

AXECC: Benchmarking the Privacy and Accessibility Impact of Browser Extensions

Supplementary Material

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Contents

1	Methodology	2
2	Static Analysis Results	3
3	Web Tracking Results	4
4	Comparison of Tracking and Accessibility across Extensions Categories	9
5	Accessibility Results	11

1 Methodology

Table 1 shows the accessibility results for all of our HoneyPages.

Table 1: Accessibility Results for our HoneyPages

HoneyPage	Lighthouse	WAVE					
		Errors	Contrast Errors	Alerts	Features	Structural Elements	ARIA
Baseline	86%	1	3	0	3	6	4
WordPress Index	96%	0	0	2	3	14	14
WordPress Login	100%	0	0	0	7	2	4
WordPress Blog	96%	0	0	2	9	20	15
WordPress 404	96%	0	0	1	6	13	13

Figure 1 shows the number of trackers recorded when using the Puppeteer Stealth plugin compared to the number of trackers recorded without it. This highlights the limited difference between the two methods, and highlights why the trade-offs with stability were not worth the benefits of using the Puppeteer Stealth plugin.

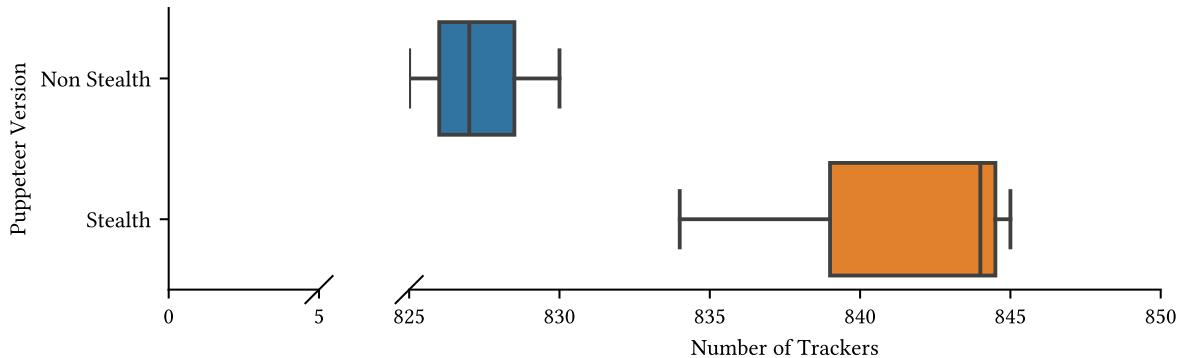


Figure 1: Box plots of the Number of Trackers for Puppeteer and Puppeteer Stealth.

Figure 2 shows the results of the crawl time experiments. As highlighted in the full paper, the number of trackers for crawl lengths from 10 to 60 seconds. It then levels out after 60 seconds, leading to the conclusion that 60 seconds is a good crawl time for our experiments.

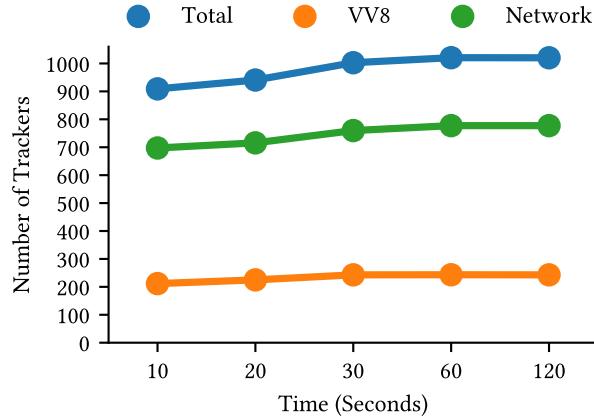


Figure 2: Results of Crawl Time Experiments

2 Static Analysis Results

Figure 3 shows the number of extensions per category which use Manifest V2, V3, or have no manifest.

