

The Brand Effect of Key Phrases and Advertisements in Sponsored Search

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ABSTRACT: In this paper, we analyze the relationship between performance and use of brand terms in the key phrases that link advertisements to searcher queries. We use data that consist of more than 2.5 million daily records from a key word advertising campaign of a major U.S. retailer. The campaign spanned nearly four years, involved approximately \$8 million in advertising cost, and generated more than \$23 million in sales. We categorize key phrases and advertisements as either brand focused or non-brand focused. Using analysis of variance in a 2×2 design, we analyze use of branded terms on the critical key word advertising metrics of number of clicks, cost per click, sales revenue generated, number of orders, number of items ordered, and return on advertising cost, as well as number of impressions triggered by these key phrases. Therefore, we investigate a significant spectrum of user actions and consumer behaviors in a sponsored search campaign. Our findings show that there is a significant advantage to matching branding terms in key phrases and advertisements relative to any other combination of key phrase or advertisement for all the metrics examined. A combination of a branded phrase and a branded advertisement generated 15 times more sales revenue than any other combination of phrase and advertisement. Therefore, a focus by key word advertisers on branded terms for search engine ads could be quite beneficial for both the effectiveness and efficiency of key word advertising. The implication for online advertising and key word search in the e-commerce domain, especially for large retailers, is that brand mentions in both key phrase and advertisements correlate with higher conversions.

KEY WORDS AND PHRASES: Branding, brands, key word advertising, online advertising, pay per click, search engine marketing, sponsored search.

Approximately half of all purchases in the business-to-consumer e-commerce category are preceded by a Web search [39], indicating the importance that search engines play in online shopping and sales. In this e-commerce environment [71], online advertising on search engines has blossomed. The most popular form of online marketing is key word advertising (also referred to as sponsored search, pay per click [PPC], and search engine advertising) [61]. Therefore, search engine advertising is becoming increasingly important, with some companies spending large amounts of money so that potential customers using search engines can see their ads.

Sponsored search, emerging in 1998 [16], has rapidly become the central business model of the major search engines, of which the PPC model is the most prevalent [45]. Financed by advertising revenue, sponsored search has

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generated billions for Google [25], by far the major source of profits for the company, as well as significant revenue for other search engines. Online advertising finances the free searching that is now an integral aspect of daily life for many people and the other free services (e.g., e-mail, office productivity suites, navigation, chat) provided by the major search engines. As such, key word advertising has helped shape the nature of the Web today, is increasingly a concern for businesses [68], and is therefore an area of critical research importance.

More specifically, key word advertising is a type of online advertising that companies use to promote their products and services on search engine results pages (SERPs), as well as at other Internet locations. Prior work has shown that searchers experience certain searching costs (e.g., locating a seller, locating price information, and locating product information) [67], all of which sponsored ads can address. Not only are search engine ads useful for increasing traffic to a company's Web site, they may also enhance a company's brand image and market reach. At its most general meaning, a brand is the intangible sum of an organization's attributes, and it can reflect an organization's name, history, reputation, and advertisement [60]. Key word advertising offers a unique opportunity for businesses and organizations to measure the effect or value of their brands by leveraging the brand, such as including brand names in key word advertisements. Providing relevant content and service can also enhance a company's brand image [29].

Given that companies are motivated to develop a positive brand image [14], it seems reasonable that they might want to leverage this brand directly in their key word advertising campaigns. However, there has been little published research investigating this important link between key word advertising and brand effect, especially concerning the wording of these key word advertisements [47]. Consequently, we currently have limited insight into how searchers, as potential consumers, interact with branded key word advertisements or what could be the possible causes of such behaviors.

Therefore, there are several open questions: Can a company leverage its brand in key word advertising to increase sales? Does a brand positively influence the potential customer to take action? Do consumers search for brands, and what does it mean if they do? What are the possible causes of any brand effect in key word advertising? What effect do brands have on a company's bottom line? These are some of the questions motivating our research. In the research reported here, we investigate the effect of using brand terms in key word advertising. Specifically, we investigate the interplay between branded terms in the key phrases, correlated with the queries that users submit to Web search engines, and in the advertisements displayed on SERPS.

In the text that follows, we begin with a literature review, outlining some of the prior work on branding in search and online purchasing. We then present our research questions and associated hypotheses, along with justifications. We present a brief overview of sponsored search next, followed by a description of our data and methods of analysis. We then discuss results and implications for advertisers, online advertising platforms, and consumers. We end with areas for future research.

Review of Literature

Brand and Branding

The advertisements on SERPs can contain branding elements. A brand can distinguish an organization or a product from its competitors. Therefore, a positive attitude toward a brand can result in customer loyalty and positive image of a business's products and services. Positive branding can have a dramatic effect on consumer reactions even when no product or service difference exists. To illustrate the value of a positive brand, in a study focusing on children's perspectives of food products, results showed that study participants ranked McDonald's branded milk and carrots as tasting better than identical products with non-McDonald's branding [55]. Therefore, branding can have a dramatic affective influence on a consumer's perception of a product, service, or experience.

Brands play a large role in search engine marketing, with branding being a major focus of the Search Engine Marketing Professional Organization (SEMPO) [13]. Where a brand is a unique attribute, name, term design, or symbol, branding is making consumers aware of a company's goods or services by seeing the "brand" and presenting an idea of what that brand means [60], and a company's online reputation can affect online sales [43]. SEMPO reports that, among advertisers, brand awareness is a top objective of sponsored search campaigns, especially for larger firms [59]. The survey found that 56–71 percent of firms use sponsored search campaigns to enhance brand awareness [59]. The effects of branding are measured through the return on marketing investments [46, p. 18]; therefore, it is extremely important for a company to have a good branding strategy in the key word advertising space and to measure the value of that brand in this area.

Branding efforts have several subcomponents that may affect the key word advertising area. These include *brand awareness*, *brand image*, and *brand relationship*. Brand awareness is related to the strength of the brand in memory, as reflected by consumers' ability to identify the brand under different conditions [51]. Brand image is the perception about a brand based on the brand associations held in the customer's memory [37]. Brand relationship is the exchange and communal aspects between the brand and the customers, which are represented by brand satisfaction and brand trust [14]. A positive brand image can aid a business in withstanding price competition [41].

These brand effects have been studied as antecedents of online trust relating to the vendor, to the Web site, and to the product, and as a means to communicate the trustworthiness of an e-vendor (for an extensive analysis, see [58]). These brand concepts are strongly interrelated and represent various stages and aspects of an individual's brand perception and processing, along with brand trust [26, 63]. Ha and Perks [26] examined the relationship of brand experience, brand familiarity, customer satisfaction, and brand trust in the online environment. They report that the search for information, familiarity, and customer experience are antecedents to brand trust. In another study, Esch et al. [15] proposed and tested a conceptual model to relate perceptual

variables (brand awareness and brand image) and relationship variables (brand satisfaction, brand trust, and brand attachment) to current and future purchasing behavior. Researchers have also done work on a search engine's effect on Web page browsing for products and services [10, 17, 50]. Pan et al. [49] found that searchers commonly type brand information into a search engine to find specific hotel Web sites, which is a navigational use of a search engine [56].

However, studies examining the effect of brands in sponsored search results are very limited. Related work in print advertisements has debated whether or not using a branded term has much effect on readers' attention; however, use of branded terms appears to have a slight influence on increasing the readership of an ad [52]. The Interactive Advertising Bureau and Nielsen Ratings studied Internet search brand effectiveness, finding that SERP branding is stronger than contextual ads in consumer awareness, especially when the company has the top position of the SERP listing [48], but this study did not investigate consumer interactions with SERPs or advertisements. Previous research has shown that brand image, positive or negative, is correlated with online product reviews [1]. In a series of articles, Ghose and Yang [20, 21, 22, 23, 24] used an aggregate data log of a key word advertising campaign from the first 13 weeks of 2007 containing weekly statistics for 1,799 key words with 5,147 records. They report that use of brand terms, retail terms, and ad rank have an effect on campaign performance. They show that queries with retailer-specific brand information tend to have higher click-through rates. Due to the small size of the data set, however, the researchers had to populate the null fields of the data set with simulated data. Nevertheless, this prior work does indicate the potential fruitfulness of this stream of research.

Aside from these works, there are limited investigations concerning the role of branding in sponsored search, including the effects of branded advertisements on consumer interactions with search engines. Additionally, there has been little to no work in actually measuring the brand effect on SERPs. Therefore, we have little insight into the measurable metrics of online brand value (i.e., the bottom line effect of a brand). Sriram et al. [66] advocate incorporating the utilization of sales data into an overall methodology for determining brand value, which we do in this research by utilizing revenue and order figures.

