

Methods of Online Grocery Shopping: Linking and Searching

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Abstract

There are two dominant methods for locating information or goods on websites and online systems: searching and linking. Most previous research on searching and linking methods has focused on generic websites dedicated to locating information, such as Yahoo, rather than the searching and linking mechanisms used in specific applications, such as online shopping. In contrast, this study assessed the searching and linking metaphors inherent in online grocery stores, where each website must provide efficient tools for locating products if they are to be successful e-commerce websites. Worldwide grocery sites were judged against a checklist of advanced search features, and the use of searching and linking methods on the sites was evaluated using results from shopping scripts completed by eighteen participants.

Keywords

World Wide Web, Searching, Linking, E-commerce

INTRODUCTION

With the development of online grocery shopping during the late 1990s, individuals were offered the opportunity to purchase grocery products via the Internet. Two broad methods of interface use have been widely adopted by websites to allow users to locate and select the items they wish to purchase. For the purposes of this paper, these two interface use methods will be termed 'linking' and 'searching'. While there has been previous research focusing on the differences between searching and linking (Koyani and Bailey, 2002; Toms et al, 2003), these papers focus mainly on information retrieval as opposed to the interface characteristics of the e-commerce ordering process. Both searching and linking methods have advantages for the consumer and the store; however there is little research to suggest which method has the greater usability and benefit to customers in the domain of online grocery shopping. It is also important to note that previous research has focused on the use of external search engines (Rowley, 2000) rather than those that are inbuilt on e-commerce websites.

The online grocery shopping industry is fundamentally different to that of other online shopping domains for several reasons. Kempniak and Fox (2002) observe that grocery goods are time sensitive (i.e. perishable), regularly replaced and "high-touch" items (i.e. customers prefer to be able to touch or inspect certain grocery items before purchasing). Burke (2002) states that due to the frequency of grocery item purchasing, consumers demand that the overall purchasing process is fast. Finally, the style of grocery ordering is different to that experienced in other online shopping domains because other online purchases usually consist of only a few products, while grocery orders are usually in excess of fifty items and there are often varying quantities for each product purchased. So, the required interface design of online grocery shopping systems is significantly different to other online shopping systems in that it must accommodate multiple items of variable quantities. This means that the searching and linking methods used in other online shopping systems may be highly inappropriate for online grocery shopping.

In interviews conducted with one of Australia's largest online grocery websites, it was stated that over 200,000 users had registered, however only 100,000 of these users had ever made a purchase. 30,000 of these customers had only ever placed one order. At this online grocery store, the average size for a completed order was fifty-four items.

The research described in this paper aims to determine which, if either, of the two dominant interface location and selection methods is more appropriate for online grocery shopping. A review of the current literature concerning the location and selection methods for online orders will be presented, followed by a detailed evaluation of eight grocery websites from around the world. This evaluation will demonstrate the suitability of three online shopping sites that were used in the second part of the study. That second part involves an analysis of the online grocery shopping activities of eighteen potential consumers who were observed while completing the ordering process for two different lists of items at the three selected online grocery stores. This process allowed evaluation of the ordering process. A summary of the results from this testing is discussed later in this paper.

BACKGROUND

The terms 'linking' and 'searching' have previously been defined in numerous ways depending on their context. For the purposes of this study, linking is the process whereby a user employs the interface's in-built links or navigation menu in an attempt to locate a specified item. The linking method allows customers to explore the website and purchase goods in a manner that is similar to in a traditional supermarket by viewing virtual aisles. The searching method allows a user to locate an item by typing in known attributes of the product such as the name, brand or type of product. With both methods, lists of results are displayed for the consumer to select a specific product.

In the traditional store context, 'linking' is equivalent to a shopper locating the relevant aisle and then locating the specific product within that aisle (Barde, 2002). Traditional shopping commonly refers to this experience as 'browsing'. However, when the term 'browsing' is used in relation to the Internet, it suggests that the user is engaged in a non goal-oriented process and does not have clear aims (Toms, 2000). When using an online grocery store, users are more likely to have clear goals. Therefore, the process of selecting an 'aisle' online (refer Illustration 1) is referred to in the literature as linking. A study by Toms et al (2003) revealed that when category (or 'aisle') labels were inconsistent or not clearly defined on a website, users tended to stop heading down that particular path (refer Illustration 2 for example), indicating the importance of using logical and clearly defined product categories.



Illustration 1: A selection of aisles available under the linking interface



Illustration 2: An example of a user's path through the linking interface

In contrast, searching is the process whereby a user employs an in-built facility (refer Illustration 3) to search for a required item using user-selected keywords. It has been found that users employ the search box in 66% of cases when attempting to locate a known item (Toms et al, 2003). Nielsen suggests that 50% of users are search-dominant (1997), and are therefore unlikely to use in-built navigation or links to access the desired page in a website (2000). He strongly recommends that most home pages should include a prominent search feature. In contrast to Nielsen, Spool (2001b) claims that in most cases it is the website interface that is search or link dominant, not the user. However, it should be noted that these figures relate to searching for single items only.

