An Examination of Searcher's Perceptions of Nonsponsored and Sponsored Links During Ecommerce Web Searching

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In this article, we report results of an investigation into the effect of sponsored links on ecommerce information seeking on the Web. In this research, 56 participants each engaged in six ecommerce Web searching tasks. We extracted these tasks from the transaction log of a Web search engine, so they represent actual ecommerce searching information needs. Using 60 organic and 30 sponsored Web links, the quality of the Web search engine results was controlled by switching nonsponsored and sponsored links on half of the tasks for each participant. This allowed for investigating the bias toward sponsored links while controlling for quality of content. The study also investigated the relationship between searching self-efficacy, searching experience, types of ecommerce information needs, and the order of links on the viewing of sponsored links. Data included 2,453 interactions with links from result pages and 961 utterances evaluating these links. The results of the study indicate that there is a strong preference for nonsponsored links, with searchers viewing these results first more than 82% of the time. Searching self-efficacy and experience does not increase the likelihood of viewing sponsored links, and the order of the result listing does not appear to affect searcher evaluation of sponsored links. The implications for sponsored links as a long-term business model are discussed.

Introduction

Web search engines often present at least two categories of search results on the results page. One set is composed of nonsponsored (i.e., organic) links that the search engine determines using its proprietary matching algorithm. The other set is composed of sponsored links that appear because a company, organization, or individual purchased the keyword(s) that the searcher used in the search query.

Paid search is the prevalent business model for searching on the Web. Most major Web search engines, such as Google and Yahoo!, have adopted paid search almost universally, and some site-specific searches (cf. CNN.com) have begun using the paid search model. For example, Google, Yahoo!, and AOL, three of the major search engines, have reported that paid search accounted for 99, 84, and 12% of 2004 annual revenues, respectively (McCarthy, 2005).

The key to whether paid search is a viable business model comes down to perceived relevance. Are sponsored links relevant to searchers' information needs? If users consider the sponsored content relevant to their task, they might consider selecting the sponsored links. If not, searchers will ignore these links. Across the search industry, there are billions of dollars riding on the answer to this question. Certainly for the near future, paid search appears to be the predominant revenue source for Web search engines, although some commentators have questioned sponsored links as a long-term business model (Rooney, 2004).

This article reports the results of a research study that investigated the interaction between searchers and sponsored links during Web searching, examining the relationship between searcher demographics, attitudes, and behaviors toward both nonsponsored and sponsored Web search engine results. We introduce our research design and data analysis. We then discuss our research results and implications, concluding with directions for future research.

Literature Review

The introduction of the Web has had implications for the development of online commerce. The unique characteristics

of the Web for ecommerce and online retailing is fundamentally transforming (Pachauri, 2002) the way in which consumers and vendors interact. Pachauri (2002) presented a review of ecommerce streams of research and highlighted future research questions. The research that we report in this article focuses on the ecommerce area of paid search, specifically the use of sponsored links in Web search engines.

Some prior research has established a potential disconnect between the perception of sponsored listings by business and users. Users appear to be suspicious of sponsored links, maybe seeing them as less relevant than organic links and perhaps are less likely to select them. On the other hand, businesses see them as the future of Web marketing. Businesses spent $8.5 billion on paid search in 2004, and this amount is expected to grow to $16 billion by 2009 (Jarboe, 2005). However, it is important to consider that sponsored links are primarily transactional. Rose and Levinson (2004) referred to these transactional searches as information location goals, where searchers are interested in locating a product or service. Sponsors are interested only in obtaining qualified customers who are interested in transactions, either now or sometime in the future.

However, the poor performance of sponsored listings in some survey field studies (cf. Hansen, 2002; Hotchkiss, 2004; Marable, 2003) where one does not know the users' information objectives may not be relevant. Perhaps the content of the sponsored links was just not as good as the organic results. The objective of the research study reported here is to investigate user perceptions of sponsored links in a set of naturalistic, transactional tasks. Because searching is a very task-oriented behavior, it is essential to understand how sponsored listings fit into the tasks that searchers typically execute when using Web search engines.

Prior research on sponsored listings can be classified as focusing on (a) searching methods, (b) personal preferences, (c) demographic factors, and (d) results characteristics. We examine each of these separate, but related, research streams.

Ecommerce Searching Methods

Web searching can be a complex, iterative process that evolves as the search progresses. Cognitive search costs reflect consumers' efforts to formulate search tasks, select queries, filter incoming information, and integrate new information with existing information to form decision evaluations (Hauser, Urban, & Weinberg, 1993).

However, empirical studies have shown that the "typical" Web searcher has little understanding of how search engines retrieve, rank, or prioritize links on the results page (Marable, 2003), so these searching paradigms may not be valid. Using results from a user study, Marable (2003) reported that searchers trust search engines to present only unbiased results on the first page, not realizing that 41% of selections were sponsored search listings. When informed of the nature of the sponsored listings, participants reported negative emotional reactions. Search engines that were less transparent about paid search results lost credibility with this sample of users.

This is in line with results from an 11-month investigation sponsored by the Federal Trade Commission recommending that search engine companies clearly mark paid listings on their sites (Hansen, 2002). The study found that phrases such as "*Recommended Sites*," "*Featured Listings*," "*Premier Listings*," "*Search Partners*," or "*Start Here*" inadequately informed searchers of the nature of the links. Even more ambiguous terms were *Products and Services*, *News*, *Resources*, *Featured Listings*, or *Spotlight*. When users suspect that search engines are intentionally disguising the presence of paid listings, ecommerce searchers may be less likely to consider them.

Hotchkiss (2004) used an enhanced focus group format to observe the search behaviors of 24 participants and interviewed them for their reactions to what they saw online. The researcher found that searchers take keywords from the sponsored listing descriptions to use in future iterations of their search process. As the search process becomes more focused, the likelihood that users will consider the paid listings increases. Hotchkiss also reported that there were four distinct types of searchers, each with a unique search pattern (i.e., The Scan and Clicker, the 2 Step Scanner, the Deliberate Researcher, and the 1,2,3 Searcher). These search patterns affected the portion of search engine results page (SERP) seen and the likelihood of conversion (i.e., the searcher buys something).

Constantinides (2004), who reviewed 48 research papers on consumer behavior in online environments, stated that understanding the behavior of online shoppers is a priority issue for competing in the virtual market place. The researcher presented sets of functionality, psychological, and content factors that affect the online shopping experience. Jayawardhena (2004) also investigated personal values and how they affect online shopping, reporting that self-direction, enjoyment, and self-achievement were significantly related to positive attitudes toward online shopping, based on structural equation modeling.

