Designing Privacy Tools for Web Browsing

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Usable Privacy and Security Guest Lecture
Carnegie Mellon University
Johnny is very shy and withdrawn, invariably helpful but with little interest in people or in the world of reality. A meek and tidy soul, he has a need for order and structure, and a passion for detail.

Is Johnny more likely to be a librarian or a farmer?
Librarian #: 2
Farmer #: 

Thinking, Fast and Slow. Daniel Kahneman, 2013
The population of a mid size city like Durham in North Carolina is about 500 thousand people.
Milwaukee is a large city in the state of Wisconsin in the north of the United States.

Average Estimate for Population of Milwaukee?

The population of a large size city like Los Angeles in California is about 14 million people.
Milwaukee is a large city in the state of Wisconsin in the north of the United States.

Average Estimate for Population of Milwaukee?
Agenda

- Hurdles In Privacy Decision Making
- Choice Architecture Applied to Privacy Tools
- Group exercise: Evaluation of Web Privacy Tool
- Advertising Industry Opt-Out Tools
- Privacy Tools for Facebook
- Conclusion
Hurdles in (Privacy) Decision Making
Privacy Decision Making Under Uncertainty

Asymmetric and Incomplete information

- How user’s information will be used?
- Who is collecting user’s information?
- What other information the website knows about the user?
- With whom would user’s information be shared?
- How does the website protect user’s information?
- Can user control or limit how website uses his information?
Cognitive Limitations

Bounded Rationality

- Limited memory resources
- Limited cognitive resources
- Limited attention
- Difficult to assess and foresee risks
- Difficult to assess all alternatives
Behavioral Biases

Optimism and Overconfidence
- Underestimate Privacy Risks

Status Quo
- Conform to the norms
- Affinity to default choices

Hyperbolic Time Discounting
- Overestimate present benefits of disclosure
- Underestimate future risks

Loss Aversion
- Losses are weighted more than gains
- Endowment effect
Decision Making Heuristics

- Availability
- Representativeness
- Anchoring
Choice Architecture

Nudge
Improving Decisions About Health, Wealth, and Happiness
Richard H. Thaler and Cass R. Sunstein
Revised and Expanded Edition

"One of the few books I've read recently that fundamentally changes the way I think about the world." — Steven D. Levitt, author of Freakonomics
Design Choices

- Information: Reduces information asymmetries and provides a realistic perspective of risks
  - Awareness
  - Education
  - Feedback

- Presentation: Provides contextual cues through the User Interface to reduce cognitive load and convey the risk properly
  - Framing
  - Ordering
  - Saliency
  - Structure
Design Choices

- **Defaults**: Reduce users’ effort by configuring the tool according to what is most likely to conform to most users’ expectations.

- **Incentives**: Motivate users to behave according to their stated preferences.
  - Cost (e.g., make it harder to make mistakes)
  - Rewards (e.g., reward for safe behavior)

- **Time**: Define the right moment to intervene.
Tracking Blockers
Browser Plugins
Short and Clear Description

Disconnect lets you visualize and block the invisible websites that track your browsing history. Click the interactive items below to find out more!

Toolbar button

The toolbar button shows you the total number of tracking requests on every page you go to. Click the button to see and block or unblock the requests.

Dropdown

Navbar

Common tracking sites

Other tracking sites

Options

Dashboard
Visual Cues

Disconnect lets you visualize and block the invisible websites that track your browsing history. Click the interactive items below to find out more!

Toolbar button

Dropdown

The dropdown shows you the number of tracking requests by company. Green means the requests are blocked. Gray means they’re unblocked. Click any icon or checkbox to block or unblock requests.

Navbar

Common tracking sites

Other tracking sites

Options

Dashboard
Salient Relevant information

**Disconnect**

Disconnect lets you visualize and block the invisible websites that track your browsing history. Click the interactive items below to find out more!

- Toolbar button
- Dropdown
- Navbar

**Common tracking sites**

*Common tracking sites* – Facebook, Google, and Twitter – are shown separately to make them easy to block or unblock. Click any icon to block or unblock a site.

- Other tracking sites
- Options
- Dashboard
Creates Awareness and Gives Feedback
Paul Announces White House Bid, in a Test of Libertarianism

By JEREMY W. PETERS 9:55 AM ET
Senator Rand Paul of
Structured Notice and Protective Default
Welcome to Ghostery for Firefox version 5.4.3!

