

THE PENNSYLVANIA STATE UNIVERSITY
SCHREYER HONORS COLLEGE

COLLEGE OF INFORMATION SCIENCES AND TECHNOLOGY

HOW TO REACH THE UNREACHABLE: WHAT ONLINE ADVERTISEMENT FORMAT
PREFERENCE INDICATES ABOUT END USERS

BRADLEY SHIVELY
Spring 2010

A thesis
submitted in partial fulfillment
of the requirements
for baccalaureate degrees
in Information Sciences and Technology and Security and Risk Analysis
with honors in Information Sciences and Technology

Reviewed and approved* by the following:

Bernard J. Jansen
Associate Professor
Thesis Supervisor

Luke Zhang
Assistant Professor
Honors Adviser

* Signatures are on file in the Schreyer Honors College.

Abstract

Search engine marketing and targeted advertising on the Internet are growing rapidly. With this growth, online advertising providers, such as Google, have introduced demographic variables such as location, time of day, and gender to assist in targeting an appropriate audience for products online. The intent of introducing these factors is to provide advertisers with greater control over what set of Internet users views their ads. This study attempts to measure a more specific metric that directly affect a potential customer's reaction to online advertising, namely the participants' respective levels of 'online suaveness', comprised of technical know-how, use of social networking Websites, and familiarity with online marketing. This research investigates these factors against the user's preferences for particular advertisement types. The results of the study indicate that viewers with a higher level of online suaveness tend to favor sites with ads that are as unobtrusive as possible. In truth, most report that they simply *do not like ads*. Banner and skyscraper ads catch the eye of users that are average in skill, but the hard-to-reach demographic of tech savvy young adults show little to no interest in these marketing techniques. However, when ads were integrated into the content of a page and manifested as a recommendation or endorsement from the author of the editorial content presented, this group indicated that they were much less perturbed by the presence of ads. The majority did not even realize they were being presented with advertising content. While it may be difficult to answer the question of exactly how to reach this demographic, it is useful to know what will not work. The results of this study clearly show that just bombarding users with large, graphic-based advertisements will not cut it. Instead, online advertisers and companies hoping to succeed with revenue streams online may need to consider different approaches to advertising in the future. The establishment of relationships with consumers, taking steps to gain long-term trust, and

offering a product that truly fulfills the desires of high skilled consumers may be the arduous road required to reach these audiences.

Table of Contents

Abstract.....	i
Table of Contents.....	iii
Introduction.....	1
Literature Review.....	3
Research Questions.....	7
Research Study.....	10
Results.....	16
Discussion.....	23
Conclusion & Future Research.....	25
References.....	26
Appendix A: Participant Introduction and Study Process.....	28
Appendix B: Advertising Survey.....	32
Academic Vita.....	33

Introduction

Online advertisers have more choices than ever before about how to engage audiences on the Web. In the current era of Web-based commerce with marketing consultants such as Seth Godin touting “permission marketing” (Godin, 2007), it has become increasingly difficult to effectively reach out to and communicate with consumers. It seems that consumers have become increasingly more adept at ignoring the messages of advertisers through a combination of technological adaptations and sheer will. Historically, online advertising efforts have been considerably less successful for a number of reasons. For example, although creativity is considered a key factor in traditional advertising mediums such as print, radio, and television, there is a notable absence of research in the area of creativity in online advertising and how it affects conversion rate of consumers (McStay, 2010).

The characteristics of a particular advertisement will directly influence whether or not a customer converts as a result of seeing the ad; this is accepted as fact both on and offline. Marketing researchers spend millions conducting focus groups, administering surveys, and trying to improve their understanding of how consumers behave both on and offline. Li (1999) discussed the notion that banner ads have been shown to raise brand awareness with viewers. For instance, size-on-screen alone accounted for 40 percent of variability in recollection of an online advertisement in one study; however, they may be less effective at producing measurable profits (Li, 1999). Experimentation with size, placement, animation, and other factors may improve the odds of a viewer recalling the product or brand being promoted, but as with traditional marketing platforms, not all ads speak to all consumers.

It is this last aspect that motivates this research. This article reports the results of a research study that investigated the relationship between an Internet user’s level of online

engagement or suaveness (referred to as technical literacy throughout) to his/her preference for a certain type of advertisement. Subjects were surveyed for technical literacy and familiarity with online advertising practices, and then asked to provide reactions and feedback on a series of advertisements formatted for the Web. The goal of this research is to examine correlations that may exist between a high or low level of technical literacy and a stated or demonstrated preference for particular ad formats.

I discuss prior work in this field of study, introduce the research design and data analysis, discuss and define technical literacy as a metric for this study, and then review the results of the study and possible implications for the business of targeted advertising on the Web. Lastly, I discuss implications this research may have and potential related areas of study for the future.

Literature Review

Pachauri (2002) reviews the birth and growth of ecommerce streams and the transformative nature of the Web as a tool for conducting business. The Internet has changed the way business is conducted, connecting vendors with consumers that would never have had the opportunity to transact business before. However, these changes have also had serious implications for businesses that existed hundreds of years before the Internet or even electricity. Bielski (2008) notes that professional marketing firms have had 150 years to learn what is effective in print, 80 years to develop sound marketing techniques for radio, 60 years of honing skills for selling products on TV, but only about 12 for marketing and conducting commerce on the Web. Moreover, broadband has existed for perhaps half that time, and is now reaching large percentages of the general population. Modern Web strategy often includes social networking, interactive Web applications, and multimedia. Companies, even old guard institutions such as banks and utility companies, have had to adapt unorthodox strategies that do not necessarily fit the character of their businesses (Bielski, 2008).

Drèze (1999) explored the notion of online advertising and the metrics generally accepted to be telling signs of efficacy. Click-through rate emerged as the de facto standard for assessing the value of online advertising shortly after its conception. However, an ad may inspire a consumer to “convert” through channels other than clicking on what is in front of her and entering her credit card information into a Website. Certain advertisements, especially in traditional mediums such as radio and television, serve to identify the consumer with the brand and product rather than inspiring an immediate transaction.

Sultan’s (2008) study on mobile marketing campaigns that targeted young consumers’ cellular phones found that “generation mobile”, today’s college and high school students, “have

been notoriously difficult for advertiser's to reach", and it is often a struggle to capture this group's attention without being perceived as intrusive (Sultan, 2008). Sultan demonstrates the current difficulty advertisers are experiencing in their efforts to expand marketing campaigns onto new mediums. It is extremely challenging to simultaneously get the attention of members of a new audience and avoid alienating potential consumers. Intrusive and unwanted ads tend to invoke ill will among audiences.