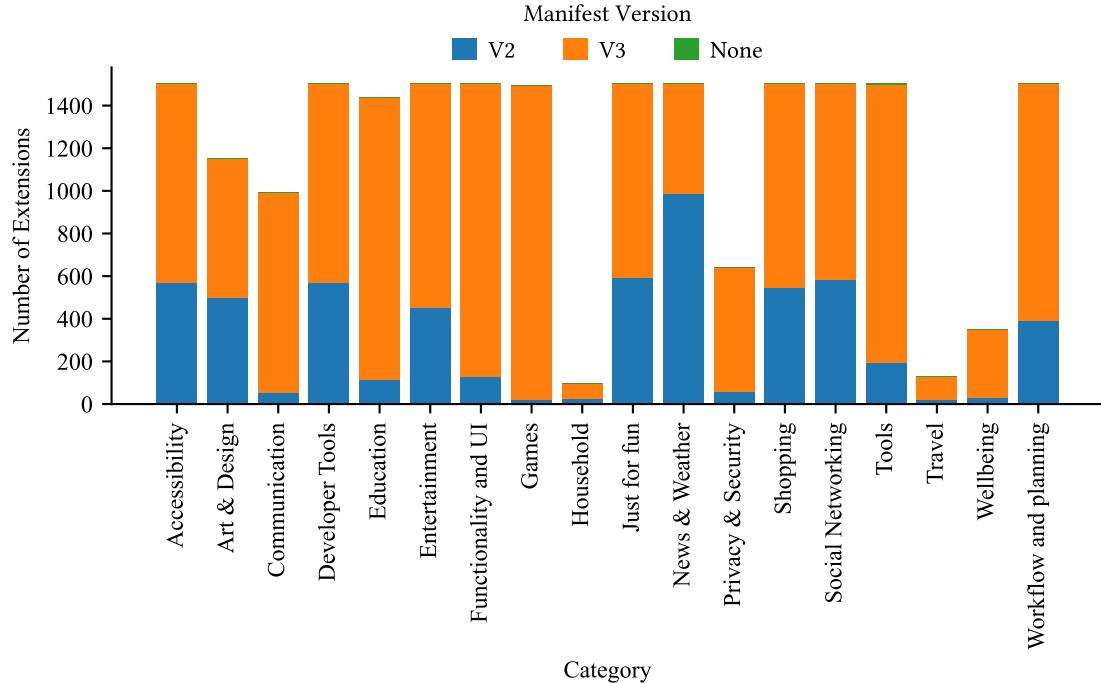


Figure 3: Manifest Version of Extensions per Category

Figure 4 shows the average number of permissions per extension per category.

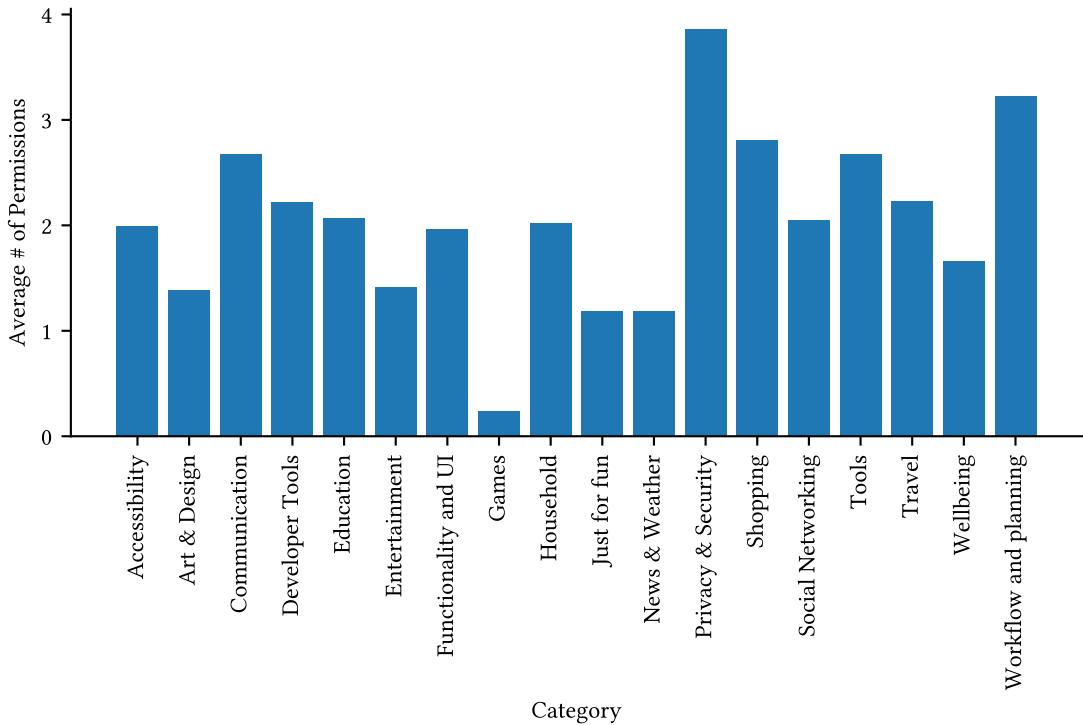


Figure 4: Average Number of Permissions of Extensions per Category

3 Web Tracking Results

Figure 5 shows the number of tracking extensions per category over all of our HoneyPages. In addition, Figure 6 shows the number of trackers per category over all of our HoneyPages.

