Privacy Mirror: Users' Concerns and Knowledge of Web Trackers

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I. ABSTRACT

Internet users are constantly encountering various types of media, interactions, and experiences that contribute to their daily web browsing. However, internet users are unaware of web trackers and their discreet activities. This paper shares our qualitative research, which gathers insights from internet users including their concerns and perceptions of web tracking and online advertisements. Further, we investigated potential actions towards protecting user privacy while navigating the internet. The research highlights internet users' mental models of internet activity through the lens of privacy.

II. INTRODUCTION

With the internet providing new grounds to discover, learn, and interact; the internet is an enormous platform for substantial interactivity for internet users, but risk as well. Privacy is a risk that can be difficult to translate to common internet users. Privacy is circumstantial and it can vary based on location, preference, or even feelings. Furthermore, the internet adds more complexity to privacy concerns and issues in ways that are unfamiliar to general users. Privacy comes in new and unfamiliar forms that basic internet users might not notice or take concern with. For example, It might come in the form of online behavioral advertising [1] or web tracking. If users are not aware of their own privacy will navigating the internet than they might be at a higher risk of being taken advantage of. As Aleecia et al states in *Beliefs and Behaviors: Internet Users' Understanding of Behavioral Advertising* "From what we have observed to date, it appears behavioral advertising violates consumer expectations and is understood as a source of privacy harm…consumers cannot protect themselves from risks they do not understand."[2]

With web tracker advertising to online users through online behavioral advertising, web trackers can gather information about online users in a passive and unethical way. Providing a tool that will help bring transparency to online users about web tracking activities will be a step forward towards a more users-centered internet. Having a more user-centered internet will allow for more transparent activities from companies and programs that act behind the users

perception. It will also educate the user more on how the internet works and how they can control it

Third party tracking companies are commonly associated with questionable activities that are not transparent enough for basic users to render. This can allow fro unethical practices to occur, for instance, monetizing and collecting user data in order to tailor advertisements for towards that particular user. This study will help show how users perceive and view the internet, their privacy, and how they are affected by web trackers. Based on the results of this research we will provide a tool that will help bring transparency to online users about web tracking activities will be a step forward towards the users-centered internet.

Considering that there are already privacy tools that reveal trackers to their users out in the market, we wanted to reevaluate what it means for online users to interact with a tool that provides them the capabilities of visualization and control over these trackers. Tracking companies are collecting user data and monetizing that information without our full user consent, so it is best through our research to determine the most appropriate way to respond to this issue. Through our qualitative research, we interviewed 4 participants in order to understand their mental models of the internet, their privacy while online, and their interactions between the two. The results will help us understand how general users perceive the internet and how we can develop a tool to better aid in their online experience.

III. METHODOLOGY

We conducted semi-structured interview with 28 questions over 10 participants including 2 activities: card sorting and scenario drawing. The interviews questions consist of 5 sections in order to help determine the participants' mental models of the internet, their privacy, and web tracking. The sections are designed in order to do five things: get the user in the mindset that we are talking about the internet, whether or not they care about their privacy online, whether or not they care about saving information in their browser, online advertising and web trackers, and finally an ideal privacy tool that benefit them in bringing transparency of web trackers. The interview

session was recorded with audio and the 2 demonstrations were photographed for analysis.

3.1 Participants

For our research, we requested adults above the age of 18 to participate in a 1 hour study. The participants had to be internet users or users who have used the internet in any way or form. However, the one requirement was that we only needed a few college students to participate in this study. We wanted users with a wide range age and education level to get a more balance collection of participants. We created a flyer to be posted in spaces like downtown Syracuse, Destiny U.S.A Mall, and Craigslist so that we can get a more randomized range of users in terms of age, education, and gender. However, the only requirement was that we only chose a few students to be selected in order to get a broader sense of internet users. The participants were compensated 10 dollars for the interview. [See Table 1 for graph of the participants gender, age, and education.]

Table 1: Collection of all participants' gender, age and educational level.

Identifier	Gender	Age	Education Level
P01	Female	21	Information Management and Technology Undergraduate
P02	Male	21	Health & Exercise Science
P03	Female	61	MBA
P04	Male	40	GED
P05	Male	40-50	Bachelors Arts
P06	Female	40	College Degree
P07	Male	23	GED
P08	Female		Masters
P09	Male	Over 40	Engineering
P10	Male	46	Information Management and Technology Masters

3.2 Personas

Prior to conducting our formal research, we informally interviewed 9 friends and family to get an idea of what type of internet users we could be interviewing with in the future. This was intended to get an understanding of internet users we are working with in order to develop personas that can help guide and define our formal research. The interview questions that we asked for these informal interviews are a low fidelity version of the final interview questions we asked for our formal interview. Personas were developed based on the interviewee's perceptions and daily activities of the internet. The personas are defined in 4 ways: persona 1 users are internet users that generally care less about their privacy online and are not willingly to take action to make online activities more transparent or safer for themselves. Persona 2.1 users are essentially persona 1s but might be more willingly to take action to help improve the quality of internet experiences. Persona 2.3 are users who generally care about their privacy online but are not sure what they can do to help it. Finally, Persona 3 users are secure about their privacy online, want to take action to make their privacy more secure online. Persona 3 users typically have more knowledge of the internet works and what it means to be online while persona 1 users typically do not have knowledge of how the internet works or it means for them to participate online activities.