According to Taylor (2008), online banner advertisements are still the most prominent form of advertising on the Web, but companies are beginning to give other formats serious consideration. This stems from a number of factors, including plummeting click-through rates and the desire to reach other market segments than those typically exposed to the one-popular banner ad format. Taylor explored background images as a means for repetitive exposure to branding on a site (Taylor, 2008). While not one of the formats utilized in this study, it is an alternative pathway that advertisers may begin to explore more readily as banners fail to return on investments.

Advertisers have demonstrated great interest in improving their understanding of whom they are marketing to online. There are a number of scales, such as the Web Motivation Inventory (Rodgers and Sheldon 2002), used to evaluate what a viewer is trying to accomplish on the Internet. It has been difficult thus far to assess the efficacy of such diagnostic tools, but this is a growing area of research. These tools have are constantly being revised to include emerging trends and metrics (Rodgers, et al. 2007). It has also been shown that the viewer's intent when browsing a Website influences his/her perception of advertisements on the Web (Rodgers, 2002). Technical literacy is another, thus far mostly unexplored, facet of what may influence viewer perception of ads on the Internet.

One emerging issue in new forms of targeted advertising that I touch on in this study is what Milne (2009) refers to as *covert marketing*. Covert marketing is any type of advertisement, online or otherwise, where the commercial intent of the message is unclear or is portrayed as something other than a sales pitch. Milne reviewed not only the ethical implications of content-masked advertising but also the positive and negative impact such techniques have on the opinions held by users. Study respondents in Milne's research generally viewed covert marketing practices in a negative light. This could prove critical in future research surrounding the rapid growth segment of affiliate marketing, which often relies on Weblog-style sites that *resemble* a personal homepage, but they are in fact elaborately construed marketing efforts (Milne, 2009). It has also been shown that viewers have an inherent dislike for sponsored search results, despite the fact that when organic and sponsored search results are swapped on the page, users will rate the "fake" organic results as being just as relevant on average as the "real" results (Jansen & Resnick, 2006).

This synthesis of prior work helped me to understand the challenges that exist in research surrounding online advertising, and what areas have yet to be explored in great depth. As the Internet has grown, it has begun to cater to what many marketers refer to as the long tail: clusters of tiny niche communities rather than large slices of the general population. One such niche that has been notoriously difficult for marketers to reach out to is so-called "power users" on the Internet, especially younger viewers. Through improving the understanding of what tactics are most effective for targeting the Internet's most experienced users as potential consumers it may be possible to have a significant impact on the future of targeted advertising and the concept of online ads as a whole.

Specifically, we are interested how users with high technical literacy react to different types of online ads. How do these users respond to online advertising? Do these users prefer certain types of ads? Are there certain types of ads that these users do not like? These are some of the specific questions that motivate our research.

Research Questions

This study examines the relationship between an Internet user's level of technical literacy and his or her demonstrated preference for particular formats of online advertising. The assumption is that highly skilled and experienced Internet users will demonstrate prejudicial behavior towards certain online advertising formats.

RQ1: Do skilled Internet users demonstrate any pattern of preference or avoidance of particular types (formats) of online advertising based on level of technical literacy?

- **H1a:** There is a correlation between a user's level of technical literacy and that user's preferred advertising mode.

Banner advertisement click-through rates have fallen dramatically in recent years (Drèze, 1999). Online and mobile advertising are projected growth areas for advertisers. Advertisers have spent time and money on research in the area of understanding user motivations and behaviors online, partly in response to the ad firms' inability to appropriately connect with and market to audiences online. Banner advertisements will sometimes confuse or trick novice site visitors into "clicking through" and visiting an advertiser's Website through methods ranging from mimicking a simple game to intimidating a user with the possibility that his/her computers may have been compromised by a virus or spyware. However, there is a clear tradeoff here between being eye catching and irritating to users simultaneously. Advertisers have learned through studies built around viewer intent that unhelpful or unwanted ads can result in viewers developing a negative opinion of the brand intruding into their viewing experience. Advertising

research has already explored qualities such as race, gender, cultural background, and other population selectors as means of understanding Internet audiences.

Technical literacy is similar, but mostly uncharted, territory for online ad research. This study aims to investigate whether a higher average skill level among users suggests an increased likelihood of aversion to these types of invasive advertisements. For example, a more experienced internet user is significantly less likely to be “tricked” into clicking through to an advertiser’s website because he/she presumably has a better grasp of the concepts of operating system, Web browser, and Web page, and thus can tell if a prompt is coming from a legitimate source such as an installed antivirus application. The line is blurred significantly for inexperienced users, as shown in one informal study conducted by Google in 2009 (Mashable, 2009). A Google representative asked individuals in New York City’s Times Square what browser and search engine they used, with fewer than ten percent correctly making the distinction between the two in their answers. Clips of the survey being conducted and results were then released online as a piece of the marketing campaign for Google’s then-new browser, Chrome.

RQ2: What factors explain a user’s preference for an advertisement?

For RQ2, after asking participants to select the variation of an ad that they prefer the most, the study explores the motivations for this choice. If there is a bias for or against particular advertising formats, I wanted to know the user’s explanation and any relationship that may exist between preferred format and explanation for the preference. In addition to knowing what ad the

users prefer, understanding *why* they prefer it could potentially be very useful to advertisers and may field information applicable in all online advertising modes.

RQ3: If given the option, how would the user change the given page with the advertisement to better suit his/her desires?

For RQ3, participants were asked to think beyond the four diagrams shown in this research activity. Each participant was asked if there was a fifth version of this page, what should it look like? Are there any features obviously missing, or is the page perhaps too cluttered and could things be eliminated? By understanding what features a user would request, we can explore the relationship between technical literacy and utilization of site elements such as recommendation engines, customer reviews, and other inclusions that could make buying an item online easier. It would be useful to advertisers to know if placing ads on a site that had a particular feature set would more effectively target technologically savvy or technologically inexperienced users.

Research Study

To investigate my research questions, I first had to establish criteria upon which to evaluate participants' technical literacy. In this study, technical literacy (TL) refers to a measure of behaviors that contribute to a participant's level of engagement in online activities, as Internet use and behaviors are most relevant to the individual's understanding of and relationship with online advertising.

Individuals were given a survey that asked questions ranging from how often they used social networking sites such as Digg, MySpace, Facebook, Twitter, LinkedIn, and several others to what type of cellular phone they use and how often they send and receive text messages. All of these factors were then combined into a raw score for technical literacy, with certain behaviors awarding points or penalizing the TL score.

