# Navigating Cookie Consent Violations Across the Globe

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# Tracking Cookies

- Cookies still used for tracking browsing behavior
- Placed on websites for ad personalization, marketing, analytics, etc.

Source:
https://www.cookieyes.com/third-party-cookies

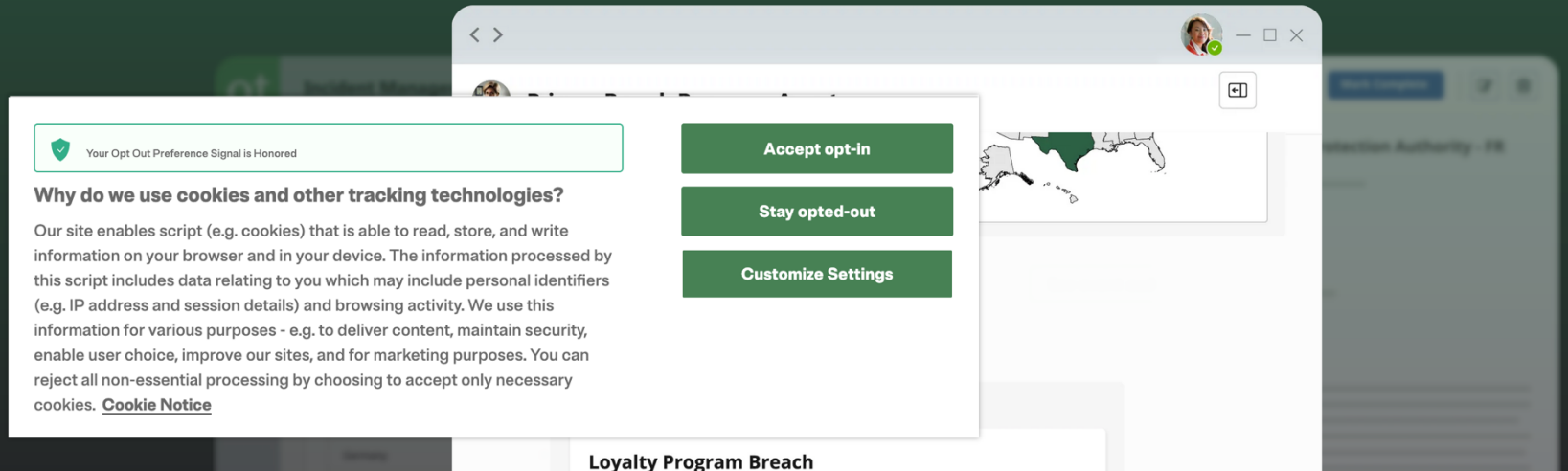
CookieYes
/CookieYesHQ

# GDPR and EU Regulations

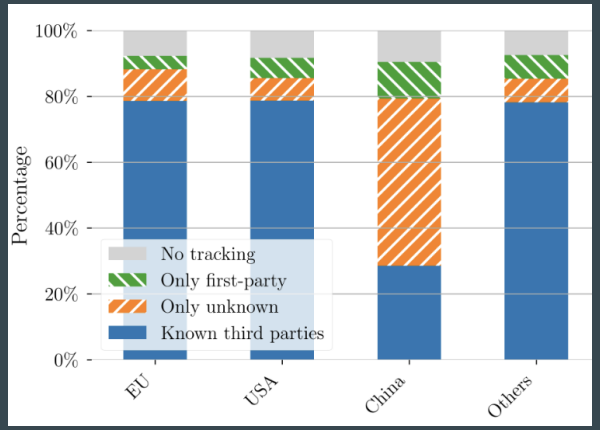
# You can't scale privacy without AI

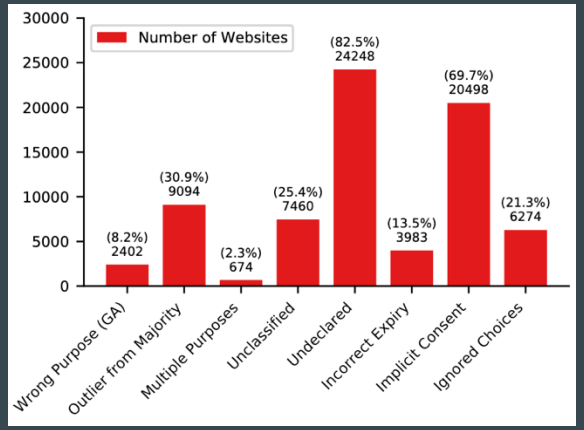
Govern well. Move fast. AI makes both possible.

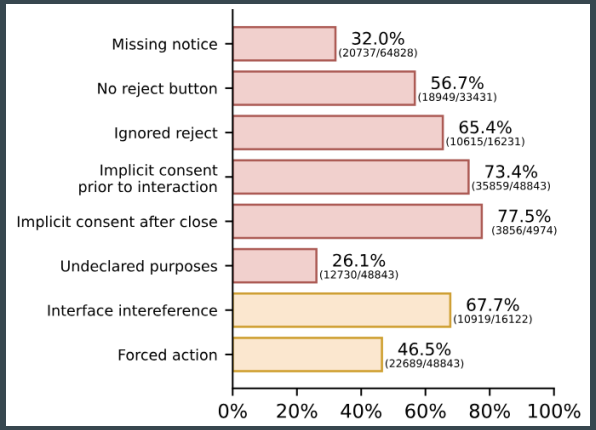
Learn more



# Prior Work on Cookie Consent




Sanchez-Rola et al. 2019

Bollinger et al. 2022

Bouhoula et al. 2024

And many more (Matte'20, Van Eijk'21, Rasaii'23, Liu'23, Kancherla'24, etc…)

# What about cookie consent outside of the GDPR?

# Canada (PIPEDA)

## PIPEDA and User Choice

PIPEDA requires an individual's knowledge and consent for the collection, us
information. [1] PIPEDA also requires that the purposes for which an indivic
collected, used or disclosed be explained in a clear and transparent manner.
recognize that the form of consent can vary: for example, express consent (c
sensitive information, and implied consent (opt-out) when the information is
to note that the sensitivity of information depends on the nature of the inforn
which it is being collected, used or disclosed. Certain types of information wi
sensitive because of the specific risks to individuals when said information is
This would include information such as health and financial data, ethnic and
opinions, genetic and biometric data, an individual's sex life or sexual orienta
philosophical beliefs.

While obtaining consent in the online environment is not without its challenges, it is possible. Opt-out consent for online behavioural advertising could be considered reasonable providing that:

- Individuals are made aware of the purposes for the practice in a manner that is clear and understandable – the purposes must be made obvious and cannot be buried in a privacy policy. Organizations should be transparent about their practices and consider how to effectively inform individuals of their online behavioural advertising practices, by using a variety of communication methods, such as online banners, layered approaches, and interactive tools;
- Individuals are informed of these purposes at or before the time of collection and provided with information about the various parties involved in online behavioural advertising;
- Individuals are able to easily opt-out of the practice - ideally at or before the time the information is collected;
- The opt-out takes effect immediately and is persistent;
- The information collected and used is limited, to the extent practicable, to non-sensitive information (avoiding information that is generally considered sensitive such as medical or health information, financial data, ethnic and racial origins, political opinions, genetic and biometric data, an individual's sex life or sexual orientation, and religious/philosophical beliefs); and
- Information collected and used is destroyed as soon as possible or effectively de-identified.

## PIPEDA's global extra-territorial jurisdiction and right to be forgotten: A.T. v. Globe24h.com

FEBRUARY 1, 2017 · BARRY SOOKMAN

The Federal Court of Canada released a landmark decision finding that the court has the jurisdiction to make an extra-territorial order with world-wide effects against a foreign resident requiring the foreign person to remove documents containing personal information about a Canadian citizen that violates the person's rights under Canada's privacy law, the *Personal Information Protection and Electronic Documents Act* (PIPEDA). In A.T. v. Globe24h.com, 2017 FC 114 the Honourable Mr Justice Mosely ordered the individual operator of the website Globe24h.com to remove all Canadian tribunal and court decisions posted on the site that contain personal information and to take all necessary steps to remove the decisions from search engines caches.

