

Factors relating to the decision to click on a sponsored link

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Abstract

In this paper, we report results of an investigation into the factors influencing the selection of sponsored links by e-commerce Web searchers. In this research, 56 participants each engaged in six e-commerce Web searching tasks. We mined these tasks from the transaction log of a major Web search engine, so the tasks represent real e-commerce searching information needs. Using 60 organic and 30 sponsored Web links retrieved by submitting these queries to the Google search engine, we controlled the quality of the Web search engine listings by switching non-sponsored and sponsored links on half of the tasks for each participant. This approach allowed for both investigating the bias toward sponsored links while controlling for quality of content. Data included 2453 interactions with result page links, 961 utterances evaluating these links, and 102 results from a post-study survey. The results of the data analysis indicate that there is a statistically significant preference for non-sponsored links with searchers viewing these results first more than 82% of the time. Searchers view sponsored links primarily as advertisements, appreciate these links if they are relevant, and are unconcerned if the search engines disclose them as sponsored links. The implications for sponsored links as a long-term business model are discussed.

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1. Introduction

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

Sponsored search is the prevalent business model for search engines and many e-commerce sites on the Web. Most major Web search engines have adopted sponsored search almost universally, and some specific sites have begun using the sponsored search model. Google and Yahoo! each own independent processes that serve these sponsored links to Web searchers. The three major search engines, Google, Yahoo! and AOL reported that sponsored search accounted for 99%, 84% and 12% of annual revenues respectively [28].

Whether sponsored search is a viable long-term business model ultimately depends on whether or not Web searchers perceive the sponsored links as relevant. If the users of Web search engines consider the sponsored content relevant to their task, they might click on the

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sponsored links (i.e., thereby generating revenue for the search engine or specific Web site). If these links are not perceived as relevant, searchers will disregard them. There are billions of dollars across the search industry at stake depending on the answer to this question, along with the free Web searching that sponsored search supports. Certainly for the foreseeable future, sponsored search appears to be the principal revenue source for Web search engines.

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

2. Literature review

Web search engines such as Yahoo! and Google have significantly altered online commerce. The unique characteristics of the Web for e-commerce and online retailing are fundamentally transforming the way in which consumers and vendors interact. Pachauri [29] presents a review of e-commerce streams of research and highlights future research questions for this on-going transformation. However, the effect of Web search engines is not confined to the algorithm listings (i.e., organic listings) retrieved by the search engine crawlers. Battelle [1] provides an overview of Yahoo! Search Marketing and Google Adwords that has led to their development within the sponsored search area. See Jansen [18,19] for an overview of and Fain and Pedersen [5] for a history of sponsored search). Feng, Bhargava, and Pennock [8] present the search engine mechanisms for implementing sponsored search. Liu and Chen [26] examine sponsored search as weighted unit-price-contract (UPC) auctions. Feng [7] articulates the role of gatekeepers in sponsored search. The research that we report in this paper focuses on the searcher interaction area of sponsored search, specifically the use of sponsored links in Web search engines.

This focus is important because prior research has established a potential disconnect between the perception of sponsored listings by business and users, even though Jansen [17] shows that sponsored and non-sponsored results are equivalent in terms of relevance. Web search engine users appear to be suspicious of sponsored links and may see these links as less relevant than organic links. Therefore, they are less likely to select them. However, businesses see sponsored search as the future

of Web marketing. Commercial and other organizations spent \$8.5 billion on sponsored search in 2004, and this amount is expected to grow to \$16 billion by 2009 [25]. Studies show that search engines are effective at returning relevant listings for Web e-commerce searching [20]. Nevertheless, sponsored links are primarily transactional in that businesses are trying to gauge the intent of the searcher. These businesses are only interested in obtaining qualified customers that are interested in transactions, either now or sometime in the future.

However, the negative performance of sponsored listings in some survey field studies [c.f., 10,11] where one does not know the users' objectives may not be relevant. Perhaps the content of the sponsored links was just not as good as the organic results. Perhaps the subjects' real behavior was different from their reported behavior. The objective of the research study reported here is to investigate user perceptions of sponsored links in a set of naturalistic, transactional, e-commerce tasks. Because searching is a very task-oriented behavior, it is essential to understand how sponsored listings integrate with these tasks that searchers typically execute when using Web search engines.

An 11-month investigation supported by the Federal Trade Commission recommended that search engine companies clearly mark paid listings on their sites [10]. The study reports that phrases such as "*Recommended Sites*," "*Featured Listings*," "*Premier Listings*," "*Search Partners*," or "*Start Here*" inadequately inform 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, e-commerce searchers may be less likely to consider them.

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 [27]. This includes sponsored links. Using data collected during a user study, Marable [27] reports that searchers did not realize that 41% of links on the search engine results page (SERP) 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 sponsored search results lost credibility with this sample of users.