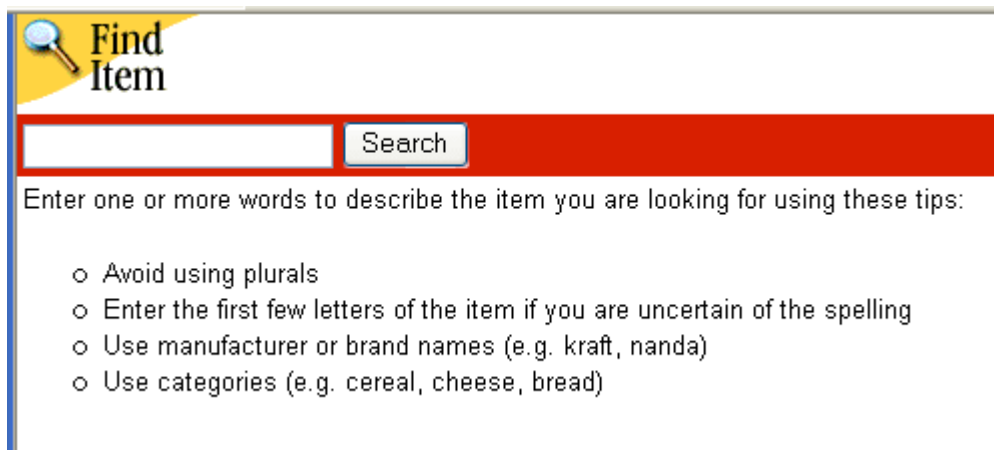


Illustration 3: An example of a search interface

In a study conducted by Spool (2001b), it was observed that users who employed the search facility located their target content only 34% of the time. However, when the user employed the linking method, they were successful in 54% of cases. He also noted that 47% of the users who used the search facility only tried to use the feature once, 30% tried to use the search facility twice and less than 25% of the users tried more than twice and were able to achieve a successful outcome.

The literature shows that users do use search methods to find products, and that users are willing to conduct repeat searches when the initial search is unsuccessful. However, there is a diminishing chance that users will find the item after each sequential search. Spool (2001a) found that 55% of the time users found the item on the first search, whereas on the second search they found it only 38% of the time. In his study the items were never found after the second search. Nielsen conducted a similar study and received the following results. On the first search 51% of users found the item, while there was only a 32% success rate on the second attempt. However, Nielsen found that 18% of users found the item on the third attempt. Although these results vary, they still indicate that users have progressively less chance of finding an item with each search conducted.

In another study conducted by Spool (2001c), thirty participants were required to make purchases from e-commerce websites. This study found that when users located their initial purchase item using a search facility, only 20% of these users continued to look at other products. However, of the users who located their initial purchase item using linking, 62% continued to look at other products after the target product was found. According to Spool, the proportion of online shoppers continuing to shop after the desired item was found is similar to the proportion of continuing shoppers in traditional shopping situations.

The figures above suggest that, while searching is popular with users, many search facilities do not meet the needs of the user. It is not only vital for search facilities to be visible, they must also function in a manner that assists in the location of the desired product. The searching mechanism is vital in the success of an online grocery store. This has been demonstrated in Freeman's (2003) study, where ten guidelines were established for use with multiple item variable quantity ordering. The ten guidelines are:

1. Informative home page
2. Pages should follow a clear left to right path
3. Searching capabilities should be visible and usable
4. Searching available across multiple columns
5. Logical ordering of results, with consistent naming
6. A separate column for each part of the results description
7. Each results row differentiated by different colours
8. Clear method for item and quantity selection
9. Buttons differentiated from text and graphics
10. Simple instructions

Several of these guidelines focus specifically on the search process and its representation to the user.

Freeman's (2003) research revealed that, in the online grocery domain, most users initially attempt to use the search facility to add products to the shopping trolley. In situations where an item is not found by the search, users become frustrated or believe that the item is not available. As a result of this difficulty, consumers often

become dissatisfied with the online shopping process. This is one major reason customers do not return to an online store (Raymond, 2001).

Previous research has shown that a major issue that should be addressed is the method for displaying the products to the consumer. Consumers have stated that they want logical ordering of results. The most efficient arrangement to facilitate fast scanning is alphabetical order. Product information and selection tools should be arranged, for western sites, in a left to right method, with the page designed for easy scanning across the lines.

