

# Toward An Empirical Investigation of Usability and Effectiveness of Do-Not-Track Tools

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## Introduction

Internet users have repeatedly expressed strong aversion to behavioral advertising and online tracking, raising concerns about privacy [1][2]. Efforts to address these privacy concerns focus on giving users privacy controls. However, for controls to be effective they must be usable and work as advertised.

A key element of industry self-regulations is to allow users to opt out of behavioral advertising. A number of opt-out mechanisms have been designed and deployed including but not limited to Network Advertising Initiative (NAI) opt-out tool, Google advertising cookie opt-out tool, Targeted Advertising Cookie Opt-out (TACO) tool, and opt-out tools in web browsers such as IE9 and Mozilla Firefox. However, we have not seen any study that investigates the effectiveness of this opt-out approach.

We set out to answer this important, timely, and practical question – *do these opt-out mechanisms actually work for ordinary users?* We plan to conduct a series of studies to empirically investigate their effectiveness in protecting users from targeted ads and online tracking and identify the causes of any deficiencies. This position paper describes our research plans.

## Research Focus

Our research will focus on the following four areas:

- Taxonomy of opt-outs
- Usability of opt-out tools
- Effect of opt-out tools on behavioral advertising
- Effect of opt-out tools on online tracking

There are a wide variety of websites that claim to support these opt-out options. For instance, NAI currently has 66 members that support the NAI opt-out tool. However, it is not clear whether these sites all interpret the opt-out the same way. We have begun to classify these sites, both in how they describe their response to the opt-out, and in how they actually respond to the opt-out, e.g., do they place further cookies on the user's browsers, and if so, what information do the cookies contain?

Because the opt-out process involves users' actions, the second area of this research focuses on the usability of these tools. If the tools are not usable, users will not be able to gain benefits from using the tools regardless of their intended functionalities.

Opt-out tools will be ineffective if ad networks choose not to respect the opt-out set by the tools, or if the tools themselves do not behave exactly as designed (e.g., they do not actually set an opt-out cookie or that cookie gets deleted). We will treat the behavioral advertising system as a black box and devise a systematic experiment scheme to observe and deduce the effect of these opt-out tools on behavioral advertising.

It is important to note that even if sites do not provide targeted ads to users, they could still track them online. Therefore, we also plan to examine how these tools might affect sites' online tracking practices.

## **Research Methodology**

We will select a set of representative opt-out tools. This set will cover a variety of ways in which these tools have been designed and implemented such as browser plug-ins and native browser features (both on computers and mobile devices), DNT headers, and websites.

### **Usability of opt-out tools**

To evaluate the usability of these opt-out tools, we will conduct a heuristic evaluation (a form of expert review) with a few usable privacy experts and a lab usability study with ordinary Internet users. Then each participant will be randomly assigned to use one of the selected opt-out tools, and asked to install the tool on a lab machine. We will give them the same set of tasks such as opting out from tracking by a certain site. We will ask them to think aloud while they install the tool and perform the tasks. At the end of study, we will ask them to fill out a subjective satisfaction survey and briefly interview them about their experience with the tool. We will video tape (without recording their face) the study and screen record their interactions with the tool. In addition, we will measure (1) how long does it take each participant to complete a task (e.g., install the tool)? (2) task success rate, and (3) their subjective assessment of the tool on a Likert scale.

For qualitative data such as interviews, we will transcribe them and identify potential usability problems. For quantitative measurements such as task performance time and task success rate, we plan to analyze the data using statistical tools.

### **Effectiveness of opt-out tools**

Our scheme to test the effect of an opt-out tool is inspired by Guha et al. [3] and our work examining Flash LSO re-spawning behavior [4]. We set up two web browser instances with only one difference (one instance enables the tool while the other does not) on the same machine.

We script both browser instances to visit the same set of “learning” websites and a destination site (e.g., a news site). We would choose “learning” websites that have clear themes, e.g., sites of baseball teams, so that user interests can be learned. For instance, one can reasonably assume that if a user visits baseball team websites frequently, this user is likely to be interested in baseball and a targeted ad system may display ads about baseball. The scripts would also keep track of all the cookies and ads each browser receives along the way. We will check how the received ads match up with the themes or characteristics of the visited sites to assess whether they are targeted ads. We then compare the two sets of ads to see how similar they are. After controlling for random noise in ad selection, generally speaking, the more difference between the two sets of ads, the more effect the opt-out tool has.

## Conclusions

The underlying model of these behavioral advertising opt-out tools relies on an important assumption that users can easily understand and use these tools to express their opt-out preferences. We have seen too many cases where brilliant security and privacy technologies are simply not usable and thus unused (e.g., PGP [5]). Therefore, usability is a key factor to the success of such tools. To our knowledge, no systematic usability evaluation has been conducted on these opt-out tools. Our study is likely to be the first. It has important research and practical value. We expect to identify major usability problems from this study and to create guidelines to help design better usability in such tools.

Our simulation experiment on the effect of these tools is based on actual system responses as if a user is browsing the Web. It is considerably more objective and reliable than people’s self-reported attitudes and behavior. The results, either positive or negative, will have substantial implications to the industry, regulators and privacy technologists.

## Reference

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