

Nurullah Demir, Tobias Urban,
Christian Wressnegger, Norbert Pohlmann

Cookie Banner Interaction Tools

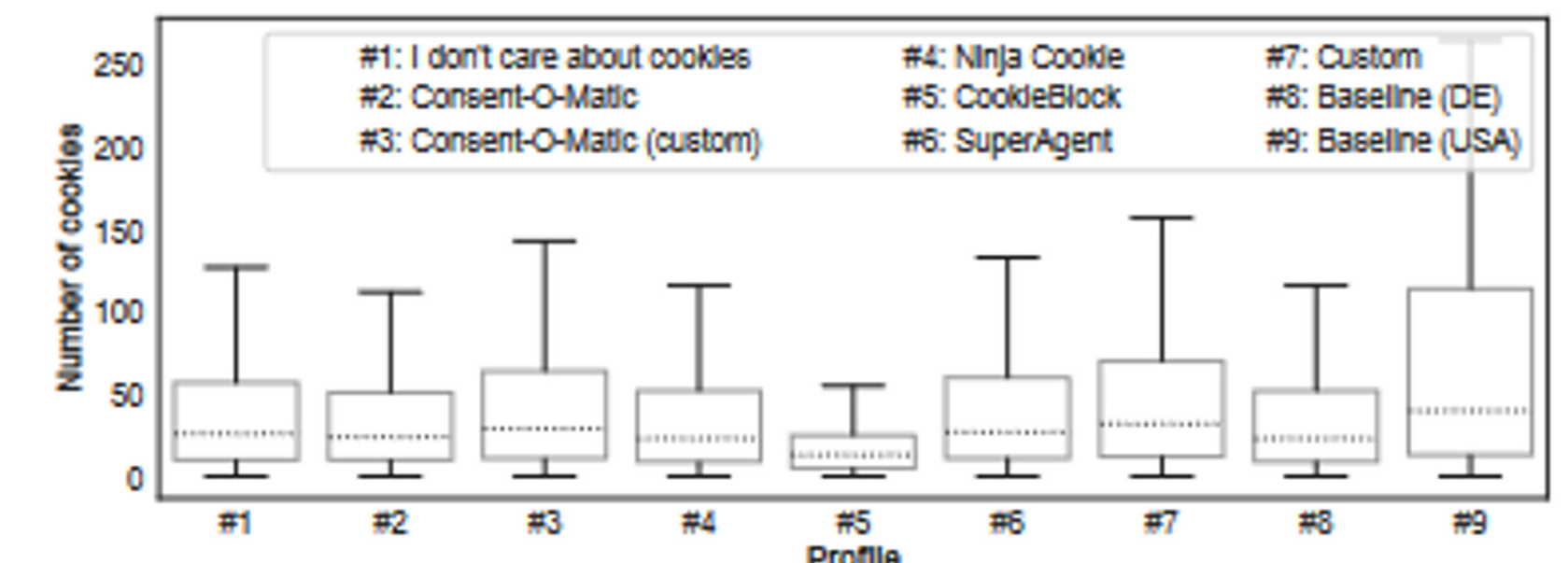
Cookie notices (or cookie banners) are a popular mechanism for websites to provide (European) Internet users a tool to choose which cookies the site may set. In this work, we perform a large-scale measurement study **comparing the effectiveness of extensions for "cookie banner interaction."**

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General Overview

We crawled 29,660 sites and 2.6M pages and recorded 415k cookies per measurement. Our observations show that some extensions can limit tracking and data collection by blocking cookies. In contrast, others may increase the number of cookies.



Analyzed Tools

We compare five different cookie banner interaction tools and performed a large-scale measurement to empirically compare either effectiveness.

#	Name	Date	Firefox Users	Chrome Users	Num. Configs
I	I don't care about cookies	02/23	317,00+	900,000+	1
II	Consent-O-Matic	02/23	21,000+	60,000+	7
II	Ninja Cookie	04/21	6,000+	40,000+	1
VI	SuperAgent	06/22	3,000+	20,000+	5
V	CookieBlock	08/22	2,000+	5,000+	4

Overview of the used extensions that claim to interact with cookie banners automatically. The date indicates the last update of the extension. User numbers as of 02/23.