Preferences of Ecommerce Searchers

Rather than examining factors, other studies have focused on searcher biases toward or against sponsored links and the effect of those biases for businesses and organizations in attracting potential customers. Langford (2000) conducted an investigation of various online advertising media (i.e., Web search engines, Web directories, newsgroups, listservs, bulletin boards, and chatrooms), reporting that online-only promotions are of little value in attracting new customers.

Foucault and Scheufele (2002) used a survey method to obtain data from 156 students concerning their attitudes toward online textbook purchasing. The results indicated that previous online purchase, positive social environment, professor support, knowledge of online retailers, and perception that needs will be met online are all predictors of online textbook purchasing. Goldsmith and Lafferty (2002) used a survey method to investigate the effects of viewing Web sites on Internet advertising. Surveying 329 undergraduate students,

the participants were asked to recall brand names seen on the Web. The authors reported that visiting Web sites appeared to increase recall of brands seen on the Web and to improve consumers' views of the brand. The researchers also examined perceived advantages of Web advertising and the interplay of Web and non-Web advertising.

Hotchkiss, Garrison, and Jensen (2004) conducted a survey study with 425 respondents, who overwhelmingly choose links offering sources of trusted, unbiased information. More than 77% of participants also favored organic links more than the sponsored links. Even in an ecommerce-like scenario, survey respondents would still choose organic over sponsored links. In a follow-up study, Hotchkiss (2004) established that novice users have particular trouble identifying sponsored links and that half of the participants were suspicious that payments influence even the organic links. In general, the study participants rated the sponsored listings as lower quality. Study results also indicated that many searchers visually ignored or did not see the sponsored listings, partly due to their screen location on the right side of the page.

Greenspan (2004) also found that users prefer organic listings relative to sponsored links. The study also raised ethical issues regarding how search engines present sponsored listings. Greenspan reported that users are more likely to select sponsored listings with search engines that do not clearly identify them as such. Brooks (2004a) found that the likelihood of a searcher selecting a sponsored listing is a curvilinear function of its placement on the page (i.e., based on rank). The higher the link's placement in the results listing, the more likely a searcher is to select it. The study found similar results with organic listings. Generally, the difference between the 1st and the 10th positions is a 20 to 30% drop in click through (i.e., customer who actually visits a Web site by clicking on a link from the SERP) for the listing. In a related study, Brooks (2004b) reported that the conversion rate (i.e., customers who actually buy something) drops nearly 90% between the 1st and 10th positions. There appears to be an intrinsic trust value associated with the rate of a listing.

The Pew Internet and American Life Project (Fallows, 2005) reported that searchers trust the search engines that they use, but they do not understand how these search engines rank and present links. Only 38% of searchers reported awareness of the distinction between sponsored results and organic links. Less than 17% report that they always can tell which results are sponsored and which are organic. Jansen and Molina (2006) showed that ecommerce search engines and Web directories offer a slight improvement over general-purpose search engines for ecommerce queries.

Demographic Factors Influencing Ecommerce Searching

Bellman, Lohse, and Johnson (1999) reported that looking for product information on the Web is the most important predictor of online buying behavior. The researchers also reported that a typical online buyer has a "wired" lifestyle.

The less discretionary time the searcher has, the more likely the searcher is to purchase from on the Web. The study reports that this effect is even stronger if the searcher's spouse also works. In a follow-up report, Johnson, Bellman, and Lohse (2000) noted that the percentage of searchers making a purchase online increased as a function of time spent online. The longer the amount of time spent on the Web in a given episode, the greater the chance of making an online purchase.

Ward and Lee (2000) reported that less experienced online Web searchers rely more on brands for ecommerce shopping. Zhou and Bao (2002) found that consumers' opinions of Web advertising in information seeking tasks depends on whether the advertisement provides information that is relevant to the task. Although conducted before sponsored listings were prevalent, one can reasonable infer that to be successful, sponsored listings should impart targeted information directly related to the query.

Hoffman, Novak, Schlosser, and Composition (2000) explored racial differences in online consumer behavior; specifically, the rate of searching for information and purchasing on the Web. The researchers stated that White participants in their study were more likely to use the Web to purchase a product or service online. White participants also were more likely than were African American participants to have searched the Web for product information. Potential explanations of the differences in search behavior offered by the researchers were that the African Americans in this study were less interested in searching online for information on products or services, had other sources for this information, or were less interested in ecommerce searching.

Joines, Scherer, and Scheufele (2003) examined the influence of demographic variables and motivational factors of two ecommerce-related activities: (a) percentage of online time spent searching for consumer-related information and (b) actually conducting online transactions. Combining survey data from 59 undergraduates and 59 New York State residents, the researchers reported that transactional privacy concerns were negatively related to the percentage of time spent on product searches and online shopping. Chiang and Dholakia (2003) stated that convenience and product type influence consumer intention to conduct online shopping. When consumers perceive offline shopping as inconvenient, they are more open to shopping online.

Chiang, Dholakia, and Westin (2004) reported that domain expertise is negatively related to perceived (i.e., the searchers' view of) cognitive search cost, which affects information search. Information load and interruptions had no significant effect on perceived cost of information searching. The reported findings suggest that a limiting factor of consumer information searching in use of the Web as a marketplace is the cognitive challenge of interacting with computers.

Characteristics of Ecommerce Information Objects

O'Keefe et al. (2000) investigated consumer Web sites, comparing the reactions of participants in the United Kingdom, the United States, and Hong Kong to automobile

manufacturers' Web sites. American participants were inclined to use the Web sites for information search purposes, and the Hong Kong participants were more inclined to use the Web for social communication purposes. Morris and Maglio (2001) studied parameters for consumer decision making about purchasing airline tickets online, reporting that generally price is the most important factor. Lightner and Eastman (2002) investigated methods of product presentation in ecommerce purchasing environments. The researchers reported that searchers preferred a combination of pictures and texts to other formats.

Dobrow (2004) reported that study participants are significantly more likely to recall the name of the company from the search listing compared to banner ad, tile ad, and three search listings on the same page. Thus, even if study participants do not select the link, there is some marketing benefit of the paid listing. Newman and Sprott (2004) investigated the use of Web sites to create a brand's image on the Web. The research results indicated that including such advertisements should be consistent with the Web site brand.

