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

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Master of Science in
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privacy
ENGINEERING

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# Online Tracking

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# Online Tracking



A9837%^6528

Interest: Guitars

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# Online Tracking



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Interest: Guitars

Interest: Guitar Straps

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# Online Tracking

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# Privacy Extensions

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# Many Privacy Extensions

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# Research Questions

- How do extensions influence privacy awareness and concerns?

- How do different interface elements shape users' awareness and concerns?

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# Browser Extensions Evaluated

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# User Interface Elements

## Main Panels



*all on nytimes.com at the same time*

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# User Interface Elements

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# User Interface Elements

## Alert Bubbles



Ghostery

DoNotTrackMe

*all on nytimes.com
at the same time*

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# User Interface Elements

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# User Interface Elements

## Extension Icons



*all on nytimes.com*
*at the same time*

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# Tracker Detection Performance



Plot legend:
- Disconnect (red)
- DoNotTrackMe (green)
- Ghostery (blue)

y-axis: number of trackers (0, 5, 10, 15)

x-axis: Alexa Top100 (July 2014), ordered by #trackers detected by Ghostery (0, 25, 50, 75, 100)

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# Study Design



x6    x6    x6

GHOSTERY

DoNotTrackMe

D. Disconnect

x6
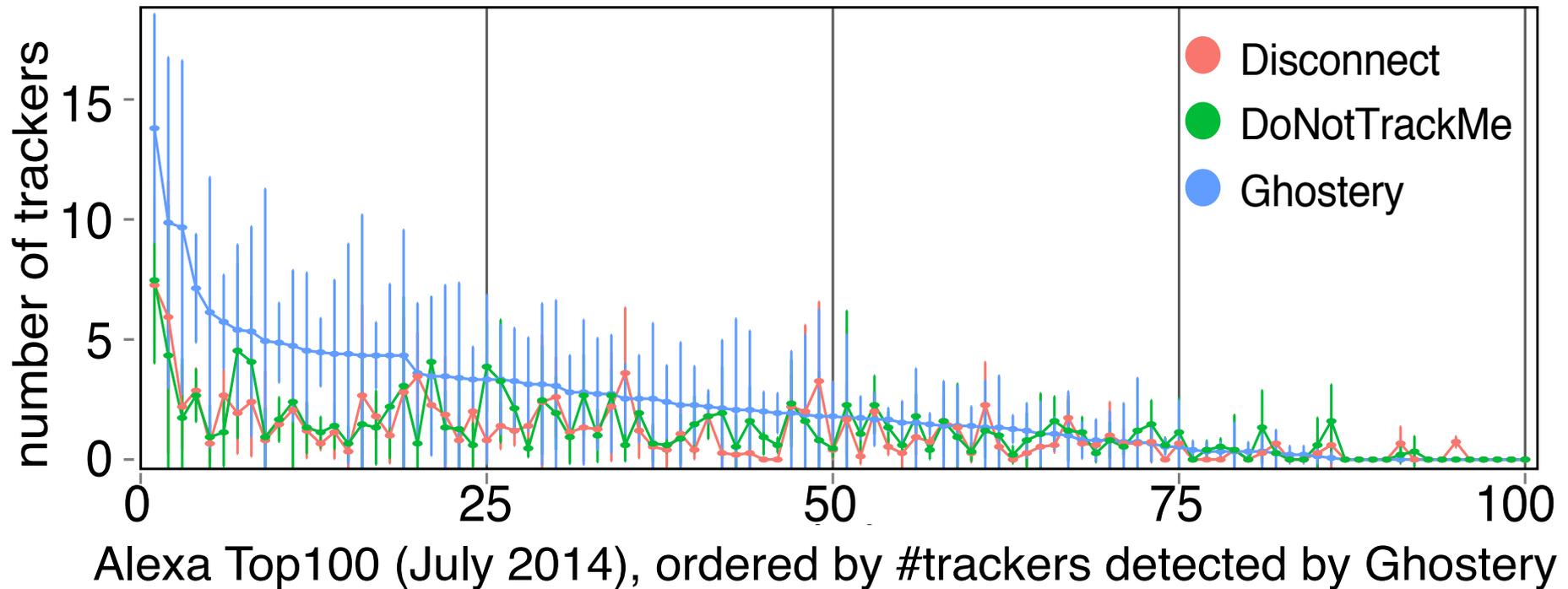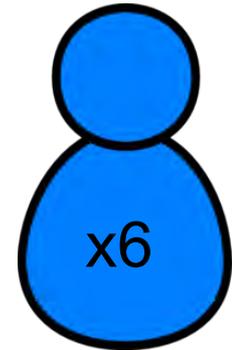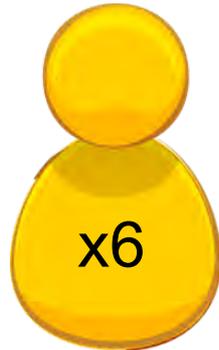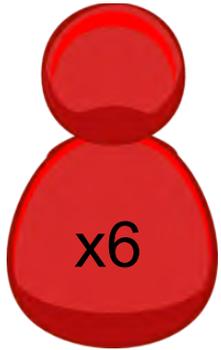
**Privacy Guard**