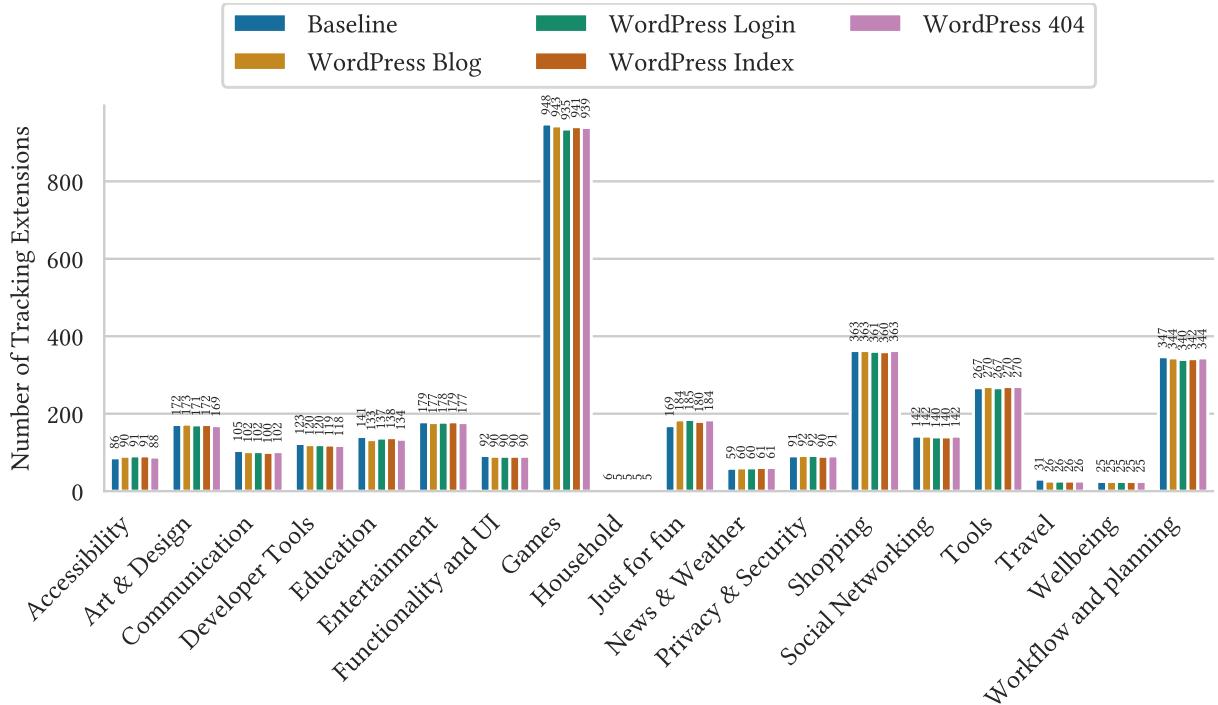


Figure 5: Number of Tracking Extensions per Category over HoneyPages

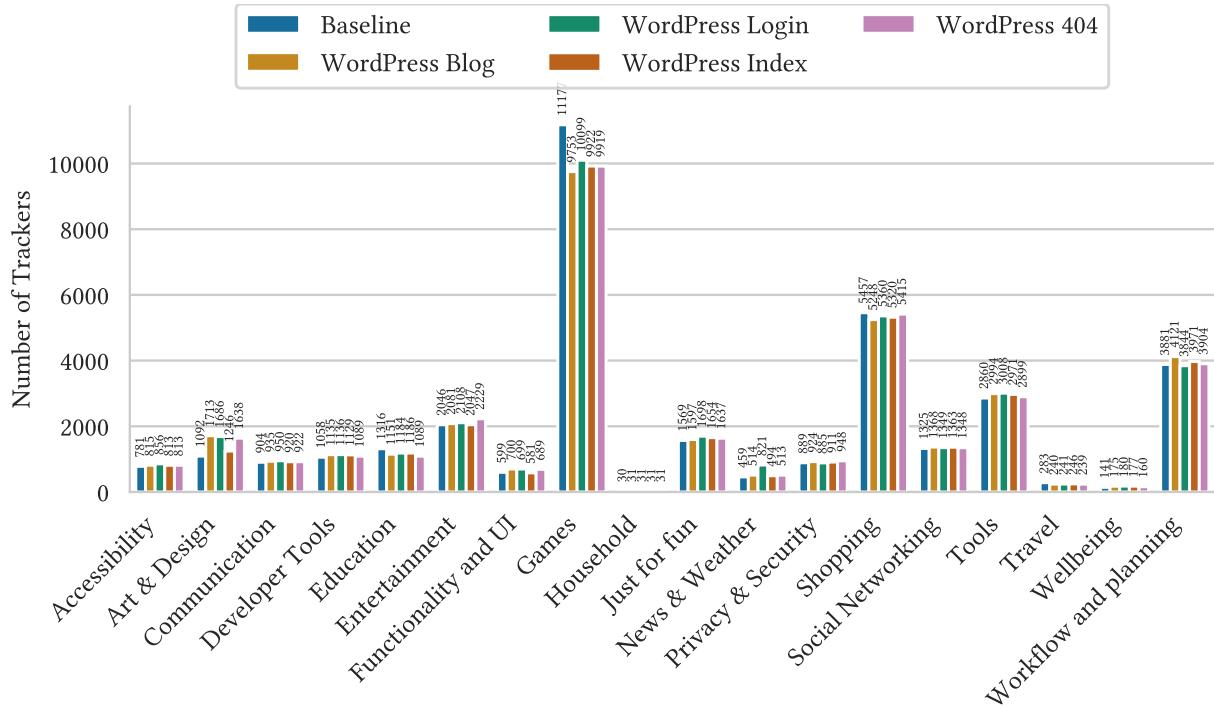


Figure 6: Number of Trackers per Category over HoneyPages

Figure 7, Figure 8, and Figure 9, and Figure 10 show the mapping of trackers from extension categories to domains to domain owners for each of our WordPress HoneyPages.

