

# **Intractable Cookie Crumbs: Unveiling the Nexus of Stateful Banner Interaction and Tracking Cookies**

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# Background

- Online Advertising is dominant revenue model
  - 98.4% of Facebook revenue
- Tracking technologies, e.g., Web cookies
- Helping monetization and user experience
- Privacy issues



# Privacy Regulations



**GDPR**



**ePrivacy Directive**



Requiring prior consent for storing or accessing non-essential information on a user's device.

# Cookie Banners

(Un)informe

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## ABSTRACT

Since the adoption of the GDPR in May 2018 more than 60 % *cookie consent notices* to their becoming fatigued with privacy the rise of both browser extensions demands for a solution that built or in the browser. In this work the graphical user interface experiments with more than 100 site to investigate the influence

## Make It Your

Addendum to

How would you like to access Gentside?

**With advertising and cookies**

I agree to the use of cookies for web analysis and personalised advertising (tracking). Details can be found in the privacy manager and in our privacy policy.

**I agree**

Your consent can be revoked at any time via the privacy link at the bottom of each page.

**With subscription**

Use Gentside without tracking, external banners and video advertising as a subscriber to our website for €1.99 / month.

**Subscribe now**

☐ Enable all

functional and cookies only\* to cookies  
omize your cookie

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## I Framing in ing: A Study on

privacy issue, due to their prevalence across the web. To address this issue, many jurisdictions have enacted which mandate information via so-called *cookie notices*. Unfortunately, these notices have been shown to be ineffective; they are generally not understood by end-users. One reason for this ineffectiveness is the presence of data collection elements that are not clearly visible in the user interface design elements that

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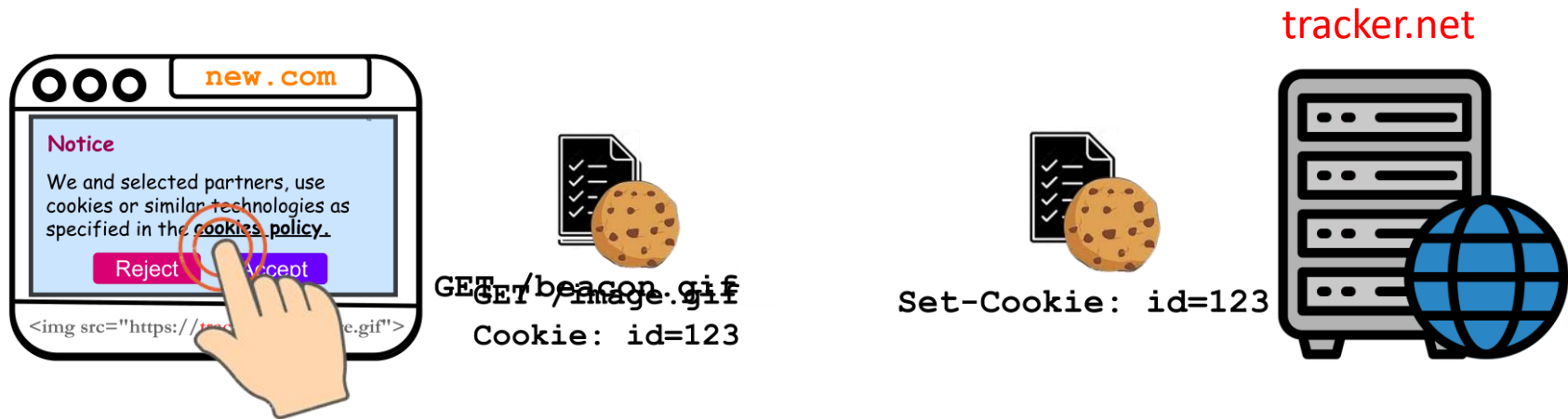
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Despite their best intentions, people struggle with the realities of privacy protection and will often sacrifice privacy for convenience in their online activities. Individuals show systematic, personality dependent differences in their privacy decision making, which makes it interesting for those who seek to design 'nudges' designed to manipulate online behavior. Moreover, such efforts in a real-life decision task. The hundred and

# Research Question

Do cookies set on a website with an accepted banner contribute to user tracking on subsequently visited websites before any consent is given?