# California (CCPA)

**3. What is considered personal information and sensitive personal information under the CCPA?**

**4. What is not considered personal information under the CCPA?**

**5. What businesses does the CCPA apply to?**

The CCPA applies to for-profit businesses that do business in California and meet any of the following:

- Have a gross annual revenue of over $25 million;
- Buy, sell, or share the personal information of 100,000 or more California residents or households; or
- Derive 50% or more of their annual revenue from selling California residents' personal information.

**6. Does the CCPA apply to nonprofits or government agencies?**

**1. What rights do I have under the CCPA?**

**2. What if I am not a California resident?**

**3. What is considered personal information and sensitive personal information under the CCPA?**

**Personal information** is information that identifies, relates to, or could reasonably be linked with you or your household. For example, it could include your name, social security number, email address, records of products purchased, internet browsing history, geolocation data, fingerprints, and inferences from other personal information that could create a profile about your preferences and characteristics.

**Sensitive personal information** is a specific subset of personal information that includes certain government identifiers (such as social security numbers); an account log-in, financial account, debit card, or credit card number with any required security code, password, or credentials allowing access to an account; precise geolocation; contents of mail, email, and text messages; genetic data; biometric information processed to identify a consumer; information concerning a consumer's health, sex life, or sexual orientation; or information about racial or ethnic origin, religious or philosophical beliefs, or union membership. Consumers have the right to also limit a business's use and disclosure of their sensitive personal information.

**Personal information does not include publicly available information (including public real estate/property records) and certain types of information.**

# Singapore (PDPA)

**Transfer of personal data outside Singapore**

**26.**—(1) An organisation must not transfer any personal data to a country or territory outside Singapore except in accordance with requirements prescribed under this Act to ensure that organisations provide a standard of protection to personal data so transferred that is comparable to the protection under this Act.

(2) The Commission may, on the application of any organisation, by written notice exempt the organisation from any requirement prescribed pursuant to subsection (1) in respect of any transfer of personal data by that organisation.

(3) An exemption under subsection (2) —

(*a*) may be granted subject to such conditions as the Commission may specify in writing; and

(*b*) need not be published in the *Gazette* and may be revoked at any time by the Commission.

(4) The Commission may at any time add to, vary or revoke any condition imposed under this section.

**Withdrawal of consent**

**16.**—(1) On giving reasonable notice to the organisation, an individual may at any time withdraw any consent given, or deemed to have been given under this Act, in respect of the collection, use or disclosure by that organisation of personal data about the individual for any purpose.

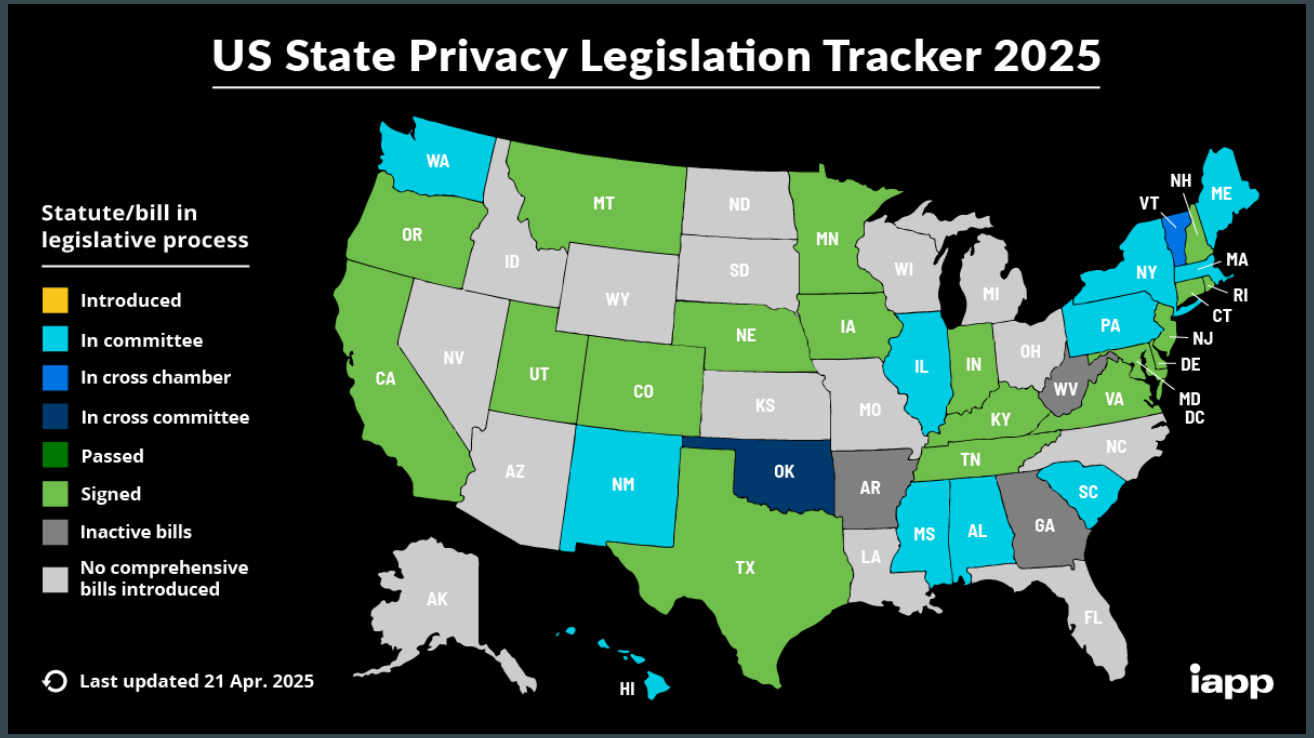
(2) On receipt of the notice mentioned in subsection (1), the organisation concerned must inform the individual of the likely consequences of withdrawing his or her consent.

(3) An organisation must not prohibit an individual from withdrawing his or her consent to the collection, use or disclosure of personal data about the individual, but this section does not affect any legal consequences arising from such withdrawal.

(4) Subject to section 25, if an individual withdraws consent to the collection, use or disclosure of personal data about the individual by an organisation for any purpose, the organisation must cease (and cause its data intermediaries and agents to cease) collecting, using or disclosing the personal data (as the case may be) unless such collection, use or disclosure (as the case may be) without the individual's consent is required or authorised under this Act or other written law.

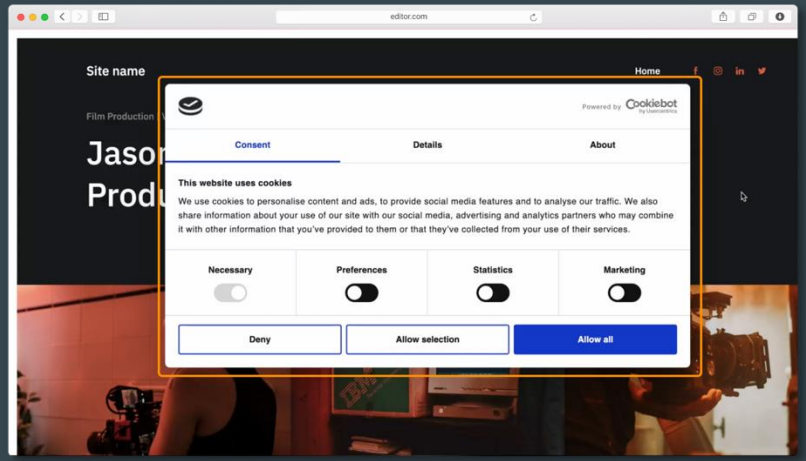
# United States of America (Other)

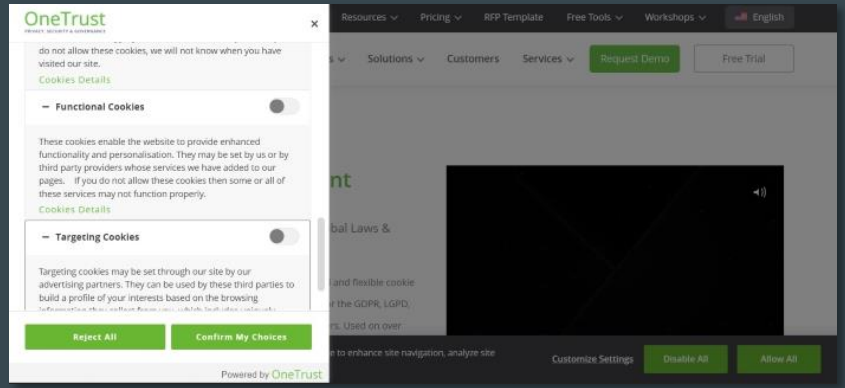
The US is also a market of great interest to advertisers.