Table 2: Participants' persona identification, whether or not they are willing to block trackers or what to learn more, and what is more important the user: the trackers or information being tracked

Identifier	Persona	Block or Educate	Tracker or Information being Tracked
P01	2.1	Educate	Information being tracked
P02	1	Educate	Information being tracked
P03	1	Educate	Information being tracked
P04	1	Educate	Information being tracked
P05	3	Block	Information being tracked
P06	3	Block	Tracker
P07	2.3	Educate	Information being tracked
P08	2.3	Educate	Both
P09	2.1	Both	Tracker

IV. PROCEDURE

The participants were interviewed by two researchers, one conducting the interview and the other took notes. The participants were ask 28 questions that commonly lead to further discussions during their responses. The first set of questions are designed to get the user in the

mindset that we are talking about the internet and their daily activities while online in order to get the user familiar with their internet activity. The second set of questions aims to identify the users' comfortability of navigating the internet and the concern level of saving information online. For example, the interviewee will be asked if they have changed their browser settings and if they save account information on particular websites. Then, the participants are asked to perform a card sorting activity.

The card sorting activity is 18 words of different types of information that may be sensitive to the users while online or information that is collectible online. This activity gives us an idea of the users mental model of what they consider private information while browsing the internet. Afterward, we present interview questions relating to online advertisements, target advertisements ,and web trackers. We wanted to determine if the participants understood what these three topics means, how it works, and if it matters to them.

Following these questions, we asked the participant to draw a diagram of the flow between two websites and how a product that the user was looking at on one website ended up as an advertisement on the website that the user is currently on. Both the diagram and the card sorting will be a talk-out-loud session and then photographed.

After the diagram drawing, we will proceed with web tracker related questions which will give us the understanding that the participants have a perception of what trackers are, what they do, who they are and whether the information is being tracked or the tracker is more important to their user experience.

Finally, we reveal that we are designing a tool to help reveal web trackers and their activities online. The users will give us their suggestions on what kind of tool they would like and what they wouldn't like to have.

V. RESULTS

5.1 Internet As A Public Space

During our interview, we found that our participants typically related their online experience to being in the public. When we asked them to elaborate, they indicated that the internet is like being public because they cannot control the everything that happens in the public; meaning that they cannot be certain about what happens to them online just like being in the public. For example, when we asked P01 "what are your thoughts and feelings on trackers" she replayed with "kinda like going out to public". We found this to be a common perception amongst our participants because of the potential risk of going online is not 100% safe. Furthermore, in the context of online advertisement, the participants' saw the internet as a place where online advertisements could exist and act in ways without the participants having to say on what types of advertisements are being advertised to them. They generally accepted online advertising for the same reason that advertisements happen in the public without their consent. Meaning, they did not care about the fact that companies would advertise to them online because it happens all the time in public. Also, the participants expressed that they are understanding online advertising because it is a form of making money for companies to survive. This perception had a big effect on how the participants' treat the internet when they are interacting with it. The participants more or less did not care about being tracked.

5.2 Perceptions of Online Advertisements and Web Trackers

Before we mentioned about web trackers to our participants, we asked them questions about their thoughts and perceptions of target ads and online advertisements. All interviews were aware of advertisements online and have at least click on one before. Some interviewees thought that targeting ads where good because it helps the advertising company make money, while the other participants were simply ok with it. However, the majority of the interviewees stated they generally does not click on ads or they will ignore them all together. This is because the ads itself never really work. Participants have stated that online advertisements either show them what they have already seen before or something that do not want to see in the first place, causing them to not be interested in the advertisements. This is contradictory because the participants state that they are understanding of target advertisements and generally perceive it be good that they exist, but will rarely ever click on an online ad.

When we asked the participants to define target advertising to us, some of them were correct with their assumptions, while a few were not. However, when we asked them to define what a web tracker is, most did not know. They assume, to a certain extent, that web tracker behaviors like collecting user data and information to be true on the internet, but they did not know who was doing this or how it works. After explanation of web trackers, the participants seemed more enlightened about how target advertisements work and the connection between target ads and web trackers. Despite this, the participants' perceptions of the internet changed little to none at all. This type of user is what we would call a persona 1 user.