Key Word Advertising

Prior to introducing our research question, we first describe the key word advertising process and important metrics. In key word advertising campaigns on the major search engines, advertisers typically bid on key phrases they believe relate to some product or service they are providing. These key phrases link ads from the advertiser to queries submitted by potential customers, who are the searchers on the Web search engines. Reports indicate that about 15 percent of search engine clicks are on these key word advertisements [33].

When a searcher enters a query that matches a key phrase, a set of ads is displayed on the SERP. The amount that an advertiser *must* bid to get an ad to

display depends on the overall demand for that key phrase. The amount that an advertiser is *willing* to bid depends on the perceived value of the visitor as determined by potential revenue and the cost of the acquisition.

Ads on the SERP are typically shown above the organic results (i.e., the results determined algorithmically by the search engine) listing (i.e., the north position), to the right of the organic results listing (i.e., the east position), or below the organic results listing (i.e., the south position), depending on the search engine. The rank of the ad depends on the bid price and a quality score (i.e., it is determined by several factors, including click-through history and landing page relationship to the ad).

These advertisements typically consist of a short headline, two short lines of text describing the product or service, and a hyperlink that points to the advertiser's landing page (i.e., an advertiser-designated Web page). In the PPC arrangement, an advertiser only pays the search engine if a searcher actually clicks on the displayed ad hyperlink.

There are several key sponsored search terms commonly used in the industry, and a basic knowledge of these is necessary in order to follow the research presented in this paper. An advertisement displayed on a SERP in response to a query that matches a given key phrase is called an *impression*. Clicking on an ad's hyperlink pointing to an advertiser's landing page is a *click*. The search engine bills the advertiser for this click, an amount known as the *cost per click* (CPC), which is capped at the advertiser's bid on the key phrase. Once at the landing page, if the consumer takes some measurable action, as defined by the advertiser, this act is known as a *conversion*. Typically a conversion is a purchase (aka an *order*), although it can be any other consumer action. An order can be composed of one or more *items*. The *sales revenue* generated from this conversion defines the value of that customer. The effectiveness of the key word advertising campaign is measured by revenue generated minus the advertising cost.

This is a brief overview of a very complex process. For further discussions of key word advertising, see [16, 30], which are part of a small but growing body of literature on key word advertising. Jansen and Resnick [31] report that searchers have a bias against sponsored results, but introducing searchers to relevant sponsored results overcomes this bias (i.e., it becomes positive). Brooks [6, 7] also shows how the ad rank affects clicks and conversions, following a curvilinear function of the ad's rank. Sen et al. [62] present situations for optimal ad pricing for the search engine. Jansen and Spink [33] report that the click-through rate on sponsored links is about 15 percent. Brooks [8] show that searchers repeat visits to search engines and click on similar ads during these visits, although Bruner and Kumar [9] state that more experienced searchers become desensitized to ad stimuli. Kalczynski et al. [36] use clickstream data to model task completion. Fulgoni and Mörn [18] show that exposure to multiple sponsored ads has a positive impact on consumer intent to purchase. However, none of these works addresses the effect of branded terms on the sponsored search process.

After a review of literature, we see there has been little empirical evaluation of the actual effect of a brand on consumer behavior on the search engine or on a company's bottom line in the online marketplace, with prior work focusing

primarily on cognitive and affective aspects of consumer reaction to brands. In fact, with the exception of the work by Ghose and Yang [20, 21, 22, 23, 24], there have been few published empirical studies of key word advertising campaigns using real-world data sets. Addressing this lack of research could have profound impacts on understanding the effectiveness of sponsored search services and campaigns for both consumers and advertisers.

Research Objective

Research Question: Does mentioning a brand term in advertisements or key phrases affect the performance of a sponsored search campaign?

It is generally accepted that branding has an effect on consumer behavior [15]; therefore, we would expect that brand mentions might have some effect on sponsored search campaigns, although what the effect might be is not clear. Understanding the relationship between brand mentions (in ads and key phrases) and consumer behavior provides an opportunity for online businesses to optimize their search engine marketing strategies by leveraging their brand awareness, brand image, and brand relationship. Additionally, the metrics of key word advertising provide a vehicle for companies to measure brand value in the online marketplace. Results from this research can serve a variety of purposes, including ad creation recommendations, valuable query indications (i.e., justification for higher bids), and use of more advanced targeted marketing methods by the sponsored search platforms.

The theoretical foundation of this research question is signaling theory [65], which postulates that certain signals are more reliable and trustable than others, with significant research into signals such as quality and price [19, 40]. Given that positive brand image can evoke affirmative consumer responses [14], signaling theory would indicate that brand mentions in advertisements would be primary signals for consumers. Specifically, in the area of Web search, signaling theory has been investigated in the context of information foraging theory [53] and, specifically, information scent [54]. As explained by information foraging theory, searchers choose information sources that are the most likely to contain rich content. Individual searcher actions are determined by the information scent of a particular information objective, such as the textual clues of an individual listing on a SERP. Therefore, information foraging theory would again indicate that brand ads, with associated brand queries, might be good information scent for searchers.

To investigate our research question, we developed two classifications for key phrases (i.e., phrases on which advertisers bid in order to trigger the ads) and two for advertisements (i.e., ads created to show on a SERP in response to a user query):

- *Brand-focused key phrases:* key phrases that contain a mention of a brand name.
- *Non-brand-focused key phrases:* key phrases that contain no mention of a brand name.

- *Brand-focused key advertisements*: advertisements that contain a mention of a brand name.
- *Non-brand-focused key advertisements*: advertisements that contain no mention of a brand name.

We implemented this classification via a straightforward key word matching methodology. With these four classifications, we investigated four phrase and advertisement combinations as shown in the 2×2 matrix in Table 1.

Based on our research question and prior work in the branding area, as outlined above, we developed six hypotheses.

Hypothesis 1: *There will be a significant difference in the number of clicks based on the brand focus of the key phrase and advertisement combination.*

The click-through rate is one of the most important measures of sponsored search success and the effectiveness of an ad. It is also a critical user behavior in many aspects of online searching. The goal of most key word advertising campaigns is to get potential consumers to click on a given advertisement and go to the business's Web site. Therefore, the click is a commonly used measure of potential interest in a search engine result and has been used as a surrogate for relevance judgments by users [35]. As such, any brand differences on click through would shed important light on the branding effect in both key word advertising and user behavior.

Hypothesis 2: *There will be a significant difference in the CPC based on the brand focus of the key phrase and advertisement combination.*

Advertisers must bid different amounts for different key phrases depending on the value that the advertiser places on those key phrases as well as on the competition from other advertisers. One would expect key phrases that advertisers anticipate will get higher sales will also be the most expensive. Therefore, higher cost per click for certain key phrases classified along branding lines (i.e., such as the name of a company) would indicate preferences for those phrases by online advertisers, being a sign of an expectation of brand value. The rule of thumb in key word advertising is that it is better to bid on branded key words than not. The justification for this is that if you do not bid on them, your competitors will. Prior work [57] has shown that this does occur, with the overall rate being low but varying by industry. Bidding on branded key words is also encouraged in order to take up screen real estate on the search engine results page, the thought being that one's own ad will push another ad off the page.

Hypothesis 3: *There will be a significant difference in the average sales revenue based on the brand focus of the key phrase and advertisement combination.*

Most online advertisements for retailers have the aim of generating a sale. Naturally, branding differences in key phrases and ads in terms of sales

Table 1. 2 × 2 Matrix of Ads and Key Phrase Combination.

	Brand-focused phrase	Non-brand-focused phrase
Brand-focused ad	Combination of a brand-focused phrase and brand-focused ad	Combination of a non-brand-focused phrase and brand-focused ad
Non-brand-focused ad	Combination of a brand-focused phrase and non-brand-focused ad	Combination of a non-brand-focused phrase and non-brand-focused ad

revenue would provide insight into the receptiveness of these searchers to online brand image and relationship. Sales revenue is a measure of the profitability of these searchers for online advertisers and a concrete measurement of brand value online.

***Hypothesis 4:** There will be a significant difference in the number of orders based on the brand focus of the key phrase and advertisement combination.*

Correlated with sales revenue, number of orders placed for a given set of key words is also tracked by companies. Any differences in number of orders among the brand-focused categories would be an indication of differences in online shopping behaviors associated with the brand, such as willingness to purchase, trust association, and perceived risk.