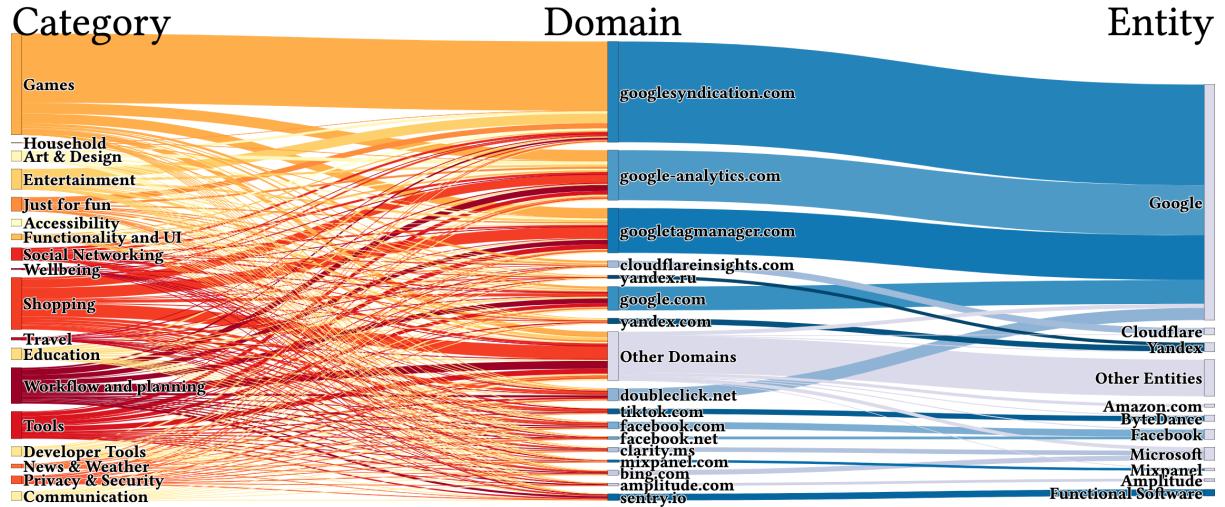


Figure 7: Mapping of Trackers, from Extension Categories to Domains to Domain Owner for the WordPress Index HoneyPage. (Other is less than 400.)

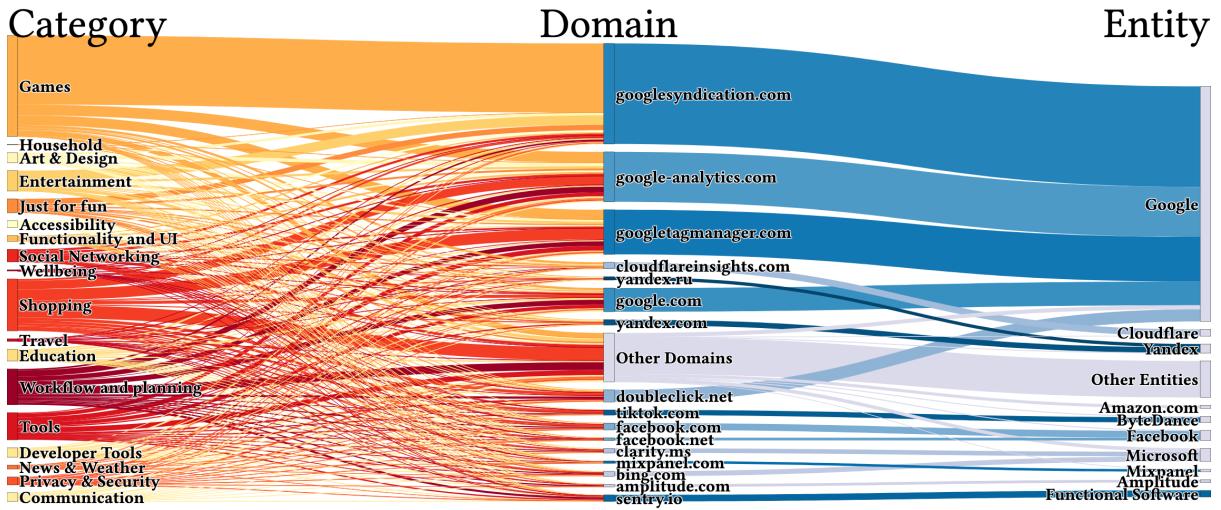


Figure 8: Mapping of Trackers, from Extension Categories to Domains to Domain Owner for the WordPress Login HoneyPage. (Other is less than 400.)

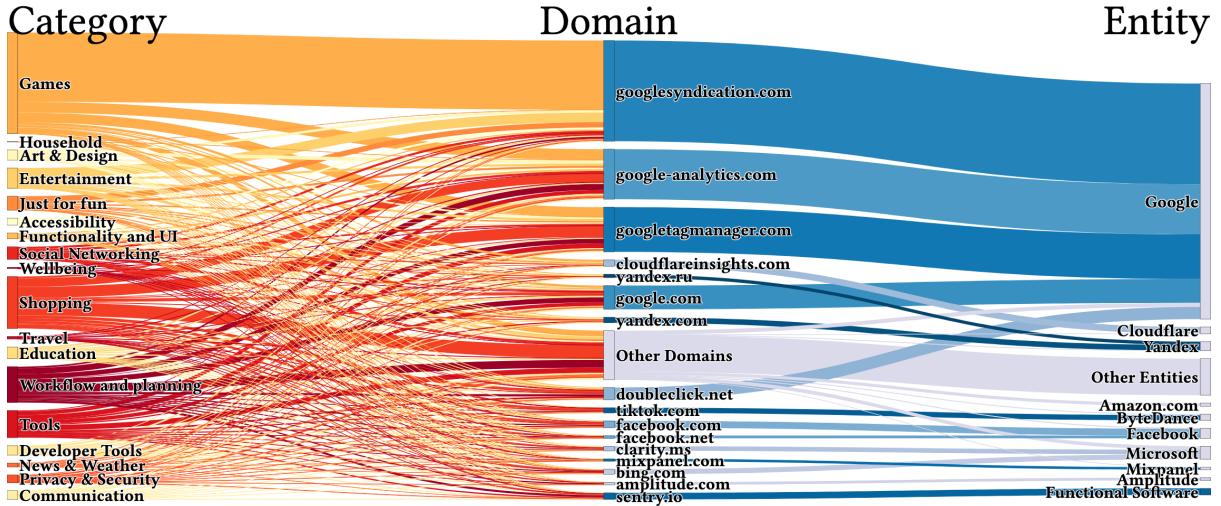


Figure 9: Mapping of Trackers, from Extension Categories to Domains to Domain Owner for the WordPress Blog HoneyPage. (Other is less than 400.)