We ask the participants to draw out a scenario on what they thought "happen" when "you go to www.amazon.com to look for shoes; some hours later, you see shoes advertising on Facebook". Typically, participants were not completely sure how the "shoe" from one website ended at another. For example, P07

drew his drawing based on his perception that Amazon and Facebook are partners selling users information to one another. [see figure 1] Despite this instance, there were participants who were more accurate with their perceptions, without knowing exactly how web tracking works. P01 drawing was the most accurate drawing in all of our participants. Her drawing indicates that a "neutral third party ad company" is what "connects" the information sold between Amazon and Facebook. [see figure 2] The participants mental models of how information travels between the user and two websites are generally not understood by the participants.
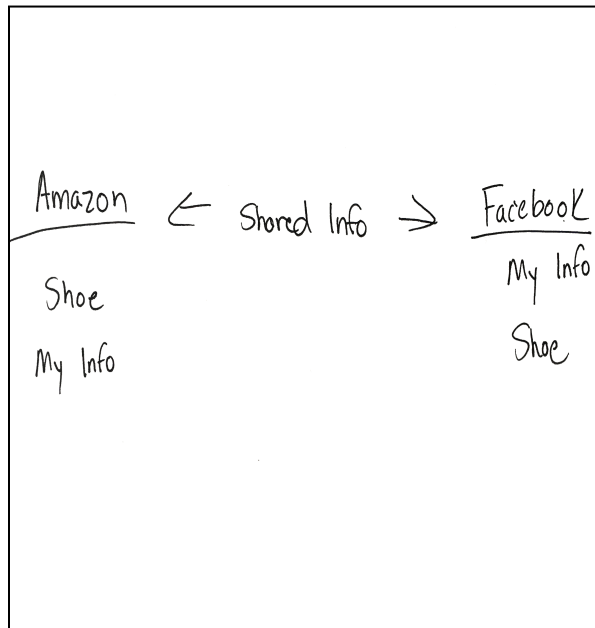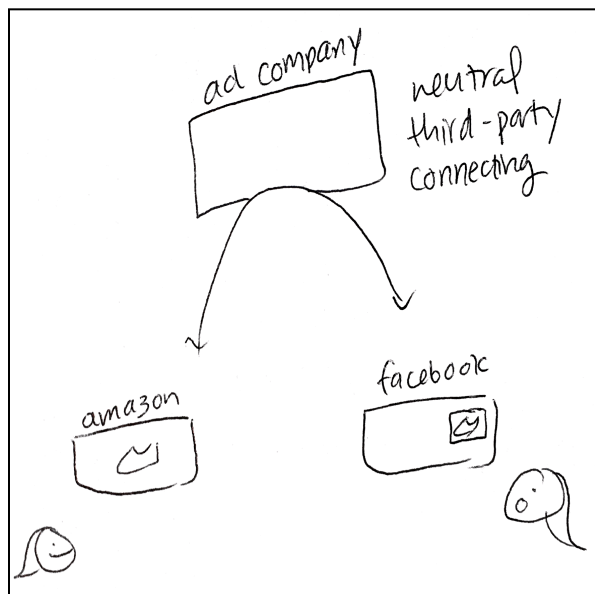

Figure 1 : P07's Scenario Drawing

Figure 2 : P01's Scenario Drawing

As stated in the "Personas section", a persona 1 user is an internet user that cares little to none about their privacy online and or what the internet does with their information. Typically, persona 1 users will be more accepting and less insecure about their presence online, therefore, less interested in caring about unethical practices that happen online like web trackers or behavioral advertisements. In this interview, most persona's were persona 1s [see table 2]. Despite that they are allowing and accepting internet practices from web trackers, these users are interested in wanting to learn more and be more educated on the nature of web tracking and how it affects them as internet users.

VI. DISCUSSIONS

6.1 Design Recommendations
The purpose of performing this research is to develop a tool that would provide internet users with transparency and action towards web tracking. Based on our results, our participants are interested in learning more about web tracking, but are not knowledge enough to act accordingly. Our users generally have basic internet practices, we did have a few with sophisticated technological background. Although their technological backgrounds do not correlate to their privacy concerns [3], their interest to learn more about web tracking complements their low understanding of web tracking. With the users low understanding of web tracking and high interest to learn more, the gap to develop a design tool that bridges the two gap is the direction we want to take this tool in. The tool will also focus on education the users about web tracking and will show information that is being collected. The users will be educated on web tracking through personable recommendations on how to react with web tracking when they find information being tracked to be sensitive. The tool will show the users what information is being collected on the particular website they are on. The information will be ranked from most concerning to least without restricting the user from seeing all information being collected.