***Hypothesis 5:** There will be a significant difference in the number of items purchased based on the brand focus of the key phrase and advertisement combination.*

Associated with orders, number of items purchased per order is a key metric of online sales. Cross-selling (i.e., enticing consumers who come to an online store for potentially only one set of products to purchase related products) [3] is a familiar retail practice. Moreover, consumers that purchase multiple items may be more valuable than consumers who purchase only a single item. Therefore, any branding differences would be of profound importance to online retailers.

***Hypothesis 6:** There will be a significant difference in the return on advertising based on the brand focus of the key phrase and advertisement combination.*

Although a particular key phrase or advertisement may generate sales, the final evaluation of any advertising effort, in terms of effectiveness, is how much profit the effort generates, which is referred to as the return on advertising (ROA). The ROA equals the gross sales of a particular advertising effort divided by the cost of that advertising effort. If the ROA is positive, the advertising effort is effective. If the ROA is negative, the effort is ineffective, as it costs more to run the campaign than the campaign generates in revenue. Therefore, ROA is of critical importance for advertisers.

Research Design

Data

The data file used for this research contains daily information on a sponsored search campaign from a large nationwide retailer, with both brick-and-mortar stores and online sales presence. With several hundred stores and an active online presence, the retailer offers a variety of novel products covering a wide price range, from a few dollars to several hundred dollars. Given its national presence, the combination of both real and virtual stores, and the range of products, we consider the retailer to be an excellent data collection site for the study of branding and key word advertising.

The data in the log is a record of the search engine marketing campaign by the company during a 33-month period spanning four calendar years, from September 30, 2005, to June 9, 2008. The log contains a rich data set in that it includes the key phrase that triggered the ad, the ad, the searcher responses, such as clicks, and sales information. Given the four years of data collection and the relative stability of the sponsored search platforms during this period, we believe that the data provide insights into current online e-commerce Web searching, in addition to providing findings concerning key word advertising solely during the data collection period.

The log file contains in excess of 2.5 million records from nearly 40,000 key phrases and more than 45,000 advertisements. The data log holds a record for every day during the 33 months of the campaign in which one of the key phrases triggered an ad. There is a unique record for each key phrase on a given day. Each record in the data log has a variety of information associated with key phrases for that day. Each record includes the key phrase that triggered the ad, the number of impressions for that phrase on that day, the number of clicks, the total cost of that key phrase for that day, number of conversions (i.e., orders), the total sales revenues, and the total number of items ordered. On a given day, a phrase may trigger one or more impressions but no clicks. If there is a click, there may or may not be a conversion. If the customer places an order, the order may be composed of one or more items. The total cost of the order is the sales revenue generated. One can calculate the ROA using sales revenue minus advertising cost.

Table 2 shows applicable fields in the log used for the research reported here.

Given the limited research published examining customer behavior in the key word advertising area, we believe this data set can shed needed insight into this important area and provide us with the required data with which to investigate our research question and associated hypotheses about the effect of branding in the sponsored search area.

Categorizing Ad and Query

To address our research question and associated hypotheses, we categorized 45,688 sponsored search ads and 39,748 key phrases from our key word

Table 2. Fields from Key Word Advertising Log.

Field	Description
Ad number	Unique identifier for the advertisement
Advertisement	Heading, line 1, and line 2 of the advertisement
Key phrase	Key phrase that triggered the advertisement
Day	Date of data collection
Impressions	Total number of impressions for that day for the given advertisement with the given key phrase
Clicks	Number of clicks on the advertisement for that day for a given key phrase
Cost	Total cost for the day for a given key phrase for a given advertisement
Sales	Revenue generated from that advertisement on that day for a given key phrase
Orders	Number of orders from the advertisement for that day for a given key phrase
Items	Number of items purchased within the order for a given day, advertisement, and key phrase; one order could have one or more items

advertising campaign of this major retailer into brand-focused or non-brand-focused categories, as presented in Table 3.

We analyzed the headline, line 2, and line 3 in the 45,688 ads for occurrence of branded terms. If a branded term appeared in any of the ad components, we classified the ad as brand focused. In the ad summarized in Table 3, the company name is mentioned in the headline; therefore, it is a branded advertisement. We categorized the 39,748 key phrases in the same manner, as also shown in Table 3.

Data Analysis

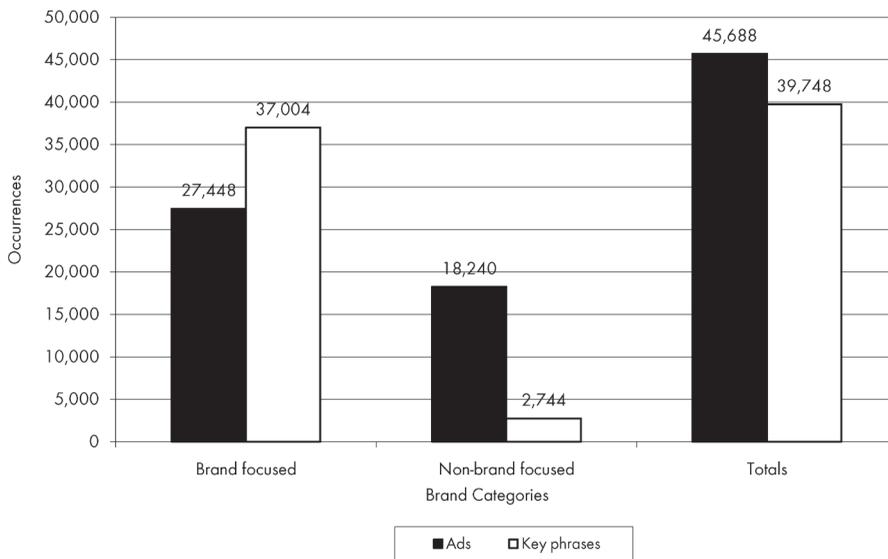
Of the 45,688 advertisements, there were 27,488 brand-focused ads and 18,240 non-brand-focused ads, as shown in Figure 1. As Figure 1 shows, slightly more than 60 percent of the ads were brand focused, with just less than 40 percent of the ads being non-brand focused. With 50.5 percent more brand-focused ads than non-brand-focused ones, this retailer adhered to accepted brand awareness and image concepts [15] of promoting one's brand to online consumers. Of the 39,748 key phrases, there were 37,004 brand-focused phrases and 2,744 non-brand-focused key phrases, as shown in Figure 1. Ninety-three percent of the key phrases were brand focused.

Once we classified each unique key phrase and ad, we used this set of phrases and ads to classify automatically the phrases and ads in the 2,570,771 records in the complete data set. After this, we linked key phrase and ad combinations, now classified with one of the brand-focused categories, to the associated user behavior and sales data in that record. With this consumer behavior data, we could then examine each key phrase and ad category based on our research question and hypotheses. Table 4 shows a snippet from the data log of more than 2.5 million records with applicable fields used for this research.

Table 3. Example of a Sponsored Search Advertisement.

Ad component	Ad content	Brand focused
Headline	Branded Term canine supplies	1
Line 2	Pet toys	0
Line 3	Gadgets and grooming item	0
	Key phrase	Brand focused
	Branded Term foldaway elliptical	1
	Personal alarm clocks	0

Note: We replaced the actual brand with Branded Term.

**Figure 1. Ad and Key Phrase Brand Categories**

Once we processed all the information, we imported the data into SPSS, which we used to run the analysis of variance (ANOVA) tests to investigate differences among the means of the brand-focused categories. However, our data are not multivariate normal; instead, they have a power law distribution. We transformed the data via the Box-Cox power transformation [5] by using $\log(\text{variable} + 1)$. After employing the Box-Cox power transformation, we plotted our data to determine whether they were normalized. The data were successfully normalized, although the distributions were skewed to the left (i.e., weighted toward lower cost click, lower sales, lower number of items ordered), which would be reasonable given the type of data. Although skewed, several prior works have noted that the ANOVA method is remarkably robust to deviations from normality (cf. [4, 28, 44]). The use of the power transformation, along with other measures (discussed later), ensured our statistical approach was valid.

Table 4. Snippet from Data Log Showing Applicable Fields.

Ad brand classification	Key phrase brand classification	Brand-focused category groups	Impressions	Clicks	CPC	Sales revenue	Orders	Items ordered
0	0	1	5	1	0.20	39.97	2	1
1	0	4	37	3	0.45	29.34	1	3
0	1	3	10	5	0.26	7.59	3	5
1	1	2	2	1	0.30	43.20	3	6

Table 5. Aggregate Statistics from the Data Set.

