

The Uncanny Valley Effect in Behavioral Targeting and Information Processing of Peripheral Cues

Donghee Yvette Wohn¹ and Chandan Sarkar²

¹ Northwestern University

² Michigan State University

Abstract

This paper examines how young adults process information related to privacy, and how that affects their attitude towards behavioral targeted advertising. Differences between computer novices and experts were examined based on the Elaboration Likelihood Model (Petty & Cacioppo, 1984), which argues that people who have the ability to process information do so differently than those who do not have the ability. Consistent with the theory, we found that computer novices were relying on peripheral cues to process information related to security due to their lack of knowledge. We also identified an “uncanny valley” effect where people liked customization of targeted advertisements, but then became uncomfortable if the advertisements seemed to know too much of their past behavior until the suggestions were perfectly aligned with their interests.

Keywords: behavioral advertising, behavioral targeting, uncanny valley, information processing, targeted advertising, peripheral cues

Citation: Wohn, D. Y., & Sarkar, C. (2014). The Uncanny Valley Effect in Behavioral Targeting and Information Processing of Peripheral Cues. In *iConference 2014 Proceedings* (p. 577–582). doi:10.9776/14075.

Copyright: Copyright is held by the authors.

Contact: wohn@northwestern.edu, sarkarch@msu.edu

1 Introduction

Behavioral targeting, or targeted advertising, is a type of personalized advertising in which advertisers track and monitor the web-browsing behavior of individual consumers across multiple websites in order to provide consumers with advertisements related to their previous online activities (McDonald & Cranor, 2009). Prior studies on personalized advertising have shown that consumers generally think advertisers violate their privacy (Yu & Cude, 2009) and that they generally avoid online advertising (e.g., Jin & Villegas, 2006). A Pew survey of 2,000 adults in the U.S. showed that 68% were “not okay” with targeted ads while 28% said that they are “okay” with it (Purcell, Brenner, & Rainie, 2012).

This study examines people’s attitudes towards targeted ads, focusing on how users process information presented on websites, and how that affects their attitude related to targeted advertising. The Elaboration Likelihood Model (ELM; Petty & Cacioppo, 1984) is a theoretical framework that explains how people process information. According to ELM, there are two routes of information processing: the central route and the peripheral route. These two separate routes differ in the amount of thoughtful processing, or elaboration. The central route is a rational process where people carefully consider the information that is presented and base their judgments on the strength of the arguments. When information is processed centrally, compelling arguments will have persuasive power, while weak arguments will be counter-argued or resisted. The peripheral route is taken when individuals do not diligently consider the pros and cons but rather use minor factors rather than the quality of the information, to form their attitude. ELM states that for people to process information in a rational manner, they must both have the ability, and the motivation to understand it. The original theory focuses primarily on text messages; we were thus interested in how this theory would apply in the context of visual cues on websites that are related to behavioral targeting. Our research question is thus looking at the relationship between users’ ability to process information (based on their computer expertise) and their online behavior.

RQ1: How is computer expertise related to consumers' online behavior?

2 Methods

We conducted 22 in-depth interviews for this study. Participants were recruited via email through existing acquaintances. Before the interview, we asked participants about their educational level, work background, college major, level of computer familiarity, and computer usage in their daily life. These preliminary questions were designed to gain some insight about their computer expertise. We applied criteria that large technology companies employ for usability tests to categorize participants into three levels of computer expertise: experts, semi-experts, and novices. Experts were those with more than 10 years of active computer and Internet usage history, who worked in a job that involved computer system administration, and have (or be pursuing) a post-secondary degree in computer science or information technology. Semi-experts were defined as users familiar with computer and Internet technology between four to ten years but did not have any experience with computer systems nor a computer science or technology-related degree. Novice users in our study were defined as users who have been using computers and the Internet between one to four years. Table 1 outlines participant demographics and computer expertise.