METHODOLOGY

This study aims to compare and contrast the use of searching and linking methods in online grocery shopping. It was realised that the study might be biased by the use of a single online shopping site because that site might inherently favour one method over the other, so the study was conducted in two phases. In the first phase, it was necessary to identify a number of online stores with comparable, well-designed linking and searching facilities. Worldwide grocery sites were assessed against a checklist of advanced search features. Having selected appropriate sites, the second phase involved the use of searching and linking to complete multiple item, variable quantity shopping tasks by eighteen participants.

Phase 1 involved reviewing a wide range of online grocery stores, from which ten well-known grocery sites were short listed for evaluation. However, it was only possible to test eight of the ten sites, because Tesco (UK) and Peapod (USA) required the user to register using a valid address in the delivery area prior to entering the store. The eight stores evaluated were:

- Coles Online (AU)
- GreenGrocer (AU)
- MyGroceryShop (AU)
- Shopfast (AU)
- Woolworths (AU)
- FoodTown (NZ)
- Sainsbury (UK)
- Safeway (USA)

Each of the selected online grocery stores was evaluated against a checklist of standard and advanced search features provided in the site's interface. This checklist was developed for this study, based on search issues identified in previous studies by Freeman (2003) and Spink (1999). The features reviewed by the checklist were:

- The ability to truncate words used in a product search. For example, the ability to enter 'mayo' as opposed to 'mayonnaise'. This feature is able to save the user time, and is convenient when the spelling of a term is unknown.
- The ability to search for both singular and plural versions of a word. For example, when one record states 'arnotts', and another states 'arnott', both records should be returned when either word is searched.
- The ability to use a range of standard Boolean and other operators, including: AND, OR, +, -, &.
- The ability for the system to recognise when a user has misspelt a search term (for example, when no records are returned) and suggest similar terms or possible products in the database.
- The ability for users to search using correct and full descriptions, and have the appropriate product(s) returned when companies have chosen to include abbreviations in product descriptions.
- The ability to use a wildcard character, such as '*', when searching using truncations.
- The ability to include numbers in the search, where these numbers relate to the title of the product (for example, Nescafe Blend 43) or when they are the size/weight of the item.
- The ability for the system to provide a suggestion when no or few results are returned, similar to the 'Do you mean...?' found on many websites.

	truncations	's' added	use AND	use OR	use +	use -	use &	misspelt words	use of wildcard (*)	numbers	do you mean?
Coles Online	Y									Y	
GreenGrocer	Y		Y	Y	Y	Y	Y			Y	Y
MyGroceryShop		Y								Y	
Shopfast	Y	Y		Y		Y		Y			
Woolworths		Y	Y	Y		Y					
FoodTown	Y	Y		Y		Y	Y	Y	Y	Y	Y
Sainsbury	Y			Y	Y	Y		Y	Y	Y	
Safeway	Y	Y									

Figure 1: Table of advanced search features.

Figure 1 lists the advanced features that were present in the sites reviewed. All of the sites allowed the user to search for items that were available for purchase from the websites. When users entered multiple words into the search, all sites displayed the items that contained all the search terms in the product description. However, Safeway's (USA) search feature displayed results for all items that contained all search keywords, followed by all items that contained at least one of the search terms. All of the sites allowed the user to search for brand names, product names and descriptions of the products.

Six of the eight sites that were under evaluation allowed the user to truncate words in the search, with some sites suggesting that this was helpful if the user was unsure of the spelling of a product. Five of the eight sites allowed the users to add an 's' to any word they searched for and the products were still returned. Two of the other sites displayed a note under the search box advising that the user should not use plurals.

Following these results, tests were designed to assess standard search operator and Boolean features commonly available in search engines and other search systems. Only GreenGrocer (AU) and Woolworths (AU) correctly allowed the use of the AND and OR Boolean operators. Several of the sites returned no results, because they treated the words AND and OR as search terms, while others returned an error message. Error messages that were returned were either in the form of a structured error or a direct error from the database stating an ODBC error occurred at a specified line. The '+' and '&' features were usable on five of the websites under review, whilst the '-' was only used correctly by two of the websites. Most of the sites that were under review ignored the use of the '-' symbol and displayed the results as usual when the symbol was not entered. Only FoodTown (NZ) had an inbuilt dictionary facility, which returned other suggestions when no or limited results were returned. Three of the sites allowed the use of the '*' wildcard symbol but this feature was somewhat redundant when truncations were automatic.

The study also evaluated the behaviour of the sites when numbers were entered into the search box. Five of the websites returned the correct results. The other three sites stated that no results could be found. This error is an issue because many product records include numbers in the description and product name fields (e.g. 'Nescafe Blend 43').

The final evaluation of the search features assessed whether the sites provided a "do you mean...?" feature. Three of the websites displayed this feature when no results were returned. The FoodTown (NZ) site was by far the most advanced, as even when some results were returned suggestions were made on other possible searches that could yield more results.