Investigating search engine loyalty and interaction with Web search engines, iProspect Inc. (2004) surveyed 1,649 Web users. Of the respondents, 60% of Google users reported organic results to be more relevant than were sponsored results. This was even higher for predominantly Google users (70%). Frequent users of the Web (i.e., ≥4 years of Internet use) found organic results to be more relevant than were sponsored results (65–56%). More women (43%) than men (34%) found sponsored results to be generally relevant.

Hotchkiss (2004) found that many searchers look for a number of specific items prior to clicking on the uniform resource locator (URL), including the key phrase in the title or description, product information, and trusted brand names and vendors. In a study of general Web searching and evaluation of Web results, Tombros, Ruthven, and Jose (2005) studied 24 participants, each of whom searched on three information seeking tasks. The researchers reported that there were five categories (i.e., text, structure, quality, nontextual items, and physical properties) used by the searchers to determine the utility of Web documents. Jansen, Jansen, and Spink (2005) studied online job seeking, and reported that job location was the top Web criterion that online job seekers sought in a job posting.

Synthesis of Prior Work on Sponsored Links

From our review of the prior work presented, it appears that searchers have a bias against the sponsored links; however, this result has been mostly from survey data and not user studies, and the content (i.e., the sponsored and nonsponsored links) was not controlled for quality. Therefore, these results may not be valid when searchers actually implement an ecommerce searching task. Searchers make judgments about a particular Web site based on characteristics of the link in the results listing, but the relationship between these characteristics and the bias against sponsored results has not been investigated.

It appears that frequency of use and searching expertise of ecommerce Web searchers influence the conduct of online shopping, but whether this correlates to an increase in the use of sponsored links by these consumers has not been determined. In addition, there has been little investigation of the particular type of ecommerce searching on the use of sponsored links, which is important given that there are various types of ecommerce information needs of Web consumers. Finally, there have been limited studies on the effect of ranking and page placement on the use of sponsored links by Web users.

This synthesis of prior work helped define and motivate our research questions, which we address in the following section. Given the importance of paid search results as the predominant business model for Web search engines, the results of this research could have substantial impact on the future development of and use of sponsored links.

Research Questions

We designed a user study to address the following research questions. We refer to a "link" as a listing in the results listing of the Web search engine. We refer to a "result" as the actual Web document referenced by a link.

Q1: When using a Web search engine, do searchers have a bias against sponsored results?

H1a: When using a Web search engine, searchers will examine organic links before examining sponsored links.
H1b: When using a Web search engine, searchers will examine organic links and not examine sponsored links.
H1c: When using a Web search engine, searchers will evaluate organic links as more relevant than sponsored links.

It appears that there is a general bias against sponsored links; however, we could locate no study that controlled for content. Therefore, we desired to investigate this assumed bias further to see its effect on actual behavior. In H1a, we wanted to see if searchers will look at organic links first rather than sponsored links. If searchers satisfy their information need with organic links, they will be less likely to view sponsored links. In H1b, we wanted to see what percentages of searchers exclusively examine organic links. In H1c, we looked at whether searchers evaluate organic links as more relevant than sponsored links solely because of their classification.

Q2: What factors influence searchers' bias against sponsored links?

For Q2, we investigated what specific factors on the SERP sponsored links are the basis for the searchers' view of those links. If there is a bias against sponsored links, as prior work has suggested, we wanted to know what factors influence this bias.

Q3: What factors influence searchers' bias for organic links?

Similarly, we wanted to know what factors create the favorable bias searchers have for organic links. For Q3, we investigated what specific factors on the SERP organic links are the bases for the searchers' views of those links.

Q4: Does Web searching self-efficacy correlate with a bias for sponsored links?

H4a: The greater the self-efficacy of the searcher, the more likely the searcher is to view sponsored links.

For Q4, we investigated whether an increased self-efficacy of searching skill will correlate with an increase in the use of sponsored links. We hypothesized that the more skilled the user, the more likely that searcher will view a sponsored link.

Q5: Does frequency of Web search engine usage correlate with bias for sponsored links?

H5a: The higher the frequency of Web search engine usage of the searcher, the more likely the searcher is to view sponsored links.

For Q5, we investigated whether an increased frequency of Web searching will correlate with an increase in the use of sponsored links. We hypothesized that the more frequently a user searches the Web, the most likely that searcher will be to view sponsored links.

Q6: Does the type of e-commerce query affect searchers' bias for/against sponsored results?

H6a: If the e-commerce query is general, the searcher will be less likely to view a sponsored link.

H6b: If the e-commerce query is brand specific, the searcher will be more likely to view a sponsored link.

H6c: If the e-commerce query is location specific, the searcher will be more likely to view a sponsored link.

For Q6, we studied whether the type of e-commerce information task has an influence on the use of sponsored links. We hypothesized that if the query is general, the searcher will be less likely to view sponsored links; however, if the query is more product specific or location specific, the searcher will be more likely to view sponsored links.

Q7: Does the ranking of the organic or sponsored results influence viewing patterns of searchers?

H7a: The lower the rank (i.e., higher in the result list) of an organic result, the more likely a searcher will view it.

H7b: The lower the rank (i.e., higher in the result list) of an organic result, the more likely a searcher will evaluate it as relevant.

H7c: The lower the rank (i.e., higher in the result list) of a sponsored result, the more likely a searcher will view it.

H7d: The lower the rank (i.e., higher in the result list) of a sponsored result, the more relevant a searcher will evaluate it.

For Q7, we investigated the effect of ranking on searcher viewing patterns of Web search engine results. We hypothesized that the lower the rank of an organic or a sponsored link, the more likely the searcher is to view that link.

In the following section, we outline the design of our research study.

Research Study

Data Preparation

To investigate our research questions, we first extracted a set of e-commerce queries from an approximately 1 million query Excite transaction log (Spink & Jansen, 2004; Spink, Jansen, Wolfram, & Saracevic, 2002) using a modified snowball technique (Patton, 1990). From these queries, we selected six queries representing three categories of e-commerce query types: general (i.e., queries representing a desire for information about a class of products), specific (i.e., queries representing a desire for information about a specific product item), and location specific (i.e., queries representing a desire for information about a product in a specific geographical location). Appendix A presents the six scenarios and the six starting queries within the three categories.