	Sex	Age	Computer expertise
P1	M	23	Semi Expert
P2	F	29	Semi Expert
P3	F	30	Semi Expert
P4	M	23	Expert
P5	F	22	Expert
P6	F	22	Novice
P7	M	28	Semi Expert
P8	F	20	Novice
P9	M	23	Semi Expert
P10	F	24	Semi Expert
P11	F	23	Novice
P12	F	24	Novice
P13	M	24	Expert
P14	M	23	Novice
P15	M	23	Expert
P16	F	26	Semi Expert
P17	M	27	Novice
P18	F	23	Novice
P19	F	24	Expert
P20	M	27	Expert
P21	F	24	Novice
P22	M	25	Expert

Table 1: Participant Demographics

Interviews lasted from 45 to 60 minutes. They were audio recorded and transcribed by a research assistant and double-checked for accuracy. Our participants ranged from 20 to 30 ($M= 24.38$, $S.D.= 2.51$) in age; 36% were male. Eighteen participants (80%) were Caucasian, three participants were Asian, and one person was African American.

2.1 Coding

Three researchers, including the authors, participated in the coding. The coding was an iterative process; first, an inductive approach was taken where major “themes” identified in the protocol were listed into a spreadsheet. We then took a deductive approach and identified more specific themes and patterns that emerged through the interviews and created a data matrix with participants’ quotes entered into the cells. This enabled us to see how representative the themes were across the different users. However, we were not just interested in finding commonalities, but also in unique cases. Participants were also coded by computer expertise, as outlined above and in Table 1.

3 Results

Consistent with prior studies (e.g., McDonald & Cranor, 2009), most participants generally agreed that behavioral targeting had pros and cons. (The one exception was P5, who majored in advertising and was extremely favorable towards all types of advertising.) The reason participants liked targeted ads were mostly the same: usefulness and personal relevance:

“I am part of a reward program. I made one purchase on my reward card and I start to get emails from that company months after I made the purchase. So it’s been intrusive. But I enjoy having the rewards and I think it’s a trade-off.” (P16, semi expert)

3.1 Differences between Experts and Novices

We saw distinct differences between experts and non-experts in how they processed information and their subsequent attitudes. In general, strong negative sentiments about behavioral targeting expressed by novices and semi-experts were emotional, based on fear. According to P6, a novice, “It’s very useful but kind of scary because your computer can know more about you than you even know, like tracking where you are going.” Semi-expert users were also more concerned regarding the vulnerabilities of their privacy online:

“I have viewed the Internet as a hole, where there is always someone who is watching you. I think the moment you get an IP address, you pretty much showcase aloud to the world when it comes to your personal private information.”(P16, semi expert)

“I think it’s highly unnecessary [to collect personal information] when you are accessing the advertisement and sometimes even buying from these companies... to me that seems illegal. It’s affecting your constitutional rights.” (P9, semi expert)

Experts, on the other hand, were more annoyed than threatened at the limitations of the technology. “I think most of the behavioral targeting including Google Ads is a failure because it does not match up the content and just scans key words,” said P13 (expert). Experts were also less concerned about data retention due to their understanding of how information is stored. “Information is usually deleted as space requires or in the normal course of business,” P4 said.

3.1.1 Peripheral Cues

Novices and semi-experts had a tendency to strongly rely on peripheral cues to make judgments about credibility or trustworthiness of the site. Source credibility is one of the peripheral cues that Petty and Cacciopo (1984) outline in their model and has been found in examples such as celebrity endorsements (Petty et al., 1983), symbols in recommender systems (Resnick and Varian, 1997) and corporate credibility (for overview, see Wathen & Burkell, 2001). The brand name of the website operator was certainly a criterion that many novice participants noted as being important in making judgments about the security of the site:

“I am kind of careful every time I use a credit card and that’s it. I use websites I can trust like Amazon, Publisher... I believe they have very good security. There are hackers or people who want to attack the website so they should have good security.” (P7, semi expert)

Novices were also looking at privacy “seals” to gauge the security of the websites. A few mentioned that they even went to the website offering the seals to verify the site. One woman said, “I buy stuff on Amazon.com, JC Penny.com. I trust the seal.” (P12, novice) Another novice user (P11) talked about Captcha tests as an indicator of a secure site. Although she was not familiar with the term “Captcha” she described the feature, saying that it was “nice to have something to click and type in to test if you are a real person or not.” Participants also thought that websites that looked more reliable or professional in terms of design were more credible.