Hotchkiss [11] 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. In general, the study participants rated the sponsored listings as lower quality. The researcher reports that as the search process becomes more focused, the likelihood that

users will consider the sponsored listings increases. Hotchkiss [11] also reported that there were 4 distinct types of searchers, and these search patterns affected the portion of SERP seen and the likelihood of conversion (i.e., the searcher buys something). The researcher states that novice users have particular trouble identifying sponsored links and that half of the participants were suspicious that payments influence even the organic links. 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.

Hotchkiss, Garrison, and Jensen [14] 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 e-commerce-like scenario, survey respondents would still choose organic over sponsored links.

Greenspan [9] also found that users prefer organic listings relative to sponsored links. The study also raised ethical issues regarding how search engines present sponsored listings, with Greenspan [9] reporting that users are more likely to select sponsored listings with search engines that do not clearly identify them as such, suggesting that they might not have selected them had they known these links were sponsored.

Brooks [2] establishes 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 reports similar results with organic listings. Generally, the difference between the first position and the tenth position is a 20%–30% drop in click through (i.e., customer that actually visits a Web site by clicking on a link from an SERP) for the listing. In a related study, Brooks [3] reported that the conversion rate (i.e. customers that actually buy something) drops nearly 90% between the first and tenth position. There appears to be an intrinsic trust value associated with the rank of a listing.

Dobrow [4] reported study participants are significantly more likely to recall the name of the company from a search listing compared to a banner ad, tile ad, and three search listings on the same page. Therefore, even if study participants do not select the link, there is some marketing benefit of the sponsored listing. Investigating search engine loyalty and interaction with Web search engines, iProspect Inc. [16] surveyed 1649 Web users. Of the respondents, 60% of Google users reported organic results to be more relevant than sponsored. This was even higher for predominantly Google users (70%). Frequent users of the Web (four or more years of

Internet use) found organic listings to be more relevant than sponsored listings (65% to 56%). More women (43%) than men (34%) found sponsored listings to be generally relevant.

The Pew Internet and American Life Project [6] reported that 38% of searchers reported that they were aware of the distinction between sponsored links and organic links. Less than 17% of survey respondents report that they can always tell which links are sponsored and which are organic.

From our review of the prior work presented, it appears that searchers have a bias against the sponsored links. However, this result has mostly been from survey data, not user studies, and the content was not controlled for quality. Therefore, these results may not be valid when searchers actually implement an e-commerce 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.

This synthesis of prior work defines and motivates our research questions, which we present in the following section. Given the implications of sponsored search 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 the sponsored links.

3. Research questions

We implemented a user study to address the following research questions. For this research, we refer to a “link” as a listing in the results listing in the SERP. We refer to a “result” as the actual Web document referenced by a link in the SERP. Certainly, the searching skill [16], the domain knowledge, and the contextual aspects of the searcher have impact on how Web search engine results are evaluated. However, extensive research shows that Web search is fairly consistent across search engines, periods, and topics [21,24].

3.1. Research question 01: When using a Web search engine, do searchers have a bias against sponsored results?

Hypothesis 01a. When using a Web search engine, searchers will examine organic links before examining sponsored links.

Hypothesis 01b. When using a Web search engine, searchers will examine organic links and not examine sponsored links.

Hypothesis 01c. When using a Web search engine, searchers will evaluate organic links as more relevant than sponsored links.

Hypothesis 01d. When using a Web search engine, searchers will evaluate organic results as more relevant than sponsored results.

It appears from prior work [10,27] that there is a general bias against sponsored links; however, we could find no published study that controlled for content. Additionally, most of the prior work was the result of survey and self-reported data. Therefore, we desired to investigate this bias assumption further to measure its effect on actual behavior. For Research question 01, we desired to see if there was a bias against sponsored links. In Hypothesis 01a, we investigate the order in which searchers view links. If searchers locate products in the organic links, they will be less likely to view sponsored links. In Hypothesis 01b, we want to see what percentages of searchers examine organic links exclusively. In Hypothesis 01c, we looked at whether searchers evaluate organic links as more relevant than sponsored links solely because of their classification. In Hypothesis 01d, we investigate if searchers evaluate organic results as more relevant than sponsored results (as opposed to the link on the SERP) solely because of their classification. Various results relating to and from research question one are addressed in detail in [22].

3.2. Research question 02: What are the bases for searchers' self-reported biases against sponsored links?

In a post-study survey, we questioned participants on their view points of sponsored links. Using open coding (i.e., considering the data in minute detail while developing some initial categories) and the Nvivo qualitative software package (i.e., a software package for qualitative analysis), we investigate the basis for these biases.