A survey of previous research concerning online advertising showed that consumers are treated as one population in most studies, or are divided based on demographic characteristics such as race, gender, or age. Furthermore, in exploring other research regarding technical literacy, it was found that the majority of these studies were severely dated. Given the explosive growth of social networking technology, as well as the transitive nature of specific site popularity, only very recent studies would yield adequate criterion for evaluating a user's current level of online engagement. For example, Facebook launched in 2004 and had nearly 27 million unique users only three years later (comScore, 2010). Twitter launched in March 2006 and three years later had nearly 8 million unique users (Compete, 2010). Therefore, it was necessary to establish new criterion upon which to assess technical literacy. Unlike previous research, this study categorizes participants by their respective levels of experience and engagement on the Internet as demonstrated through participation in online communities, use of the Internet as a

communication tool, and comfort in conducting commerce online. We pilot tested the survey with ten subjects, making minor modifications in wording and grammar. This set of behaviors should not be thought of as a rigid definition, but it is rather as a guideline that describes the majority of activity on the Internet currently. Without a doubt, this list will grow and change along with the Internet, just as prior studies that did not mention social networking often were conducted before such tools existed.

For instance, texting several times a day gave participants two raw points, whereas rarely or never texting would subtract two points from the score. A similar scoring mechanism was applied to each factor in the TL score, and these values were then totaled to yield the raw technical literacy score. This provided a simple relative scale upon which to compare study participants. Note that the scale represents a continuum that places those with little or no experience using technology and online communities at one end, and Internet-savvy participants that regularly utilize technology and interact in online communities, especially niche communities, at the other. Appendix A includes the full technical literacy survey as administered to study participants.

We needed a method of data collection that did not require technical expertise to complete this and did not exclude non-Windows users. An ideal solution was developed in the form of a Google Documents survey embedded in a simple Website. This presented a reasonable compromise between being able to efficiently collect data and also not exclude too many users due to technical challenges and skill limitations. Since online advertising is targeted almost exclusively at people who are capable of using the Internet, this seemed to be a reasonable prerequisite for this study; the only individuals that would be excluded due to technical inexperience were individuals that are not capable of using the Internet at all.

The survey site was distributed through various social networking sites such as Twitter and Facebook, as well as targeted directly at college students through communications by professors. Students received a message requesting that they complete the survey, which takes approximately 10 to 15 minutes per participant, and normally requires no direct guidance or assistance. Participants were provided with a contact e-mail on the Website where they could submit procedural questions if necessary.

Data was collected from 40 participants ranging in age from 18 to 40 with various levels of technical expertise. Participants were asked to state their area of study if currently enrolled in a university. Above the survey portion of the page users were presented with links to four diagrams. These diagrams were counterbalanced to prevent any learning effect that may have resulted from every participant viewing the diagrams in a particular order, with about 25% of the participants each receiving a different ordering. Participants were asked to view each diagram separately and give their impressions, and then to make some comparisons and recommendations based on the complete set. See Appendix B for a complete listing of the questions. Together, the survey and diagram questions represent the entire body of data collected for analysis. Survey results were distilled into technical literacy scores and open-ended questions were broken into trend-based categories such as design, social, product, or vendor related using open coding.

http://bradleyjshively.com/thesis/form.php

FORM VERSION: C

This is approved research and taking the survey is agreeing to the informed consent. [Click here](#) to view the full informed consent.

This is a study regarding internet use. There are a few short sections to this study, and it should not take much of your time (approximately 10-15 minutes.) All data is being collected anonymously, and will be aggregated for analysis in combination with other participants' input. If you have any questions or concerns about participation, please don't hesitate to contact me at bshively@gmail.com.

Please note your form version, printed above in red. To begin, complete the internet use survey below. Following the survey are a series of questions that refer to diagrams. There are links to each of the diagrams directly above the survey. Please answer questions in the order they are presented.

[Diagram 1](#)

[Diagram 2](#)

[Diagram 3](#)

[Diagram 4](#)

Diagram 4 *
 Given that you are looking to purchase a digital camera, please read over the website pictured in the diagram and record your general impressions of it and any feedback.

Overall *
 Overall, what version of the site do you prefer the most?

☐ 1

☐ 2

☐ 3

☐ 4

☐ No preference

Why *
 Is there any clear/definite reason that you prefer this choice over the others? If so, what is it?

Figure I: Participant Survey Website

The four diagrams demonstrate four different styles of online advertising. Each is a variation of the same digital camera review Website, outfitted with a different advertisement format. The four variations shown to users were graphical banner ads, graphical “skyscraper” (vertical banner) ads, Google text ads, and content-embedded affiliate ads (recommendation from the review site as a part of the review).

Banner ads are typically displayed at the top or bottom of a Webpage in the form of a wide, short image. Sometimes these will feature animations or even game-like interfaces (i.e.

“Punch the monkey, win a prize!”) or other interactive elements to encourage a viewer to click on the ad, resulting in a visit to the advertiser’s Website.

Skyscraper advertisements are the same as banner ads, except they are narrow and tall, making them ideal for placement on the left or right side of a page rather than the top or bottom.

Google text ads are powered by the Google AdWords service. This service scans the page for keywords to get a sense of the page topic, and then automatically displays an ad that it considers to be relevant to the rest of the page. For instance, an electronics review site might display a Google text ad for an online electronics retailer.

The last type of ad used in this study is the content-embedded endorsement. These blur the line between advertisements and actual content and are often utilized on affiliate marketing Websites. This type of ad is employed when a Website makes an editorial-integrated recommendation to use a particular product or service, such as an online review site placing a link in a review article to the product’s Amazon.com purchase page.

Content-Integrated Ad

SONY DSC-T300 Cyber-shot

Sony Cyber-shot T300 Concise Review, March 2008, Richard Butler

Review based on a production Sony Cyber-shot DSC-T300

The Cyber-shot DSC-T300 is the second generation of touch-screen ultra compacts from electronics colossus Sony. Because it is built around a very small 1/2.3" sensor, Sony has been able to cram a 5x zoom into the slimline body without it ever having occasion to protrude. It's also packed full of the latest special modes and functions, including Smile Shutter, that only takes a photo once your subject is smiling. The real standout feature of this camera is the huge, 16:9 aspect ratio touch screen that covers the entire reverse of the body. So in this beginning of the revolution that will free us from the hegemony of the four-way controller, or is there a good reason that most cameras are covered in buttons?

Click here to order digital cameras and more from BH.com. BH is ranked #1 in consumer excellence and is the professional's source for digital camera equipment. This one is a 5 star rated trust site.

Before getting on to that question, let's start with the headline features:

- 15.1 Megapixels and 5x zoom
- Super Steady Shot image stabilization
- Dynamic range optimization
- 3.5" touch-screen control system

Key differences compared to T200

In a shooting sequence of events, the biggest difference between the T300 and its predecessor is that the new model is built around a more pixel-dense sensor. The lens range also changes, with the wide end getting a tiny bit wider (though we're not about to hold a street party for a 33mm wide angle camera). This is a side-effect of adding a large, 1/2.3" sensor in the same position as the old 1/2.3" one.