However, those with high levels of computer expertise were not very convinced by seals or other peripheral cues. P13 talked about how seals do not add anything to his trust of the websites because “businesses know how to manipulate things.” Another expert user (P15) pointed out that seals were just an indicator of the website operator investing a little more money. “If you pay fifty bucks, you can get it on your website,” he said.

Sponsored links gave mixed signals in terms of credibility. Many semi-experts and novices were not able to distinguish sponsored links from unsponsored links, but among the people that did, novices perceived sponsored links as being more secure sites. The following quote illustrates a participant’s misunderstanding of what a sponsored link is:

“I am inclined more towards sponsored ads as they are more reputable in terms of security and privacy. They usually are a stronger company and are usually safe from viruses, Trojans, and malware. Unpaid ads have a chance for more viruses.” (P1, semi expert)

Experts, on the other hand, used different peripheral cues such as the “https” in the website address because they perceived this as a cue for a secure site. They also placed less importance in brands and privacy seals in comparison to novices.

Although we did not ask participants about what kind of computer they used, several participants identified themselves as Apple computer users and displayed confidence in protection from spyware. Sometimes, this led to a false perception of security among novices. Semi expert and expert users were also more familiar with anti-virus applications. They used different types of anti-virus software, were partitioning their computer to prevent viruses, and using other types of security software:

“I run two programs simultaneously. One is Active Monitor and one is an anti-virus. Active Monitor scans the computer basically and clears up the stuff.” (P3, semi expert)

3.1.2 Privacy Policies

Experts reported that they read privacy policies—not very carefully, but usually when they were using a website for the first time, they scanned through the policy for certain indicators. :

“They are so long and I don’t have thirty-five minutes to read them. So I scan them, and I want to see if anything scary pops up, like jail. If they say something like they will charge you for using the website, I won’t go on it.” (P5, expert)

Novices and semi-experts, however, rarely read privacy policies for three main reasons. The first was that users did not read privacy policies for websites that they trusted, such as Amazon, Google or Best Buy. The second reason participants avoided reading privacy policies was because of the lengthiness of the message itself, which provided a distraction from what they wanted to do. This was particularly prevalent for online shopping sites. As one participant put it, it didn’t matter what the privacy policy said because she wanted to buy the product. The third was a perceived social norm; participants were assuming that no

one else would read the privacy policy. “I think no one is gonna read that really. People don’t spent twenty minutes to read the stuff,” P6 said.

3.2 The “Uncanny Valley” Effect

An unexpected finding emerged through the interviews as participants talked about a “weird” negative feeling that they sensed when the targeted ad was getting too personal. Their comments strongly resounded with the phenomenon that takes place in the “uncanny valley” effect (Mori, 1970). This term, initially conceptualized to describe how humans feel about robots, claims that as a machine acquires greater similarity to humans, it becomes more appealing. However, when it becomes too close to the likeness of a human, people experience a strong discomfort; when a machine looks “perfectly human” the positive emotions are revived. Other than robots, the idea of the uncanny valley has been applied to other computer-generated entities such as animated characters in video games and movies (Seyama & Nagayama, 2007).