Ghostery looks for third-party page elements (or "trackers") on the web pages you visit. These can be things like social network widgets, advertisements, invisible pixels used for tracking and analytics, and so on. Ghostery notifies you that these things are present, and which companies operate them. You can learn more about these companies, and if you wish, choose to block the trackers they operate.

This quick walkthrough will highlight some of Ghostery's options and give you a chance to set things up straight-away. You can change any of these decisions (and view more options) by visiting the full Ghostery options page at any time. If you have any questions during the process, drop us a line at support@ghostery.com.
Help support Ghostery by sending anonymous statistical data back to Ghostery HQ.

When you enable Ghostrank, Ghostery collects anonymous data about the trackers you've encountered and the sites on which they were placed. This data is about tracking elements and the webpages on which they are found, not you or your browsing habits.

... See more.

☐ Click here to enable Ghostrank
Default Active Alert Bubble

When Ghostery detects trackers on a page you’re visiting, it displays the companies that operate those elements in a purple box at the top right corner of the screen. If you’d rather Ghostery work in the background, you can uncheck the box below.

There are more ways to customize the purple box on Ghostery's options page.

Click here to enable Alert Bubble
Blocking Choices Shown Late & Off by Default

Ghostery can prevent the page elements it detects from running in your browser. Blocking trackers will prevent them from running in your browser, which can help control how your behavioral data is tracked. Keep in mind that some trackers are potentially useful, such as social network feed widgets or browser-based games ... Blocking may have an unintended effect on the sites you visit.

Please let us know if you run into any issues.

Trackers that got blocked will be crossed out in the alert bubble and the findings panel.

**Trackers**  
**Cookies**

- **Blocking no trackers.**
  - When you block a tracker, the tracker is prevented from communicating with its third-party provider.

<table>
<thead>
<tr>
<th>Type</th>
<th>Count</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Advertising</td>
<td>978</td>
<td>blocking none</td>
</tr>
<tr>
<td>Analytics</td>
<td>317</td>
<td>blocking none</td>
</tr>
<tr>
<td>Beacons</td>
<td>380</td>
<td>blocking none</td>
</tr>
<tr>
<td>Privacy</td>
<td>19</td>
<td>blocking none</td>
</tr>
<tr>
<td>Widgets</td>
<td>290</td>
<td>blocking none</td>
</tr>
</tbody>
</table>

Show all  | Select none  | Expand all  | Collapse all  | Show more tags...
Discourage to Block Tracking

Ghostery can prevent the page elements it detects from running in your browser.

Blocking trackers will prevent them from running in your browser, which can help control how your behavioral data is tracked. Keep in mind that some trackers are potentially useful, such as social network feed widgets or browser-based games ... Blocking may have an unintended effect on the sites you visit.

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<table>
<thead>
<tr>
<th>Trackers</th>
<th>Cookies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blocking no cookies.</td>
<td></td>
</tr>
<tr>
<td>When you block a cookie, selected third-party providers are unable to write cookies to your browser.</td>
<td></td>
</tr>
<tr>
<td><strong>Warning!</strong> When combined with other cookie monitoring addons such as Beef Taco, Cookie Monster, and Google Opt-Out, this feature can cause unresponsive script errors. If you experience this error, please try disabling this feature or conflicting addons.</td>
<td></td>
</tr>
</tbody>
</table>

Select all | Select none | Expand all | Collapse all

- **Advertising**: 426 cookies; blocking none
- **Analytics**: 132 cookies; blocking none
- **Beacons**: 154 cookies; blocking none
Creates Awareness
Unstructured Choices & Ineffective Visual Cues
Ad Industry Opt-Out Tools
Ineffective Awareness
Welcome to the Digital Advertising Alliance’s consumer choice page. The companies participating in this page provide transparency and choice under the DAA Principles.

Some of the ads you receive on Web pages are customized based on predictions about your interests generated from your visits to different Web sites. This type of ad customization is sometimes called "online behavioral" or "interest-based" advertising. Such online advertising helps support the free content, products and services you get online. The DAA Principles apply to interest-based advertising and other applicable uses of Web viewing data collected from a particular computer or device over time and across unaffiliated Web sites.

Using the tools on this page, you can opt out from the collection of Web viewing data for interest-based advertising and other applicable uses, by some or all of the participating companies.

- See all the participating companies on this choice page and learn more about their practices;
- Also find out which participating companies have currently enabled customized ads for your browser;
- Check whether you've already opted out from participating companies;
- Exercise choice with some or all participating companies, using opt-out cookies to store your preferences in your browser; or
- Use the "Choose All Companies" feature to opt out from all currently participating companies in one step.