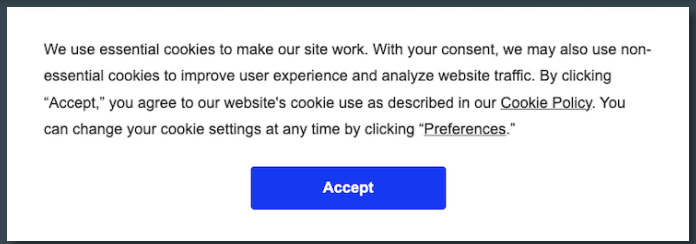


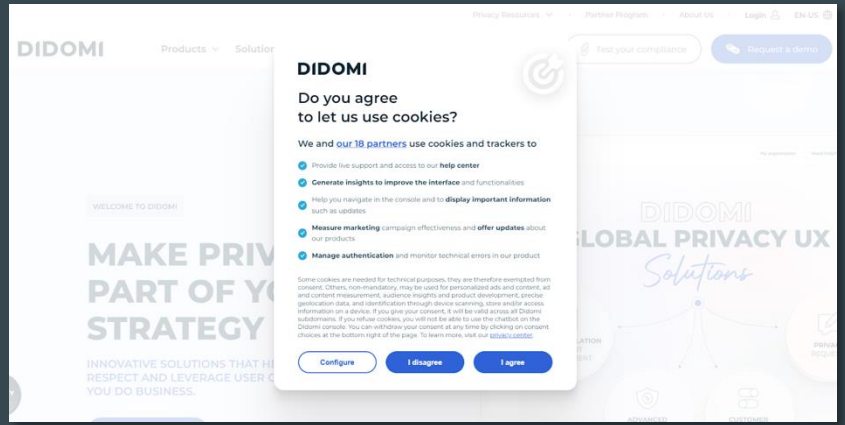
# Consent Management Platforms (CMPs)

- OneTrust, Cookiebot, Didomi, etc.



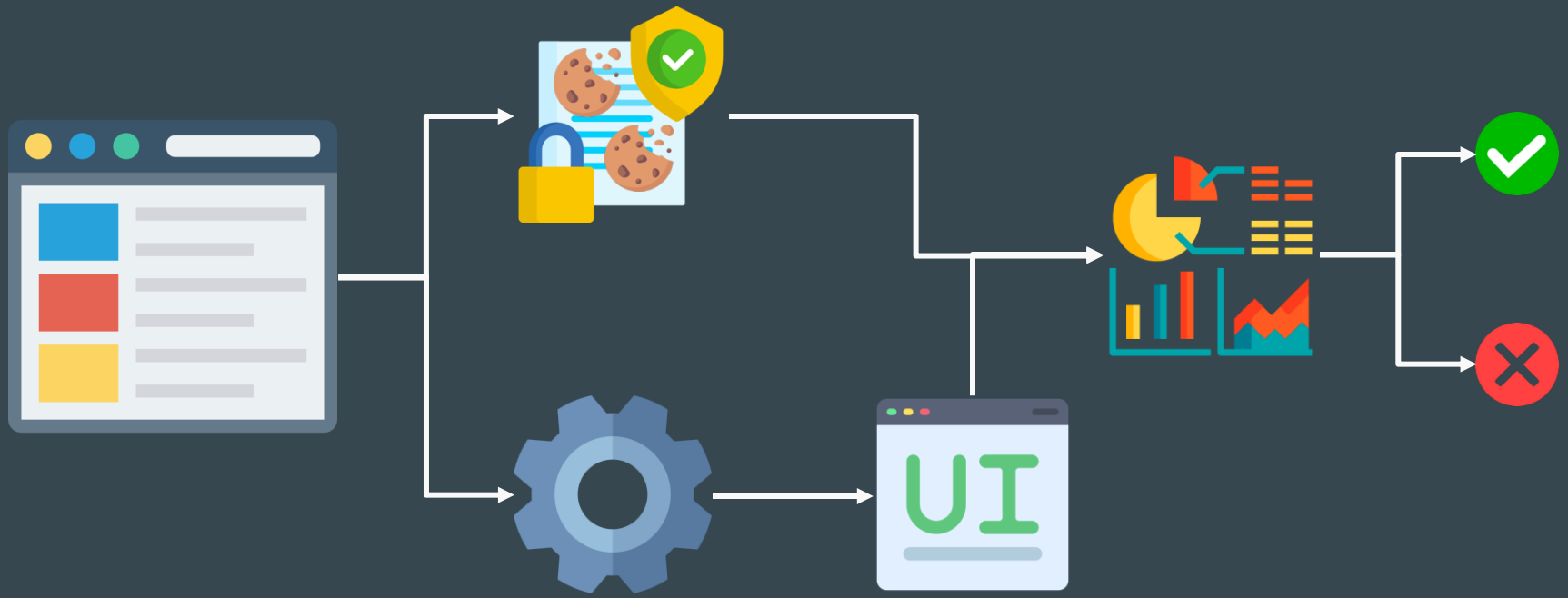



# CMPs Provide Interpretations

- Regardless of what actual privacy laws are, CMPs hold the power of interpretation and implementation

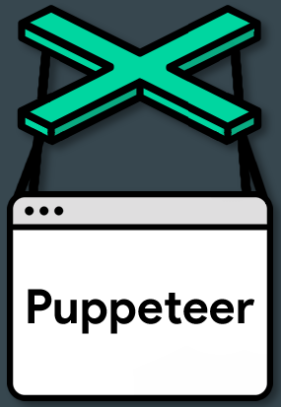
- If a regulation is not provided on OneTrust, who will enforce it?
  - Where is PIPEDA, PDPA, APP, POPIA, UK DPA, etc.?

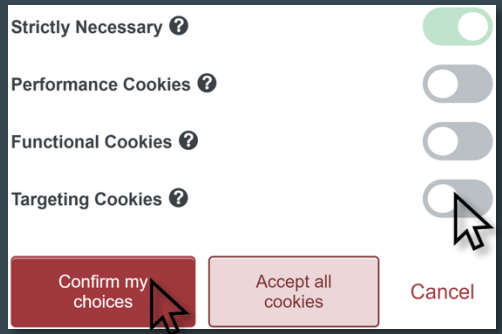
# ConsentChk Design



# ConsentChk Crawler

- Visits 10 random subpages
- Spoofs user agent
- Uses techniques to simulate human behavior and avoid bot detection