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

Running ...

© 2014 Privacy Guard Inc. Help

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# Study Design

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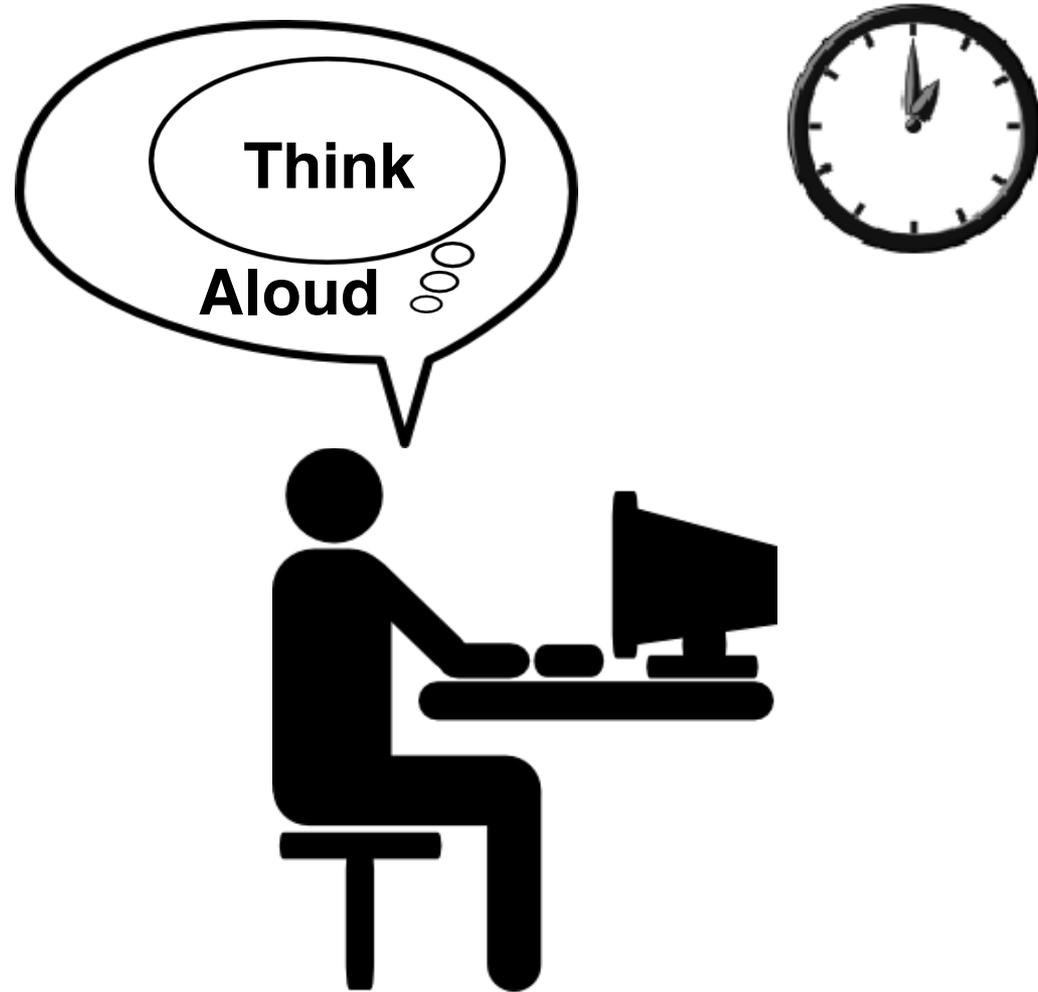
# Study Design