# Intractable Cookies

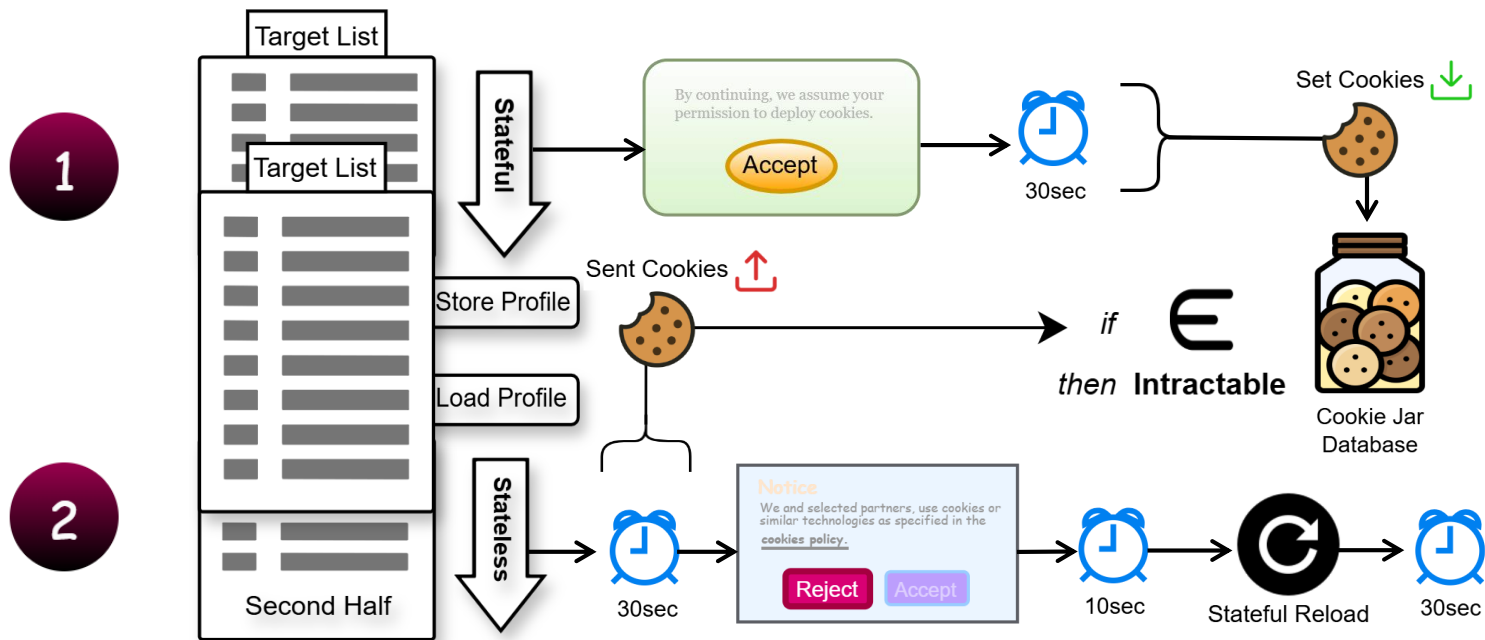


**Intractable Cookies** → tracking cookies that are set on a accepted domain and later sent to the tracker by subsequent websites prior to any banner interaction.