We then submitted these six queries to a major U.S. search engine (i.e., Google) using a software application that not only submitted the queries but also retrieved the first SERP for each query exactly as it would be presented to a human user. We submitted the queries and retrieved the results on November 2, 2004. The total time from submission to completion of result retrieval took approximately 30s.

We then removed all identifying logos, text, URLs, and HTML code from the Google result pages, replacing them with a fictitious search engine identifier (i.e., *Really Cool Search Engine*). We disabled all hyperlinks to other result pages and the form submit button. We removed the redirects in the organic and sponsored results, so the URLs pointed directly to the targeted Web site. If there were more than five sponsored links on the page, we removed Link 6 and greater. This provided us with six SERPs (one for each of the six queries) with 10 organic links and five sponsored links. We refer to each SERP in this set as an *Original page*.

We then used each Original page to create a second page, referred to as the *Switched page*. For the Switched page, we switched the five sponsored links and the top five organic links to control for the quality of the content contained within the sponsored listings. We manipulated only the top five organic links because most users do not scroll down past the top results on the page (e.g., see Hotchkiss et al., 2004; Jansen & Spink, 2003). Because of the differences in the way Google presents organic and sponsored listings, we edited the descriptions in the switched condition so that the format for each listing type was consistent throughout the study.

This process provided us with six Web SERPs with what looked like 10 organic links (However, the first five were really sponsored links.) and what looked like five sponsored results
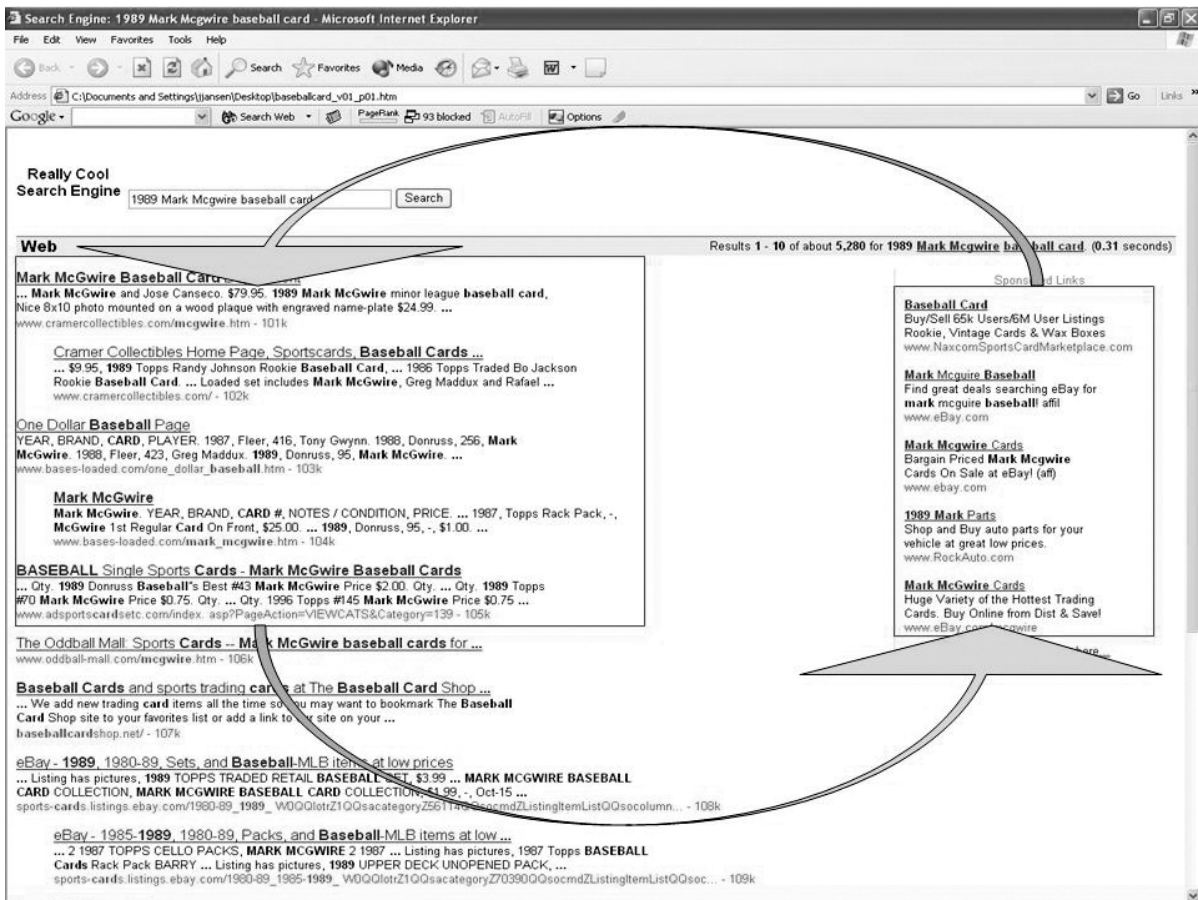
FIG. 1. Switched results page created.

(However, they were really five organic links.) Figure 1 shows the transformation from an Original to a Switched page.

Study Procedure

We conducted the study simultaneously at two locations, each a major U.S. university. Both locations followed the same procedure and used the same instruments. We recruited 56 participants between both campuses. The age range was restricted to 18 to 29 years to focus the study on the demographic most valued by marketers. We explained to each participant the purpose of the study as an investigation into searching methods and obtained informed consent.

For each participant, a moderator read the participant a short introduction (see Appendix B). For each experimental task, we explained the task to the participant and reminded the participant to think aloud. We used an unrelated practice task to explain the use of the verbal protocol method.

We then read the participant one of the six e-commerce searching scenarios, informed him or her that the query already had been entered into the search engine, opened the appropriate Web page, and asked the participant to continue the search. The participant would then continue the search as if he or she had entered the query. The session for that query would end when the participant took some action that would remove them from the presented results page without returning (i.e., submit a new query, go to a new results page, go to a different search engine, etc.). Viewing a Web page from the listing on the results page was not considered one of these actions. We instructed the participants to describe the screen content they were viewing, evaluate its relevance to the task, and explain why they moved from one item to the next.

We presented each participant with all six queries, one at a time. Each participant completed one query before moving to the next. The moderator would read the applicable scenario before moving to the next query. For each participant, three of the result pages were original and three were switched. We counterbalanced the order of original and switched result pages within each participant's sessions and between each participant.