	Total	Average (by day)	Standard deviation
Impressions	150,063,317	58.37	971.14
Clicks	3,896,310	1.51	41.35
Advertising cost	\$8,484,855	\$1.24	\$19.68
Sales	\$23,075,796	\$8.98	\$440.04
Orders	142,256	0.06	2.83
Items	270,567	0.11	5.66

Results

Prior to investigating our specific hypotheses, we provide some aggregate results from our data analysis. We first present overall statistics for the data set of 2,570,771 records, as shown in Table 5. The table indicates that this was a substantial marketing effort generating more than \$23 million in sales and moving more than 270,000 items. Table 5 also presents the average figures per day, with the standard deviations. The standard deviations are high due to the nature of retailing, since there are substantial sales during the holiday buying season, typically October through early January.

Brand-Focused Categories

Using the 45,688 ads and 39,748 key phrases, we automatically categorized the entire data set of approximately 2.5 million records, with findings presented in Table 6. Comparing Table 6 (i.e., number of occurrences of ads and key phrases in the complete data set) with the data in Figure 1 (i.e., number of unique ads and key phrases), we see a striking difference between the advertiser focus on branded phrases (93 percent) versus what people are actually searching for: nonbranded phrases (e.g., those key phrases without any branded terms) (slightly more than 59 percent). This would indicate that there is considerable searching by potential consumers for more generic terms, perhaps reflecting broader commerce needs. Since the sample sizes are uneven, this could confound our analysis. Therefore, we used the weighted means for the samples in the data analysis [11, p. 249], which addresses the confounding issue in our ANOVA methods. In addition, we employed the Welch equality of means [70], which does not assume equal sample sizes or equal variance, to verify our results. Given these precautions, we believe our statistical approach to be sound.

We investigated the specific number of impressions generated by each category of key phrase, as shown in Table 7. From Table 7 we see that nearly 95 percent of the impressions were generated by non-brand-focused phrases, indicating that the majority of Web searchers do not come to the search engine with a particular brand in mind, or at least they do not express it when searching. This is in line with research on the Web search area showing that most

Table 6. Occurrences for Each Brand-Focused Category in Overall Data Set.

Brand-focused categories	Occurrences	Percentage
Nonbranded ad and nonbranded phrase	1,517,144	59.0
Branded ad and branded phrase	68,951	2.7
Nonbranded ad and branded phrase	6,887	0.3
Branded ad and nonbranded phrase	977,789	38.0
Overall	2,570,771	100.0

Note: Highest percentage is in boldface.

Table 7. Example of Customer Query and Brand Mentions.

Brand-focused phrase categories	Number of impressions	Percentage
Non-brand-focused phrases	141,838,245	94.5
Brand-focused phrases	8,225,072	5.5
All phrases	150,063,317	100.0

searchers use short, generic queries [64, 69], deferring to the search engine to provide focused results. With this grounding in the data, we now address our research question and associated hypotheses.

Research Question Evaluation

We first evaluate our overall research question (“Does mentioning a brand term in advertisements or key phrases affect the performance of a sponsored search campaign?”) using confirmatory factor analysis (CFA), which is a methodological approach that examines whether underlying constructs influence one or more measure responses. As CFA is commonly used to establish the validity of a given model, it is a suitable method to evaluate the appropriateness of the use of branding terms proposed in our research question. For the factors, we used the category of branded phrase and branded ad (i.e., independent variables) and number of clicks, CPC, sales revenue, number of orders, number of items ordered, and ROA (i.e., dependent variables).

The CFA results show that 0.77 of the variance is due to the underlying factors ($p < 0.01$), which indicates that factor analysis would be a useful modeling technique for the data. All the extraction values were good, with most approaching 1.0. Therefore, there was good fit with all the factors. Two factors (brand focus and clicks) had eigenvalues greater than one, together accounting for 85.2 percent of the variance in the other factors. The brand focus factor by itself explained 69.2 percent of the variance, with clicks explaining 16.0 percent. One would expect number of clicks to have an impact on the other factors, as they are dependent on a click occurring.

Table 8. Post Hoc Analysis for Clicks by Phrase and Ad Combination.

Branded ad	Branded phrase	Level	Mean	SD
Yes	Yes	D	24.37	0.16
Yes	No	C	1.18	0.04
No	Yes	B	1.43	0.50
No	No	A	0.69	0.03
Overall			6.92	0.18

Notes: Levels not connected by same letter are significantly different. Highest mean is in boldface. For clarity, we report the actual means and standard deviation, rather than the log values.

With these findings from our CFA, we were confident that our research question had merit.

Hypotheses Testing

In evaluating our six hypotheses, we ran two-way ANOVA tests to compare means among different brand-focused categories. For all ANOVA tests presented, the critical value of p was 0.05. We also used Tamhane's T2 test, which does not assume equal variance among samples, as the post hoc analysis to uncover the exact differences among the groups.

Concerning H1 ("There will be a significant difference in the number of clicks based on the brand focus of the key phrase and advertisement combination"), the ANOVA results indicated that there is a significant interaction between clicks and branded ads and branded phrases ($F(1, 2.6 \times 10^6) = 16,830.39$, $p < 0.01$). Both branded ad and branded phrase were significant ($p < 0.01$). The post hoc analysis (Table 8) shows a significant difference among all four brand classification groups. Combined with the higher rate of impressions for non-branded phrases (as shown in Table 7), this would also indicate that branded key phrases are much more focused and worthwhile targets for attracting potential online consumers to a Web site. Although more searchers submit generic phrases, this group does not appear to contain the most potentially convertible searchers.

However, notice that the combination of a branded phrase and a nonbranded ad did not lead to the same level of click through, with a mean number of 1.43 clicks. Although the second highest, it is still significantly lower than the combination of a branded ad with a branded phrase.

Given the significantly higher level of click through with both the branded ad and the branded key phrase relative to the other categories, it would appear that the dual branding in both the phrase and the ad has a significant impact on click through, with a mean of 24.37. The post hoc analysis tells us there is a brand lift (i.e., increase in some measure related to a positive brand image) of either the phrase or the ad, but a branded ad with a branded phrase performs the best.

Table 9. Post Hoc Analysis for CPC by Phrase and Ad Combination.

Branded ad	Branded phrase	Level	Mean	SD
Yes	Yes	D	0.46	0.54
Yes	No	C	0.48	0.17
No	Yes	B	0.59	1.58
No	No	A	0.70	0.15
Overall			0.56	0.61

Notes: Levels not connected by same letter are significantly different. Highest mean in boldface. For clarity, we report the actual means and standard deviation, rather than the log values.

For H2, the results indicate that there is a significant interaction between CPC and branded ad and branded phrase ($F(1, 485,943) = 990.423, p < 0.01$). Both branded ad and branded phrase were significant ($p < 0.01$). The post hoc analysis (Table 9) shows a significant difference among all four of the brand classifications. Therefore, H2 is fully supported.

From Table 9, the nonbranded ad and nonbranded phrase category has the highest mean CPC (0.70), and the other three categories are substantially lower. Although we saw earlier that the branded ad and branded phrase category generated more clicks, the CPC is higher for the nonbranded ad and nonbranded phrase category relative to other categories. The mean CPC for the nonbranded ad and branded phrase category is also relatively higher than for just the branded ad categories. Advertisers engaged in sponsored search campaigns have an incentive to bid higher on the key phrases that they believe convert more customers. Therefore, these higher CPCs would indicate that, regardless of the number of impressions, the advertisers consider these potential customers (i.e., those searching with nonbranded key phrases) to be of higher value, which is reflected in the higher CPC for these nonbranded categories.

Moving to H3, the results indicate that there is a significant interaction between revenue and branded ad and branded phrase ($F(1, 2.6 \times 10^6) = 52,129.31, p < 0.01$). Both branded ad and branded phrase were significant ($p < 0.01$). The post hoc analysis (Table 10) shows a significant difference between the branded ad and branded phrase classification and the other three brand classifications. Therefore, H3 is supported.

We see from Table 10 that the branded ad and branded phrase category generated, by far, more average sales revenue (\$247.88) than any other category, followed by the nonbranded ad and branded phrase category (\$15.51). This would indicate that, based on sales revenue, the higher CPCs for the nonbranded ad and nonbranded phrase are not justified in terms of revenue generation, as the branded ad and branded phrase category generates nearly 15 times more sales revenue. However, we have to caveat this by noting that the nonbranded phrases received more searcher traffic. Results also show that a branded phrase will generate more sales revenue regardless of the type of ad it is combined with.