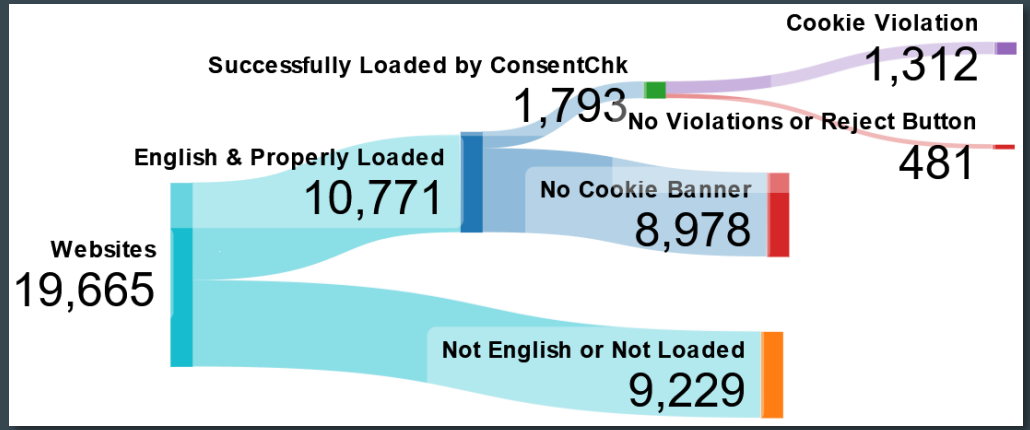


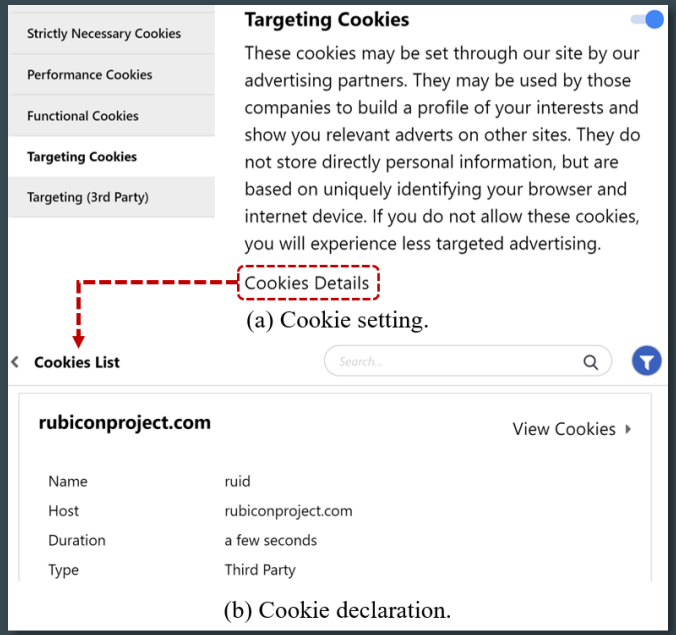
# 8 Measurement Vantage Points

- English-Speaking
- Privacy Laws (Except Michigan)
- CA, US, CAN, UK, EU, ZA, SG, AU

# Crawling Methodology

- 3 CMPs
- Only sites with cookie banner settings
- Only sites which were loaded successfully
- October 4-12 2024

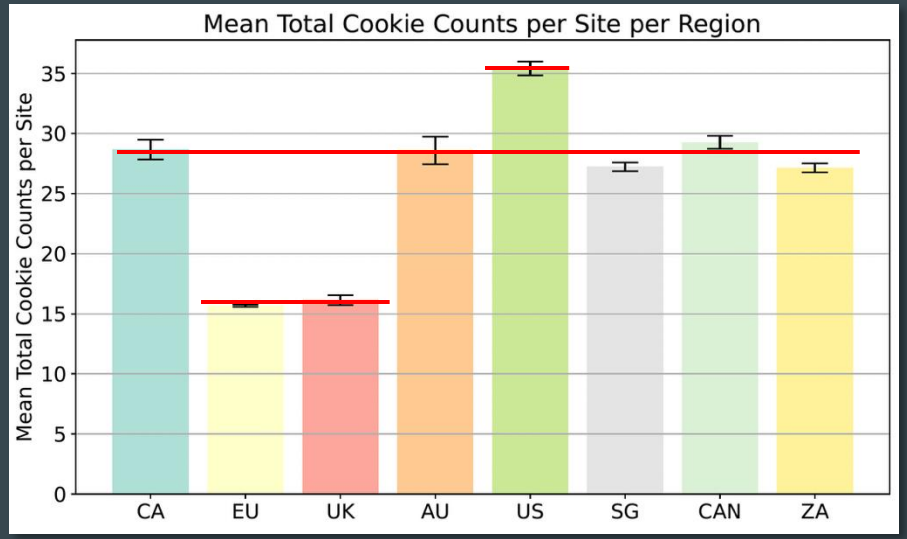


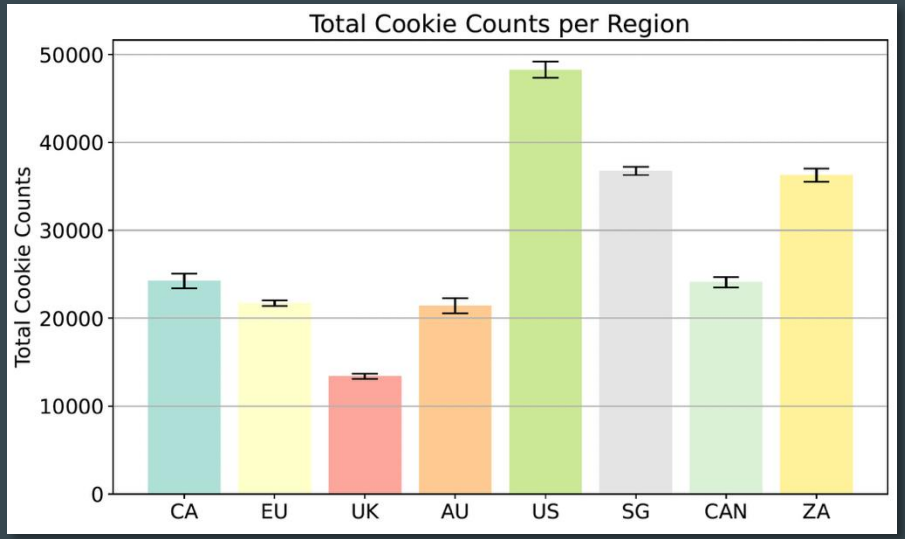



# Violation Types

- Ignored Cookie Rejection
  - Click reject button, but cookie still loads
- Undeclared Cookie
  - Cookie not in CMP library and is unable to be rejected or given consent to
- Wrong/Ambiguous Cookie Category
  - Cookie in multiple cookie categories and cannot be rejected

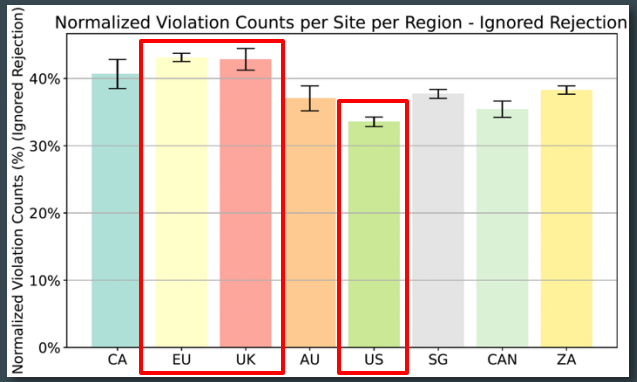
# Finding 1: Cookie Placement

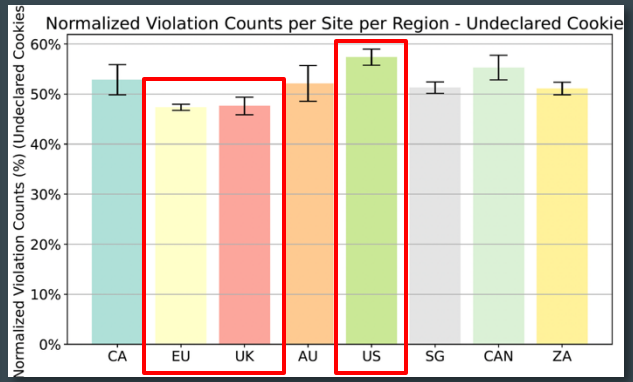


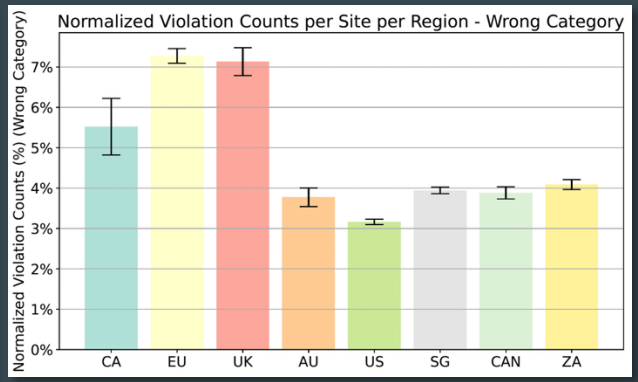




Regions with stricter privacy regulations have on average 11 fewer cookies per site