3.3. Research question 03: Does a lack of information concerning sponsored links contribute to the bias?

It has been reported that the majority of searchers do not understand what sponsored links are [11,27]. Therefore, we investigate if providing information about sponsored links alters searchers' viewpoints. In the post-study survey, we provided a brief explanation of what sponsored links are, then again questioned the participants concerning their viewpoint of sponsored links. We again used open coding and Nvivo to investigate this research question.

3.4. Research question 04: What is the impact of disclosure on searchers' viewpoint of sponsored links?

There have been several reports concerning searchers not being able to identify sponsored links, with search engines being implicated in efforts to not fully disclose sponsored links [27]. We investigate whether or not the level of disclosure influences searchers' viewpoints concerning sponsored links. In the post-study survey, we provided a brief situational report outlining that some search engines do not disclose sponsored links to searchers. Following this scenario, we questioned the participants about the effect that this knowledge had on their view of sponsored links, again using open coding and Nvivo to investigate this research question.

3.5. Research question 05: After viewing the SERP, what is the searcher's next action?

Another question that has not been addressed by prior research, what do Web searchers engaged in an e-commerce searching task do after viewing the SERP. In the study, we recorded the searchers next action following departing an SERP (other than clicking on a link) and not returning.

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

4. Research study

4.1. Data preparation

To investigate our research questions, we extracted a set of e-commerce queries from an approximately 1 million query transaction log from Excite [31,32] using a modified snowball technique [30]. We believed that it is important that the queries represent real queries from real Web search engine users with real needs. From this set of e-commerce 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 submitted these six queries to Google, a major search engine using a software application that both submitted the queries and retrieved the first SERP for each query exactly as the search engine would present it to a human searcher. We submitted the queries and retrieved the results on 2 November 2004, with the total time from submission to completion of results retrieval taking approximately 30 s.

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

We then utilized each Original SERP to create a second page, referred to as the Switched SERP. For the Switched page, we switched the five sponsored links and the top five organic links. We did this to control for the quality of the content for 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 [c.f., 14,23], and other studies show that there is a predictable drop-off in traffic as the rank of a link increases [2,3]. Because of the differences in the way Google presents organic and sponsored links, 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 6 Web SERPs with what looked like 10 organic links (however, the first 5 were really sponsored links) and what looked like 5 sponsored results (however, they were really 5 organic links). Fig. 1 shows the transformation process from an Original to a Switched page.

Fig. 2 shows an example of a resulting Switched page.

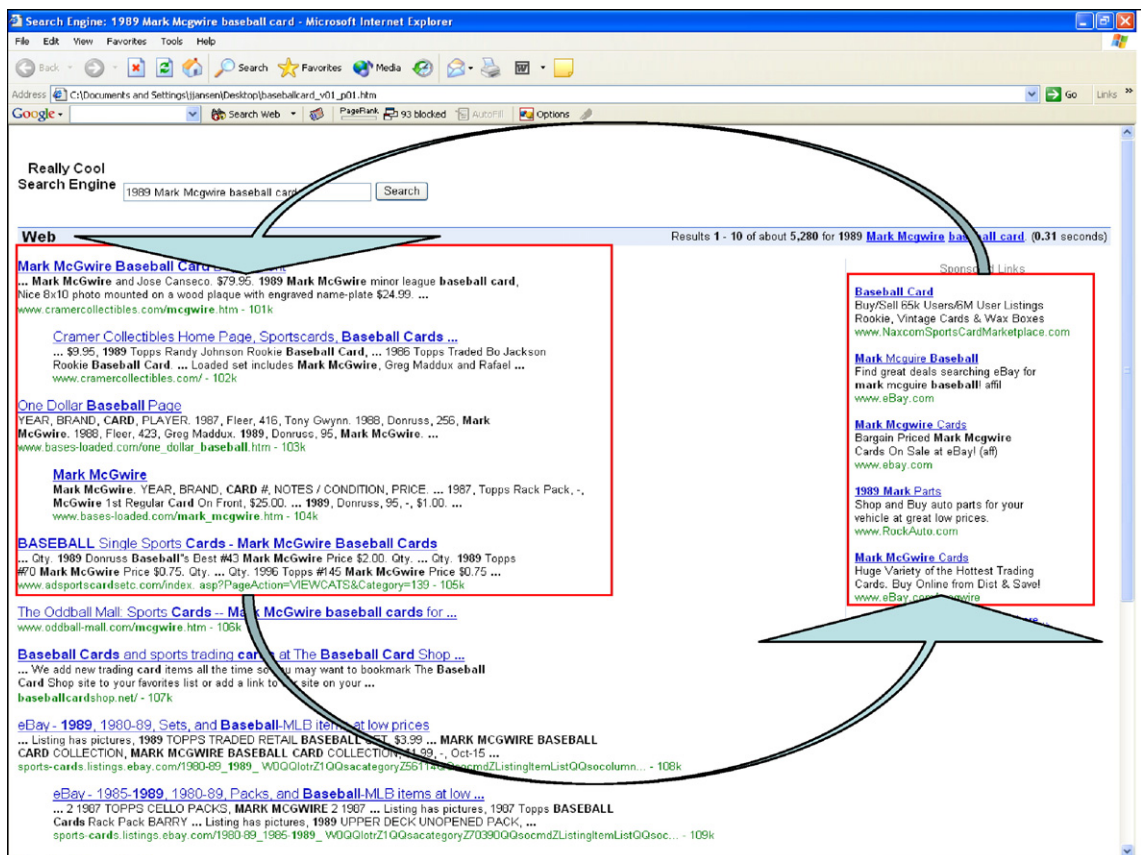


Fig. 1. Switched results page created.