Table 10. Post Hoc Analysis for Revenue by Phrase and Ad Combination.

Branded ad	Branded phrase	Level	Mean	SD
Yes	Yes	D	247.88	1.67
Yes	No	C	2.13	0.44
No	Yes	B	15.51	5.29
No	No	A	2.50	0.36
Overall			0.56	67.01

Notes: Levels not connected by same letter are significantly different. Highest mean is in boldface. For clarity, we report the actual means and standard deviation, rather than the log values.

Table 11. Post Hoc Analysis for Orders by Phrase and Ad Combination.

Branded ad	Branded phrase	Level	Mean	SD
Yes	Yes	D	1.61	0.01
Yes	No	C	0.01	0.00
No	Yes	B	0.06	0.03
No	No	A	0.01	0.00
Overall			0.56	0.42

Notes: Levels not connected by same letter are significantly different. Highest mean is in boldface. For clarity, we report the actual means and standard deviation, rather than the log values.

Regarding H4, the ANOVA results indicate that there is a significant interaction between orders and branded ad and branded phrase ($F(1, 2.6 \times 10^6) = 74,815.18, p < 0.01$). Both branded ad and branded phrase were significant ($p < 0.01$). The post hoc analysis (see Table 11) shows a significant difference among all branded categories. Therefore, H4 is supported.

As shown in Table 11, the highest mean was, again, for the branded ad and branded phrase category, with a mean order of 1.61. The nonbranded ad and branded phrase category followed with a mean of 0.06. Comparing the difference in mean sales revenue with the difference in mean orders shows that branded phrase categories not only generated more orders but that the orders were for a higher amount relative to the nonbranded phrase categories. Overall, though, there again appears to be a significant advantage of combining branded phrases with branded advertisements, with a mean that is 25 times higher than the second-highest order, generated by nonbranded ad and branded phrase.

As to H5, the results indicate that there is a significant interaction between items sold and branded ad and branded phrase ($F(1, 2.6 \times 10^6) = 70,059.23, p < 0.01$). Both branded ad and branded phrase were significant ($p < 0.01$). The post hoc analysis (Table 12) again shows a significant difference among all categories. Therefore, H5 is supported.

Table 12. Post Hoc Analysis for Items Sold by Phrase and Ad Combination.

Branded ad	Branded phrase	Level	Mean	SD
Yes	Yes	D	3.09	0.02
Yes	No	C	0.03	0.01
No	Yes	B	0.11	0.07
No	No	A	0.02	0.00
Overall			0.56	0.81

Notes: Levels not connected by same letter are significantly different. Highest mean is in boldface. For clarity, we report the actual means and standard deviation, rather than the log values.

From Table 12 we see that the branded ad and branded phrase category had the highest mean number of items sold (3.09), again followed by the non-branded ad and branded phrase category (0.11). These results echo findings by Ghose and Yang [21], who focused on 166 key words and reported that queries containing brand products offered the potential for cross-selling in other product categories. Our findings show that the advertisement, in conjunction with query terms, has a significant effect on items ordered.

The results indicate not only that a branded phrase and ad combination leads to higher rates of orders and sales revenue but also that this demographic of searchers orders a wider array of products relative to demographics targeted by other phrase and ad categories. The post hoc analysis shows that branded ads and branded phrases are associated with selling the highest number of items, with a mean that is 27 times higher than the second-highest category, nonbranded ad combined with branded phrase.

Finally, for H6, the results indicate that there is a significant interaction between ROA and branded ad and branded phrase ($F(1, 2.6 \times 10^6) = 16,830.39$, $p < 0.01$). Both branded ad and branded phrase were significant ($p < 0.01$). The post hoc analysis (Table 13) shows a significant difference among all branded ad and branded phrase classifications. Therefore, H6 is supported.

From Table 13 we see that the branded ad and branded phrase combination had a mean more than 10 times greater than the next nearest category (nonbranded ad–branded key phrase), with a mean of \$233.98. This would indicate, in conjunction with other findings, that the use of branded terms in both phrases and ads is the most profitable for the advertiser, factoring in both revenue and costs.

Effect Size

Although there were statistically significant differences in our brand groupings, a portion of this difference can be attributed to the large sample sizes. We performed an additional analysis to ensure that the observed differences among the brand groupings were meaningful. We used Cohen's d test to

Table 13. Post Hoc Analysis for ROA by Phrase and Ad Combination.

Branded ad	Branded phrase	Level	Mean	SD
Yes	Yes	D	233.98	51.31
Yes	No	C	1.01	64.63
No	Yes	B	12.96	93.11
No	No	A	1.31	51.31
Overall			7.47	430.73

Notes: ROA = return on advertising. Levels not connected by same letter are significantly different. Highest mean is in boldface. For clarity, we report the actual means and standard deviation, rather than the log values.

determine the effect size of each between group [12]. Table 14 shows the obtained *d*-values.

From Table 14 we see that most of the effect size analyses indicate a small effect (53 percent of the comparisons), with 6 percent of the comparisons indicating a moderate effect and 11 percent indicating a large effect. Thirty-one percent of the comparisons showed a negligible effect, meaning that although the results were statistically significant, the outcome on key word advertising metrics are of limited practical significance. From an analysis of the Cohen's *d* results, it is clear that the nonbranded ad and nonbranded phrase categories were most different, especially when compared to the branded ad and branded phrase category, which is where the most occurrences of large and moderate effect sizes occurred. Most metrics showed this strong differential, with one exception, the CPC. For this metric, the effect sizes were negligible. This indicates that branded key phrases are especially effective, as they produce significantly more sales but generally cost the same as nonbranded terms.

Discussion and Implications

Discussion of Results

In this research, we investigated the effect of a brand mention on user behavior in a key word advertising campaign. To address this research aim, we designed a study that segmented the various categories of brand mention in both key phrases and ad text. We investigated a key word advertising campaign from a major U.S. retailer composed of more than 2.5 million daily records of Web search advertising interactions and sales. This study offers important insights about search engine advertising for companies that sell multiple products while being brands themselves. There are several examples of these types of retailers, including Wal-Mart, Target, Best Buy, Sharper Image, and Radio Shack. The results reported here show that focusing on brand image in both the key phrase and advertisement produces more clicks, sales, orders, and items sold relative to other combinations of phrases and ads, including a brand mention in just key phrase or ad alone.

Table 14. Cohen's *d* Results to Account for Effect Sizes.

Brand-focused categories	1	2	3	4
Clicks				
Nonbranded ad and nonbranded phrase (1)		0.61 **	0.48*	0.12
Branded ad and branded phrase (2)			0.11	0.46*
Nonbranded ad and branded phrase (3)				0.28*
Branded ad and nonbranded phrase (4)				
CPC				
Nonbranded ad and nonbranded phrase (1)		0.06	0.26*	0.01
Branded ad and branded phrase (2)			0.24*	0.08
Nonbranded ad and branded phrase (3)				0.08
Branded ad and nonbranded phrase (4)				
Sales				
Nonbranded ad and nonbranded phrase (1)		0.83 ***	0.46*	0.01
Branded ad and branded phrase (2)			0.24*	0.41*
Nonbranded ad and branded phrase (3)				0.25*
Branded ad and nonbranded phrase (4)				
Orders				
Nonbranded ad and nonbranded phrase (1)		0.90 ***	1.00 ***	0.02
Branded ad and branded phrase (2)			0.26*	0.36*
Nonbranded ad and branded phrase (3)				0.22*
Branded ad and nonbranded phrase (4)				
Items				
Nonbranded ad and nonbranded phrase (1)		0.85 ***	0.39*	0.02
Branded ad and branded phrase (2)			0.30*	0.37*
Nonbranded ad and branded phrase (3)				0.21*
Branded ad and nonbranded phrase (4)				
ROA				
Nonbranded ad and nonbranded phrase (1)		0.61 **	0.48*	0.12
Branded ad and branded phrase (2)			0.12	0.30*
Nonbranded ad and branded phrase (3)				0.26*
Branded ad and nonbranded phrase (4)				

Notes: ROA = return on advertising. * Small effect; ** moderate effect; *** large effect.