# Measurement Setup

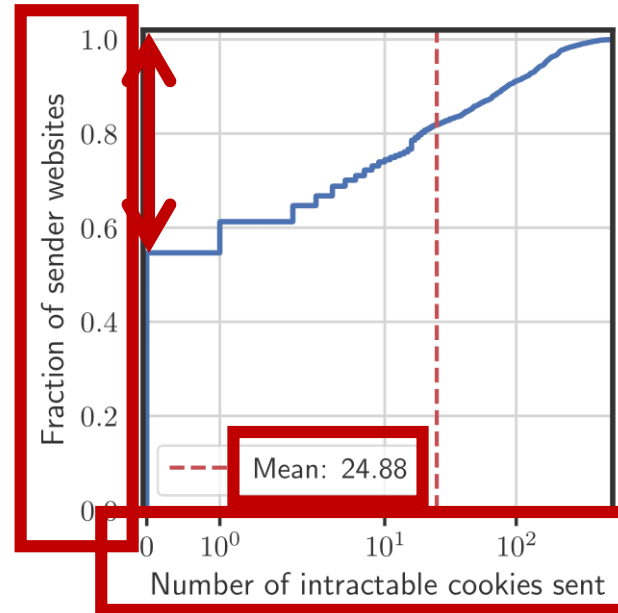
- **Measurement tools:**
  - BannerClick: detecting and interacting with banners with 99% accuracy.
  - OpenWPM: crawling and collecting required data like cookie set and sent.
- **Vantage point:** an AWS server in Germany.
- **Target list:** randomly select and shuffle 20k sites from Tranco's top 50k.

# Methods



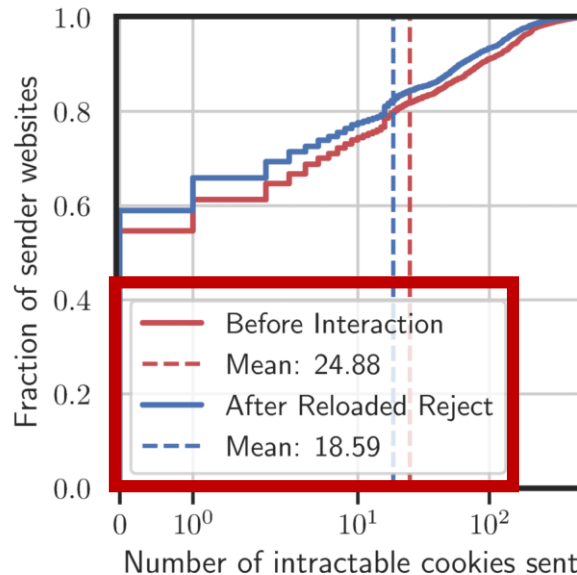


## Results – Intractable Cookies Prevalence



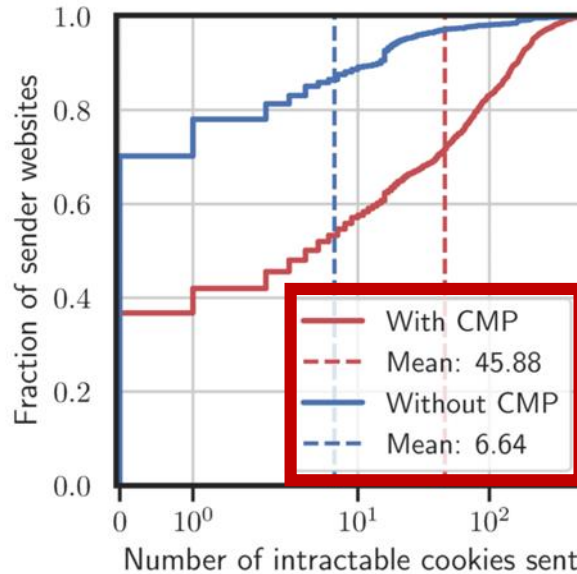
~50% of websites sent at least one intractable cookies.

## Results – Impact of Banner Interaction



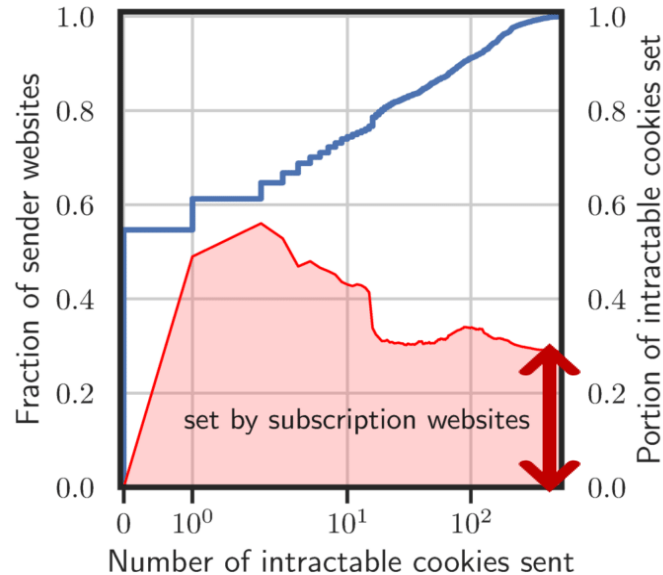
~25% of intractable cookies are not sent after reloading the rejected webpage.