The moderators did not assist the participants during the searching sessions; however, the moderator would answer procedural questions. While the participant was searching, the moderator annotated utterances and user actions using an application that the researchers designed for quantitative and qualitative data capture during Web searching studies such as this one.

After the participant had completed all six query sessions, the moderator returned the participant to the first query, and the participant visited all Web pages for each query that the participant had not visited during the session. The participant evaluated the Web document and presented a basis for the evaluation. The moderator collected these Web document evaluations again using the data collection application.

After all six tasks were accomplished, the participant completed a demographic questionnaire and answered questions about his or her opinions regarding sponsored listings in general. Approximately 1 hr was required to complete the sequence for each participant.

Results

The objective of the study was to evaluate the differences in participant behavior between organic and sponsored listings. We expected that participants would be biased against sponsored listings and thus would be more likely to view and select the organic listings and rate them as being more relevant. The results were mixed in this regard based on analysis of Q1.

> **Q1:** When using a Web search engine, do searchers have a bias against sponsored results?
>
> **H1a:** When using a Web search engine, searchers will examine organic results before examining sponsored results.

Using a binomial test, participants were more likely to view the organic links first ($p < .001$) (see Figure 2). Participants viewed the organic listings first for 82% of the tasks, compared to 6% for the sponsored listings and 12% when both were viewed.

So, we accept H1a: When using a Web search engine for e-commerce searching, searchers will examine organic results before examining sponsored results.

> **H1b:** When using a Web search engine, searchers will examine organic links and not examine sponsored links.

Using a binomial test, participants were more likely to view both the organic and sponsored links ($p < .001$). Only 27% ($n = 15$) of the participants viewed only the organic listings while 73% ($n = 41$) viewed both the organic and sponsored results. No searcher viewed only the sponsored links.

So, we reject H1b: When using a Web search engine for e-commerce searching, searchers will examine at least some of both the organic and sponsored links.

We also examined, using a binomial test, whether participants would actually click on a sponsored link or not. The bino-
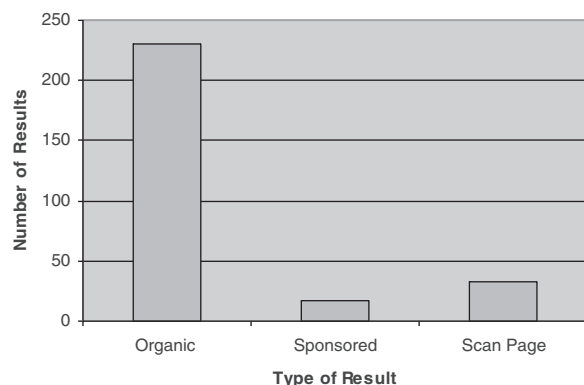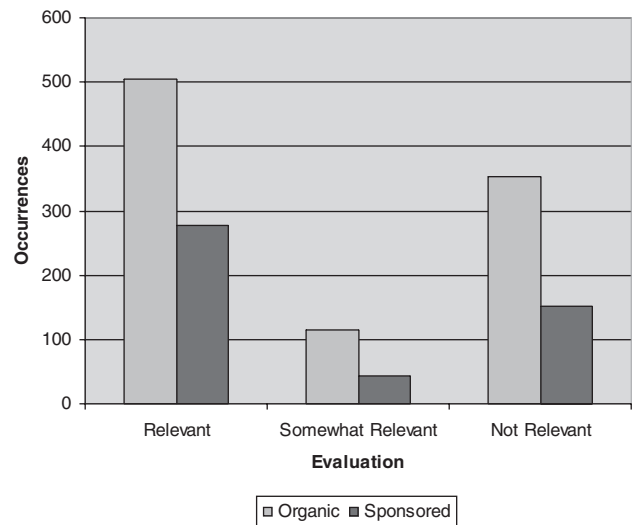

FIG. 3.   Relevance evaluation or organic and sponsored links.

mial test was not significant. Fifty-five percent (31) of the participants viewed a sponsored Web page and 45% (25) did not.

> **H1c:** When using a Web search engine, searchers will evaluate organic links as more relevant than sponsored links.

A chi-square goodness-of-fit test was used to determine if there was a differential bias for or against the sponsored listings. There was a significant difference in the measured bias between the organic and sponsored links ($p < .001$) (see Figure 3). Despite the fact that the content of the actual listing descriptions were controlled for relevance by rotating them between the organic and sponsored listings, participants rated 52% of the organic listings as relevant compared to only 42% of the sponsored listings. Another interesting finding is that few listings were rated neutrally (i.e., 12% for the organic listings and 13% for the sponsored listings).

Therefore, we accept H1c: When using a Web search engine for e-commerce searching, searchers will evaluate organic links as more relevant than sponsored links.

This bias against sponsored results was not found when participants looked at the content pages that were linked to the listings. A chi-square goodness-of-fit test found that there was no difference in relevance ratings of the content pages ($p = .850$). Figure 4 clearly illustrates this finding. When viewing the content pages, participants knew that the content was accessed via the sponsored link, but the bias inherent with this knowledge was overcome by the actual content.

> **Q2:** What factors influence searchers' bias against sponsored links?

For Q2, we recorded the utterances of the searchers during each search session, annotating each sponsored link the searchers viewed, their evaluation of those links, and the basis for that evaluation.

There were 290 utterances pertaining to the evaluation of sponsored results. We content analyzed the responses, assigning the utterances into seven categories developed
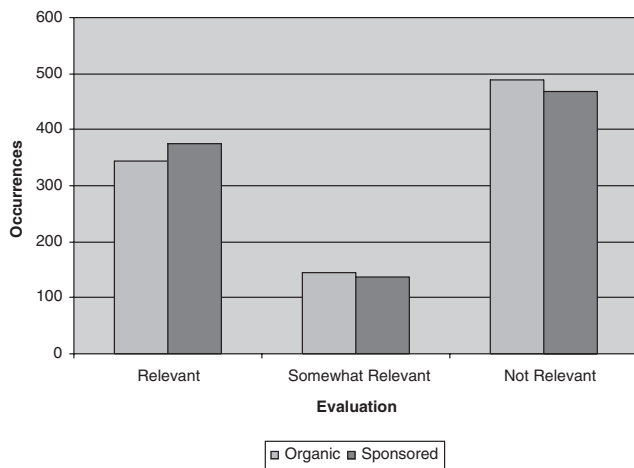

FIG. 2.   Number of Web results examined by type.