The data show how a strong and positive brand image is important for a company in the online e-commerce area, resulting in more customer engagement with advertising and more revenue for the bottom line. When consumers submit a query containing a brand term, they are more likely to make a purchase when that query is associated with an ad that also mentions the same brand. By advertising on search engines with ads that prominently show a brand name, a company can generate higher sales revenue.

Theoretical Implications

There are several theoretical implications of this research. In noting that brands may be one of an organization's most valuable intangible assets,

Keller and Lehmann [38] report that there are a variety of branding aspects that a business considers, including positioning, integration, and growth, and that branding can spotlight either the customer or the company. The research reported in this paper focuses primarily on the customer perspective of branding, relating it to the company advertising strategy. With the tracking and measurement inherent in key word advertising, one can specifically measure the value of a brand (e.g., in terms of interest, sales, orders, or items) or the brand awareness (e.g., impressions or clicks relative to nonbranded product searches).

Determining brand value in concrete measurable terms has previously been a challenge. However, key word advertising offers a methodology to measure the value of a brand via three main statistics. First, the number of impressions, or number of times a brand term is searched, is an indication of brand awareness. Second, the number of clicks, or number of times potential consumers click on a branded ad, is an indication of brand image. Third, the number of converts, or number of times a visitor who clicked on a branded ad makes a purchase, is an indication of brand relationship.

These findings also provide theoretical underpinning to prior empirical research concerning the effect of search engine results text on the evaluation of those results. For example, Jansen et al. [34] have proposed that branding on Web searching is a multistage process, with one element being the branding aspects of the individual links on the SERP of a particular search engine for a given query. The user evaluation of the link is influenced both by the search engine and by the user's perception of the entire SERP. This influences the evaluation of a given link as relevant or not relevant.

However, the link snippet moderates the perception of relevance as well. The title, the summary, and the URL all affect how users view a particular result on the SERP. This appears to confirm prior work examining aspects of the link snippet. Hotchkiss [27] has noted that slight variations in how the individual links are displayed on the SERP can affect user evaluation. There is also an element of trust in terms of whether or not the link is sponsored, as shown by Jansen and Resnick [31], who have also pointed out the interplay of title and result summary as determinants of relevance and nonrelevance for a given result. Koufaris and Hampton-Sosa [42] have shown that perceived company reputation and willingness to customize products and services can significantly affect initial trust. The mention of specific companies in ads in this research seems to conform to Jansen et al.'s [34] multistage model of online branding in the search area.

The research presented here, combined with prior research, shows the beginning of a possible framework for describing the user's evaluation of SERPs and links in e-commerce-related searching. It appears that certain brand terms in the search engine results have a profound effect on a searcher's inclination to click on a results link and subsequent purchase at the landing page. User behavioral tendencies when these terms appear indicate that brand awareness, brand image, and brand relationship are important factors in online commercial searching and evaluation of search results. These branding concepts link key word advertising to the core marketing efforts involved in brand management.

Practical Implications

Even though our findings are statistically significant, one might ask, “Are these differences of practical significance?” From a review of the data presented in Tables 1 through 14, along with the accompanying figures, it would appear that the findings do have substantial practical implications for key word advertisers, search engines, and consumers, as shown by the effect size results in Table 14.

The implication for advertisers is clear—do not ignore the extremely high payoff area of brand-focused key phrases in a key word advertising campaign ad and pair these phrases with branded ads. These focused branded phrases combined with ads containing branded terms appear highly relevant to potential consumers and can be the high performers in an overall key word advertising effort.

Although there is a small higher cost associated with the unbranded ad and unbranded phrase category relative to the branded ad and branded phrase category, the latter generated higher mean sales. Therefore, companies that employ key word advertising efforts should include relatively niched, long-tailed [2] key phrases common in branded queries, along with the more generic phrases common with nonbranded queries. Used effectively, this approach could save a company costs while generating higher revenue.

The essential factor in this effort is the overall impact or efficiency. Note that although the branded ad and branded phrase category had a 1,503 percent higher mean number of clicks, this category resulted in 2,653 percent more in sales revenue. This indicates that the branded ad and branded phrase category is even more effective in generating sales than it is in generating clicks (i.e., more of the users who clicked on the ads converted). The branded ad and branded phrase combination is shown to be even more effective if we examine the sum of both cost and revenue for the key word advertising campaign in our data set, as shown in Figure 2. The branded ad and branded phrase category generated 74.1 percent of the total sales revenue during the 33-month campaign, followed by 16.4 percent for the nonbranded ad and nonbranded category and 9.0 percent for the branded ad and nonbranded phrase category. However, the branded ad and branded phrase category generated only 3.3 percent of the cost compared to 62.8 percent for the nonbranded ad and nonbranded phrase category (with only 16 percent of revenue). The branded ad and nonbranded phrase category (with only 9.0 percent of revenue) incurred 33.4 percent of the cost. Hence, there is a potentially higher cost associated with the less-focused nonbranded ad and nonbranded phrase and the branded ad and nonbranded phrase categories.

Therefore, for key word advertising campaigns, the branded ad and branded phrase category is the most effective (in generating revenue) and the most efficient (in generating this revenue at the cheapest cost). The nonbranded ad and nonbranded phrase and other relatively generic categories cannot be used exclusively for an advertising campaign to be profitable. Nonbranded and generic phrases that generate impressions and clicks but few converts should be candidates for removal as they incur a lot of overall cost with little revenue generation.

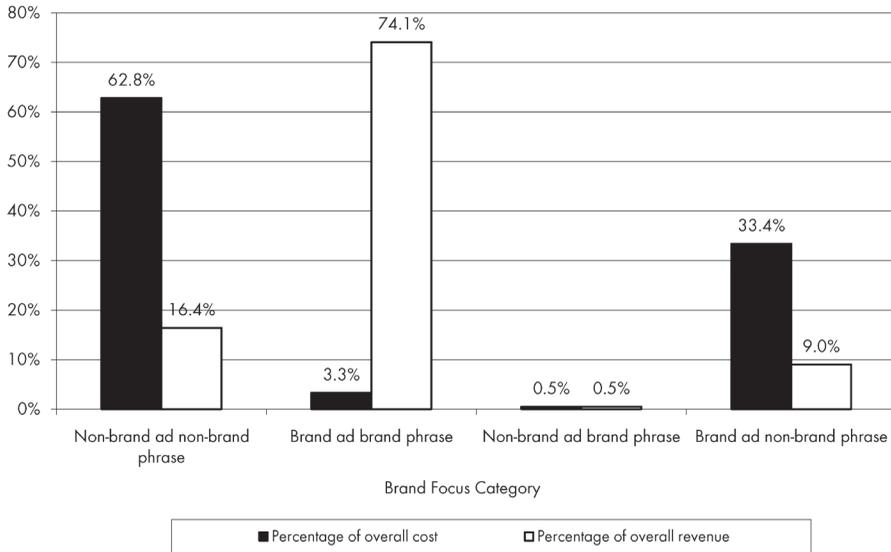


Figure 2. Percentage of Overall Cost and Revenue by Brand-Focus Categories

This recommendation is based, of course, on the total attribution of the conversion going to a single phrase and advertisement combination. If we assume that this phrase and ad combination is a branded pair, we are ignoring any possible information searching and gathering during the entire information-seeking process. For example, consumers might view several advertisements before making the conversion. If we assume that these earlier advertisements are nonbranded phrase and advertisement pairs, our assigning the total attribution to the final ad might discount important information gathering that occurred earlier in the consumer search process. However, Jansen and Simone [32] have shown that many consumers do not act according to this rational view of a consumer search process.

Limitations and Strengths

There are limitations to our study, as with any research. First, the data set is from the key word advertising campaign of just one retail company, although the data set is quite large in terms of the number of records and temporal span. Also, with only one retailer, the brand image of this retailer might have an effect on consumer reaction to ads and on subsequent conversions. Including other large retailers with a different brand image, either more positive or more negative, might have produced different results. Additional research using data from other companies in other market verticals is needed in order to generalize the results to other areas and companies. In addition, given that this company is a large national retailer, additional research would be needed to see if the findings translate to local or small- to medium-size enterprises.

However, we believe that the research findings reported in this study provide valuable insight into the empirical research of brand usage in the key word advertising area, with its effect on searching and consumer behaviors.

As a second limitation, the data set used in this research does not include customer behaviors on the landing pages, nor does it contain the offline behaviors of the searchers. Customers may use Web search engines for some aspects of the searching and purchasing process (e.g., just information gathering or just purchasing) and then use other information systems or sources for other portions of the process. For example, a searcher might begin seeking a product on a search engine by submitting a query, clicking on a displayed advertisement, and browsing the landing page. However, the customer might make the actual purchase in a brick-and-mortar store or via the telephone. Nevertheless, at least for the searching and purchasing behaviors on the search engine, the findings reported here seem to support the proposition that there are brand-focused behavioral differences in phrases and advertisements, even if the consumers are conducting other activities in other mediums.