	Street price	15.1 Megapixels and 5x zoom
Sensor	15.1 Megapixels and 5x zoom	15.1 Megapixels and 5x zoom

Google Text Ad

SONY DSC-T300 Cyber-shot

Sony Cyber-shot T300 Concise Review, March 2008, Richard Butler

Review based on a production Sony Cyber-shot DSC-T300

The Cyber-shot DSC-T300 is the second generation of touch-screen ultra compacts from electronics colossus Sony. Because it is built around a very small 1/2.3" sensor, Sony has been able to cram a 5x zoom into the slimline body without it ever having occasion to protrude. It's also packed full of the latest special modes and functions, including Smile Shutter, that only takes a photo once your subject is smiling. The real standout feature of this camera is the huge, 16:9 aspect ratio touch screen that covers the entire reverse of the body. So in this beginning of the revolution that will free us from the hegemony of the four-way controller, or is there a good reason that most cameras are covered in buttons?

Click here to order digital cameras and more from BH.com. BH is ranked #1 in consumer excellence and is the professional's source for digital camera equipment. This one is a 5 star rated trust site.

Before getting on to that question, let's start with the headline features:

- 15.1 Megapixels and 5x zoom
- Super Steady Shot image stabilization
- Dynamic range optimization
- 3.5" touch-screen control system

Key differences compared to T200

In a shooting sequence of events, the biggest difference between the T300 and its predecessor is that the new model is built around a more pixel-dense sensor. The lens range also changes, with the wide end getting a tiny bit wider (though we're not about to hold a street party for a 33mm wide angle camera). This is a side-effect of adding a large, 1/2.3" sensor in the same position as the old 1/2.3" one.

Cyber-shot DSC-T300 specifications

	Street price	15.1 Megapixels and 5x zoom
Sensor	15.1 Megapixels and 5x zoom	15.1 Megapixels and 5x zoom

Banner Ad

SONY DSC-T300 Cyber-shot

Sony Cyber-shot T300 Concise Review, March 2008, Richard Butler

Review based on a production Sony Cyber-shot DSC-T300

The Cyber-shot DSC-T300 is the second generation of touch-screen ultra compacts from electronics colossus Sony. Because it is built around a very small 1/2.3" sensor, Sony has been able to cram a 5x zoom into the slimline body without it ever having occasion to protrude. It's also packed full of the latest special modes and functions, including Smile Shutter, that only takes a photo once your subject is smiling. The real standout feature of this camera is the huge, 16:9 aspect ratio touch screen that covers the entire reverse of the body. So in this beginning of the revolution that will free us from the hegemony of the four-way controller, or is there a good reason that most cameras are covered in buttons?

Click here to order digital cameras and more from BH.com. BH is ranked #1 in consumer excellence and is the professional's source for digital camera equipment. This one is a 5 star rated trust site.

Before getting on to that question, let's start with the headline features:

- 15.1 Megapixels and 5x zoom
- Super Steady Shot image stabilization
- Dynamic range optimization
- 3.5" touch-screen control system

Key differences compared to T200

In a shooting sequence of events, the biggest difference between the T300 and its predecessor is that the new model is built around a more pixel-dense sensor. The lens range also changes, with the wide end getting a tiny bit wider (though we're not about to hold a street party for a 33mm wide angle camera). This is a side-effect of adding a large, 1/2.3" sensor in the same position as the old 1/2.3" one.

Cyber-shot DSC-T300 specifications

	Street price	15.1 Megapixels and 5x zoom
Sensor	15.1 Megapixels and 5x zoom	15.1 Megapixels and 5x zoom

Skyscraper Ad

SONY DSC-T300 Cyber-shot

Sony Cyber-shot T300 Concise Review, March 2008, Richard Butler

Review based on a production Sony Cyber-shot DSC-T300

The Cyber-shot DSC-T300 is the second generation of touch-screen ultra compacts from electronics colossus Sony. Because it is built around a very small 1/2.3" sensor, Sony has been able to cram a 5x zoom into the slimline body without it ever having occasion to protrude. It's also packed full of the latest special modes and functions, including Smile Shutter, that only takes a photo once your subject is smiling. The real standout feature of this camera is the huge, 16:9 aspect ratio touch screen that covers the entire reverse of the body. So in this beginning of the revolution that will free us from the hegemony of the four-way controller, or is there a good reason that most cameras are covered in buttons?

Click here to order digital cameras and more from BH.com. BH is ranked #1 in consumer excellence and is the professional's source for digital camera equipment. This one is a 5 star rated trust site.

Before getting on to that question, let's start with the headline features:

- 15.1 Megapixels and 5x zoom
- Super Steady Shot image stabilization
- Dynamic range optimization
- 3.5" touch-screen control system

Key differences compared to T200

In a shooting sequence of events, the biggest difference between the T300 and its predecessor is that the new model is built around a more pixel-dense sensor. The lens range also changes, with the wide end getting a tiny bit wider (though we're not about to hold a street party for a 33mm wide angle camera). This is a side-effect of adding a large, 1/2.3" sensor in the same position as the old 1/2.3" one.

Cyber-shot DSC-T300 specifications

	Street price	15.1 Megapixels and 5x zoom
Sensor	15.1 Megapixels and 5x zoom	15.1 Megapixels and 5x zoom

Figure II: Advertisement Type Diagrams

Results

A general description of the data collected from all respondents is as follows:

Number of Participants	40
Average Age (in years)	24.28
Average Technical Literacy Raw Score (in points)	34.30
Participants Studying Information Technology-Related Subject Matter	13

Table I: Participant Data Overview

It is worth noting that there seemed to be very little correlation between participant age and technical literacy raw score, as shown in Figure III. The oldest and youngest participants fell near the middle of the results. The majority of respondents were in the 20 to 25 range.

The objective of the study was to evaluate any existing correlations between technical literacy and online advertising format preference. I expected that the contextual, content-integrated advertisements (such as a recommendation from a reviewer) would be favored by participants with a higher average raw score on the technical literacy survey. I also expected that the average score of those that favored graphical banner and skyscraper format advertisements would tend to be lower. The results of Q1 were mixed.

RQ1: Do skilled Internet users demonstrate any clear pattern of preference or avoidance of particular types (formats) of online advertising?