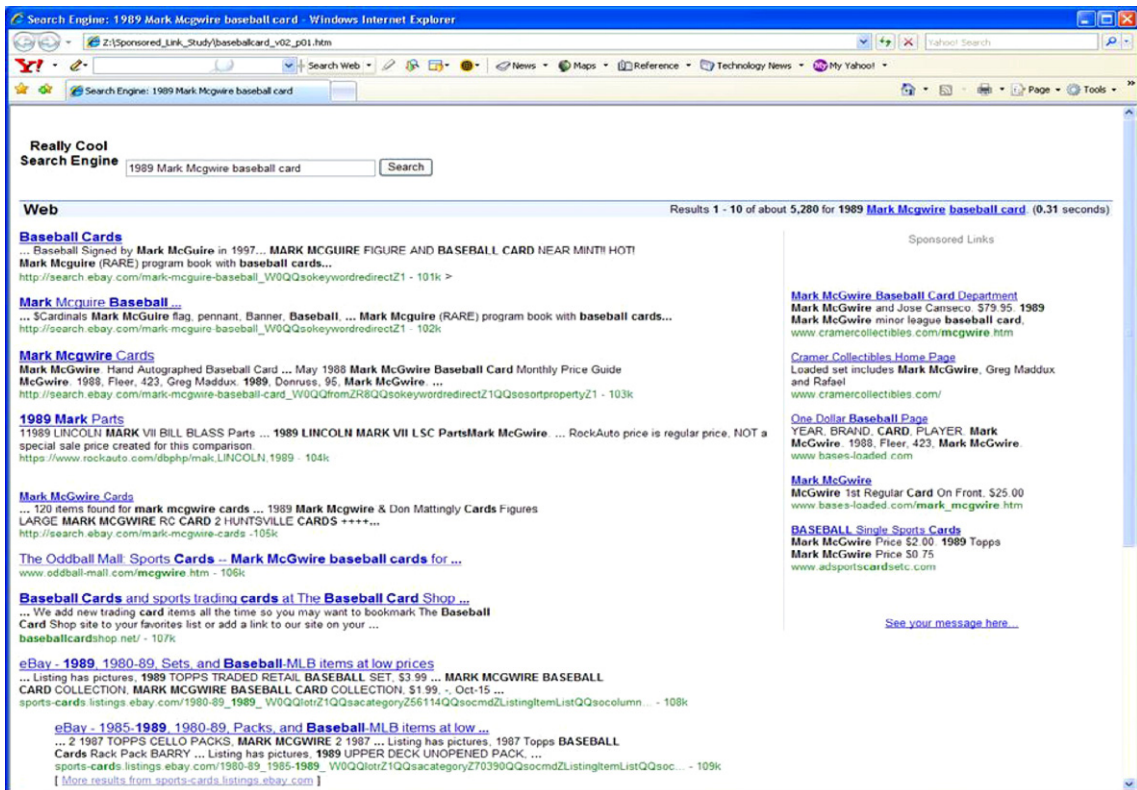


Fig. 2. Switched results page.

4.2. Study procedure

We conducted the study at two locations simultaneously, each location a major U.S. university. Both study sites followed the same procedure and used the same instruments. For the demographic characteristics of the participants, we recruited 56 participants between both campuses. We restricted the age range to 18–29 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 from each.

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

The moderator then read the participant one of the six e-commerce searching scenarios, informed him/her that the query had already 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 they had entered the query.

The moderator would end the session for that query when the participant took some action that would remove them from the presented results page (other than clicking on a link on that SERP). The moderator instructed the participant 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.

The moderator presented each participant with all six queries, one at a time. Each participant completed one query and then moved to the next. The moderator would read the appropriate scenario before the participant would move to the next query. For each participant, three of the SERPs were original and three were switched. We counterbalanced the order of original and switched result pages for each participant and between each participant. We also counter balanced the order of the tasks.

The moderator 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 we designed for quantitative and qualitative data capture for 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 viewed during the session. The participant evaluated the Web document and also presented a basis for the evaluation. The moderator collected these Web document evaluations again using the data collection application.