# Finding 2: Cookie Consent Violations



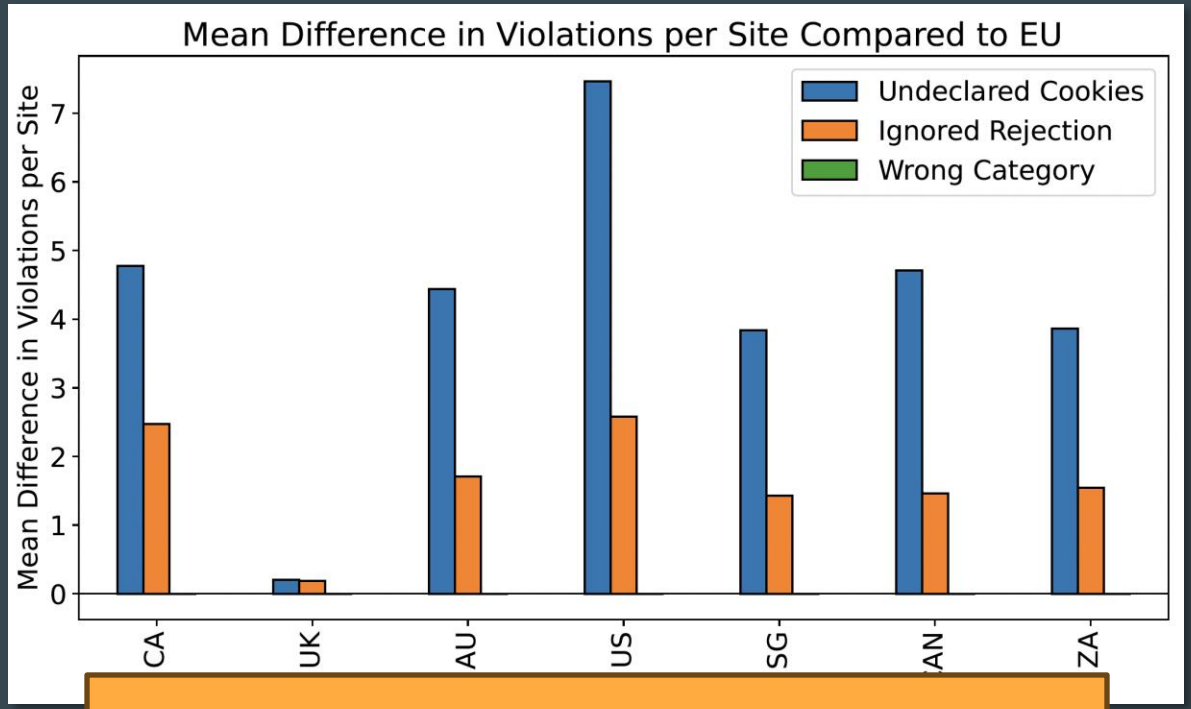




Stricter privacy regulations = 4-9% fewer undeclared cookies

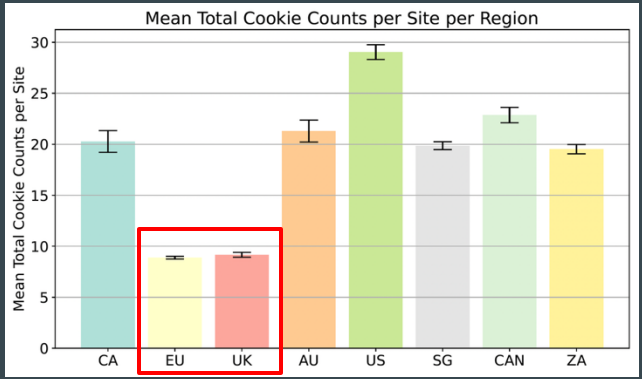
But 4-9% more declared cookies = 3-10% more ignored rejections

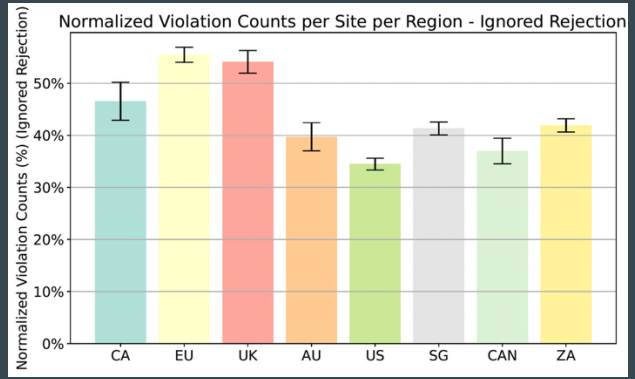
# Finding 3: Cookie Violations Same-Site Comparison

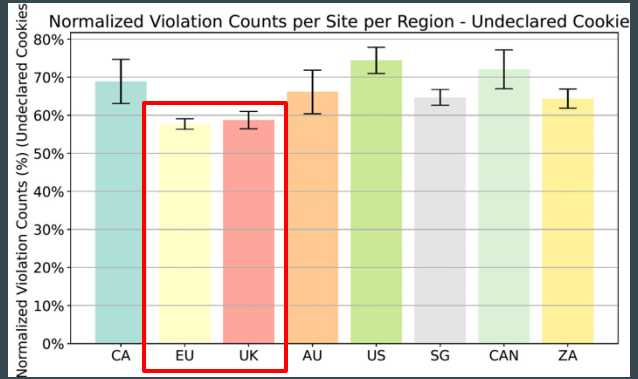



Sites visited from regions with stricter privacy regulations have ~10 more cookie violations.