All Participating Companies (121)

Companies Customizing Ads For Your Browser (3)

Existing Opt Outs (0)

These 3 participating companies have enabled interest-based ads for this web browser.

Click the company name to find out more about a participating company. To opt out from interest-based ads by one or more companies, check the box(es) in the "Select" column next to the company name(s), and then hit the "Submit your choices" button. You can also use click the "Select all shown" box to pre-check all the listed companies before you hit the "Submit" button.

Need help?
Default Tab List the Fewer Companies

These 3 participating companies have enabled interest-based ads for this web browser.

Click the company name to find out more about a participating company. To opt out from interest-based ads by one or more companies, check the box(es) in the "Select" column next to the company name(s), and then hit the "Submit your choices" button. You can also use click the "Select all shown" box to pre-check all the listed companies before you hit the "Submit" button.

Submit your choices for the selected companies stores your opt out preference(s) in your browser. Learn More.
### Extra Effort to Opt Out of More

**All Participating Companies (121)**

- **These 121 companies participate in the DAA's consumer choice page.**

  Click the company name to find out more about a participating company. To opt out from one or more companies, check the box(es) in the "Select" column next to the company name(s), and then hit the "Submit your choices" button. You can also click the "Select all shown" box to pre-check all the listed companies before you hit the "Submit" button. An [-] symbol in the check box indicates that you have already set an opt out for this company.

**Need help?**

<table>
<thead>
<tr>
<th>COMPANY NAME</th>
<th>SELECT ALL SHOWN</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuen Inc.</td>
<td>status currently unavailable</td>
</tr>
<tr>
<td>eBay Enterprise (formerly FetchBack)</td>
<td>status currently unavailable</td>
</tr>
<tr>
<td>Videology</td>
<td>status currently unavailable</td>
</tr>
<tr>
<td>33Across</td>
<td></td>
</tr>
<tr>
<td>Acxiom</td>
<td></td>
</tr>
<tr>
<td>Adara Media, Inc.</td>
<td></td>
</tr>
<tr>
<td>Adblade Premium Ad Network</td>
<td></td>
</tr>
<tr>
<td>AddThis (including XGraph)</td>
<td></td>
</tr>
<tr>
<td>Adelphic</td>
<td></td>
</tr>
<tr>
<td>Adobe Media Optimizer</td>
<td></td>
</tr>
</tbody>
</table>

**Companies Customizing Ads For Your Browser (3)**

**Existing Opt Outs (0)**

*Submitting your choices for the selected companies stores your opt out preference(s) in your browser. [Learn More.]*
Privacy Tools for Facebook
Just in time Intervention

Privacy Checkup

Hi Charlie — Sorry to interrupt. You haven’t changed who can see your posts lately, so we just wanted to make sure you’re sharing this post with the right audience. (Your current setting is Public, though you can change this whenever you post.) Learn more.

Who do you want to share this post with?

Friends  Public  More Options
Salient and Structured Notice

Privacy Settings

- Contacts Info
- Name
- Everyone
- Friends of Friends
- Friends
- Profile Picture
- Photos & Videos
- Posts
- Other Profile Info
- Comments

Additional Settings you should be aware of:

- Facebook partners **cannot** use your public info
- Friends **can** share your info
- Advertisers **can** show your info to friends in ads

Questions? See our FAQ!
Facebook Nudges

Passive aggressive people irritate the hell out of me, if you can't say something to my face maybe you should keep your mouth shut.

These people and 102 more can see your post.

Passive aggressive people irritate the hell out of me, if you can't say something to my face maybe you should keep your mouth shut.

Your post will be published in 3 seconds.

Post Now  Edit  Cancel
Improved Awareness

“That was almost the ‘Oh wow’ moment when I realized that more people could see my posts than I thought about”
“It helped me avoid getting into fights on Facebook because you have to **stop and think**.”

“I used it to correct grammatical errors or statuses that looked off.”
not excited about still being sick wtf

not excited about still being sick after spending all afternoon in bed not doing my paper or having fun.
Conclusions

- Behavioral biases affect privacy decision making
- Good tool design needs to take these biases into account
- Tools can both mitigate and leverage biases to assist users’ decisions
- Every design choice will impact users’ behavior
- Good tools can have a positive impact on users’ behaviors
- Usability testing can help to assess the effectiveness of privacy tools
Thank you!

Questions?

Contact: pleon@law.stanford.edu