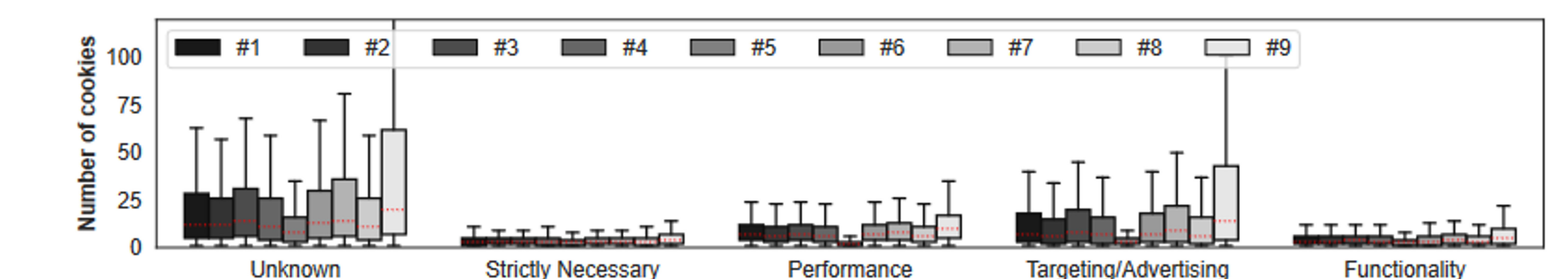
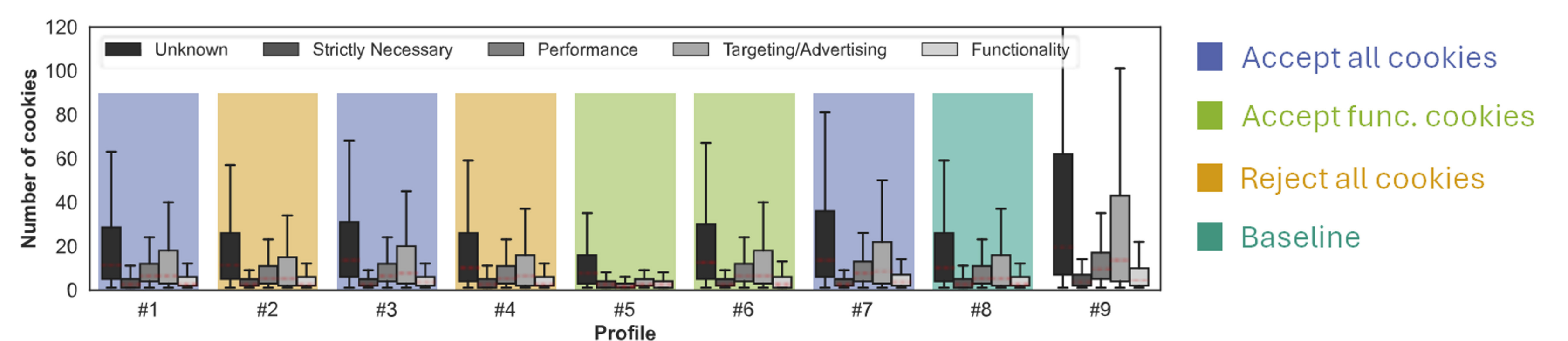
We install each extension in a separate OpenWPM instance, allowing us to compare each tool's effects individually.

#	Name	Version	Location	Method	Cookie Policy	All Banners
1	I don't care about cookies	3.4.2	DE	rule-based	Hide banners and accept/rejects cookies	Yes
2	Consent-O-Matic	1.0.8	DE	rule-based	Reject all cookies	Only CMPs
3	Consent-O-Matic (<i>custom</i>)	1.0.8	DE	rule-based	Allow all cookies	Only CMPs
4	Ninja Cookie	0.2.7	DE	rule-based	Reject all cookies	Yes
5	CookieBlock	1.1.0	DE	ML-based	Accepts functional cookies	Yes
6	SuperAgent	2.6.0	DE	rule-based	Accept functional and performance	Yes
7	"Accept all" Extension (<i>custom</i>)	-	DE	rule-based	Accepts all cookies	Yes
8	None	-	DE	-	No cookie banner interaction	-
9	None	-	US	-	No cookie banner interaction	-

Overview of the measurement profiles. Profiles #3 and #7 are custom extensions as described in Section 4.4. The last column marks tools that can process all banner types (and do not state any limitations of banner interaction) with a "Yes".