VII. CONCLUSION
Based on what we have collected, we can say two things: one, that the user would rather be educated or learn more about trackers and two, the information being collected by trackers is more important to the participants than knowing who the trackers are. Our participants generally were not aware of the direct relationship that web trackers have on users and how web trackers conduct their practices online. Therefore, the users are more concerned about what could be more immediately affected by and that is the information being tracked. On addition, in order for the users to understand what information is being collected, most of the participants have expressed interest to learn more about web tracking. General internet users are less

interested in taking action but are more inclined to be more aware of what happens online. A tool will be developed in order to accommodate these perceptions and testing will have to be done in order to put their perceptions to the test. My theory is that users will appreciate the knowledge gained from a tool, but would like some actions to be taken without hindering their online experiences. The tool will have to accommodate the aspect that these users don't necessarily care for a tool to disturb their experiences and also, be quick and easily digestible. Based on this, the tool will be a simple browser extension that will discreetly collect tracker information of what type of information is being tracked while the user is on that particular website. Also, it will be simplistic and education-centered so that the user can easily comprehend what goes on behind the scenes while they navigate the web. A reason for the simplistic functionality is based on Florian Schlub's *A Design Space for Effective Privacy Notices* as he says "In my mind, the question is not whether consumers should be given a say over unexpected uses of their data; rather, the question is how to provide simplified notice and choice." [4]

VIII. REFERENCE

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[3] Kang, Ruogu, Laura Dabbish, Nathaniel Fruchter, and Sara Kiesler. ""My Data Just Goes Everywhere:" User Mental Models of the Internet and Implications for Privacy and Security." *USENIX*. N.p., n.d. Web. 06 May 2016.

[4] Schaub, Florian, Rebecca Balebako, Adam L. Durity, and Lorrie Faith Cranor. *A Design Space for Effective Privacy Notices* (n.d.): n. pag. Web.

IX. APPENDIX

1. What do you do for a living? (What is your profession?)

2. How old are you? If you do not feel comfortable answering, could you give us the age group?

3. What gender do you identify as?

4. What ethnicity do you associate with?
5. What is your education level?
6. Do you have any background experiences working with computers
7. How many hours a day do you use the internet?

    a. How many days a week do you use the internet?

8. What do you usually do when you browse the web?

9. What devices do you use when you browse the web?

10. What do you use each device for? Could you explain why?

11. What web browsers to do you use?

    a. Do you use your browser's for any particular reasons?

    b. Do you use different browsers for different reasons and why?

12. In general, do you feel comfortable browsing the web?

13. Do you know that you can change your browser settings?

    a. (If yes) Have you ever looked into changing your browser setting. If so what did you change and why?

    b. Do you know what an extension/add-on is?

    c. (If Yes) Have you ever downloaded any? Which one(s)?

    d. What was the purpose of the extension?

14. Have you created different accounts for different websites while browsing the web.

    a. Do you save any your account information?

    b. What kind of information do you save? (credit card, address, username...

    c. Why (or why) don't you save your account information?

15. What information do you feel most comfortable saving? Please sort these cards based on your feeling.

16. Do you notice that there is ads on websites?

    a. What are you thoughts on that? Why do you think that?

17. Do you generally click on ads?

    a. (If No) Why?

    b. (If Yes) What type of ads do you click on?

    c. When is the last time you click on any ads? Can you describe it?

    d. What type of websites do you usually click ads on?

    Describe the user a typical targeting scenario, like "you go to www.amazon.com to look for shoes; some hours later, you see shoes advertising on facebook" and ask them to draw what happened

    e. Explain your drawing

    f. We will make specific questions about what they have drawn

18. Have you ever heard of target ads?

19. Do you know how target ads work?

    a. If yes, explain how did you come to this conclusion

20. Have you ever heard of a web "tracker"? What do you think a web tracker is, who they are and what they do?

    a.   If yes, explain how did they come to this conclusion

21. Before our explanation about targeting ads and web tracking, were you aware that there are trackers tracking your information while you browse the internet?

    a. If yes, how did you know about it?

    Whether or not they have a definition for how target ads work, we will give them our definition: Third party entities that collect user information and monetize it either by selling it or directly using it.

22. What are your thoughts and feeling on trackers?

23. What do you think trackers are collecting when they are tracking you?

24. Is there anymore information that you would like to know about web trackers from us?

25. what's more important the trackers or what data is being tracked and why?

26. We are building an online tool to help bring transparency to users (like you) about web tracking and would like to get your input on what kind of ideas you could have for us.

27. If there was a magic tool that can do anything,

    a. What types of features would you like this tool to have pertaining to web trackers.

    b. What features would make you feel uncomfortable in a tool.

    c. Would you feel comfortable allowing developers to use your own information in order for the tool to prevent trackers?

    d. If the developers says that their tool will not get your data, would you trust him?

28. do you feel different now after our interview?