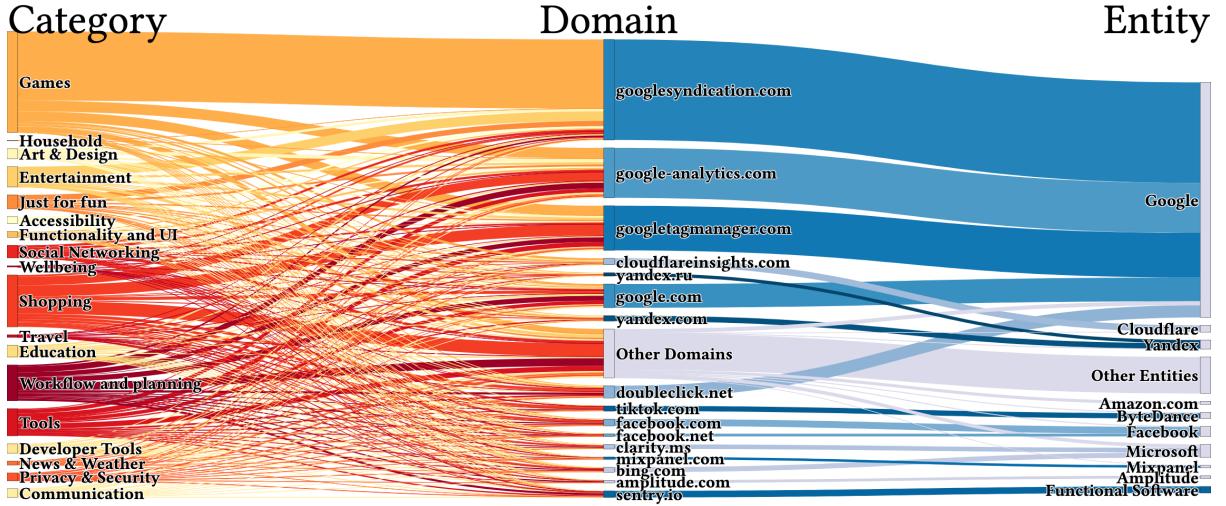


Figure 10: Mapping of Trackers, from Extension Categories to Domains to Domain Owner for the WordPress 404 HoneyPage. (Other is less than 400.)

Figure 11, Figure 12, Figure 13, and Figure 14 show the boxplots of the number of trackers for each of our WordPress HoneyPages.

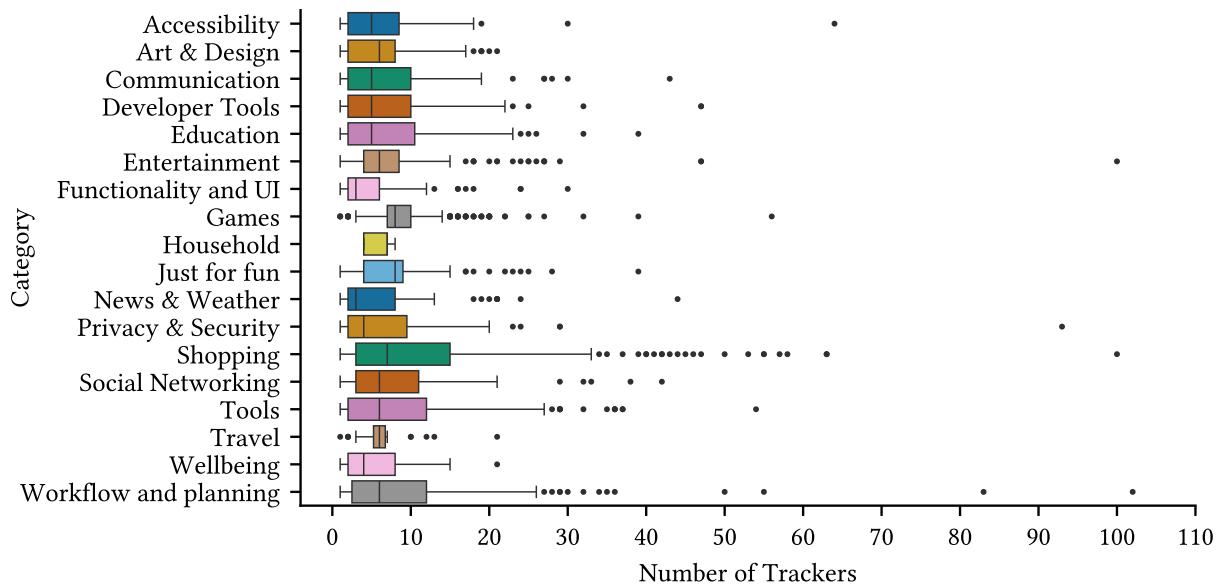


Figure 11: Boxplot of the Number of Trackers for the WordPress Index HoneyPage.