A similar phenomenon was seen in behavioral targeting whereas if the targeted ad was too obvious about tracking the participant’s behavior, they felt uncomfortable:

“If you are too aggressive in collecting information, people start seeing ads related to their geographical location, IP address, or stuff like that, it really bothers some people. They will get mad.” (P13, expert)

“If I purchased something online yesterday or very recently I will be disappointed [by the targeted ad] but if I buy something long ago and then get the ad I will be okay because if I buy it a long time ago there is a random chance that they may not have used my browsing behavior.” (P2, semi expert)

Ads that were relevant to the participant’s interests and well-targeted, but lacking in usefulness due to ill timing, were perceived as being worse than irrelevant ads. For example, several participants complained about receiving ads for products they had just bought:

“Say I have bought ten dozen boxes of Coca-Cola. Then an advertisement of Coca-Cola will be shown to me again and again, even if I don’t need to buy it.” (P3, semi expert)

However, if the advertisement was taking place in a specific purchasing environment where the system was making recommendations that perfectly aligned with the user’s interests, the targeting was no longer perceived as being “weird.” For example, P14, a novice, described how his prior searching behavior on an online bookstore led to advertisements of other related books. He compared this to the music-streaming website Pandora, which plays songs that are similar to the ones you search.

4 Conclusion

This paper provides a cognitive explanation of differing young adults’ privacy attitudes and behaviors. We found that how users process information in relation to privacy and security issues online was very different based on the level of their computer expertise. Low-expertise users relied on peripheral cues in order to make judgments about websites’ information-collecting activities.

Even among our sample, we found a considerable privacy knowledge gap between expert, semi expert and novice users. Given that our participants are in the age bracket of 20 to 30, the findings from this study may be considered as a valuable step in understanding the importance of how users’ process information in regards to their online privacy practices. Such understanding may provide useful guidelines in terms of creating policies associated with users’ personal information for business purposes.

Our interview data also suggests that major brands should work hard to maintain their credibility as not to violate expectations of the customers who have low computer expertise, who are more trusting of large brands and taking the brand name as a credibility cue. On the other hand, smaller brands may want

to incorporate as many peripheral cues as they can, such as sponsored links, security seals, user reviews, and professional-looking interfaces, especially if the target customer is anticipated to have low computer expertise.

5 References

- Jin, C., & Villegas, J. (2006). Consumer responses to advertising on the Internet: The effect of individual difference on ambivalence and avoidance. *CyberPsychology & Behavior*, *10*, 258-266.
- McDonald, A. M., & Cranor, L. F. (2009). An empirical study of how people perceive online behavioral advertising. *Privacy Enhancing Technologies Symposium*, CMU-CyLab-09-015.
- Mori, M. (1970) Bukimi no tani [the un-canny valley]. *Energy*, *7*, 33-35.
- Petty, R.E., & Cacioppo, J. T. (1984). The effects of involvement on responses to argument quantity and quality: central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*, *46*, 69-81.
- Petty, R. E., Cacioppo J. T., & Schumann, D. (1983). Central & peripheral routes to advertising effectiveness: the moderating role of involvement. *Journal of Consumer Research*, *10*, 135-46.
- Purcell, K., Brenner, J., & Rainie, L. (2012). *Search engine use 2012*. Washington, D.C.: Pew Internet
- Resnick, P., & Varian, H. L. (1997) Recommender systems. *Communications of the ACM*, *40*, 56-58.
- Seyama, J., & Nagayama, R. S. (2007). The uncanny valley: Effect of realism on the impression of artificial human faces. *Presence: Teleoperators and Virtual Environments*, *16*, 337-351.
- Wathen, C. N., & Burkell, J. (2001). Believe it or not: Factors influencing credibility on the web. *Journal of the American Society for Information Science and Technology*, *53*, 134-44.
- Yu, J., & Cude, B. (2009). ‘Hello Mrs. Sarah Jones! We recommend this product!’ Consumers’ perceptions about personalized advertising: comparisons across advertisements delivered via three different types of media. *International Journal of Consumer Studies*, *33*, 503-514.

6 Table of Tables

Table 1: Participant Demographics	578
---	-----