## Results – Impact of CMP Banners



Websites with CMP banners send 6.9 times more intractable cookies compare to websites with native banners.

# Results – Impact of Cookie Paywall Banners



A few websites with cookie paywalls are responsible for ~35% of intractable cookies.

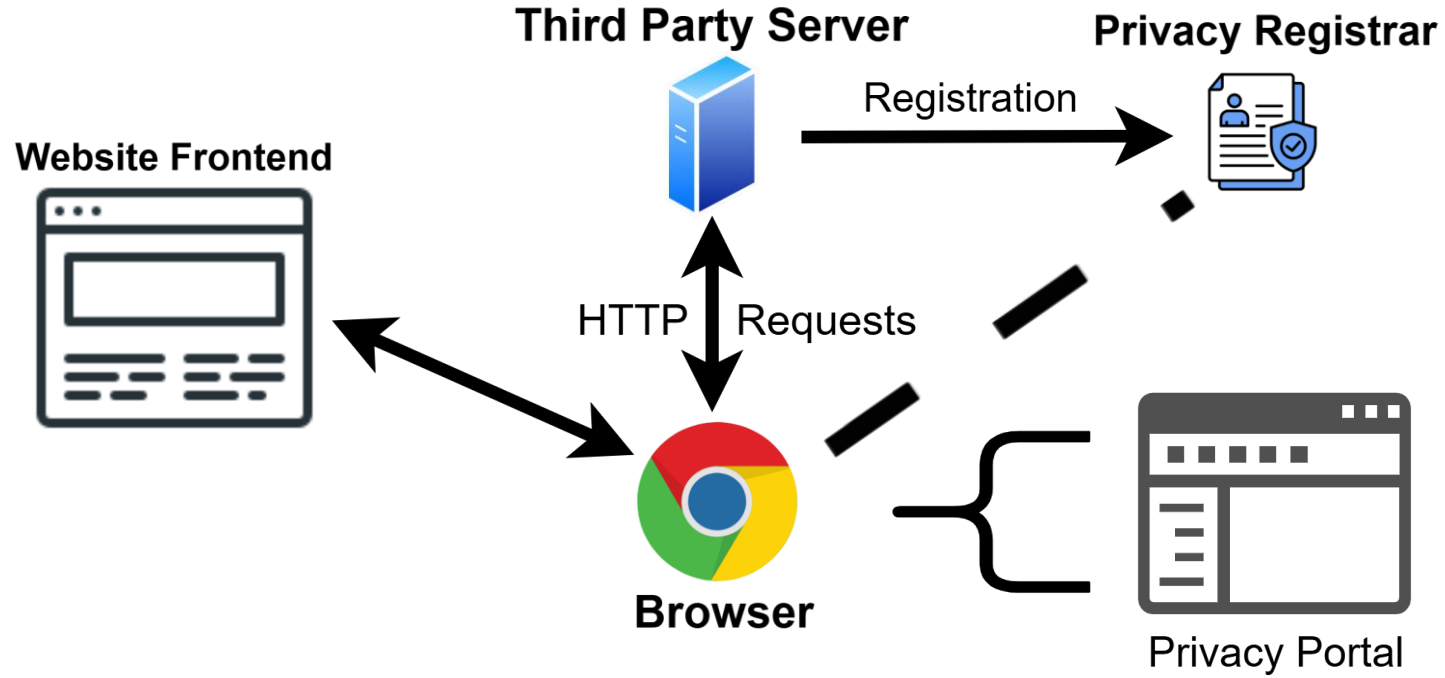
# Discussion – Interpretation of Privacy Regulations

- Two Privacy Regulations Limitations
  - **Fragmented interpretation of consent requirements:**
    - GDPR is not specific on the implementations.
    - Implementation details is delegated to **soft law privacy frameworks**.
      - European Data Protection Board (EDPB)
      - national Data Protection Authorities (DPA)
      - and court rulings
    - **Inconsistency** between EDPB and DPAs.
  - **Ambiguity of Accountability:**
    - Per GDPR, “data controller” is responsible for ensuring compliance.
    - When multiple parties involved, data controller is **unclear**.
    - **Hard to enforce** accountability.