## Search Topics



Body Odor                                    Depression

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# Study Design

Websites

# Study Design

## Part 1:
Think-Aloud
Browsing Tasks
Without Extension

✓ Search Topic 1
(On all three sites)

✓ Gather Baseline

✓ Gather Baseline
(assuming logged in)

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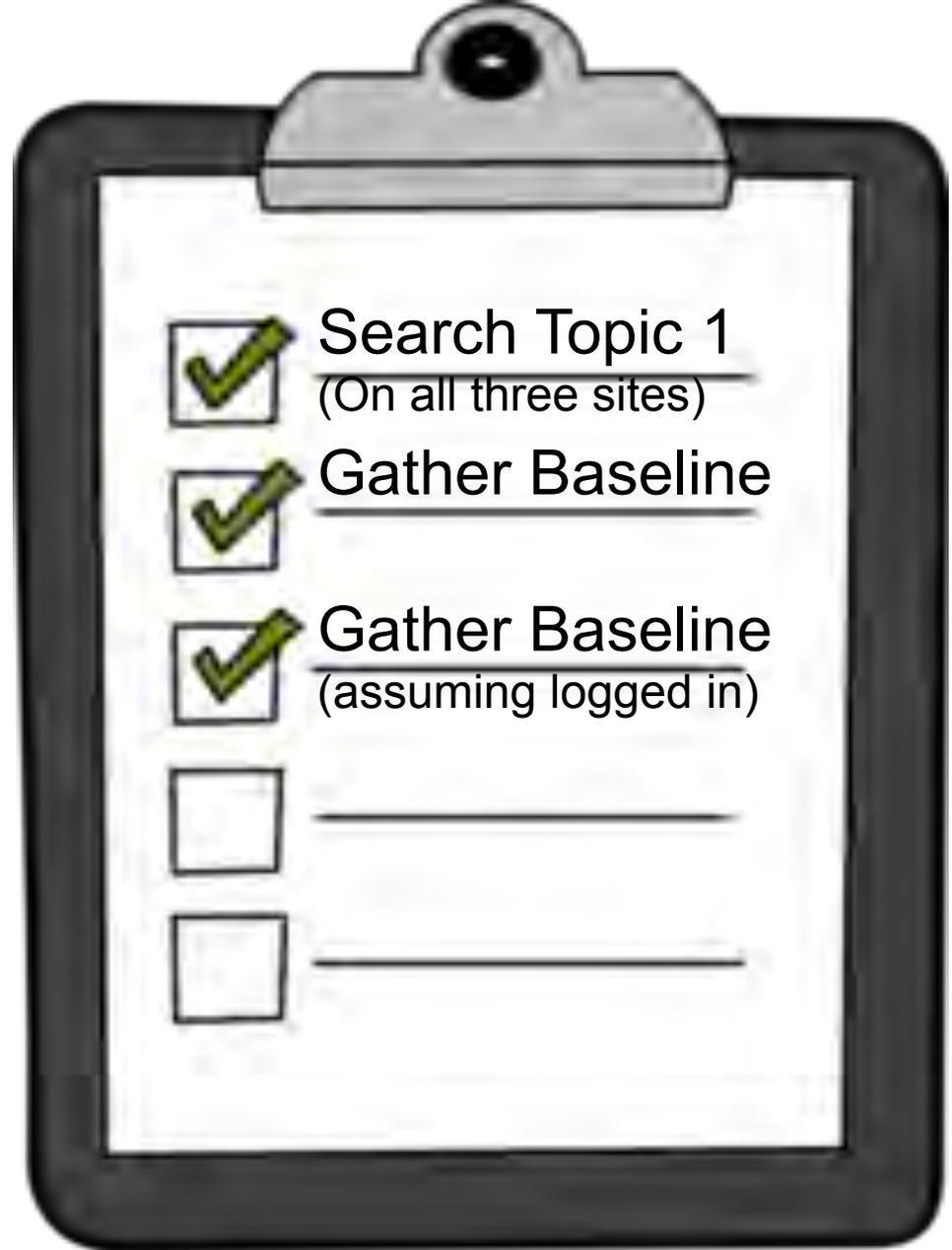
# Study Design