This research also has several strengths. Based on the significance of the findings, we believe that the research results presented here make valuable contributions to the currently limited but growing body of research concerning searcher and customer behavior in the important sponsored search area. Given the substantial impact that sponsored search technology and its accompanying business process have had on the development, growth, and use of the Web for online commerce (along with other areas), sponsored search is an area that deserves substantial investigation.

Specifically, the data set was quite large, and the data collection was longitudinal. The data consisted of more than 2.5 million records of searching and purchasing behavior and had a lengthy data collection period (33 months spanning four calendar years). The data set also included a varied and rich set of search and consumer behavior and interactions (e.g., impressions, clicks, orders placed, items ordered, and money spent), along with the actual ads. Therefore, the research findings provide important insights into searcher and customer behavior in the real world, within the online commercial domain.

Conclusion

A company that employs sponsored search has a great deal of information at its disposal for evaluating advertising performance. By using data collected during online interactions, companies can track everything from what terms users searched for, to what ads they clicked on, to which visits resulted in a sale. Analyzing these measures can aid companies in spending their online advertising dollars more effectively.

The results of the research reported here also indicate that the combination of brand-focused key phrases and advertisements generate the most sales and are relatively cheaper than nonbranded phrases. Therefore, it is generally beneficial for online advertisers to devote advertising resources to targeting brand-focused key phrases and matching them with brand-focused ads. It also indicates that continued marketing efforts to manage positive brand im-

age, awareness, and relationship have a direct effect on key word advertising performance, and thereby on the financial performance of the company.

For future work, investigations on brand perception of online advertisements could lead, perhaps, to better advertisement creation. This could increase the receptiveness of the ads and in turn enhance the overall effectiveness of a campaign and improve sponsored search platforms. Another interesting research area would be analysis of the entire SERP, both organic and sponsored results, in order to gauge the interplay of these two listings in the branded search area. Also, here we analyzed sponsored search ads in general. It would be worthwhile to analyze the effect of ad position on the SERP (i.e., north, east, and south) and ad rank in each of these positions on number of impressions, click-through rate, CPC, sales, number of orders, number of items ordered, and ROA. Finally, a really interesting study would be to take secondary data about this company's brand image over time and correlate the key word advertising performance to fluctuations in brand image.

REFERENCES

1. Amblee, N., and Bui, T. Can brand reputation improve the odds of being reviewed on-line? *International Journal of Electronic Commerce*, 12, 3 (2008), 11–28.
2. Anderson, C. *The Long Tail: Why the Future of Business Is Selling More of Less*. New York: Hyperion, 2006.
3. Berry, M.J.A., and Linoff, G.S. *Data Mining Techniques: For Marketing, Sales, and Customer Relationship Management*. New York: Wiley, 2004.
4. Box, G.E.P., and Anderson, S.L. Permutation theory in the derivation of robust criteria and the study of departures from assumptions. *Journal of the Royal Statistical Society*, 17, 1 (1955), 1–34.
5. Box, G.E.P., and Cox, D.R. An analysis of transformations. *Journal of the Royal Statistical Society*, 26, 2 (1964), 211–252.
6. Brooks, N. The Atlas Rank Report I: How search engine rank impacts traffic. Atlas Research, London, July 2004 (available at www.atlasdmt.com/media/pdfs/insights/RankReport.pdf).
7. Brooks, N. The Atlas Rank Report II: How search engine rank impacts conversions. Atlas Research, London, October 2004 (available at www.atlasonepoint.com/pdf/AtlasRankReportPart2.pdf).
8. Brooks, N. Repeat search behavior: Implications for advertisers. *Bulletin of the American Society for Information Science and Technology*, 32, 2 (2006), 16–17.
9. Bruner, G.C., and Kumar, A. Web commercials and advertising hierarchy-of-effects. *Journal of Advertising Research*, 40, 1 (2000), 35–42.
10. Cho, J., and Roy, S. Impact of search engines on page popularity. In M. Najork and C. Wills (eds.), *Proceedings of the Thirteenth International Conference on World Wide Web (WWW 2004)*. New York: ACM Press, 2004, pp. 20–29.
11. Clark-Carter, D. *Quantitative Psychological Research: The Complete Student's Companion*. New York: Psychology Press, 2009.

12. Cohen, J. *Statistical Power Analysis for the Behavioral Sciences*, 2d ed. Hillsdale, NJ: Routledge Academic, 1988.
13. Econsultancy and Search Engine Marketing Professional Organization (SEMPO). *State of Search Engine Marketing Report 2010*. New York: Econsultancy and SEMPO, 2010.
14. Esch, F.-R.; Langner, T.; and Schmitt, B.H. Are brands forever? How brand knowledge and relationships affect current and future purchases. *Journal of Product and Brand Management*, 15, 2 (2006), 98–105.
15. Esch, F.-R.; Langner, T.; Schmitt, B.H.; and Geus, P. Are brands forever? How brand knowledge and relationships affect current and future purchases. *Journal of Product and Brand Management*, 15, 2 (2006), 98–105.
16. Fain, D.C., and Pedersen, J.O. Sponsored search: A brief history. *Bulletin of the American Society for Information Science and Technology*, 32, 2 (2006), 12–13.
17. Frieze, A.; Vera, J.; and Chakrabarti, S. The influence of search engines on preferential attachment. In A. Frieze and J. Vera (eds.), *Proceedings of the Sixteenth Annual ACM-SIAM Symposium on Discrete Algorithms*. New York: ACM Press, 2007, pp. 293–300.
18. Fulgoni, G.M., and Mörn, M.P. How online advertising works: Whither the click? White paper, ComScore, Philadelphia, 2008 (available at www.comscore.com/Press_Events/Presentations_Whitepapers/2008/How_Online_Advertising_Works_Whither_The_Click/).
19. Gerstner, E. Do higher prices signal higher qualities? *Journal of Marketing Research*, 22, 1 (1985), 209–215.
20. Ghose, A., and Yang, S. An empirical analysis of paid placement in online advertising. In C. Dellarocas and F. Dignum (eds.), *Proceedings of the Ninth International Conference on Electronic Commerce (ICEC'07)*. New York: ACM Press, 2007, pp. 95–107.
21. Ghose, A., and Yang, S. Analyzing search engine advertising: Firm behavior and cross-selling in electronic markets. In W.-Y. Ma, A. Tomkins, and X. Zhang (eds.), *Proceedings of the Seventeenth World Wide Web Conference*. New York: ACM Press, 2008, pp. 219–225.
22. Ghose, A., and Yang, S. Comparing performance metrics in organic search with sponsored search advertising. In *Proceedings of the Second Annual International Workshop on Data Mining and Audience Intelligence for Advertising (ADKDD 08)*. New York: ACM Press, 2008, pp. 18–26.
23. Ghose, A., and Yang, S. An empirical analysis of sponsored search performance in search engine advertising. In A. Broder and S. Chakrabarti (eds.), *Proceedings of the First ACM International Conference on Web Search and Data Mining (WSDM 2008)*. New York: ACM Press, 2008, pp. 241–250.
24. Ghose, A., and Yang, S. An empirical analysis of search engine advertising: Sponsored search in electronic markets. *Management Science*, 55, 10 (2009), 1605–1622.
25. Google. Financial tables. November 12, 2008 (available at http://investor.google.com/fin_data2007.html).
26. Ha, H.-Y., and Perks, H. Effects of consumer perceptions of brand experience on the Web: Brand familiarity, satisfaction and brand trust. *Journal of Consumer Behaviour*, 4, 6 (2005), 438–452.