# Proposal: Browser-Integrated Consent Mechanism

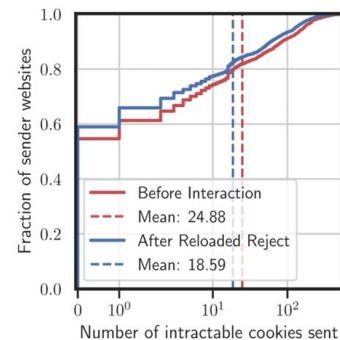
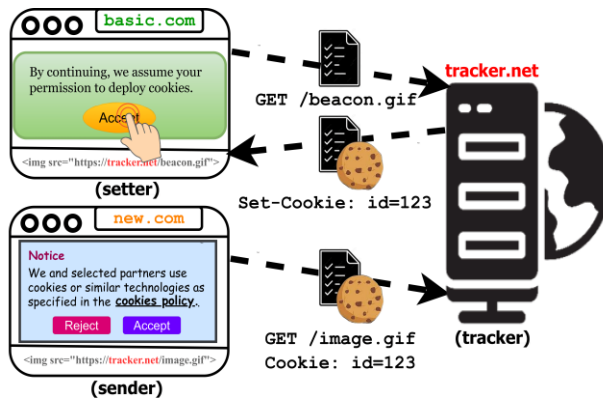
- **Our proposal**
  - Handle unwanted tracking
  - Consider interests of other stakeholders
- “Data Controller” ambiguity
- Obtaining consent is distinct from data collection and processing.
- Integrating Consent Mechanism in the browser
  - Browser as consent manager
  - Collect user preferences and applies them accordingly
- A user centric and uniform Consent Mechanism
- Less burden on users and developers
  - Streamlined, scalable, and user-friendly system

# Browser-Integrated Consent Mechanism

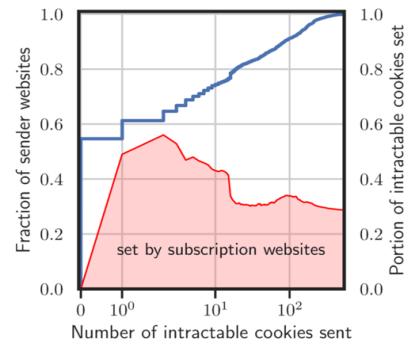
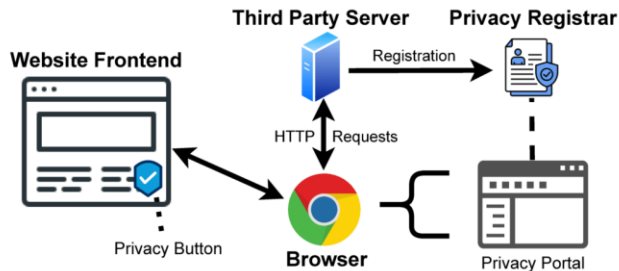


# Conclusion

- More results and details on discussion in paper
- Artifact incl. tools and analysis codes and data



<https://bannerclick.github.io>





# Appendix – Example of Banner With Reject in Setting

### We value your privacy

We and our partners store and/or access information on a device, such as cookies and process personal data, such as unique identifiers and standard information sent by a device for personalised advertising and content, advertising and content measurement, audience research and services development. With your permission we and our partners may use precise geolocation data and identification through device scanning. You may click to consent to our and our 642 partners' processing as described above. Alternatively you may click to refuse to consent or access more detailed information and change your preferences before consenting. Please note that some processing of your personal data may not require your consent, but you have a right to object to such processing. Your preferences will apply to this website only and will be stored in Browser Cookies for 13 months. You can change your preferences or withdraw your consent at any time by returning to this site and clicking the "Privacy" button at the bottom of the webpage.