Part 2:
Install Extension



- ☑ Install Extension
- ☑ Familiarize with UI
- ☐ _____
- ☐ _____
- ☐ _____

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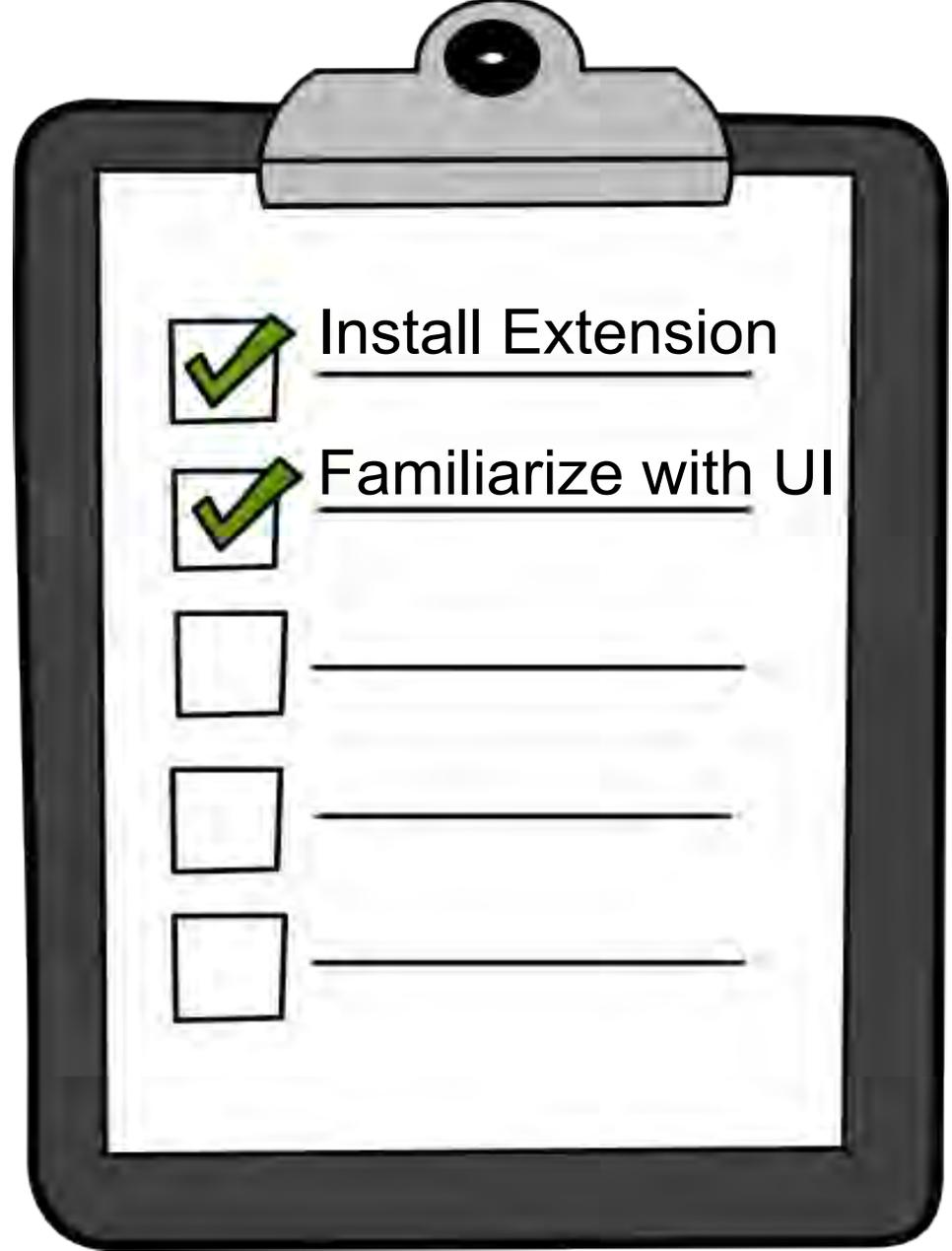
# Study Design