# Finding 4: 3rd Party Cookie Consent Violations

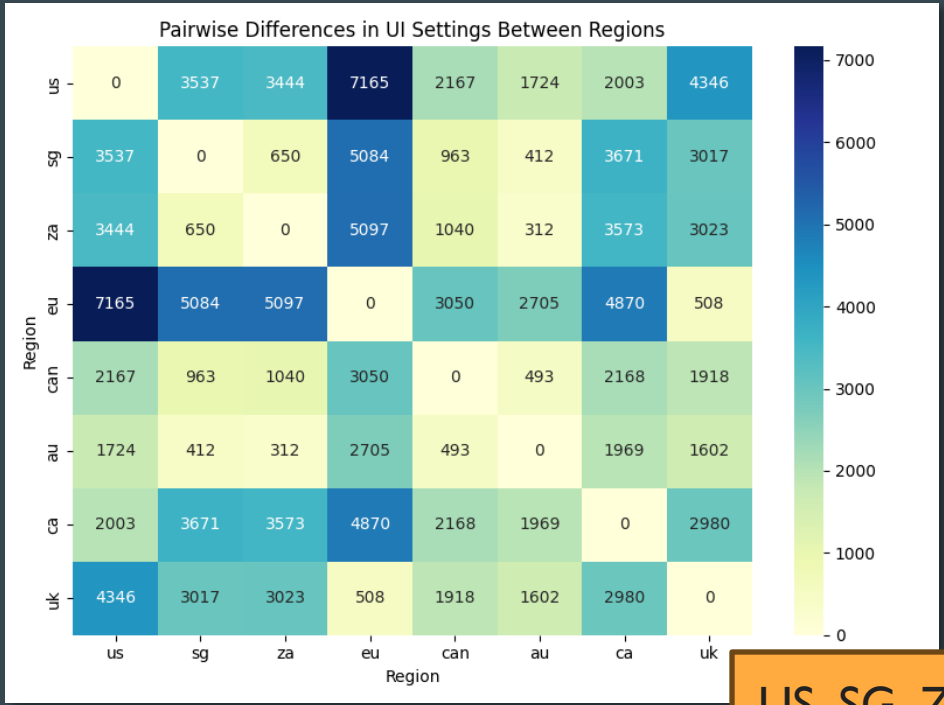



Previous trends are exacerbated by an extra ~6% for 3rd party cookies

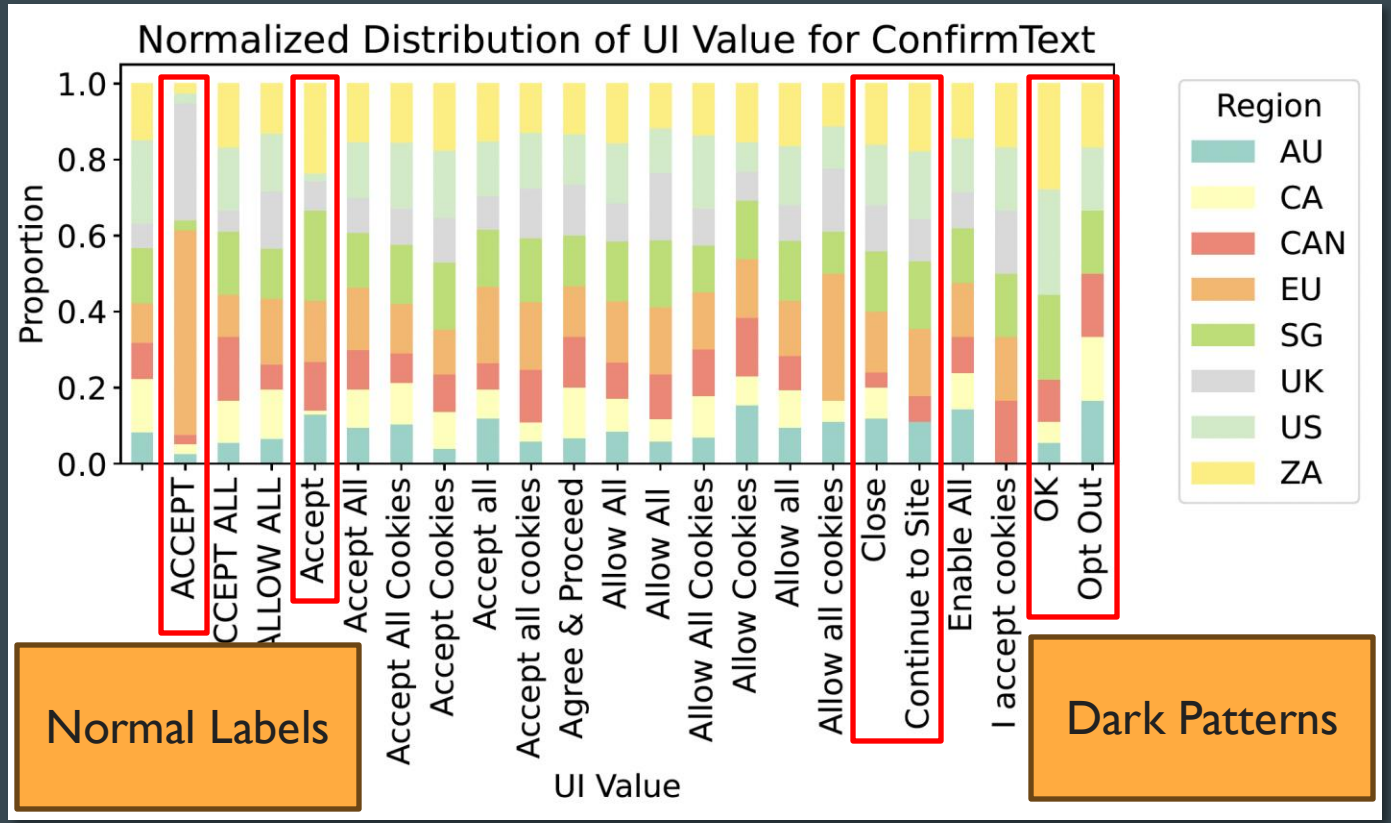
# Finding 5: Cookie Banner UI and Behavior Disparities



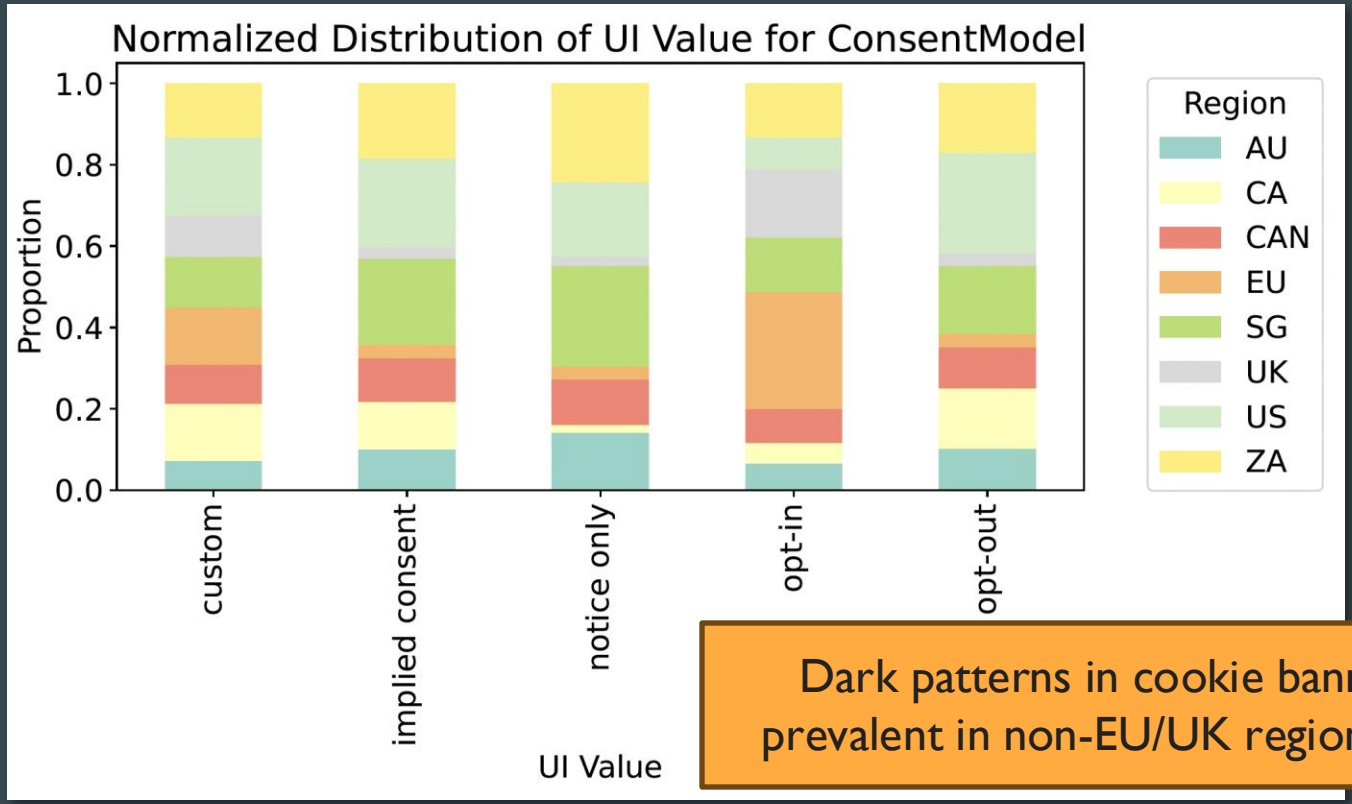

- Metric here is each cookie banner parameter that is different between regions.
  - E.g., button text, colors, position, consent mode, button layout, banner display

US, SG, ZA, CA have most disparities with the EU
SG, ZA, AU, CAN few disparities with each other