[REJECT ALL](#)[ACCEPT ALL](#)

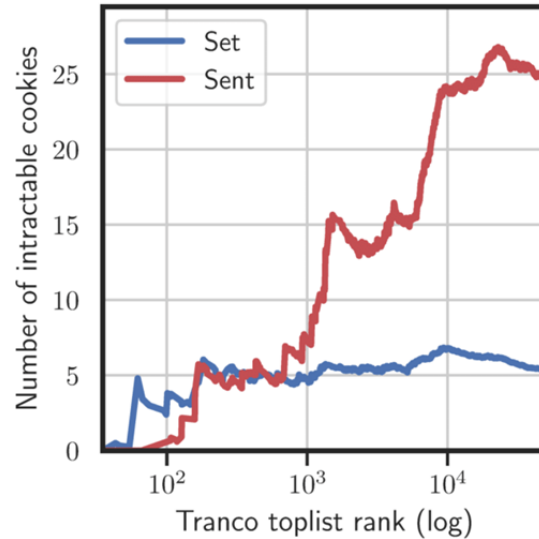
#### Purposes (34 partners)

Store and/or access information on a device (31 partners)	OFF >
Use limited data to select advertising (29 partners)	OFF >

[PARTNERS](#)[LEGITIMATE INTEREST](#)

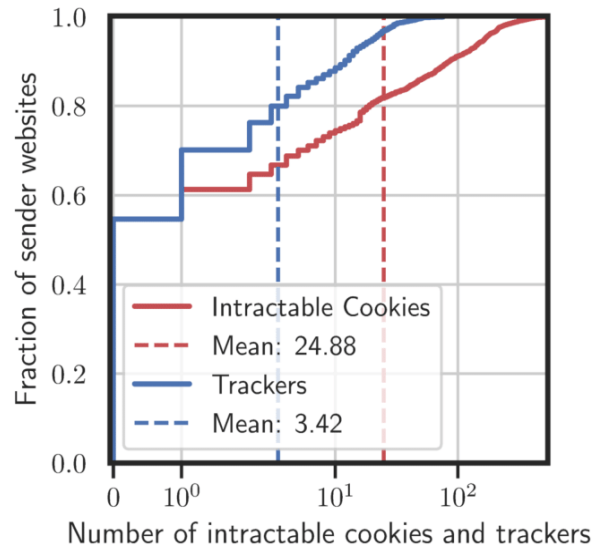
[SAVE & EXIT](#)

## Appendix – Impact of Ranking



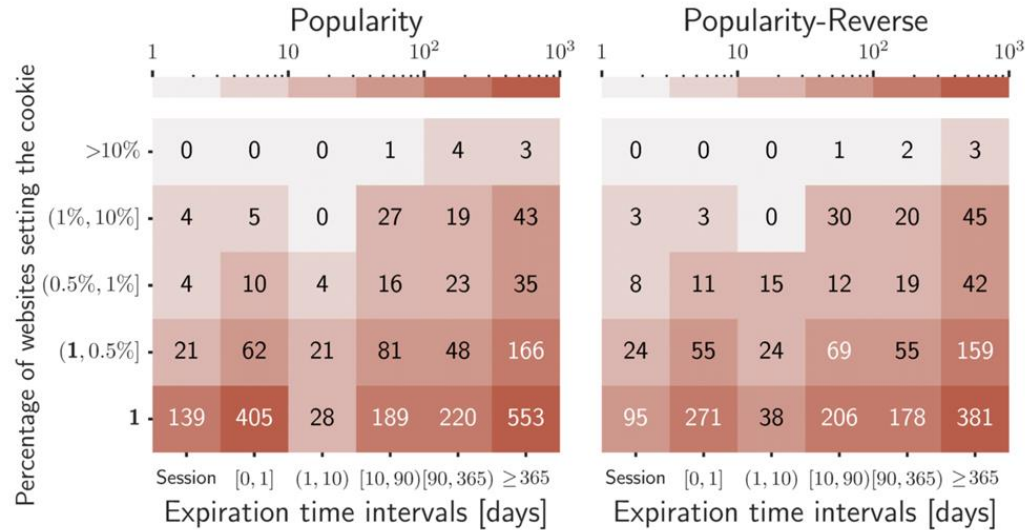
Popular websites, on average, send fewer intractable cookies than less popular ones.

