Watching Them Watching Me
Browser Extensions’ Impact on User Privacy Awareness and Concern

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Online Tracking

Justice Scalia dies at 79

Replacement fight brews
Conservative giant dies in his sleep | Who could be on Obama’s short list

‘Life-threatening' cold sweeping in
Online Tracking

Interest: Guitars

A9837%^6528

Interest: Guitars
Online Tracking

Interest: Guitars

Interest: Guitar Straps
Online Tracking

The snails spreading fever across Africa

Girl with ‘butterfly skin’ dies

Pioneering electric race series resumes on streets of Buenos Aires

2 teens killed sledding on closed Olympic track
Privacy Extensions
Many Privacy Extensions
Research Questions

• How do extensions influence privacy awareness and concerns?

• How do different interface elements shape users’ awareness and concerns?
Browser Extensions Evaluated
User Interface Elements

Main Panels

*all on nytimes.com at the same time*
User Interface Elements
User Interface Elements

Alert Bubbles

Ghostery

DoNotTrackMe

all on nytimes.com
at the same time
User Interface Elements
User Interface Elements

Extension Icons

all on nytimes.com
at the same time
Tracker Detection Performance

Alexa Top100 (July 2014), ordered by #trackers detected by Ghostery

- Disconnect
- DoNotTrackMe
- Ghostery

number of trackers
Study Design

Privacy Guard

Privacy Guard helps protect your privacy online.

Privacy Guard is a cost-free privacy browser extension for Internet Explorer, Opera, Mozilla Firefox, Apple Safari, and Google Chrome.

If you have any problems, please contact us

contact@privacyguard.com

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Study Design

Think Aloud
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Search Topics

Body Odor  Depression
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Websites

- Veoh
- Amazon
- The New York Times
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Part 1:
Think-Aloud Browsing Tasks Without Extension

- Search Topic 1 (On all three sites)
- Gather Baseline (assuming logged in)
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Part 2: Install Extension

- Install Extension
- Familiarize with UI
Study Design

Part 3:
Think-Aloud Browsing Tasks With Extension

- Search Topic 2 (On all three sites)
- Gather Ratings
- Gather Ratings (assuming logged in)
Study Design

Part 4:
Hypothetical Scenario
With Extension
Taken Away

Gather Ratings
Gather Ratings (assuming logged in)
Study Design

Part 5: Exit Interview Questions

- Extension Related
- Demographic
Qualitative Data Analysis

- All interviews were recorded and transcribed
- Analyzed by two researchers
- Iteratively developed coding taxonomy
- Affinity diagramming to identify themes
  - 2,623 annotations overall
  - 111 codes within 8 broad categories
Demographics

• 24 participants
  – 62% female, 38% male
  – Age: 18-63 years (median 22 years)
  – Diverse occupations (14 students)
  – 14 had installed a browser extension before
Results: Before Using Extension

Reasons for Concern

- External tracking
- Browsing activities personal
  - Distrust website
  - Dislike targeted ads
  - Logging-in linked to user awareness about presence of data collection

Reasons for Unconcern

- Nothing to hide
- Reputable/trusted website
- Activities personally un-linkable
Results: While Using Extension

Reasons for Increased Concern

- More aware of tracking
- Websites/others still able to track
- Believe extension is tracking

Awareness about **extent** of data collection

- Extension blocks trackers

Reasons for Decreased Concern
Results: While Using Extension

...contd.

- No harm perceived from tracking
- Questioned extension’s effectiveness
Results: Post Extension Removal

- Increased awareness of tracking
- Perceived protection loss

Reasons for Increased Concern

Unchanged Concern

- No harm perceived from tracking
Results: Interface Elements

Installation & Documentation

- Videos are informative
- Tutorials help familiarizing UI
- User Reviews
- Jargon, and confusing descriptions
- Unexplained permission request
- Selling premium features
Results: Interface Elements

Extension Icon

- Numbers calibrate privacy concern
- Color change suggest heightened warning

- Small details not always visible
Results: Interface Elements

Alert Bubble

• Led people to click on main panel

• Transient, so not everyone saw it
• Annoying due to constant interruption
Results: Interface Elements

Main Panel

- List increased awareness, and concern
- Company names and purpose unknown
- Terms and tracker categories unclear
- Additional information rarely accessed
Study Limitations

- Qualitative study with 24 participants
- Limited topics, websites
- Lab setting
- Habituation effects
- Potential priming
- Anchoring
Design Implications

- Extension icon is essential
- Use alert bubble sparingly
- Integrate relevant explanations
- Avoid jargon
- Setup materials shape mental models
- Emphasize why and what
Thank you! Questions?

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