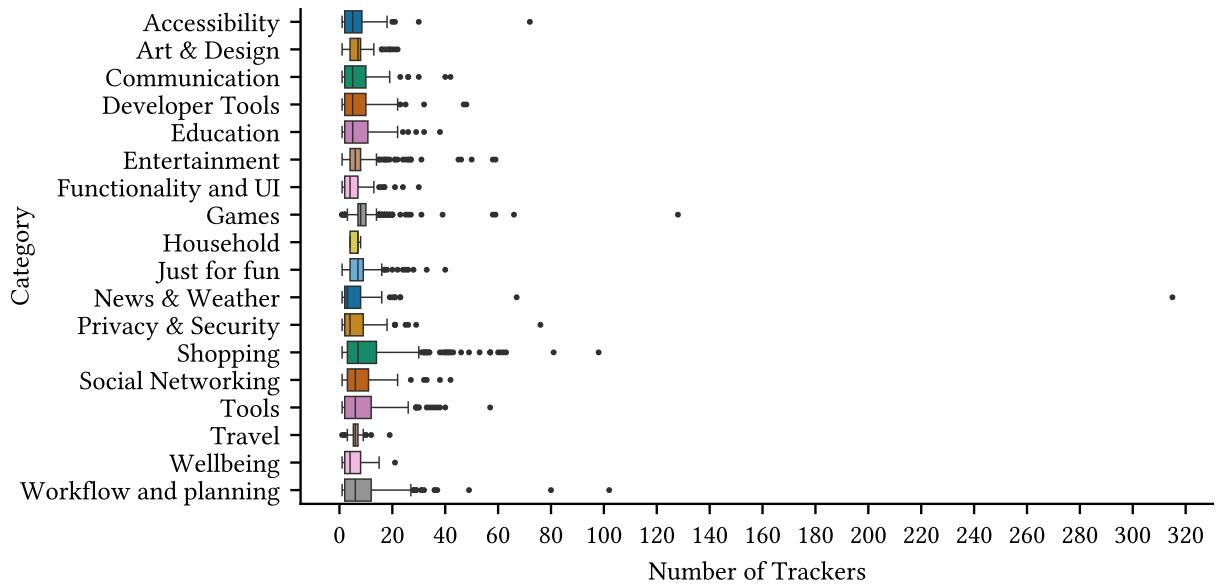


Figure 12: Boxplot of the Number of Trackers for the WordPress Login HoneyPage.

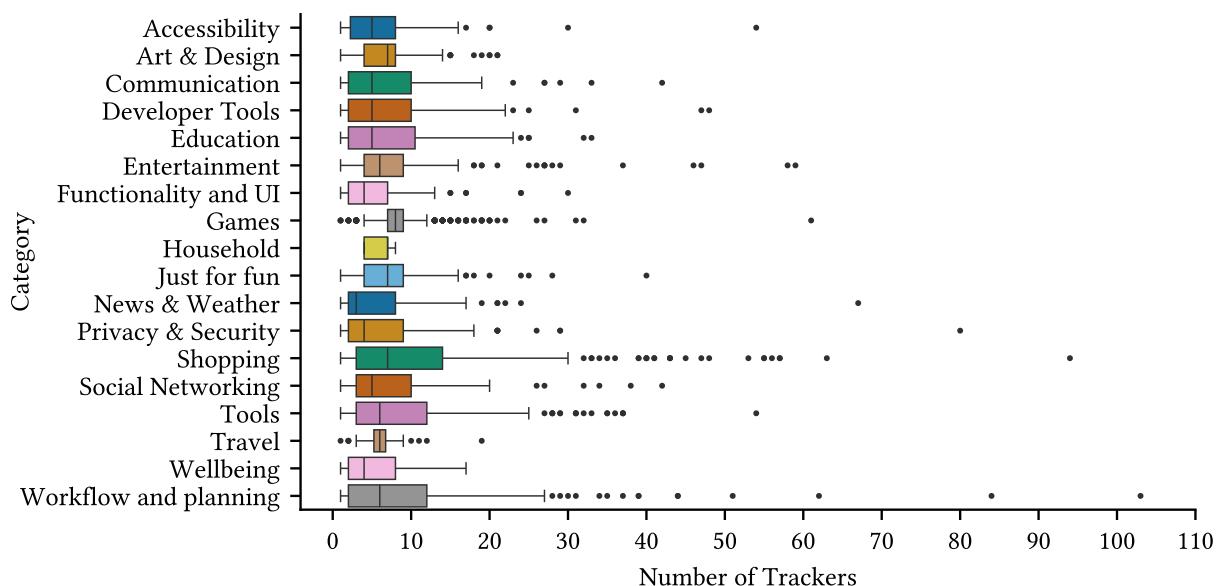


Figure 13: Boxplot of the Number of Trackers for the WordPress Blog HoneyPage.