# Cookie Banner UI Disparities

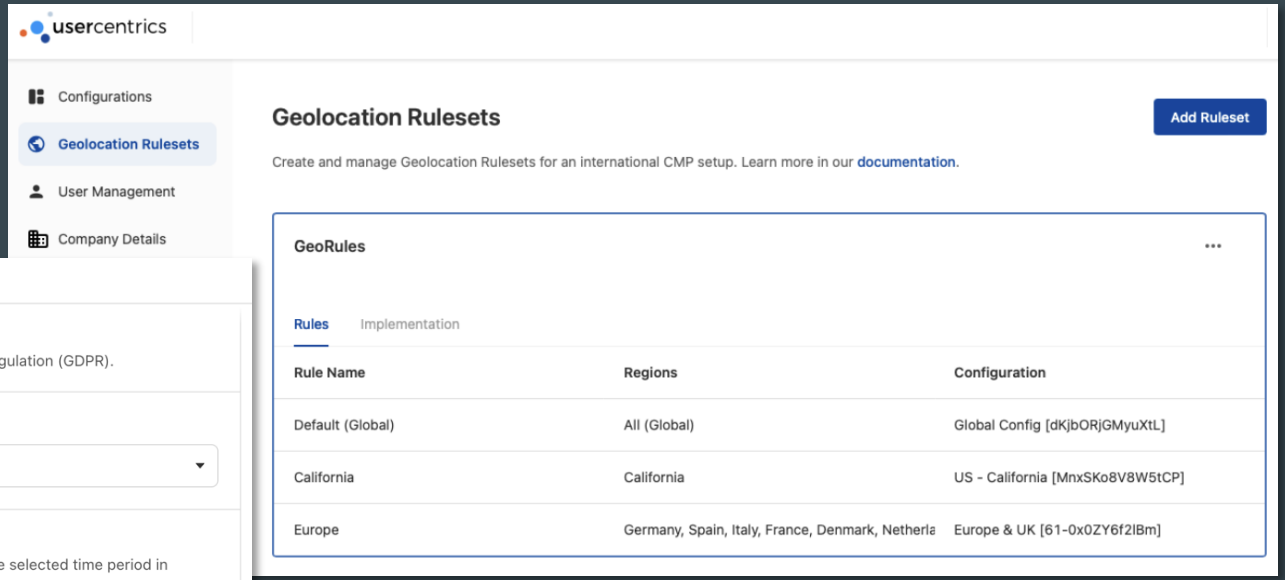


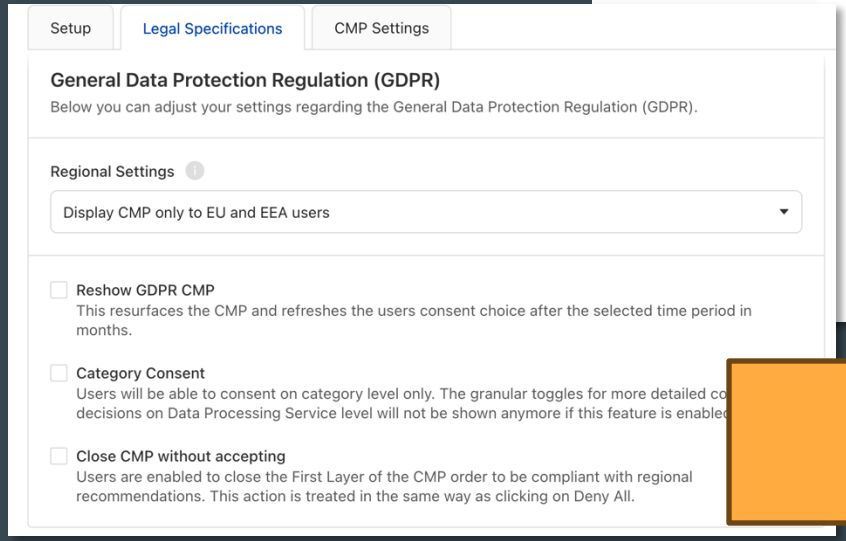
# Cookie Banner Behavior Disparities




Dark patterns in cookie banners are more prevalent in non-EU/UK regions, especially US

# Root Causes of Violations: Geolocation Rulesets and Behaviors

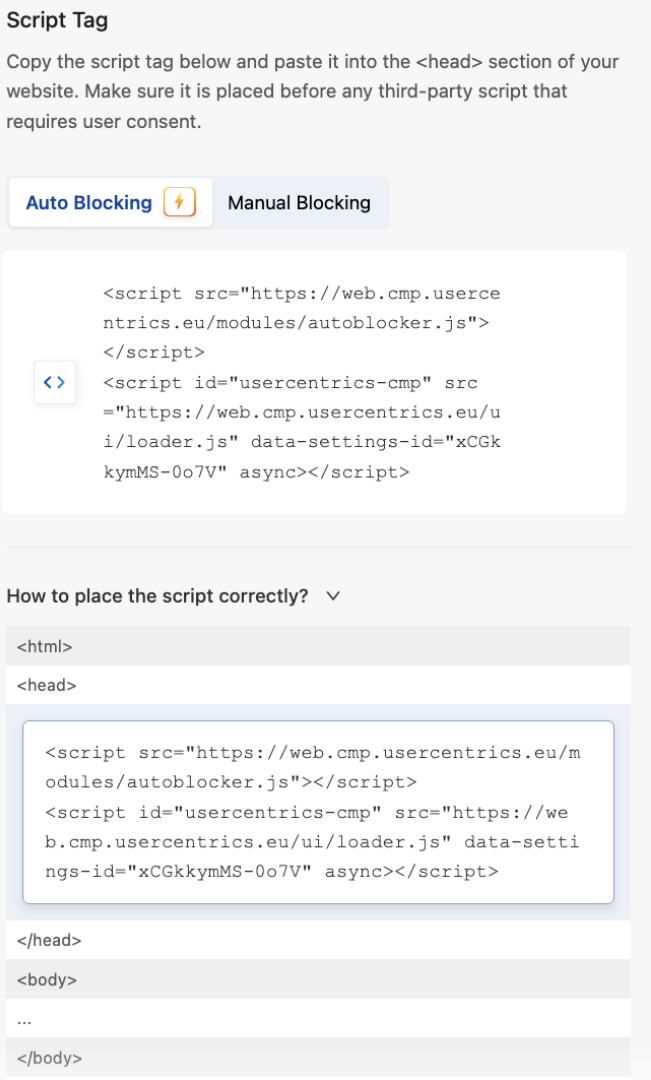



Geolocation rulesets on CMPs allow for region/regulation specific banners

# (Website Responsibility) Why Do Ignored Cookie Rejections Happen?

- Have to place in the <head> ***before*** other scripts
- Must update all tracking scripts
  - <script data-usercentrics="Name of Data Processing Service”>
- Any scripts loaded afterwards mean cookies will be loaded and not deleted!

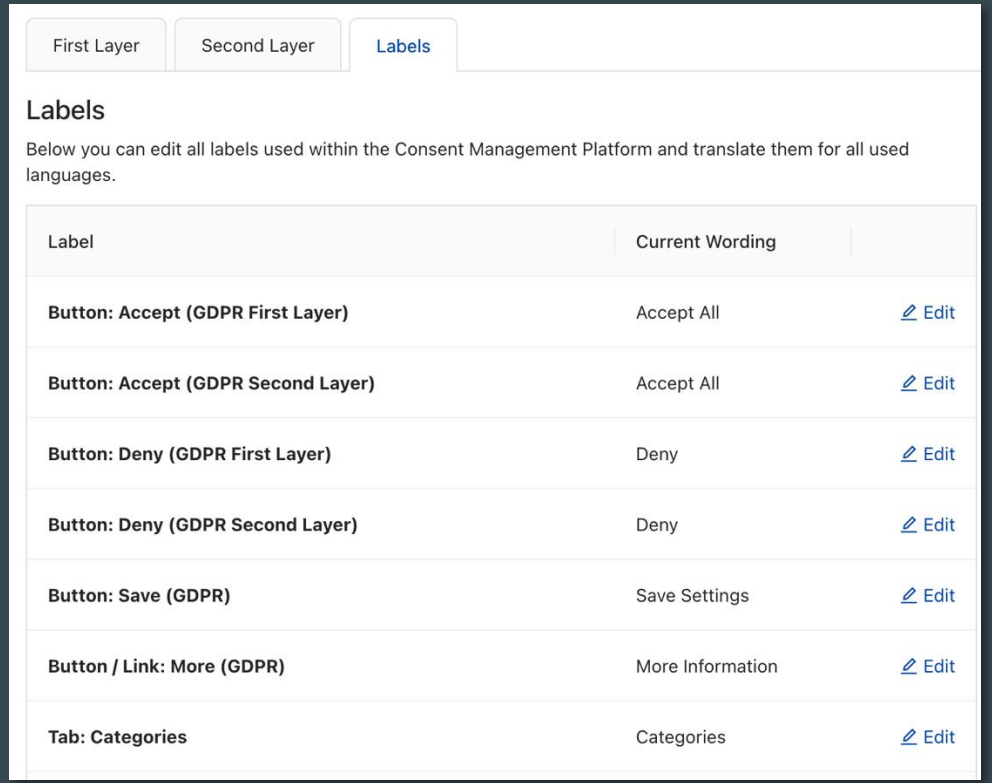


# (Website Responsibility)
# Why Do Undeclared Cookies Happen?

Developers must label and categorize all cookies that are detected by the crawler but not known to the cookie database.