After the participant accomplished all six tasks and evaluated all Web results, the participant completed a demographic questionnaire and answered questions about his/her opinions regarding sponsored links. The data from participants' interactions with the six e-commerce tasks were used to address Research questions 01 and 05. We used the responses to questions regarding sponsored links on the post-study survey for Research questions 02, 03, and 04. Approximately one and a half hours were required to complete the sequence for each participant.

5. Results

The objective of the study was to evaluate the differences in participant behavior with organic and sponsored listings, along with the bases for these differences in action. We anticipated 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 not uniform in this regard based on analysis of Research question 01.

5.1. Research question 01: When using a Web search engine, do searchers have a bias against sponsored results?

Hypothesis 01a. When using a Web search engine, searchers will examine organic links before examining sponsored links.

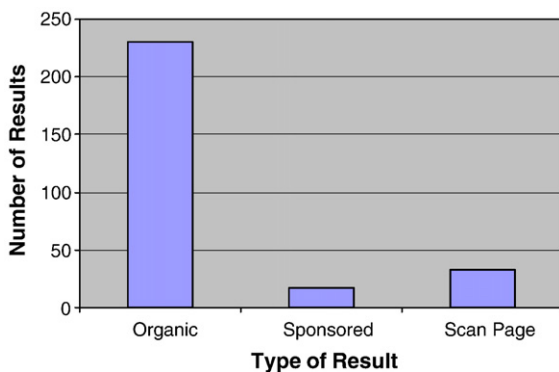


Fig. 3. Number of web results examined by type.

Table 1
Methods of viewing links on SERP

Method	Occurrences	Percentage (%)
Organic by rank	205	73.0
Scanned whole page first	33	11.7
Organic no rank	26	9.3
Sponsored by rank	12	4.3
Sponsored no rank	5	1.8
	281 ^a	100.0

^a Note: There were 55 tasks where the first action was not logged during a coding error.

Using a binomial test, we determined that participants were more likely to view the organic links first ($p < 0.001$) (see Fig. 3). Participants viewed the organic listings first during 82% of the tasks, compared to 6% for the sponsored listings. For 12% of the tasks, both were viewed first (i.e., participants scanned the entire page). From Fig. 3, both the viewed sponsored first and scan page occurred very infrequently.

Therefore, we accept Hypothesis 01a: when using a Web search engine for e-commerce searching, searchers will examine organic links before examining sponsored links.

Table 1 shows the initial methods of viewing the links on the SERP by search.

We see from Table 1 that on 73% of the searching tasks, users initially viewed the SERP using organic by rank. Just more than 6% of the time will searchers go to the sponsored links first. Although we expect some biases against the sponsored links, we found this percentage low given that these were e-commerce tasks. The implications for advertisers are that search engine optimization (SEO) is extremely important, even with the introduction of the sponsored search paradigm. For those advertisers that can get their Web sites on the first SERP for a particular query, this is an advantage. Of course, the issue is that there are only approximately ten non-sponsored links on the first SERP, so sponsored search is the alternative for those advertisers whose Web sites do not appear on the first SERP.

Hypothesis 01b. When using a Web search engine, searchers will examine organic links and not examine sponsored links.

Based on a binomial test, participants were more likely to view both the organic and sponsored links ($p < 0.001$). Nearly 27% (15) of the participants viewed only the organic listings while 73% (41) viewed both the organic and sponsored results. No searcher viewed just the sponsored links. When we examine this research question at the task level, we find that 51.5% (173 tasks)

of searchers solely viewed the organic results. During 48.5% (163 tasks), searchers viewed both organic and sponsored links.

Therefore, we reject Hypothesis 01b: When using a Web search engine for e-commerce searching, searchers will typically examine both the organic and sponsored links. This result is important for several reasons. For advertisers, it shows that even if their Web sites do not appear on the first SERP in the non-sponsored listing, sponsored listings are a viable alternative. For search engines, it shows that sponsored search may be a good method for addressing the criticism of some that there are biases in this ranking of the algorithmic links [15]. Sponsored search is mechanism that helps level the playing field.

Hypothesis 01c. When using a Web search engine, searchers will evaluate organic links as more relevant than sponsored links.

We used a chi-square goodness of fit test 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 ($\chi^2(2)=34.3; p<0.001$). This bias against sponsored links exists despite the fact that the content of the actual listing descriptions was controlled for relevance by rotating them between the organic and sponsored listings. Participants still rated 52.4% of the organic listings (557) as relevant compared to only 47.6% of the sponsored listings (506). As a note, these were the numbers for links that the participants actually viewed and not the total number of links that the participants possibly could have viewed.

Fig. 4 illustrates the evaluation of the links on the SERP using a three point scale.

