

Away From Prying Eyes: Analyzing Usage and Understanding of Private Browsing

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Introduction

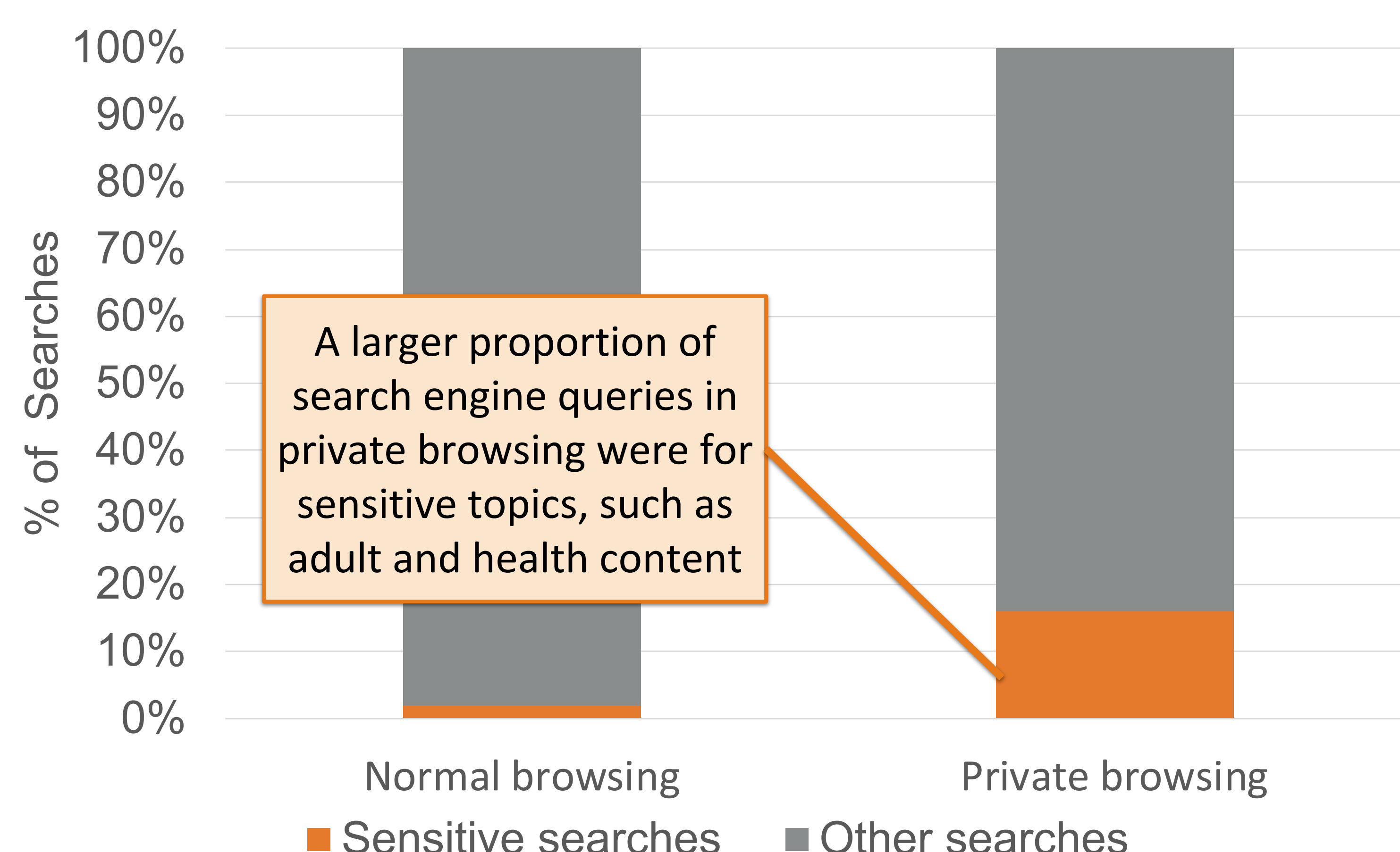
- **Private browsing** is a browser feature in which data from a browsing session is deleted after the session ends
- To ensure users are not putting their data at risk, it is critical to learn how and why private browsing is used
- **The Security Behavior Observatory (SBO)** is a longitudinal study that collects data about privacy and security behaviors from participants' home computers

Research Goals

- Leverage SBO browsing data to explore patterns in private browsing usage
- Investigate the impact that self-reporting bias has on results reported in prior work
- Provide insights into why people use private browsing for specific use cases

Private Browsing Use Cases

Most Common Use Cases	% of private browsing sessions
Log into service	38%
General browsing ¹	37%
General searches ¹	33%
Access adult content	24%
Stream audio/video	19%



Approach

Empirical Analysis

- Manual annotation of SBO private browsing data collected from Chrome and Firefox users between Oct. 2014 and Dec. 2017
- Comparison between normal and private browsing:
 - Domain categories
 - Search engine queries
 - YouTube activity

451
SBO participants

41% used private browsing mode

167,128
browsing sessions

4% had private browsing activity

Survey

- Exploration of user rationales and technical understanding of private browsing mode
- 227 SBO + 305 Mechanical Turk participants

User Perceptions of Private Browsing

Motivations

- **Practical**
 - Avoid price discrimination
 - Prevent unwanted video recommendations
- **Security Related**
 - Keep passwords and personal information safe
 - Protect themselves from malicious activity
- **Privacy Threats**
 - Other users of their device
 - Web tracking
 - Targeted advertising

"[private browsing] lets me think I am seeing 'real' prices for tickets/items instead of prices generated for me..."

Misconceptions

- 75% thought private browsing prevents cookies from being sent to websites
- 48% thought private browsing encrypts web traffic
- 41% thought private browsing hides their IP address

1. Activities that did not fall under any other use case were categorized as "general" browsing or searches