Types of Used Cookie

Our analysis shows that different extensions for blocking cookies have varying effects on the types of cookies used by the analyzed websites. For example, extensions that accept all cookies tend to increase the number of 'Targeting/Advertising' cookies, while extensions that only accept functional cookies show different results.



Number of cookies in the different profiles by cookie usage category. To increase readability, the y-axis is cut at 100. The upper whisker of the category "Unknown" in profile #9 is around 150.

Potential Subsequent Effects

The results show that different extensions, even with similar goals and functionalities, can have noteworthy differences in their impact on tracking mechanisms.

Accepting all cookies

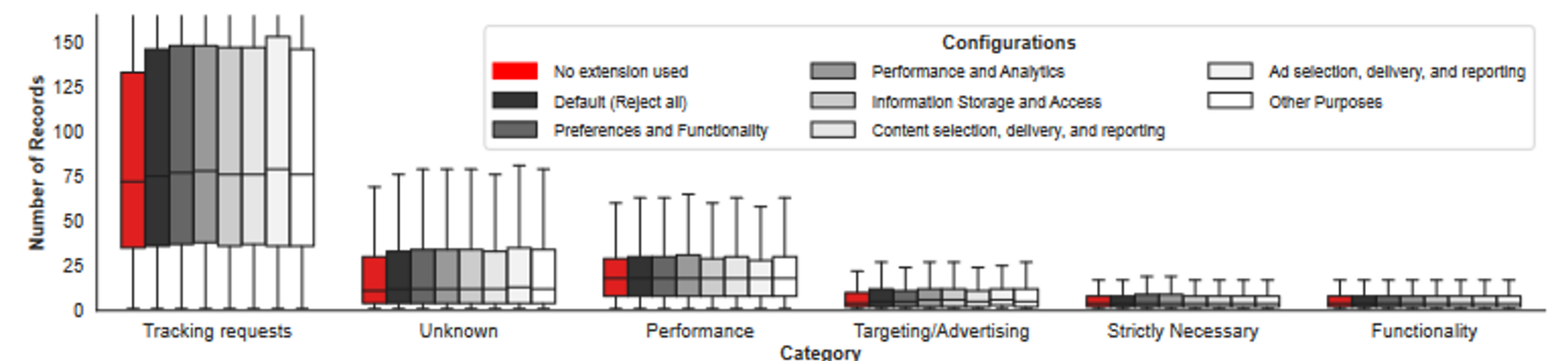
- Increases tracking requests significantly (up to 60%).
- Enhances tracking and data collection by third parties
- Negatively impacts user privacy as more data is collected and analyzed

Accepting Functionality Cookies

- Varying impacts on tracking requests
- Some tools may still increase tracking despite reducing the number of cookies

Rejecting All Cookies

- Generally does not affect the number of tracking requests.
- Effectively reduces cookie usage without increasing tracking activities



Distribution of number of records for tracking requests and different cookie categories grouped by different configurations (allowed cookie types) of Consent-O-Matic.

Lessons Learned

- Balancing privacy and functionality is challenging; blocking cookies may still lead to increased tracking
- Users should select extensions based on privacy needs and preferences

Recommendations

Researchers

- When planning a study, researchers should evaluate which pages the tools work on to assess the impact on the study's outcome
- Identify limitations and challenges that arise when utilizing a cookie banner tool

Developers

- Include community-driven projects to identify banners and test on less popular sites
- Actively check for and delete cookies that contradict user privacy settings.

End users

- Use ad or tracking blockers with cookie tools and avoid configurations that accept all cookies.
- Verify how an extension works (hiding vs. interacting with banners) to ensure it meets your goals.

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