us locate your data:

~~Name~~ *   First   ☰   Last

Email address *

~~Country of residence~~ *   ~~Select Country~~ ⌄

~~Instance ID for Apps~~

Add the option "delete my account from all NYT services."

Convert this to a list of checkboxes.

The New York Times

Reduce Number of User Actions

Send me notifications from the following categories and new categories as they become available.

- ☐ Amazon Cloud Cam
- ☐ Amazon Invites
- ☐ Alexa
- ☐ Amazon Appstore
- ☐ Amazon Books - physical stores
- ☐ Amazon Dash Button
- ☑ Amazon Echo
- ☐ Amazon Family
- ☐ Amazon Fresh
- ☑ Amazon Home Services
- ☐ Amazon Marketplace
- ☐ Amazon Move
- ☑ Amazon Music Unlimited
- ☐ Amazon News
- ☐ Amazon Outfit Compare
- ☑ Amazon Partners
- ☐ Amazon Pop-Ups
- ☑ Amazon Prime Marketing Communications
- ☑ Amazon Returns
- ☐ Amazon Seller App

- ☐ Electronics
- ☐ Friends & Social Networks
- ☐ Furniture
- ☐ General Offers
- ☐ Grocery
- ☑ Health & Personal Care
- ☑ Home, Garden & Pets
- ☐ Industrial & Scientific
- ☐ Jewelry
- ☐ Kindle & Fire Devices
- ☐ Kindle Books
- ☐ Local Services
- ☑ MP3 Downloads
- ☐ Magazine Subscriptions
- ☑ Movies & TV
- ☑ Music
- ☐ Musical Instruments
- ☑ News
- ☐ Office Products & Supplies
- ☐ Prime Music
- ☐ Prime Now
- ☐ Prime Student

☑ Do not send me any marketing email for now

Check this box to stop receiving all Amazon marketing communications. Note that you will still receive subscription emails you explicitly opted to receive. We will still send you messages related to your orders, listings, updates about products or services you have purchased from us, or information about your account. You will also continue to receive emails about programs you are enrolled in, such as Amazon Associates and Amazon Services.

Cancel | Update

amazon

Regulation Needs to Combat Dark Patterns

CNIL Fines Google €50 Million for Alleged GDPR Violations

For alleged failure to…
- Provide notice in an **accessible** form.
- Obtain **valid** user consent to data processing for ad personalization.

Improving Website Privacy Choices

Planning

Translation

Physical action

Assessment   Describe what privacy choices achieve clearly.

Describe What Privacy Choices Do

Online Behavioral Advertising. This program offers a centralized location where users can make choices about the use of their information for online behavioral advertising. To learn more and to make choices about the use of your information for online behavioral advertising on websites, please click **here**. Please note that if you exclude online behavioral advertising using this method, this choice will only apply to the specific browser or device from which you opt out.

If you would like to cancel your account or delete your User Personal Information, you may do so in your user profile. We will retain and use your information as necessary to comply with our legal obligations, resolve disputes, and enforce our agreements, but barring legal requirements, we will delete your full profile (within reason) within 90 days. You may contact GitHub Support or GitHub Premium Support to request the erasure of the data we process on the basis of consent within 30 days.

Summary

Privacy choices are **prevalent** on websites.

Severe issues exist regarding their **description** and **usability.**

Companies and **regulators** must ensure usability of privacy choices.

Yixin Zou

yixinz@umich.edu / @yixinzou1124

yixinzou.github.io

Carnegie Mellon University

UNIVERSITY OF MICHIGAN