FIG. 4. Relevance evaluation or organic and sponsored links.

postpriori, and then met to resolve discrepancies. Table 1 provides the aggregate statistics from the content analysis.

From Table 1, we can see that Summary (67%) was the primary basis that searchers use to determine if a sponsored link is relevant. Title (56%) was the primary basis for determining that a sponsored result is not relevant. From verbal utterances during the searching sessions, the evaluation was a two-stepped process. Searchers viewed the title, and if relevant, then moved to the summary for a second evaluation. If the title was not deemed relevant, searchers rarely viewed the summary.

To examine this research question further, in a poststudy survey, we received 32 responses to the question "Some search engines return Featured Sites or Sponsored Sites. Do you usually look at these types of results?" The response range was "yes," "sometimes," or "no," followed by a "Why/why?" open-ended question.

Eight (25.0%) participants responded "yes," 4 (12.5%) responded "sometimes," and 20 (62.5%) responded "no." Twenty-five participants responded with a qualitative response as the basis for their evaluation. Of the 7 participants who did not respond, all answered "no" to whether they examined sponsored links. Table 2 provides the aggregate results. Some participants responded with multiple reasons for examining or not examining sponsored links.

The two major reasons for examining sponsored links were related to the relevance of the links for purchasing a product or perceived relevance to the query. The major reason for not examining sponsored links was lack of trust.

Q3: What factors influence searchers' bias for organic links?

For Q3, we repeated the process described for the previous research question for organic links. There were 671 utterances pertaining to the evaluation of organic links. We content analyzed the responses, assigning the utterances into seven categories developed postpriori. After content analysis, the researchers met to resolve discrepancies. Table 3 provides the aggregate statistics from the content analysis.

From Table 3, we can see that Summary (42%) and Title (41%) were the primary bases that searchers used to determine if an organic link was relevant. Title (60%) was the primary basis for determining that an organic result was not relevant. This was the same finding as that for sponsored links. Again, this evaluation was a two-step process.

It appears that the Summary can have a positive impact on judging a link as relevant, but the Title is the decisive factor used by searchers when determining a link as not relevant.

TABLE 1. Reasons for viewing sponsored results.

	Relevant		Somewhat relevant		Not relevant	
Summary	**102**	**67.1%**	**49**	**54.4%**	88	30.3%
Title	21	13.8%	29	32.2%	**163**	**56.2%**
URL	21	13.8%	8	8.9%	7	2.4%
Sponsored	6	3.9%	4	4.4%	26	9.0%
Rank	2	1.3%	0	0.0%	0	0.0%
Location on SERP	0	0.0%	0	0.0%	6	2.1%
	152	100.0%	90	100.0%	290	100.0%

TABLE 2. Influence of bias.

	For		Against		Neutral	
Relevant for purchasing	**5**	**50.0%**	0	0.0%	0	0.0%
Relevant to query	**5**	**50.0%**	0	0.0%	1	33.3%
Advertising	0	0.0%	1	8.3%	0	0.0%
Last resort	0	0.0%	0	0.0%	**2**	**66.7%**
Personalization (lack of)	0	0.0%	1	8.3%	0	0.0%
Not relevant	0	0.0%	4	33.3%	0	0.0%
Lack of trust	0	0.0%	**6**	**50.0%**	0	0.0%
	10	100.0%	12	100.0%	3	00.0%

TABLE 3. Reasons for viewing organic.

	Relevant		Somewhat relevant		Not relevant	
Summary	**328**	**42.4%**	**127**	**55.2%**	212	31.6%
Title	**320**	**41.3%**	84	36.5%	**400**	**59.6%**
URL	65	8.4%	13	5.7%	34	5.1%
Rank	27	3.5%	0	0.0%	1	0.1%
Organic	24	3.1%	3	1.3%	6	0.9%
Location	9	1.2%	3	1.3%	18	2.7%
Ran out of options	1	0.1%	0	0.0%	0	0.0%
	774	100.0%	230	100.0%	671	100.0%

Q4: Does Web searching self-efficacy correlate with a bias for sponsored links?

H4a: The greater the self-efficacy of the searcher, the more likely the searcher is to view sponsored links.

We ran a regression analysis comparing viewing of sponsored Web results (i.e., searchers who actually clicked on a sponsored link and visited a Web page) based on the reported self-efficacy of the searchers. The relationship was not significant. So, counter to prior reported research based on survey data, more sophisticated searchers are neither more nor less inclined to interact with sponsored results.

Q5: Does frequency of Web search engine usage correlate with bias for sponsored links?

H5a: The higher the frequency of Web search engine usage by the searcher, the more likely the searcher is to view sponsored links.

We ran a regression analysis comparing viewing of sponsored links based on self-reported frequency of daily searches. The relationship was not significant. So, counter to prior research results based on survey data, more experienced searchers are neither more nor less inclined to interact with sponsored results.

Q6: Does the type of e-commerce query affect searchers' bias for/against sponsored links?

H6a: If the e-commerce query is general, the searcher will be less likely to view a sponsored link.

We used a chi-square goodness-of-fit test to determine if there was a differential bias for or against the sponsored links for general queries. There was no significant difference in the measured bias between the viewing of sponsored or organic links for general e-commerce queries. The mean viewing of sponsored links for general e-commerce queries was 2.79.

Therefore, we reject H6a. If the e-commerce query is general, the searcher will be equally likely to view either organic or sponsored links.

H6b: If the e-commerce query is brand specific, the searcher will be more likely to view a sponsored link.

We used a chi-square goodness-of-fit test to determine if there was a differential bias for or against the sponsored links for general queries. There was a significant difference in the measured bias between the viewing of sponsored links and organic links for general e-commerce queries, $\chi^2 = 9.7$, $p < .05$, despite the fact that the content of the actual listing descriptions was controlled for relevance by rotating the result listings between the organic and sponsored results. The participants viewed more sponsored links for brand-specific queries than for general or location queries. The mean for general e-commerce queries was 4.06.

So, we accept H6b: If the e-commerce query is brand specific, the searcher will be more likely to view a sponsored link.

H6c: If the e-commerce query is location specific, the searcher will be more likely to view a sponsored link.

We used a chi-square goodness-of-fit test to determine if there was a differential bias for or against the paid listings for location specific queries. There was a significant difference in the measured bias between the viewing of sponsored results for location specific queries, $\chi^2 = 11.3$, $p < .05$, and organic results. This was despite the fact that the content of the actual listing descriptions was controlled for relevance by rotating the listings between the organic and sponsored results. The mean viewing of sponsored links for location specific ecommerce queries was 2.20.