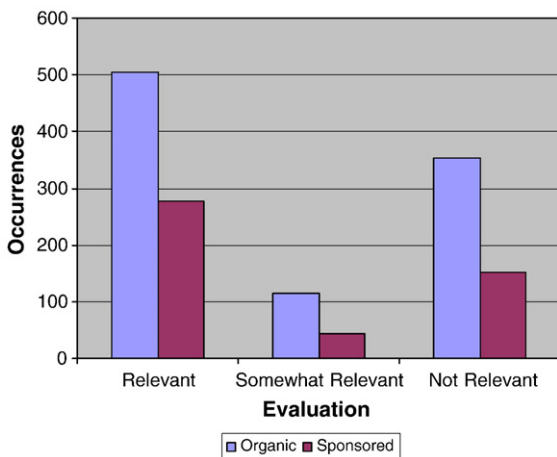


Fig. 4. Relevance evaluation of organic and sponsored links.

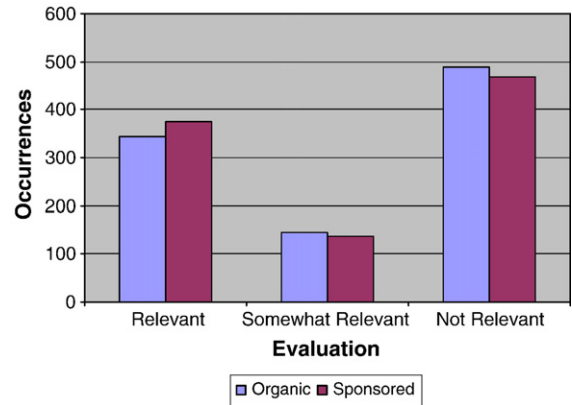


Fig. 5. Relevance evaluation of organic and sponsored results.

Therefore, we accept Hypothesis 01c: When using a Web search engine for e-commerce searching, searchers will evaluate organic links as more relevant than sponsored links. This result illustrates a concern for advertisers and search engine companies. The apparent inherent negative bias that searchers have for sponsored links (even given the control for quality in this experiment) will hamper sponsored search as a viable business model for a large segment of the Web population unless some corrective action is taken.

Hypothesis 01d. When using a Web search engine, searchers will evaluate organic results as more relevant than sponsored results.

This bias against sponsored results was not found when participants looked at the content pages that were linked to the listings. A chi-squared goodness of fit test found that there was no difference in relevance ratings of the content pages ($p=0.850$). Fig. 5 clearly illustrates this finding.

When viewing the content of the Web 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 within that Web. This is excellent news for search engine companies and advertisers. It shows that the negative bias searchers display toward sponsored links is changeable and can be overcome.

Therefore, we reject Hypothesis 01d: When using a Web search engine for e-commerce searching, searchers will not evaluate organic results as more relevant than sponsored results.

5.2. Research question 02: What are the bases for searchers' self-reported biases against sponsored links?

In a post-study survey, we questioned participants on their view points of sponsored links. The question was

“Do you ever look at sponsored links? Why or Why not? The results for the number of participants who responded to this question is reported in Table 2.

We see in Table 2 that approximately 35% of all searchers self-reported that they did or at least sometimes clicked on sponsored links. We investigated how this tracked with their behavior during the study. Fifty-five percent (31) of the participants viewed a sponsored Web page at least once during their six searches during the study, and 45% (25) did not. For 173 of the searching task, 51.5% of the times a searcher viewed only the organic results. For 163 of the searching tasks (48.5%) a searcher viewed both organic and sponsored links. Therefore, the participant self-reported bias was about 10% higher than what was observed in the lab study.

However, the data from the lab study shows that while 73% of searchers look at the sponsored links, only 38% actually look at the Web sites pointed to by these sponsored links, perhaps based on the notion that the sponsored sites are only there to sell you something. These percentages are more inline with the participants' survey responses. The implications for e-commerce are that users will look at sponsored sites, but only if it is their last option or they think the sponsored site is very relevant.

We investigated the participants' self-reported factors of why they did or did not view sponsored links. The results are displayed in Table 3.

We see from Table 3 that the primary motivation of searchers is relevance (40%), valuing this aspect of sponsored links three times as much as any of the other main factors, such as appeal (12%), need (12%), or options (12%). Of the respondents, 65% reported that they would look at sponsored links if they thought they were relevant. There were 35% of the respondents who stated that they never looked at sponsored links because they thought they were always non-relevant. The percentages are calculated from the total number of passages coded. For managers and content providers of sponsored search, there are several implications from these results. First, understanding the domain of the searcher is critically important in addressing the relevance issue. This would point to the need to bid on phrases that link specific products to particular infor-