**Part 3:**

Think-Aloud
Browsing Tasks
With Extension

Search Topic 2
(On all three sites)

Gather Ratings

Gather Ratings
(assuming logged in)

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# Study Design

**Part 4:**

Hypothetical Scenario
With Extension
Taken Away

☑ <u>Gather Ratings</u>

☑ <u>Gather Ratings</u>
(assuming logged in)

☐ _____

☐ _____

☐ _____

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# Study Design

**Part 5:**
Exit Interview Questions

✓ Extension Related

✓ Demographic

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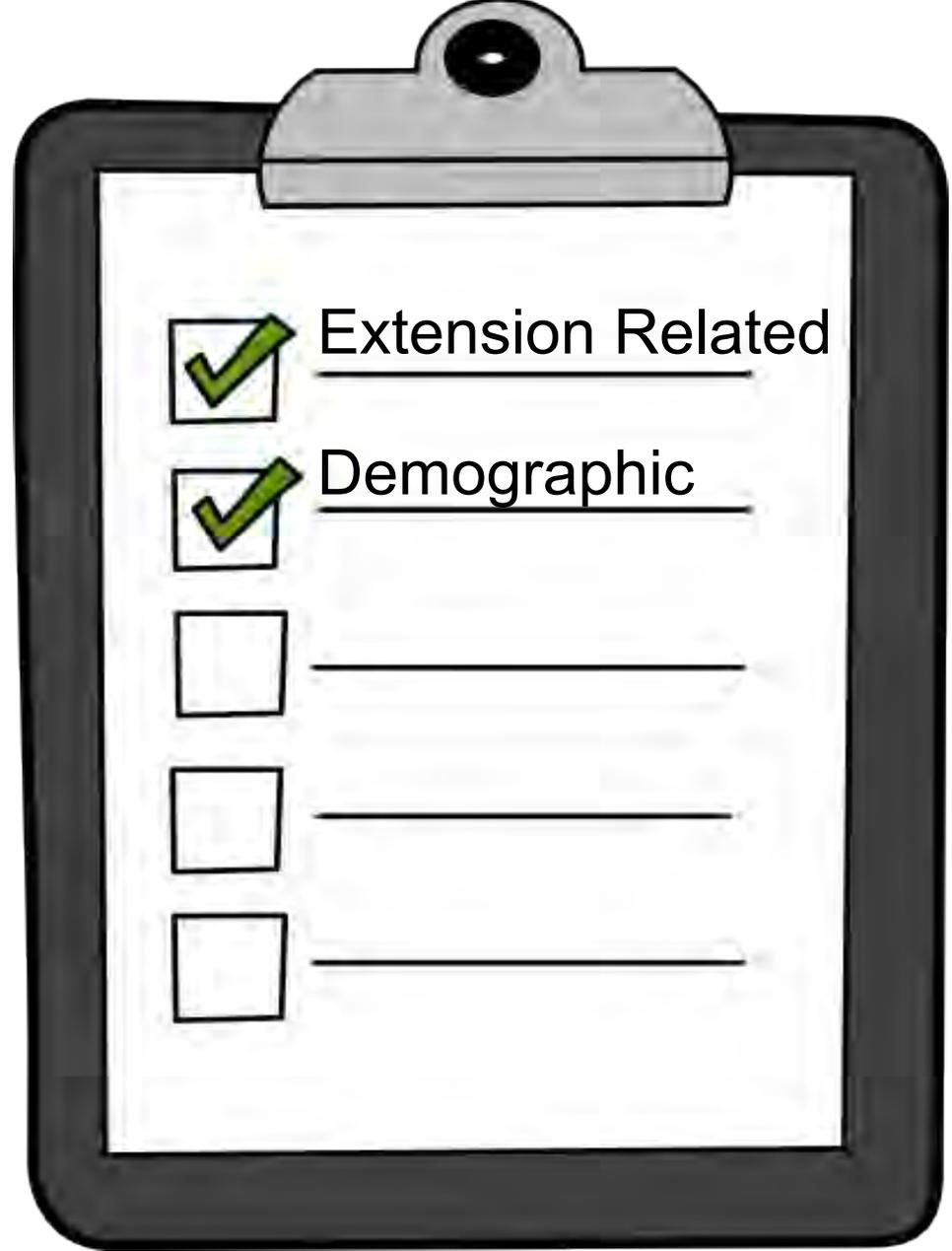
# Qualitative Data Analysis