So, we reject H6c: If the e-commerce query is location specific, the searcher will be less likely to view a sponsored link.

Q7: Does the ranking of the organic or sponsored links influence viewing patterns of searchers?

H7a: The lower the rank (i.e., higher in the results listing) of an organic link, the more likely a searcher will view it.

Table 4 shows the number and percentage of link views by rank. There appears to be a correlation between rank of the link and number of views for both organic and sponsored links. We conducted a regression analysis for rank of organic links, determining that there is a statistically significant relationship, $F(9) = 17.56$, $p < .01$.

Therefore, we accept H7a: The lower the rank (i.e., higher on the page) of an organic link, the more likely a searcher will view it.

TABLE 4. Viewing of links by rank.

Rank	No. of views total	Percentage
Organic 01	286	73.2
Organic 02	246	59.5
Organic 03	202	56.5
Organic 04	214	52.4
Organic 05	177	48.5
Organic 06	118	43.2
Organic 07	111	44.6
Organic 08	167	44.3
Organic 09	144	43.8
Organic 10	142	45.5
Sponsored 01	143	42.0
Sponsored 02	156	40.8
Sponsored 03	120	37.5
Sponsored 04	112	39.3
Sponsored 05	115	38.1
	2,453	100.0

TABLE 5. Average evaluation by rank.

Rank	No. of views	Average relevance ranking
Organic 01	286	0.16
Organic 02	246	0.24
Organic 03	202	0.06
Organic 04	214	0.22
Organic 05	177	0.09
Organic 06	118	−0.19
Organic 07	111	−0.26
Organic 08	167	0.12
Organic 09	144	−0.02
Organic 10	142	−0.07
Sponsored 01	143	0.01
Sponsored 02	156	0.14
Sponsored 03	120	−0.05
Sponsored 04	112	−0.15
Sponsored 05	115	−0.10
	2,453	0.03

H7b: The lower the rank (i.e., higher in the results listing) of a sponsored result, the more likely a searcher will view it.

We conducted a regression analysis for rank of sponsored links, but determined that there was no statistically significant relationship.

Therefore, we reject H7b: The lower the rank of a sponsored link, the searcher is less likely to view it.

H7c: The lower the rank (i.e., higher in the results listing) of an organic result, the more relevant a searcher will evaluate it.
H7d: The lower the rank (i.e., higher in the results listing) of a sponsored result, the more relevant a searcher will evaluate it.

For H7c and H7d, we assigned a numerical score of 1 for a relevant evaluation, a 0 for a somewhat relevant evaluation, and −1 for a not relevant evaluation.

For the organic listings, a correlation of −0.58 was found between each listing's rank and relevance rating ($p < .079$), indicating that listings lower on the page received lower relevance ratings. For the 10 organic listings, the first five listings were rated positively and the last five were rated negatively, on average ($p < .001$).

Therefore, we accept H7c. The lower the rank of an organic result, the more likely a searcher will evaluate it as relevant.

For the five sponsored links, there was a correlation of −0.72, but this was not significant. The first two sponsored links were rated positively and the last three were rated negatively, on average.

Also note that the cumulative average of all ratings for all ranks is 0.03, which is essentially neutral. The total for all organic listings is 0.05, and for the sponsored listings it is −0.03. The listings were taken directly from Google, which is currently the most popular search engine (Sullivan, 2006). The fact that the listings are not perceived as significantly relevant presents an opportunity for sponsored listings if one can construct them in a way that clearly illustrates their relevance for the user's task. It also means that one does not need to be first in the sponsored ranking to be competitive.

Table 5 shows the occurrences, percentages, and evaluation by rank. Figure 5 shows the relationship of relevance evaluation by rank.

Discussion

We conducted a laboratory study investigating searcher biases toward sponsored links, controlling for content. For sponsored links to yield the financial results that the business community anticipates in the coming years, it is critical that consumers perceive sponsored links and their descriptions as relevant to their transactional tasks. The results of this study support some previous findings that many searchers do not view sponsored links in a positive manner. It appears that sponsored links are currently reaching only about 20 to 25% of the Web searcher population, based on data from this study; however, the results also provide possible avenues for the development of paid search education or marketing campaigns.

The participants in the study showed a bias against sponsored links in several ways. They viewed organic links first
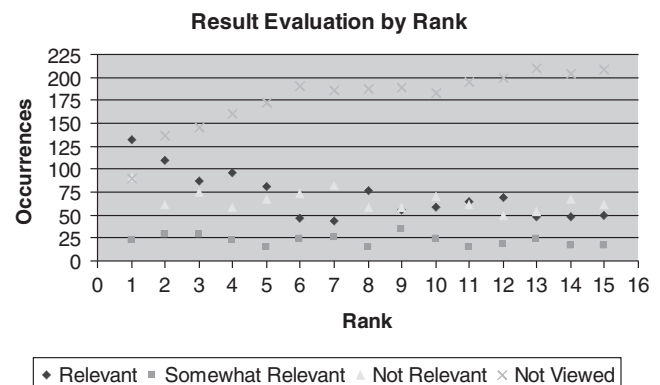
FIG. 5. Number of relevance evaluation types by rank of link.

more than 82% of the time; however, more than 73% of the searchers did view sponsored links at least once during the six searching sessions. Generally, participants reported an explicit suspicion about sponsored links in their verbal protocols. They rated the relevance of the sponsored links as lower than that of the organic links despite the content of the descriptions being controlled across listing type. Certainly, if sponsored links are to be a long-term business model for Web searching, the lack of trust and bias against these paid links must be overcome.

When viewing the Web pages rather than the result listings, there was no difference in relevance ratings. We found no relationship between self-efficacy and the tendency to view or not view the sponsored links, so these factors do not affect perceptions of paid searching.

There was a significant difference in sponsored link viewing based on the type of e-commerce query. Brand-specific queries resulted in more sponsored link viewing. Local search queries resulted in less sponsored link viewing. Rank did have significant effect on the viewing of organic results (i.e., the lower the rank, the higher the probability of viewing by the searcher). This correlation did not hold with the sponsored links, raising questions about the efforts to "buy" the top position in the sponsored listing. It appears that one can be competitive and not be in the top position; however, we qualify this statement by noting that this data is from a lab study with six queries that were all product related. These factors may have impacted the results. Results from the one study we could locate (Brooks, 2004a) and data from practitioners report that the rank of sponsored links has a dramatic effect on the number of clicks generated.