Table 2
Self-reported viewing of sponsored links

Yes	16	28%
No	37	65%
Sometimes	4	7%
	57	100%

Table 3
Participant viewpoint of sponsored links

Node	Passages coded ^a	Nvivo tree placement	Percentages
Viewpoint			
Relevance	17	Viewpoint/relevance	40%
Relevant	11	Viewpoint/relevant	65%
Irrelevant	6	Viewpoint/relevance/irrelevant	35%
Usefulness	3	Viewpoint/usefulness	7%
Options	5	Viewpoint/options	12%
Appeal	5	Viewpoint/appeal	12%
Intrinsic	1	Viewpoint/intrinsic	2%
Need	5	Viewpoint/need	11%
Reliability	3	Viewpoint/reliability	7%
Motivations	1	Viewpoint/motivations	2%
Trust	3	Viewpoint/trust	7%
	43		100%

^a Passage is Nvivo terminology for the unit of verbal protocol, in this case the responses of the participants.

mation contexts. Second, the appeal and intrinsic characteristic of the Web site are key attributes for enticing searchers to click on a sponsored link. Finally, the trust factor in terms of a known URL and branding of an online presence can also improve click through rates for sponsored links.

A subset of respondents commented specifically about the purchasing of products, so we analyzed these separately with the results displayed in Table 4.

For those who are searching for products, we see a shift in view of sponsored links. It appears that many of the searchers, who avoid sponsored sites for information searches, click on them frequently when the listings are directly Commerce Related (43%). Potential Influences (29%) follow this. That is, the searcher will click on a sponsored link in the midst of a product search hoping to find information relevant to that product. They seem to be very likely to view sponsored links, in the hopes of getting a better deal, or at the very least, a convenient

Table 4
Participant viewpoint of sponsored links when searching for a product

Node	Passages coded	Nvivo tree placement	Percentages
Buyer related			
Cost	2	Buyer related/cost	14%
Commerce related	6	Buyer related/commerce related	43%
Potential	4	Buyer related/potential	29%
Utility	2	Buyer related/utility	14%
	14		100%

price comparison. For the e-commerce systems, this should encourage them to continue promoting their Web sites. From several of the responses, we see that users are very likely to buy products from these sponsored sites provided that the product information is relevant and appealing.

5.3. Research question 03: Does a lack of information concerning sponsored links contribute to the bias?

Prior research has reported that many searchers do not understand sponsored links. Therefore, we investigate if providing information about sponsored links positively alters searchers' viewpoints. In the post-study survey, we provided a brief explanation of what sponsored links are, then again questioned the participants concerning their viewpoint of sponsored links (Table 5).

In the second category, Education, the major factors are again relevance and acceptance. We see both factors in the 36–47% range. Again, respondents stated that they would only click on sponsored links if they thought that they were relevant. There was an increase in acceptance after the respondents had a better understanding of sponsored links. Based on the data, it appears that the users are more lenient in their view of sponsored links after they have a better understanding of what sponsored links are. One user commented that he would use them more now that he knew they were paying for their position on the page. However, most of the user's still viewed sponsored links as irrelevant and misused space. This data points to the possibility that educational marketing about what sponsored links are could assist in overcoming some of the searcher bias against them, but not all.

5.4. Research question 04: What is the impact of disclosure on searchers' viewpoint of sponsored links?

There have been several reports concerning searchers not being able to identify sponsored links, with search engines being implicated in efforts to not fully disclose

Table 5
View of sponsored links after educational scenario

Node	Passages coded	Nvivo tree placement	Percentages
Education			
Acceptance	17	Education/acceptance	48%
Relevance	13	Education/relevance	36%
Trust	3	Education/trust	8%
Motivations	3	Education/motivations	8%
	36		100%

Table 6
Effect of disclosure on participant perceptions of sponsored links

Node	Passages coded	Nvivo tree placement	Percentages
Disclosure			
Enjoyment	9	Disclosure/enjoyment	18%
Effectiveness	25	Disclosure/effectiveness	49%
Quality	14	Disclosure/quality	27%
Motivations	3	Disclosure/motivations	6%
	51		100%

sponsored links. We investigate whether or not the level of disclosure influences searchers' viewpoints concerning sponsored links. The results of our data analysis are displayed in Table 6.

From Table 6, we see that the primary factor is still relevance or effectiveness (49%), while quality the next largest influence is roughly half that (27%). It appears from the data that the information provided in the second question allowed the user to formulate an opinion about sponsored links, while in this question we were asking users if disclosure affected their usage. It seemed that most users were willing to forgive the deceptive practice of disguising the sponsored links if they were able to effectively locate relevant information. Several users noted that if the search engine had more money (i.e. had more sponsored listings), this would possibly increase the quality of the algorithms that would hopefully produce significantly better organic results. It appears that the respondents are unconcerned about disclosure if in the end they are able to find truly relevant information.

5.5. Research question 05: After viewing the SERP, what is the searcher's next action?

In Table 7, we present what the participants' next actions were after completing all actions on the SERP.