- 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
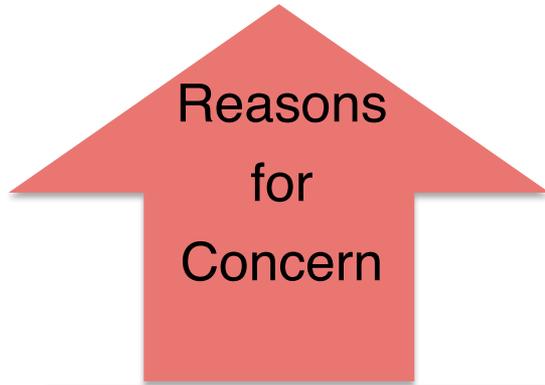
- External tracking
  - Browsing activities personal
  - Distrust website
    - Dislike targeted ads
      - Logging-in linked to user

**Reasons for Concern**

**Awareness about presence of data collection**

- Nothing to hide
- Reputable/trusted website
- Activities personally un-linkable

**Reasons for Unconcern**

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# Results: While Using Extension
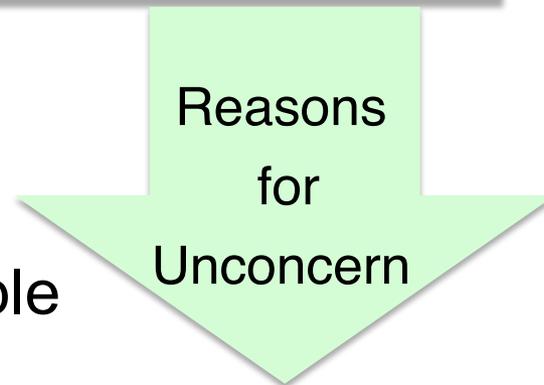
Reasons for Increased Concern
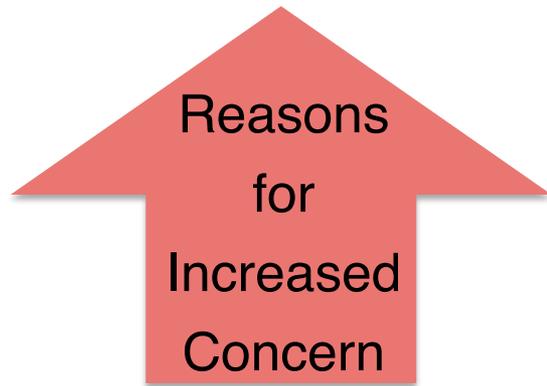
- More aware of tracking
  - Websites/others still able to track
    - Believe extension is tracking

**Awareness about extent of data collection**

Reasons for Decreased Concern

- Extension blocks trackers

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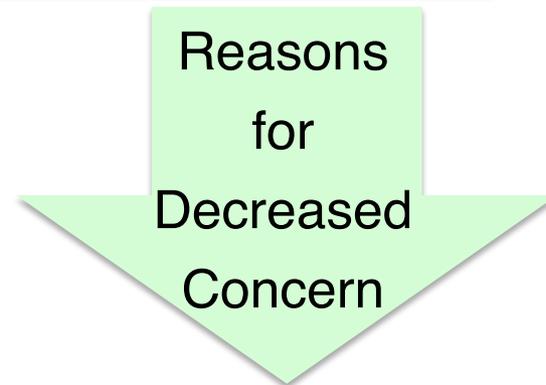
# Results: While Using Extension