## Appendix – Tracker Prevalence

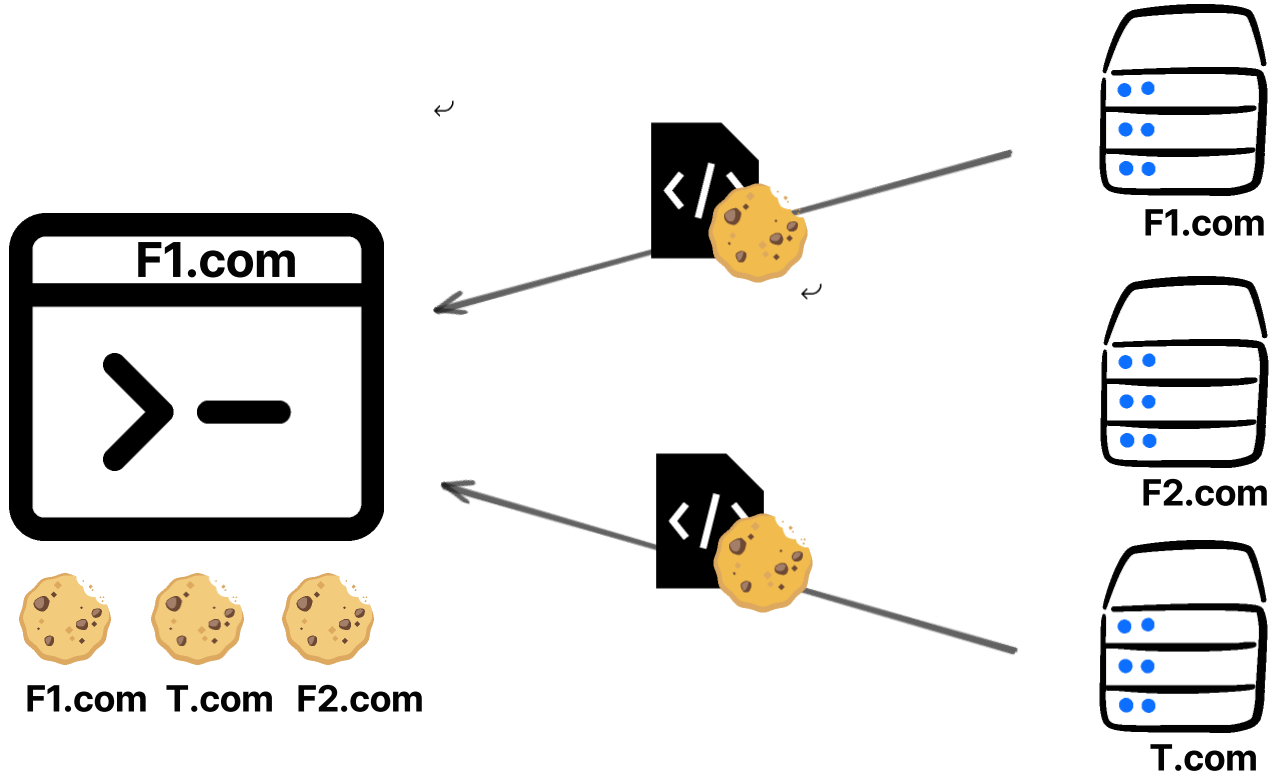


On average, each domain has 3.42 different trackers.

# Appendix – Expiration and Renewal Heatmap



≈ 60% of intractable cookies have an expiration time of at least 10 days.



## Discussion – Possible Solutions

- Approaches to mitigate non-consensual tracking via cookies
  - **Blocking third-party cookies** entirely
  - Deploying **partitioned cookies**
- **Our proposal:** Browser-Integrated Consent Mechanism
  - Handle unwanted tracking in
  - Consider interests of other stakeholders