# (Website Responsibility) Dark Patterns

- Developers can set arbitrary labels for your cookie banner buttons
- For example:
  - Button: Accept can be “Close” or “Reject” or “Whatever”



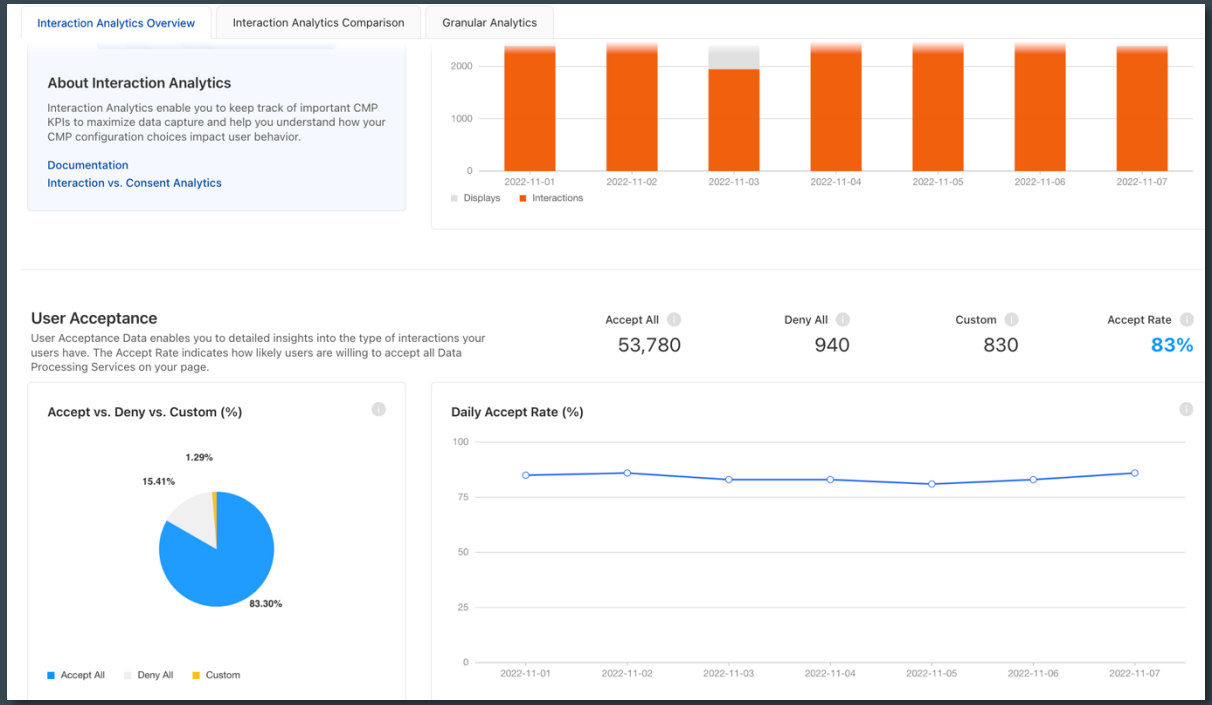
# (CMP Responsibility)
# Why Do Cookie Violations Happen?

- Ignored Cookie Rejection: Poor documentation on CMP script integrations and script editing.

- Undeclared Cookies: Crawler misses cookies and does not include them in cookie declaration list.

# (CMP Responsibility)
# Dark Patterns and Dark Incentives

- No guardrails for cookie banner labels
- Analytics that optimize for cookie acceptance rates



# 4 Years of Measurements

- 2021-2025

| Consent Violation Type | UK | | US | |
|---|---|---|---|---|
| | # Cookies | # Websites | # Cookies | # Websites |
| Rejected Cookie Usage | 43,697 | 82.20% (4,973/6,050) | 39,446 | 81.86% (4,134/5,050) |
| Consent Choice Omission | 52,804 | 85.02% (5,144/6,050) | 70,547 | 89.05% (4,497/5,050) |
| Ambiguous Consent | 398 | 4.20% (254/6,050) | 345 | 4.02% (203/5,050) |

| Inconsistency Type | Ireland (GDPR) | | California (CCPA) | | Michigan (FTC) | | Canada (PIPEDA) | |
|---|---|---|---|---|---|---|---|---|
| | # Cookies | % Websites (#) | # Cookies | % Websites (#) | # Cookies | % Websites (#) | # Cookies | % Websites (#) |
| Rejected Cookie Usage | 11,034 | 82.58% (1,204) | 16,417 | 86.22% (1,201) | 15,052 | 80.76% (1,129) | 14,163 | 80.07% (1,081) |
| Consent Omission | 14,568 | 88.55% (1,291) | 29,725 | 93.47% (1,302) | 36,677 | 93.13% (1,302) | 29,309 | 92.44% (1,248) |
| Ambiguous Consent | 124 | 4.53% (66) | 101 | 4.81% (67) | 146 | 5.58% (78) | 103 | 4.89% (66) |

| Inconsistency Type | South Africa (POPIA) | | Singapore (PDPA) | | Australia (APP) | | UK (DPA) | |
|---|---|---|---|---|---|---|---|---|
| | # Cookies | % Websites (#) | # Cookies | % Websites (#) | # Cookies | % Websites (#) | # Cookies | % Websites (#) |
| Rejected Cookie Usage | 12,998 | 79.32% (1,020) | 12,660 | 77.52% (1,007) | 12,993 | 77.33% (989) | 10,662 | 81.57% (1,164) |
| Consent Omission | 26,637 | 91.14% (1,172) | 23,981 | 92.07% (1,196) | 24,963 | 92.10% (1,178) | 14,920 | 89.56% (1,278) |
| Ambiguous Consent | 93 | 5.05% (65) | 104 | 4.93% (64) | 94 | 5.00% (64) | 88 | 4.20% (60) |

| Violation Type | California (CA) | | Ireland (EU) | | United Kingdom (UK) | | Australia (AU) | |
|---|---|---|---|---|---|---|---|---|
| | # Cookies | % Websites | # Cookies | % Websites | # Cookies | % Websites | # Cookies | % Websites |
| Ignored Cookie Rejection | 83,036 | 88.41% | 72,928 | 86.09% | 44,605 | 84.75% | 60,985 | 80.74% |
| Undeclared Cookies | 115,718 | 93.61% | 87,251 | 90.19% | 54,633 | 90.04% | 99,893 | 92.86% |
| Wrong Cookie Category | 316 | 3.03% | 365 | 3.13% | 206 | 2.82% | 218 | 3.20% |

| Violation Type | Michigan (US) | | Singapore (SG) | | Canada (CAN) | | South Africa (ZA) | |
|---|---|---|---|---|---|---|---|---|
| | # Cookies | % Websites | # Cookies | % Websites | # Cookies | % Websites | # Cookies | % Websites |
| Ignored Cookie Rejection | 128,871 | 84.65% | 107,233 | 82.22% | 65,882 | 81.63% | 107,072 | 81.97% |
| Undeclared Cookies | 250,447 | 94.15% | 167,979 | 92.90% | 117,144 | 91.20% | 165,647 | 93.56% |
| Wrong Cookie Category | 300 | 2.50% | 395 | 3.37% | 272 | 3.35% | 446 | 3.69% |

# Navigating Cookie Consent Violations Across the Globe

**Takeaways:**

- Cookie consent is still a big part of tracking personal data and privacy
- Privacy laws have a significant impact on cookie consent effectiveness
- CMPs still have a long ways to go for proper implementations of privacy laws
- Websites are inadequate when it comes to managing cookie consent

**Paper and Code**

**Resources:**

- Contact: bjaytang@umich.edu | ducbui@umich.edu | kgshin@umich.edu
- Websites: https://www.bjaytang.com/ | https://ducbui.com/ | https://web.eecs.umich.edu/~kgshin/