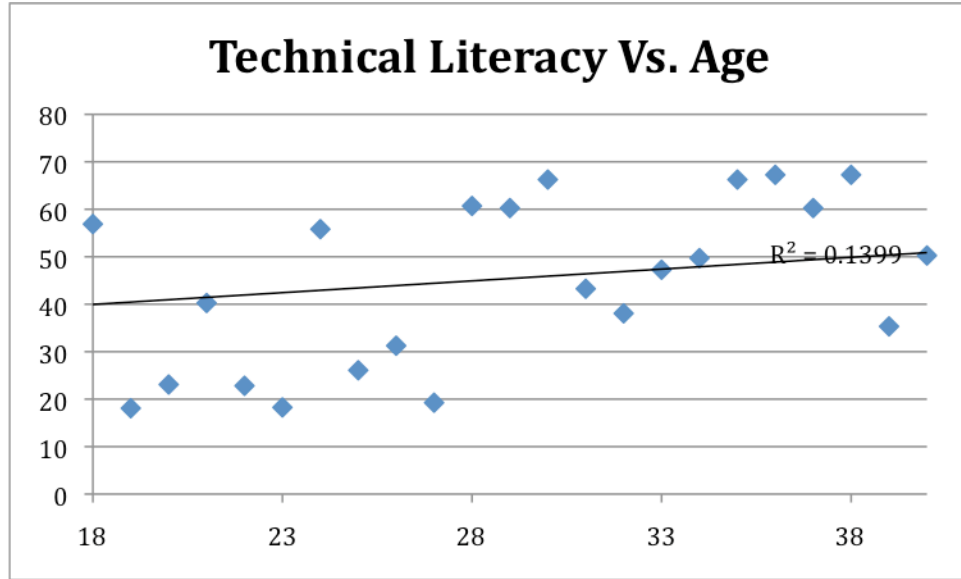


Figure III: Technical Literacy vs. Age Plot

H1a: *There is a correlation between a user's level of technical literacy and that user's preferred advertising mode.* In order to evaluate H1a, I performed a statistical evaluation to determine if there is a difference of means (relevancy means) in technical literacy score among those that preferred each of the four types of advertising shown to participants, as well as those that stated they had no preference. I used a one-way ANOVA, statistical analysis to compare means and variance between the groups. The ANOVA analysis tests the null hypothesis that group means do or do not differ.

Participants were asked to select their preferred diagram after viewing all four variations of the site shown in Figure II. The following table summarizes the selections made.

Selection	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum	% Of Total
Banner	7	39.12	7.04	2.66	32.04	50.70	17.50
Content	19	43.32	12.32	2.83	22.26	71.07	47.50
No Preference	7	29.61	14.04	5.31	18.09	56.89	17.50
Skyscraper	4	34.29	17.20	8.60	18.26	55.82	10.00
Google Text Ad	3	25.54	6.02	3.48	19.26	31.26	7.50

Table II: ANOVA Descriptives for Hypothesis 1a

The results indicate that there is a significant difference among the mean technical literacy score of groupings based upon stated ad mode preference. ($F(4) = 2.66$, $p < .05$; the

critical value of $F = 2.65$). The results of Fisher's test for multiple comparisons indicate that there are significant differences in technical literacy amongst the group means based on advertising mode preference. Those that preferred banner ads fell in the middle of the pack, with a confidence interval that overlaps both the lower and higher scoring groups. Those that preferred the content-integrated advertisements tended to score higher than both those that stated a preference for the Google text ad and those that had no preference based on ad type. The relatively low F value suggests that there are likely extraneous factors that I have failed to take into account in this initial study. Refining the metrics used here is a definite opportunity for future research.

It is also worth noting the breakdown of percentages that preferred particular ad formats. Very few users (just three) stated a preference for the Google text advertising mode. My suspicion is that this relates to the trend shown by online behavioral studies; viewers find advertising to be annoying unless they are already in "buying mode." The majority group of participants in this study preferred the content-integrated ad, but as is explained in the following section, this was largely due to a misconception that the page they were viewing contained no advertisements. A few participants *did* notice, and mention, that the content-based ad was present, including such remarks as the feeling that it "reduces the site's credibility." In general those that remarked on the presence of the content-integrated ad did so in a negative light. These comments support Milne's (2009) research on covert marketing and the way users respond to it.

RQ2: What factors explain a user's preference for an advertisement?

Reason	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Credibility	3	33.11	12.00	6.93	19.26	40.26
Design	7	34.12	14.13	5.34	18.26	55.82
No Answer Given	6	25.07	7.93	3.24	18.09	40.26
Endorsement	1	34.09	N/A	N/A	34.09	34.09
Familiar	2	35.93	5.50	3.89	32.04	39.82
No Ads	15	45.22	12.47	3.22	22.26	71.07
Uncluttered	6	40.86	11.76	4.80	28.07	57.26

Table III: ANOVA Descriptives for Reason Ad is Preferred

After selecting their preferred advertising format, participants were asked to explain their decisions. This data, shown in Table III, provided some interesting insights. First, examining only those that preferred the content integrated advertisement yields a greater understanding of the perception of the participants. Of the 19 that stated a preference for this ad type, 15 stated the reason for their preference was a complete lack of advertisements on the page. This suggests that the participants do not necessarily “prefer” this type of ad, but rather they may simply dislike advertisements in general and did not recognize the presence of an ad at all. This is an interesting, and perhaps troubling, insight into how users view a page. Possible explanations include page “skimming”, user inability to differentiate between a legitimate recommendation and an advertisement, or other factors not considered within this study.

There were also some interesting anomalies in the responses. For example, at least one participant stated that they felt placing the advertisement in the content of the page was deceptive and dishonest to viewers as aforementioned. This raises an ethical question surrounding the pay-for-post business model that some blogs operate under, in which a product or service provider pays a blogger or furnishes them with a review unit on the condition of receiving a positive editorial. There are many different business models built around affiliate marketing. They range in complexity from a simple recommendation to buy a product at Amazon in an independent review with the purchase returning a small percentage to the author up to multitier organizations

that specialize in generating compelling marketing content that converts viewers. Meanwhile, a small number of respondents indicated that the presence of advertisements at all made the site “feel more legitimate” for stated reasons such as a verifiable revenue stream and the familiarity of a banner or skyscraper ad as an element on the page. This could perhaps be likened to the scamming technique known as phishing; the page looks similar enough to a trusted site for a participant to transfer that trust to a previously unknown page. One respondent indicated that having the author of the review recommend the site within the editorial content made this advertiser seem more legitimate. Obviously, there is some subjectivity to this area of study. Further research may need to be conducted to truly discover the predictors of whether a user will find a content-integrated ad to increase confidence in the advertiser or reduce confidence in the content provider due to mistrust.