27. Hotchkiss, G. *Enquiro Eye Tracking Report II: Google, MSN and Yahoo! Compared*, vol. 2006. Kelowna, BC: Enquiro Search Solutions, 2006.
28. Hull, D. Using statistical testing in the evaluation of retrieval experiments. In R. Korfhage, E. Rasmussen, and P. Willett (eds.), *Proceedings of the Sixteenth Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*. New York: ACM Press, 1993, pp. 329–338.
29. Jang, H.; Olfman, L.; Ko, I.; Koh, J.; and Kim, K. The influence of on-line brand community characteristics on community commitment and brand loyalty. *International Journal of Electronic Commerce*, 12, 3 (2008), 57–80.
30. Jansen, B.J., and Mullen, T. Sponsored search: An overview of the concept, history, and technology. *International Journal of Electronic Business*, 6, 2 (2008), 114–131.
31. Jansen, B.J., and Resnick, M. An examination of searchers' perceptions of non-sponsored and sponsored links during ecommerce Web searching. *Journal of the American Society for Information Science and Technology*, 57, 14 (2006), 1949–1961.
32. Jansen, B.J., and Simone, S. Bidding on the buying funnel for sponsored search campaigns. *Journal of Electronic Commerce Research*, 12, 1 (2011), 1–18.
33. Jansen, B.J., and Spink, A. Investigating customer click through behaviour with integrated sponsored and nonsponsored results. *International Journal of Internet Marketing and Advertising*, 5, 1–2 (2009), 74–94.
34. Jansen, B.J.; Zhang, M.; and Schultz, C. Search engine brand and the effect on user perception of searching performance. *Journal of the American Society for Information Sciences and Technology*, 60, 8 (2009), 1572–1595.
35. Joachims, T.; Granka, L.; Pan, B.; Hembrooke, H.; and Gay, G. Accurately interpreting clickthrough data as implicit feedback. In G. Marchionini, A. Moffat, and J. Tait (eds.), *Proceedings of the 28th Annual International ACM SIGIR Conference on Research and Development in Information Retrieval*. New York: ACM Press, 2005, pp. 154–161.
36. Kalczyński, P.J.; Senecal, S.; and Nantel, J. Predicting on-line task completion with clickstream complexity measures: A graph-based approach. *International Journal of Electronic Commerce*, 10, 3 (2006), 121–141.
37. Keller, K.L. Conceptualizing, measuring, and managing customer-based brand equity. *Journal of Marketing*, 51, 1 (1993), 1–22.
38. Keller, K.L., and Lehmann, D.R. Brands and branding: Research findings and future priorities. *Marketing Science*, 25, 6 (2006), 740–759.
39. Kelt, J. Search before the purchase: Understanding buyer search activity as it builds to online purchase. DoubleClick, February 2005 (available at http://static.googleusercontent.com/external_content/untrusted_dlcp/www.google.com/en/us/doubleclick/pdfs/DoubleClick-02-2005-Search-Before-the-Purchase.pdf).
40. Kirmani, A. Advertising repetition as a signal of quality: If it's advertised so often, something must be wrong. *Journal of Advertising*, 26, 3 (1997), 77–86.
41. Koças, C. A model of Internet pricing under price-comparison shopping. *International Journal of Electronic Commerce*, 10, 1 (2005), 111–134.
42. Koufaris, M., and Hampton-Sosa, W. The development of initial trust in an online company by new customers. *Information and Management*, 43, 3 (2004), 377–397.

43. Lee, D.; Kauffman, R.J.; and Bergen, M.E. Image effects and rational inattention in Internet-based selling. *International Journal of Electronic Commerce*, 13, 4 (2009), 127–166.
44. Lindman, H.R. *Analysis of Variance in Complex Experimental Designs*. San Francisco: W.H. Freeman, 1974.
45. Mahdian, M., and Tomak, K. Pay-per-action model for on-line advertising. *International Journal of Electronic Commerce*, 13, 2 (2008), 113–128.
46. McDaniel, C., Jr., and Gates, R. *Marketing Research*. New York: John Wiley & Sons, 2009.
47. Nicholson, S.; Sierra, T.; Eseryel, U.Y.; Park, J.-H.; Barkow, P.; Pozo, E.J.; and Ward, J. How much of it is real? Analysis of paid placement in Web search engine results. *Journal of the American Society of Information Science and Technology*, 57, 4 (2006), 448–461.
48. Nitke, M. IAB issues new research from Nielsen/Netratings on branding value of sponsored text advertising. News release, Nielsen/Netratings, New York, June 15, 2004 (available at www.iab.net/about_the_iab/recent_press_releases/press_release_archive/press_release/4742/).
49. Pan, B.; Litvin, S.; and O'Donnell, T. Understanding accommodation search query formulation: The first step in putting “heads in beds.” *Journal of Vacation Marketing*, 13, 4 (2007), 371–380.
50. Pandey, S.; Roy, S.; Olston, C.; Cho, J.; and Chakrabarti, S. Shuffling a stacked deck: The case for partially randomized ranking of search engine results. In *Proceedings of the Thirty-First International Conference on Very Large Data Bases (VLDB 2005)*. New York: ACM Press, 2005, pp. 781–792.
51. Percy, L., and Rossiter, J.R. A model of brand awareness and brand attitude advertising strategies. *Psychology and Marketing*, 9, 4 (1992), 263–274.
52. Pieters, R., and Wedel, M. Attention capture and transfer in advertising: Brand, pictorial, and text-size effects. *Journal of Marketing*, 68, 1 (2004), 36–50.
53. Pirolli, P. *Information Foraging Theory: Adaptive Interaction with Information*. Oxford: Oxford University Press, 2007.
54. Pirolli, P. A theory of information scent. In J.A. Jacko and C. Stephanidis (eds.), *Human-Computer Interaction: Theory and Practice*, vol. 1. Mahwah, NJ: CRC Press, 2003, pp. 213–227.
55. Robinson, T.N.; Borzekowski, D.L.G.; Matheson, D.M.; and Kraemer, H.C. Effects of fast food branding on young children's taste preferences. *Archives of Pediatrics and Adolescent Medicine*, 161, 8 (2007), 792–797.
56. Rose, D.E., and Levinson, D. Understanding user goals in Web search. In *Proceedings of the 13th World Wide Web Conference (WWW 2004)*. New York, ACM Press, 2004, pp. 13–19.
57. Rosso, M.A., and Jansen, B.J. Brand names as keywords in sponsored search advertising. *Communications of the Association for Information Systems*, 27, 1 (2010), article 6.
58. Schultz, C.D. *Consumer Trust in E-Commerce: An Analysis of Means Communicating Trustworthiness from a Buying Transaction Life Cycle Perspective*. Hamburg: Verlag Dr. Kovac, 2008.
59. Search Engine Marketing Professional Organization. Annual state of search survey 2007. SEMPO, Wakefield, MA, 2007 (available at www.sempo.org/?page=sem_research/).

60. Search Engine Marketing Professional Organization. Search engine optimization & marketing glossary. SEMPO, Wakefield, MA, 2009 (available at www.sempro.org/learning_center/sem_glossary#b/).
61. Search Engine Marketing Professional Organization. The state of search engine marketing 2008. Wakefield, MA, 2009.
62. Sen, R.; Bandyopadhyay, S.; Hess, J.D.; and Jaisingh, J. Pricing paid placements on search engines. *Journal of Electronic Commerce Research*, 9, 1 (2008), 33–50.
63. Sicilia, M.; Ruiz, S.; and Reynolds, N. Attitude formation online—How the consumer’s need for cognition affects the relationship between attitude towards the Website and attitude towards the brand. *International Journal of Market Research*, 48, 2 (2006), 139–154.
64. Silverstein, C.; Henzinger, M.; Marais, H.; and Moricz, M. Analysis of a very large Web search engine query log. *SIGIR Forum*, 33, 1 (1999), 6–12.
65. Spence, M. Job market signaling. *Quarterly Journal of Economics*, 87, 3 (1973), 355–374.
66. Sriram, S.; Balachander, S.; and Kalwani, M.U. Monitoring the dynamics of brand equity using store-level data. *Journal of Marketing*, 71, 2 (2007), 61–78.
67. Su, B.-c. Characteristics of consumer search on-line: How much do we search? *International Journal of Electronic Commerce*, 13, 1 (2008), 109–129.
68. Wang, K.; Wang, E.T.G.; and Farn, C.-K. Influence of Web advertising strategies, consumer goal-directedness, and consumer involvement on Web advertising effectiveness. *International Journal of Electronic Commerce*, 13, 4 (2009), 67–96.
69. Wang, P.; Berry, M.; and Yang, Y. Mining longitudinal Web queries: Trends and Patterns. *Journal of the American Society for Information Science and Technology*, 54, 8 (2003), 743–758.
70. Welch, B.L. The generalization of “student’s” problem when several different population variances are involved. *Biometrika*, 34, 1–2 (1947), 28–33.
71. Zwass, V. Electronic commerce: Structures and issues. *International Journal of Electronic Commerce*, 1, 1 (1996), 3–23.

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