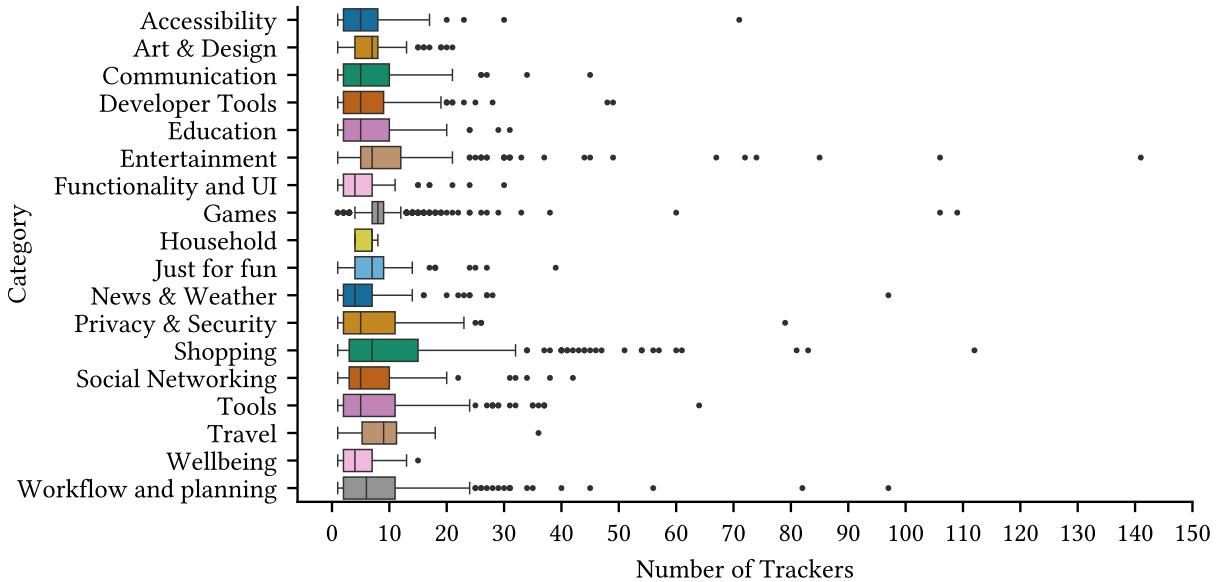


Figure 14: Boxplot of the Number of Trackers for the WordPress 404 HoneyPage.

Table 2: Summary of Tracking Detection Results

HoneyPage	Detection Mechanism		
	VV8	Network	Total
Baseline	6932	28935	35867
WordPress Index	7343	27639	34982
WordPress Login	7738	28397	36135
WordPress Blog	7835	27660	35495
WordPress 404	7839	27643	35482

4 Comparison of Tracking and Accessibility across Extensions Categories

Table 3 shows a summary of the comparison of tracking and accessibility across extensions categories across all of our HoneyPages.

Table 3: Comparison of Tracking and Accessibility across Extensions Categories Across HoneyPages.

(a) Tracking and API Calls

Category	% of Total Trackers					% of Extensions that Track					Mean API Calls				
	404	Baseline	Blog	Index	Login	404	Baseline	Blog	Index	Login	404	Baseline	Blog	Index	Login
Accessibility	2.29%	2.18%	2.3%	2.32%	2.37%	5.85%	5.72%	5.92%	6.05%	6.05%	268.94	209.8	289.09	280.79	245.24
Art & Design	4.62%	3.04%	4.83%	3.56%	4.67%	14.67%	14.93%	15.02%	14.94%	14.84%	275.82	241.05	278.04	271.94	263.11
Communication	2.6%	2.52%	2.63%	2.63%	2.63%	10.2%	10.6%	10%	10.29%	10.29%	337.35	392.35	371.15	375.74	370.66
Developer Tools	3.07%	2.95%	3.2%	3.23%	3.14%	7.87%	8.19%	8%	7.94%	8%	229.56	184.14	233.9	234.45	227.25
Education	3.07%	3.67%	3.24%	3.39%	3.28%	9.27%	9.81%	9.26%	9.6%	9.53%	420.23	401.12	394.65	462.3	416.25
Entertainment	6.28%	5.7%	5.86%	5.85%	5.83%	11.78%	11.91%	11.78%	11.91%	11.84%	230.65	189.94	226.94	233.66	223.36
Functionality and UI	1.94%	1.67%	1.97%	1.66%	1.93%	6.01%	6.15%	6.01%	6.01%	6.01%	194.25	164.14	203.02	193.26	189.3
Games	27.96%	31.16%	27.48%	28.36%	27.95%	62.73%	63.33%	62.99%	62.86%	62.43%	2047.23	2031.53	2027.97	2142.49	2105.75
Household	0.09%	0.08%	0.09%	0.09%	0.09%	5.26%	6.32%	5.26%	5.26%	5.26%	142.35	101.38	144.98	144.69	131.91
Just for fun	4.61%	4.37%	4.5%	4.73%	4.7%	12.25%	11.24%	12.25%	11.98%	12.25%	308.36	251.2	296.6	312.95	296.11
News & Weather	1.45%	1.28%	1.45%	1.41%	2.27%	3.99%	3.87%	3.86%	3.93%	3.93%	422.44	330.39	449.95	424.43	327.22
Privacy & Security	2.67%	2.48%	2.6%	2.6%	2.45%	13.78%	13.92%	13.94%	13.76%	14.06%	363.42	313.67	365.78	398.94	390.33
Shopping	15.26%	15.21%	14.79%	15.21%	14.83%	24.08%	24.05%	24.03%	23.83%	23.81%	643.9	615.82	623.94	648.8	626.21
Social Networking	3.8%	3.69%	3.85%	3.9%	3.73%	9.45%	9.45%	9.39%	9.2%	9.26%	672.21	791.21	580.82	538.64	635.5
Tools	8.17%	7.97%	8.43%	8.49%	8.32%	17.93%	17.73%	17.9%	18.01%	17.75%	458.14	415.2	460.4	495.87	482.17
Travel	0.67%	0.79%	0.68%	0.7%	0.67%	20.31%	24.22%	20.31%	20.31%	20.31%	277.77	260.08	262.11	271.26	262.38
Wellbeing	0.45%	0.39%	0.49%	0.51%	0.5%	7.1%	7.1%	7.1%	7.12%	7.1%	131.51	169.03	136.28	136.44	125.43
Workflow and planning	11%	10.82%	11.61%	11.35%	10.64%	22.85%	22.98%	22.82%	22.68%	22.53%	570.46	536.95	580.89	568.01	536.9