Regardless of the motivation, it is clear that those who scored higher on the technical literacy survey (presumably those with more experience using the Internet on a regular basis) have a strong preference for Websites that do not prominently feature advertising. The average raw score of those that stated their reason for liking the diagram was a lack of advertising was 45.22. Of the various subpopulations that can be extracted from this data, this group yields one of the highest average raw scores. One of the only subpopulations to yield a higher average raw score during my analysis was found when breaking the data down by operating system. The three self-professed Linux users produced an average raw score of 56.02: almost fifty percent greater than the 41.20 average of the complete sample. One of these three was the highest scoring overall participant, and included in his open ended responses that “there is no situation where [he] would research a camera and then click on the advertisements provided in order to purchase it.” Comparatively, individuals that gave reasons such as design or familiarity for selecting a

particular diagram as their preferred option tended to score lower. From this advertisers might deduce that when targeting non-technical consumers on the Web, it may be worthwhile to place especial emphasis on the “design” (color, layout, font, and other elements) and “familiarity” (similarity between product page and other pages popular with the intended audience) of a site and its ads. It seems clear that the best way to target the more technically inclined population is not to have ads at all. Barring this mostly impractical approach, perhaps concealing the ads through endorsements, promotional codes, and similar online marketing tactics is the best way to reach these users.

However, the above analysis is cursory and based only on group means. A statistical analysis using ANOVA was also conducted. The results indicate that there is a statistically significant difference among the mean technical literacy score of groupings based upon stated reason for ad mode preference. ($F(6) = 2.41$, $p < .05$; the critical value of $F = 2.39$). Again, a low F value suggests outside factors not accounted for in this study.

Upon further analysis using Fisher’s test to conduct multiple comparisons select groups were found to demonstrate statistically significant differences from one another. Those who indicated the reason they preferred a particular version was the lack of any advertisements tended to score higher than those that stated they liked the design of the page. Those that failed to provide reasoning for their preference tended to score lower than both the group that stated the lack of ads was preferential and the group that said their choice made the page look less cluttered. Other groups did have trends, but they seemed to be at best marginally significant. This may be explained by some factors outside the scope of this study or a need to refine the diagnostic instruments developed for this study.

RQ3: If given the option, how would the user change the given page to better suit his/her desires?

Participants were asked to think back to the four site diagrams they had been shown, and recommend improvements to the site. The types of features recommended were then analyzed for a relationship with technical literacy. Table IV below features the descriptives of this data. Here our results indicate a significant relationship between the participants' suggestion for site improvement and group mean technical literacy. ($F(4) = 3.70$, $p < .011$; the critical value of $F = 2.64$).

Recommendation	N	Mean	Std. Deviation	Std. Error	Minimum	Maximum
Design	7	31.38	11.45	4.33	18.26	50.26
None Given	18	36.61	10.72	2.53	19.58	56.26
Product Related	2	21.08	4.23	2.99	18.09	24.07
Social Feature	6	50.76	9.41	3.84	37.60	57.26
Vendor Related	7	41.82	16.01	6.05	22.26	71.07

Table IV: ANOVA Descriptives for Site Recommendation

Multiple comparisons were then conducted using Fisher's test. Participants that said the four versions given were adequate and made no further recommendation tended to score lower than those requesting social features such as recommendation engines or customer reviews of products and those making vendor-specific remarks ("I only buy from Amazon", etc.) Those that commented specifically on the product they were being shown (i.e. "I prefer Nikon over Sony") scored lower than both social and vendor related recommenders. It's interesting to note that those who focused on the product they were being shown rather than the site as a whole tended to score lower than those who were able to look at the site in more abstract terms and consider feature sets beyond what was being displayed. Higher scorers also seemed more apt to recommend features with a specific basis or compare the pages shown to popular ecommerce sites such as Amazon.com.

Discussion

My results show that, statistically, there are differences in the level of technical literacy displayed by groups of users that preferred particular types of advertising modes on the Internet based on technical literacy survey results and the feedback provided by participants in this study. This supports my suspicions before conducting the study, as more traditional means of advertising online have grown progressively less effective (Drèze, 1999). Ad agencies have already begun to explore alternative options, hoping to increase interactivity and reach previously unreachable consumer segments. This is demonstrated in the explosive growth in advertising strategy built around cellular phones that is popular in Asia and now starting to appear more frequently within the United States (Sultan & Rohm, 2008).

While the diagnostic instruments in this study may require further honing to assist researchers in truly understanding the trends among users, some obvious points did emerge from the analysis conducted. The more experience participants had on the internet, the more they tended to dislike seeing advertisements and request the inclusion of social-based or crowd-sourced features such as recommendation engines, “Customer’s who bought this also bought...” dialogues, buyer-submitted reviews, and similar Web 2.0 features. It therefore seems that the best way to reach out to these demographics is perhaps to either not include advertising at all, which is an impractical approach

Participants in general reacted negatively to advertising. However, less experienced users seemed to be less discerning, or at the very least more open minded, about the advertisements a Website displays. Meanwhile, the more knowledgeable users indicated that they were annoyed by the very presence of ads, and covert marketing seemed to be more effective as it often went undetected. There were a number of reasons participants gave for liking or disliking a site, but

most of these groupings had similar levels of technical literacy. This may mean that advertisers will have to take a fundamentally different approach to the way they behave online in order to continue generating high levels of revenue in the future. As click-through and conversion rates fall, the customers of the advertising companies will begin to reduce ad budgets when the return on investment drops sufficiently. It is therefore important to adapt to the changing market; consumers are becoming more aware of, and thus less interested in, advertisements online.

Based on the suggestions participants made to improve the site, inclusion of social features such as recommendation engines seem to be popular. Perhaps an advertising tie-in with these elements of the page would yield a more positive response to advertising on the page. One option might be a panel of ads that “feel” like recommendations but actually link to an affiliate site that sells the products in question. It also seems that content-integrated endorsements don’t necessarily catch the attention of consumers as readily, but they also may be detected and result in ill will towards the Website’s authors. Covert marketing may be effective, but is also frowned upon, by the end user. All of these factors will have to be balanced against one another in the future to truly construct an effective online marketing strategy that ensures longevity.

Conclusion & Future Research

Internet advertising is a key to the business models of many of today's most profitable and well-known companies. It seems clear that, in the future, companies will need to be more thoughtful about the way in which they engage customers and attempt to establish personal and commercial relationships. While it may be difficult to determine a consumer's level of technical skill based solely on whether or not they respond to a particular marketing technique, it is still essential to understand the likes and dislikes of different online populations in order to avoid alienating potential buyers. We found in this study that there were marginal statistical differences in technical skill levels of populations that preferred particular advertisement types and those participants justified these preferences using a variety of explanations. Perhaps more interesting, and revealing, was how easily many participants were lulled into believing "there is no ad." This bodes well for the continued growth of affiliate marketing.

Future research may be needed to further assess the criterion for a technical literacy metric or examine this concept in terms of dimension beyond the reach of this study. It may prove useful to conduct analysis of how the technology savvy consumers focused on in this study conduct themselves in relation to more traditional means of marketing. Affiliate marketing is an emerging trend that is extremely controversial and has strong ties to this study. An assessment of the efficacy of different types of covert marketing on a general population, as well as when examining technical literacy as a predictor of a consumer's relationship to advertising would be very informative. In summary, as content providers and marketers use more demographic information to deliver customized content, researchers will need to similarly conduct studies that account for unique subpopulations of users selected on less traditional guidelines than in the past.