...contd.
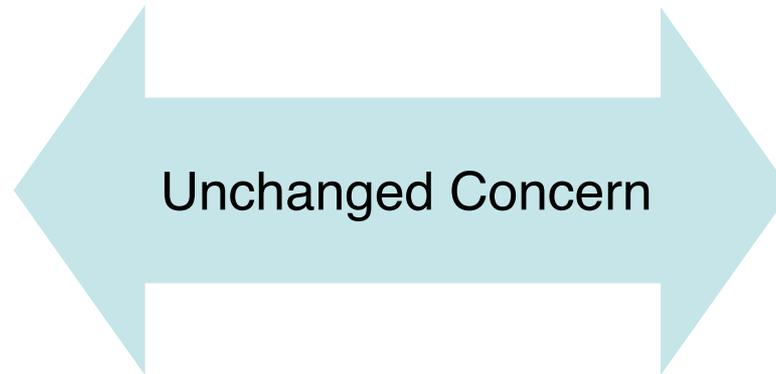
Unchanged Concern

- No harm perceived from tracking
- Questioned extension's effectiveness

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# Results: Post Extension Removal
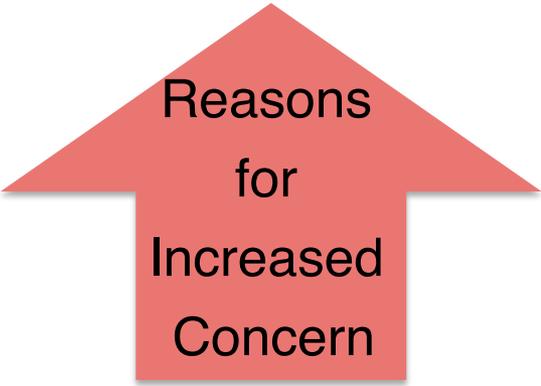
**Reasons for Increased Concern**

- Increased awareness of tracking
- Perceived protection loss
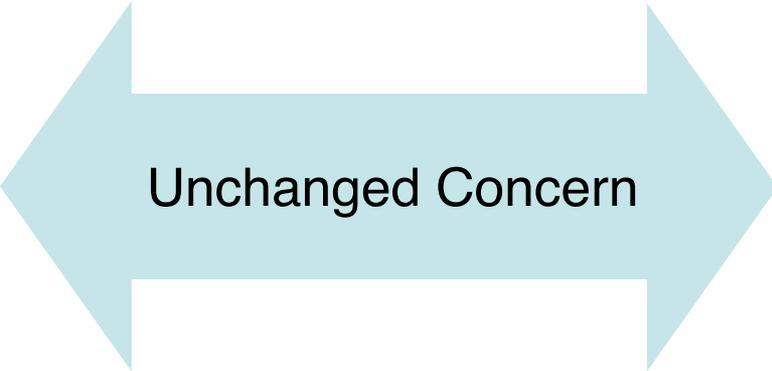
**Unchanged Concern**

- 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

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# Results: Interface Elements

## Extension Icon

- Numbers calibrate privacy concern
- Color change suggest heightened warning

- Small details not always visible

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# Results: Interface Elements

## Alert Bubble





- Led people to click on main panel

- Transient, so not everyone saw it
- Annoying due to constant interruption

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# Results: Interface Elements

## Main Panel
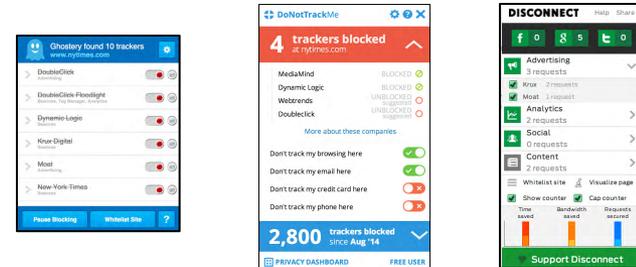


- List increased awareness, and concern



- Company names and purpose unknown
- Terms and tracker categories unclear
- Additional information rarely accessed

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# Study Limitations

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

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# 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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