(b) Accessibility Results

Category	Altered Accessibility					Worse Accessibility					Better Accessibility				
	404	Baseline	Blog	Index	Login	404	Baseline	Blog	Index	Login	404	Baseline	Blog	Index	Login
Accessibility	3.33%	3.86%	3.59%	3.59%	3.52%	2.66%	2.13%	2.86%	2.86%	2.93%	1.66%	2.66%	1.86%	1.8%	1.73%
Art & Design	1.56%	1.65%	1.56%	1.56%	1.56%	1.22%	1.13%	1.22%	1.22%	1.22%	0.69%	0.95%	0.69%	0.78%	0.78%
Communication	5.25%	5.85%	5.66%	5.35%	5.85%	4.14%	4.34%	4.55%	4.24%	4.74%	4.55%	4.84%	4.55%	4.55%	4.54%
Developer Tools	1.8%	1.73%	1.87%	1.67%	1.93%	1.13%	1.07%	1.27%	1.07%	1.47%	1.2%	1.2%	1.13%	1.13%	1.07%
Education	4.04%	4.94%	4.45%	4.38%	4.45%	3.07%	3.2%	3.41%	3.27%	3.48%	2.37%	3.13%	2.44%	2.51%	2.44%
Entertainment	0.87%	1.13%	1%	0.86%	0.93%	0.8%	1%	0.93%	0.8%	0.86%	0.33%	0.4%	0.33%	0.33%	0.27%
Functionality and UI	1.47%	1.54%	1.54%	1.47%	1.54%	1.2%	1.07%	1.34%	1.27%	1.34%	0.6%	0.8%	0.53%	0.53%	0.53%
Games	0.33%	0.4%	0.33%	0.33%	0.33%	0.27%	0.27%	0.27%	0.27%	0.27%	0.13%	0.2%	0.13%	0.13%	0.13%
Household	2.11%	2.11%	2.11%	2.11%	2.11%	2.11%	2.11%	2.11%	2.11%	2.11%	1.05%	1.05%	1.05%	1.05%	1.05%
Just for fun	2.33%	2.46%	2.4%	2.26%	2.33%	1.86%	1.66%	1.93%	1.86%	1.86%	1.07%	1.4%	1.07%	1%	1%
News & Weather	1.13%	1.27%	1.13%	1.07%	1.26%	1%	1.07%	1%	0.93%	1.13%	0.67%	0.73%	0.6%	0.6%	0.6%
Privacy & Security	2.56%	4.16%	3.53%	2.56%	3.83%	1.44%	2.4%	2.08%	1.44%	2.56%	1.76%	3.36%	2.4%	1.76%	2.88%
Shopping	5%	5.41%	5.21%	5.01%	4.88%	4.07%	4.01%	4.27%	4.27%	4.08%	2.33%	2.81%	2.4%	2.27%	2.07%
Social Networking	2.33%	2.26%	2.27%	2.33%	2.4%	1.73%	1.66%	1.67%	1.73%	1.73%	1.4%	1.46%	1.4%	1.33%	1.4%
Tools	4.2%	4.4%	4.21%	4.14%	4.34%	3.27%	3%	3.41%	3.34%	3.6%	2.4%	2.8%	2.27%	2.27%	2.2%
Travel	0.78%	1.56%	0.78%	0.78%	0.78%	1.56%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%	0.78%
Wellbeing	1.14%	2.27%	1.14%	1.42%	1.14%	0.85%	1.42%	1.14%	1.14%	1.14%	0.85%	1.42%	0.85%	0.85%	0.85%
Workflow and planning	4.53%	5.34%	4.67%	4.47%	4.53%	3.6%	3.41%	3.74%	3.47%	3.67%	2.93%	4.01%	2.94%	2.87%	2.87%

5 Accessibility Results

Table 4 shows a summary of the accessibility results for all of our HoneyPages.

Table 4: Summary of Accessibility Results (I = Increases, D = Decreases)

HoneyPage	WAVE																	
	Lighthouse				Contrast Errors		Alerts		Features		Structural Elements		ARIA					
	Errors		I		D		I		D		I		D		I		D	
	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D	I	D
Baseline	145	235	242	5	37	30	114	0	77	6	251	5	77	5				
Wordpress Index	0	310	233	0	31	0	115	6	70	7	248	4	74	5				
Wordpress Login	0	334	235	0	43	0	119	0	71	7	245	5	75	5				
Wordpress Blog	10	326	239	0	37	0	120	10	70	12	246	6	76	7				
Wordpress 404	12	291	237	0	32	0	117	6	69	13	245	7	74	8				