References

- Bielski, Lauren. "The art and science of Web marketing." *ABA Banking Journal* 100.9 (2008): 40-42. 2010.
- Drèze, Xavier and Francois-Xavier Hussherr (1999), "Internet Advertising: Is Anybody Watching?," Working Paper, Department of Marketing, Marshall School of Business, University of Southern California.
- "Facebook Sees Flood Of New Traffic From Teenagers And Adults - comScore, Inc." *comScore, Inc.*. N.p., n.d. Web. 10 Apr. 2010.
<http://www.comscore.com/Press_Events/Press_Releases/2007/07/Teenagers_and_Adults_Flood_Facebook>.
- Godin, Seth. *Permission Marketing: Turning Strangers into Friends and Friends into Customers*. New York: Pocket Books, 2007.
- "Google Asks Common Man , "What is a Browser?" Common Man Has No Clue [Video]." *Social Media News and Web Tips | Mashable - The Social Media Guide*.
<<http://mashable.com/2009/06/19/google-chrome-browser-video/>>.
- Jansen, B. J. and Resnick, M. 2006. *An examination of searcher's perceptions of non-sponsored and sponsored links during ecommerce Web searching. Journal of the American Society for Information Science and Technology*. 57(14), 1949-1961.
- Milne, George R., Andrew Rohm, and Shalini Bahl. "If It's Legal, Is It Acceptable?." *Journal of Advertising* 38.4 (2009): 107-122.
- Li, Hairong, and Janice L. Bukovac. "Cognitive impact of banner ad characteristics: An experimental study." *Journalism and Mass Communication Quarterly* 76.2 (1999): 341-353.

- McStay, Andrew. "A Qualitative Approach to Understanding Audience's Perceptions of Creativity in Online Advertising." *The Qualitative Report* 15.1 (2010): 37-58.
- Pachauri, M. (2002). Researching online consumer behaviour: Current positions and future perspectives. *Journal of Customer Behaviour*, 1(2), 269–300.
- Rodgers, Shelly, Qimei Chen, Ye Wang, and Ruth Rettie. "The Web Motivation Inventory." *International Journal of Advertising* 26.4 (2007): 447-475.
- Rodgers, Shelly and Kennon M. Sheldon (2002), "An Improved Way to Characterize Internet Users," *Journal of Advertising Research*, 42 (5), 85-94.
- Rodgers, Shelly. "The interactive advertising model tested: the role of motives in ad processing." *Journal of Interactive Advertising* 2.2 (2002).
- "Site Profile for twitter.com (rank #42) | Compete." *Compete*. N.p., n.d. Web. 10 Apr. 2010. <<http://siteanalytics.compete.com/twitter.com/?metric=uv>>.
- Sultan, Fareena, and Andrew J. Rohm. "How to Market to Generation M(obile)." *MIT Sloan Management Review* 49.4 (2008): 35-41.
- Taylor, Nolan J., Eleanor T. Loiacono, and Richard T. Watson. "Alternative Scenarios to The "Banner" Years." *Communications of the ACM* 51.2 (2008): 53-58.

Appendix A: Participant Introduction and Study Process

Study participants were recruited through Facebook, Twitter, word-of-mouth, and requests forwarded by professors to students from various academic units throughout Penn State. Students were provided with a Website address. At this site, students were presented with the following:

FORM VERSION: (A, B, C, or D) [randomly generated by a simple script]

This is approved research and taking the survey is agreeing to the informed consent. Click here to view the full informed consent. [A link to the informed consent document was provided.]

This is a study regarding Internet use. There are a few short sections to this study, and it should not take much of your time (approximately 10-15 minutes.) All data is being collected anonymously, and will be aggregated for analysis in combination with other participants' input. If you have any questions or concerns about participation, please don't hesitate to contact me at bshively@gmail.com

Please note your form version, printed above in red. To begin, complete the Internet use survey below. Following the survey is a series of questions that refer to diagrams. There are links to each of the diagrams directly above the survey. Please answer questions in the order they are presented. [Users are given a list of 4 hyperlinks, ordered by the same script that selects the form version. The order of the links and the form version are coordinated. This is to prevent a learning effect that would occur if all students saw a particular advertisement type first.]

The following is the user survey completed by each participant:

Survey

Directions: Answer each of the following questions to the best of your ability. PLEASE do not guess, as it may result in inaccuracies in our study. Answering "I don't know/I'm not sure" is not a bad thing, and should be done if you're unsure of the answer.

* Required

Form Version * Please CAREFULLY select your form version. It is printed in red at the top of the page with diagram links.

- A
- B
- C
- D

Gender * Please select your gender

- Male
- Female
- Transgender
- I prefer not to say
- Other:

Age * Please enter your age as a two digit number, such as 18

Area of Study * If you are a student, what is your major? If you aren't a student, please answer "NA"

Operating System * What operating system do you use primarily?

- Google
- Windows Vista
- Bing
- Yahoo
- Linux
- Internet Explorer
- Windows 7
- Firefox
- Opera
- Windows XP
- Safari
- Apple OS X
- I don't know / I'm not sure
- Other:

Web Browser * What Web browser do you use primarily?

- Internet Explorer
- Bing
- Safari
- Google
- Apple OS X
- Yahoo
- Windows XP
- Opera
- Windows Vista
- FireFox
- Windows 7
- Linux
- Chrome
- I don't know / I'm not sure
- Other:

Search Engine * What search engine do you use primarily?

- Internet Explorer
- Bing
- Safari
- Google
- Apple OS X
- Yahoo
- Windows XP
- Opera
- Windows Vista
- FireFox
- Windows 7
- Chrome
- I don't know / I'm not sure
- Other:

Number of Web Browsers * How many Web browsers are on your computer?

- 1
- 2
- 3
- 4 or more
- I don't know / I'm not sure

Pop-up Blocker * Do you currently use a pop-up blocker when surfing the Web?

- Yes, it's built into my browser
- Yes, I installed one
- No, I don't use one

- I don't know / I'm not sure

Google AdWords * Please rate your familiarity with Google AdWords

- I have never heard of Google AdWords.
- I have heard of Google AdWords, but am unfamiliar with it
- I have a basic understanding of what Google Adwords is and how it works
- I am somewhat experienced with Google Adwords account usage
- I am a Google AdWords expert.
- I don't know / I'm not sure

Purchasing Goods Online * Please rate how frequently you make purchases online

- Never
- Almost Never (1-5 times a year)
- Sometimes (6-10 times a year)
- Often (1-3 times a month)
- Very Often (1-2 times a week)

Price * Select the lowest price range that you consider to be expensive (i.e. an amount of money you wouldn't spend on impulse).