We see in Table 7 that more than 93% of searchers who located a relevant product would purchase online. What is very interesting is what happened when the searchers did not locate relevant information. Of these searchers, approximately 59% of the searchers would remain on the search engine by either going to another results page (42%) or reformulating the query (17%). The other 41% of the searchers would leave the search engine for either another search engine, leave for another Web site (22%), or just quit searching online (19%). The searchers that quit stated it would be easier just to go to Wal-Mart, Target, or some other store to find the item. Generally, this is good news for

Table 7
Next action following departing the SERP

	Occurrences	% of total actions	%
<i>Located relevant information</i>			
Buy product	99	32.5%	91.7%
Online	93	93.9%	
Offline	5	5.1%	
Place a bid (at online auction site)	1	1.0%	
	99	100.0%	
Seek more information (offline)	9	3.0%	8.3%
	108		100%
<i>Did not locate relevant information</i>			
Go to another results page	82	26.9%	41.6%
Go to another Web site	43	14.1%	21.8%
Another search engine	38	88.4%	
Another Web site (to search)	5	11.6%	
	43	100.0%	
Quit (too much trouble to locate online)	38	12.5%	19.3%
Reformulate query	34	11.1%	17.3%
	197		100.0%
	305	100.0%	

the search engine companies and it shows that there is a degree of stickiness to the Web search engine users.

6. Discussion

We conducted a controlled study and survey investigating searcher biases toward sponsored links, controlling for content between the sponsored and non-sponsored links. For sponsored search to yield the financial returns that the business community and Web search engines anticipate in the coming years, it is critical that consumers perceive sponsored links and their descriptions as relevant to their transactional tasks. Unfortunately, the results of this study support some previous findings from survey studies that many searchers do not view sponsored links in a positive manner. It appears that sponsored links are currently reaching only a limited percentage of the Web searcher population. However, the results also provide possible avenues for the development of the presentation of sponsored links presentation and marketing campaigns. Certainly, the results of this study show that even a limited educational campaign targeted to Web shoppers would dramatically and positively influence searcher perceptions of sponsored links.

The participants in the study showed a bias against sponsored links in several ways. They viewed organic links first greater than 82% of the time. It should be noted that there may be other reasons for this behavior in

conjunction with bias against sponsored links. For example, eye tracking studies [12,13] have shown that there is a visual hot spot at the top left portion of the SERP. So, this normal eye-movement behavior aspect may be adding to the negative bias. The outcome is the same, however, searchers typically view organic links first.

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 and in the post-study survey. They rated the relevance of the sponsored links as lower than the organic links in spite of the content of the descriptions being controlled across listing type. Undoubtedly, if sponsored links are to be a long-term business model for Web searching, the lack of trust and bias against these sponsored links must be overcome. In participant responses, the major evaluation criterion for sponsored links was relevant to the information task. This was rated paramount by the respondents, even if the nature of the sponsored link was not disclosed. When viewing the Web pages rather than the result listings, the participants reported no difference in relevance ratings.

The strengths of this study are that it involved the use of real queries from a major Web search engine transaction log. Therefore, the queries represent real e-commerce needs of real Web searchers. The searchers were also placed in realistic scenarios that actual e-commerce searchers would find themselves. The search engine results were also actual results from the Web presented in a controlled environment. As such, the study combined the best of both generalizability and accuracy. As with any study, there are limitations. The participants in this study were all college students at two major US universities. As such, the results may be biased in that the interactions, expressions, and attitudes of these participants may not reflect the entire Web population. As such, there is an external validity question. However, given that the samples from the two universities did not differ in any of the measure, we are reasonably assured that the results are generalizable.

7. Conclusion and future research

In general, the results indicate that searchers do have a bias against sponsored links, even when controlled for content. However, when they view the content Web pages of sponsored links, searchers evaluate the sponsored Web pages just as relevant as the pages of the organic links. 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. Search engines need to leverage this

effectiveness and educate their customers in order to ensure that sponsored links achieve the market share expected if the sponsored search market is to continue to expand. With reports of approximately 30% of searchers presently interacting with sponsored links, there is certainly a potential growth market and revenues for Web search engines companies.

Our future research plans are to evaluate a broader range of e-commerce queries to identify specific query characteristics that might predict the viewing of sponsored links. This would also make possible the identification of searcher, system, or content factors that contribute to the present searcher bias against sponsored links. We are also looking at examining transaction log data from Web meta-search engines, which typically inter-mix non-sponsored and sponsored links together in one result listing to measure the effective on the percentage traffic to sponsored links. Another avenue of future research would be to measure the effect of increasing levels of education or disclosure of about sponsored linked. These findings will aid the expansion of the sponsored search market to a wider range of Web searchers, helping to ensure the growth of this market. We would also like to evaluate a significant sample of sponsored and organic links to determine a relevant comparison.

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 and 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,” and “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, and Unsure.

12. After you rate each one, tell me why you think so.

Repeat 9–12 for all six queries.

Post-test 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.

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