Interestingly, when searchers viewed the actual page off of the sponsored link, they rated these Web pages just as relevant as the pages from the organic links. This raises some interesting questions. Is the labeling of links as sponsored causing searchers to miss relevant results? One could argue that sponsored links are just another form of search engine results to be evaluated in the same way as organic links. Why should searchers be informed of how these results are chosen? How many Web searchers know how Web search engines choose the organic links? Research says not many (cf. Fallows, 2005; Marable, 2003). Different expectations concerning organic and sponsored results is a trust issue, and this points to the need for more understanding on why searchers have a low expectation level of sponsored results.

Conclusion and Future Research

Overall, our results indicate that searchers do have a bias against sponsored links, even when controlled for content; however, when viewing the content Web pages of sponsored links, searchers ranked them just as relevant as the pages off the organic links. Thus, the mechanism through which sponsored links are selected for a search query is as effective at selecting sponsored Web sites as it is with selecting organic Web sites. This effectiveness needs to be leveraged to ensure that sponsored links achieve the marketing lead qualification

and attraction that are expected if the paid search market is to continue to expand.

In future research, we would like to evaluate a broader range of e-commerce queries to identify specific query characteristics that might predict the viewing of sponsored links. The queries in this experiment were all product based. Service-related e-commerce queries (i.e., looking for car repair shops, plumbers, dentists, etc.) might have different results. This also would facilitate the identification of searcher, system, or content factors that contribute to the present searcher bias against sponsored links. Additionally, we would like to explore the sequence causality (i.e., the order of observation) as a searcher reads search results and a result listing. By examining the number of times events followed each other, we might be able to develop transitional probability matrixes which would lead to the design of result listings that aid searcher cognition. This could support the expansion of the paid search market to a wider range of Web searchers, helping to ensure the growth of this market. We also would like to evaluate a significant sample of sponsored and organic results to determine a relevance comparison.

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Appendix A: Queries for Sponsored Links Study

A. Specific

1. You want to give your son a 1989 Mark McGwire baseball card for his birthday. Find one for sale.
2. You are setting up a home entertainment center and you need a Sony 23" LCD HDTV monitor. Find one for sale.

B. General

1. You are looking for a tennis racquet to bring on vacation. Since you do not plan to bring it home, you want to find something low-priced. Find a low-priced tennis racquet for sale.
2. You need a disposable camera that can be used outdoors. Find a camera that meets your needs.

C. Geographic

1. You are looking for a dirt bike to give to your nephew in Pittsburgh. You want to use a local store. Find a dirt bike for sale in Pittsburgh.
2. You finished your Epil Stop & Spray hair remover and need a replacement right away. Find a 4-oz container for sale in Los Angeles.

Appendix B: Participant Introduction and Study Process

Greeting: Welcome. Today we are studying the usability of search engines. What we are interested in is how the search engine works. It is not your skill that is important. You will get credit for your participation as long as you complete all of the tasks.

Practice Task: The first thing I am going to ask you to do is to practice the "think aloud" method. What I need you to do is to complete a task that I am going to assign you, and tell me everything that you are thinking as you go through. You should tell me:

- What you are looking at
- What you think about it

Let me demonstrate as I get you started. The task you will do is to find a file on Windows Explorer. Therefore, for that I need to open up Windows Explorer and get to the right folder. "I am looking at the toolbar in the lower right to find the Windows Explorer icon. I recognize the icon that looks like a yellow folder, so I am going to click on it. The Windows Explorer application opens just as I expect it to. I need to open the C: drive folder, which I remember is in either the 'my computer' folder or the 'my documents' folder. I will try 'my documents' first because that is on top. So I click on the

plus sign in front of 'my documents' to see. It isn't there, so I close that and try 'my computer.' There it is. So I click on the C: drive label to open that."

Now I will assign you a task to practice using this "think aloud" method. In the C: drive folder, find a file called "think aloud.doc." As you go through it, think aloud just as I did in the example. Tell me what you are looking at and what kinds of decisions you are making as you go.

<<As participants do the practice trial, probe them to verbalize more of what they are thinking. Ask question like: What are you looking at? Why did you click on that? What do you think of the results?

When they find the file, congratulate them and give them feedback on whether they verbalized enough. In general, ask them to verbalize as much as they can, even when it seems minimal or redundant.>>

First search query

1. <<Move to the appropriate access sheet for data collection. Fill out the information for the query type.>>
2. Your first task is to <<read task one.>>

   Don't forget to think aloud as you go through it.

3. <<Open the html file for the first task.>> We selected the initial keywords and here is the results page that came up.

   What would you do to complete the task? Do not forget to "think aloud."
   <<Record their verbalizations in the utterances textbox.>>
   <<Based on where they start looking, select from the viewed first menu.>>
   <<If they say anything about sponsored or organic results, record the bias in the bias rating menus.>>

4. <<If they are not verbalizing completely, use probes to encourage them.>>
5. <<As they look at each result, record their evaluation and the basis of evaluation for each one.>>

<<If they click on a result, check the view results checkbox and select a relevance rating based on what they say, and put a few keywords in the basis for evaluation based on what they say.>>

6. <<If they are not verbalizing completely, use probes to encourage them.>>
7. <<When they are done, record the result in the Next Action menu. Being 'done' is defined as when they have enough information to stop, or when they do something else such as reformulate the query. Also, record whether they scrolled down the page.>>
8. That was the first task. Each of the remaining tasks will be exactly like that, but with a new task to search for. Are you ready for the next one?

Repeat 1–8 for all six queries.

9. Now we are going to go through all of the results from each of the queries and rate them based on how relevant they are to the query. For each one, is it: "Relevant," "Somewhat relevant," "Not relevant," or "Unsure?"
10. After you rate one, tell me why you think so.
11. <<After they have gone through all 15 results.>> Now we are going to rate the content pages for each result. For each page, is it: "Relevant," "Somewhat relevant," "Not relevant," or "Unsure?"
12. After you rate each one, tell me why you think so.

Repeat 9–12 for all six queries.

Posttest questionnaire

13. <<Hand the participant the post-test questionnaire.>>

   Please fill this out and return it when you are done.

14. Thank you for participating in the study. Based on the results, we hope to improve the design of search engine user interfaces so that in the future you can find what you are looking for faster, more easily and more reliably.