- \$0-\$10
- \$11-\$50
- \$51-\$100
- \$101-\$200
- \$201-\$300
- \$301-\$500
- \$501 or above

PayPal * Please select the option that describes your usage.

- Rarely/Almost never use
- Once a month
- Once a week
- A few times a week
- Once a day
- A few times a day
- I don't use it
- I don't know / I'm not sure

Computer Programming * Please rate your skill in computer programming

- I have never written a program/ I do not know any programming languages
- I have at least basic familiarity with one or more programming languages
- I am proficient in one or more programming languages
- I am an experienced programmer and have completed several complex programming projects
- I consider myself to be an expert programmer, with several years of experience
- I don't know/I'm not sure

Cell Phone * Please select the item that best describes your cell phone usage/ownership

- I own an iPhone
- I own a Blackberry
- I own an Android-based phone
- I own a Windows mobile-based phone
- I own some other type of smartphone
- I own a cell phone, but not a smart phone
- I don't own a cell phone
- I own a cell phone, but I don't know/I'm not sure what kind it is

Text Messaging * How often do you send and receive text messages?

- Several times a day
- At least once a day
- A few times a week
- At least once a week
- Rarely/Almost never
- Never
- I don't know / I'm not sure

E-mail * How often do you check your e-mail?

- Several times a day
- At least one a day
- A few times a week
- At least once a week
- At least once a month
- A few times a year
- When someone tells me they e-mailed me something, never otherwise
- I don't have an e-mail account
- I don't know / I'm not sure

Facebook * Please select the option that describes your usage.

- I don't have an account
- Rarely/Almost never use
- Once a month
- Once a week
- A few times a week
- Once a day
- A few times a day
- I don't know / I'm not sure

Twitter * Please select the option that describes your usage.

LinkedIn * Please select the option that describes your usage.

MySpace * Please select the option that describes your usage.

•

YouTube * Please select the option that describes your usage.

- Rarely/Almost never use
- Once a month
- Once a week
- A few times a week
- Once a day
- A few times a day
- I don't use it
- I don't know / I'm not sure

Digg * Please select the option that describes your usage.

•

Yelp * Please select the option that describes your usage.

Reddit * Please select the option that describes your usage.

Skype * Please select the option that describes your usage.

•

Instant Messaging * Please select the option that describes your usage.

Television Viewing * Where do you typically get/watch TV shows?

- On TV at original air time
- On a DVR (Such as TiVo or Comcast OnDemand)
- On Hulu
- On iTunes (I download my content)
- Netflix (via mail)
- Netflix (via Webstream)
- BitTorrent
- Other:

Appendix B: Advertising Survey

Section 2

Please refer to form diagrams for the following section. Assume you're looking to purchase a digital camera for a family member. During your search, you came to the following Website. Assume that the site you're viewing is a familiar/trusted site, and therefore you believe the site and its advertisers to be reputable companies in general. That is, you would be comfortable making a transaction online with this Website and any associated sites.

Diagram 1 * Given that you are looking to purchase a digital camera, please read over the Website pictured in the diagram and record your general impressions of it and any feedback.

Diagram 2 * Given that you are looking to purchase a digital camera, please read over the Website pictured in the diagram and record your general impressions of it and any feedback.

Diagram 3 * Given that you are looking to purchase a digital camera, please read over the Website pictured in the diagram and record your general impressions of it and any feedback.

Diagram 4 * Given that you are looking to purchase a digital camera, please read over the Website pictured in the diagram and record your general impressions of it and any feedback.

Overall * Overall, what version of the site do you prefer the most?

- 1
- 2
- 3
- 4
- No preference

Why * Is there any clear/definite reason that you prefer this choice over the others? If so, what is it?

Purchasing * Of the four versions, which is the most likely to get you to visit the advertisers' Website and make a purchase? Why?

Another version * Do you wish there was a 5th version, different from what you have been shown? What would you change or what should it contain, and why?

Academic Vita

BRADLEY J. SHIVELY JR.

(724) 513-8070 ♦ 326 Ridge Ave. ♦ State College, PA 16803 ♦ bradley@psu.edu

EDUCATION

Pennsylvania State University, University Park, PA
BS in Information Sciences and Technology
BS in Security and Risk Analysis
Schreyer Honors College

Expected Graduation: May 2010
Focus: Systems Design & Development
Focus: Information & Cyber Security

Thesis: How to Reach the Unreachable: What Online Advertisement Format Preference Indicates About End Users

Freedom Area High School, Freedom, PA
Class of 2006 Valedictorian

Graduated June 2006

EXPERIENCE

Business Technology Analyst Summer Scholar

Deloitte Consulting, Pittsburgh, PA

Summer 2009

- Led Interactive Voice Response (IVR) focus group with government assistance clients at Michigan DHS office
- Designed reporting flows for Voice Application Reporting (VAR) in IVR system
- Served as a liaison between a team of 5 developers and over 20 testers to facilitate testing and issue resolution
- Created work and development requests, promoted code, and validated test notes for accuracy/resolution
- Managed the creation, validation, testing, and passage of both QAT and UAT IVR system tests; facilitated testing

IST2U Media Director

College of IST at Penn State, University Park, PA

September 2008 – May 2009

- Administered and updated a Drupal-based Website utilized by over 450 unique visitors monthly
- Developed alternative marketing campaigns, such as the use of Twitter and Facebook for promotion
- Tracked and assessed bounce rate, pageviews, and other metrics through Google Analytics toolset
- Increased traffic by over 120% through redesign, relaunch, and aggressive marketing on various mediums

Information Services Division Intern

University of Pittsburgh Medical Center, Pittsburgh, PA

Summer 2008

- Audited Third Party Liability files demonstrating less than 1% variance between UPMC and state datasets
- Developed a C# application to extract fields from an Oracle database and output to pipe-delimited files
- Automated business processes using Visual Basic for Applications in Excel and Access (ver 2003/2007)
- Composed business rules for use by non-technical users based on source code of a complex C# program

Technology and Processing Services Intern

PNC Financial Services Group, Pittsburgh, PA

Summer 2007

- Evaluated vendor network access control (NAC) offerings and made recommendations based on multiple metrics
- Researched existing workflows and processes used for security policy exception management within PNC
- Composed software requirements document based on current processes, brainstorming, and user feedback
- Calculated values and updated database of server specs including processors, RAM, and storage capacity

AWARDS & ACTIVITIES

- College of IST Student Government (Executive Board) Fall 2007 – Present
- Magazine of IST (President, former Webmaster) Fall 2006 – Present
- University Park Undergraduate Association (UPUA) (Executive Board, Webmaster) Spring 2007
- Gamma Tau Phi IST Honors Society Inductee Fall 2007
- College of Information Sciences & Technology Dean's List Fall 2006, Spring 2007, Fall 2007