This evaluation revealed that a significant number of the large online grocery stores are attempting to implement advanced search features on their websites. However, it should be noted that only two of these advanced features were employed during user testing: standard truncations (without the use of a wildcard), and the inclusion of numbers in the search terms.

The second phase of this research consisted of eighteen participants completing two tests at three different sites that had been previously reviewed. Rubin (1994) states that 10-12 participants are the minimum number of users needed to conduct qualitative research. In contrast to his often cited recommendation of using only five users, Nielsen (2001b) recommends that tests should be conducted with about 20 users when conducting qualitative research. For this reason, 18 participants were chosen for this research.

All of the participants that undertook the study were experienced computer- and Internet-users, and stated that they understood how to use both search facilities and navigation links on web pages. All participants were also regular

users of traditional grocery stores, and therefore understood the method of dividing grocery products into aisles. A cross-section of users was obtained, with participant ages ranging from 18 to 75+ years.

Each of the tests completed by participants was similar to a grocery item list, and each of the participants completed identical tests. The first test contained ten items, and the second test contained twenty-eight items. Participants completed these tests by adding each product from the list into their shopping trolley. In some cases, participants employed both search and linking before being able to locate an item. In such cases, whichever method was used to successfully locate the item was the method recorded as used for that item.

The results for the first-set (on three websites) and second-set (on three websites) of tests were compared to ascertain whether an increase in test length led to a change in the users' preference for the searching metaphor over the linking metaphor or vice versa. Participants were encouraged to 'think aloud' while completing the test scripts. While participant perceptions were not required for recording the essential data, they provided an insight into the user's decision-making process when selecting the method for item location.

RESULTS

The preferred method for locating items varied across the participants, with some participants preferring the linking method while the majority used the searching method. In the short tests, two participants employed linking most often, with one participant using searching and linking equally (refer Figure 2). The remainder preferred searching. In the long tests, the same two participants again used linking more often, while all others used searching (refer Figure 3). The majority of users initially used searching, resorting to linking when the search failed. However, there was no correlation between age, gender or experience and the preferred location method.

Based on observation of the participants and from later discussions with them, it appears that the method chosen to locate items was largely based on personal choice and familiarity with that method in other contexts. Many participants commented that it was natural to conduct a search for the desired item, as that was how they normally located information on the Internet. In situations where users conducted an unsuccessful search, they commonly used linking as a last resort. In a limited number of cases, participants at some websites were forced to locate items through linking because they were unable to locate the available search facilities on the given interface. The choices made by users regarding linking and search preferences are an area of ongoing research.

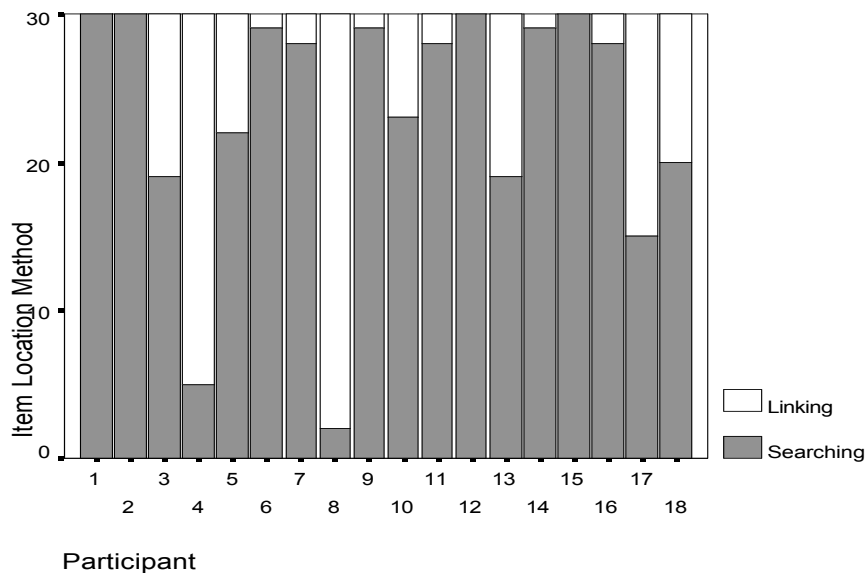


Figure 2: Comparison of linking versus searching - short (10) items test scripts

Figure 2 shows the behaviour of participants during the 3 short tests, and shows the number of times that each participant used searching compared to the number of times that they used linking. The horizontal axis refers to individual participants, and the vertical axis refers to the number of items. A total of 30 items are accounted for on this figure: 3 tests, each of which contained 10 items. The figure demonstrates that most (15) of the participants used the search facility the majority of the time, and one participant used the search and link methods an equal number of times. The mean number of searches that the participants conducted was 23.11 (from 30 items over 3 websites), with a standard deviation of 8.57. Overall, 77% of items were located by searching.

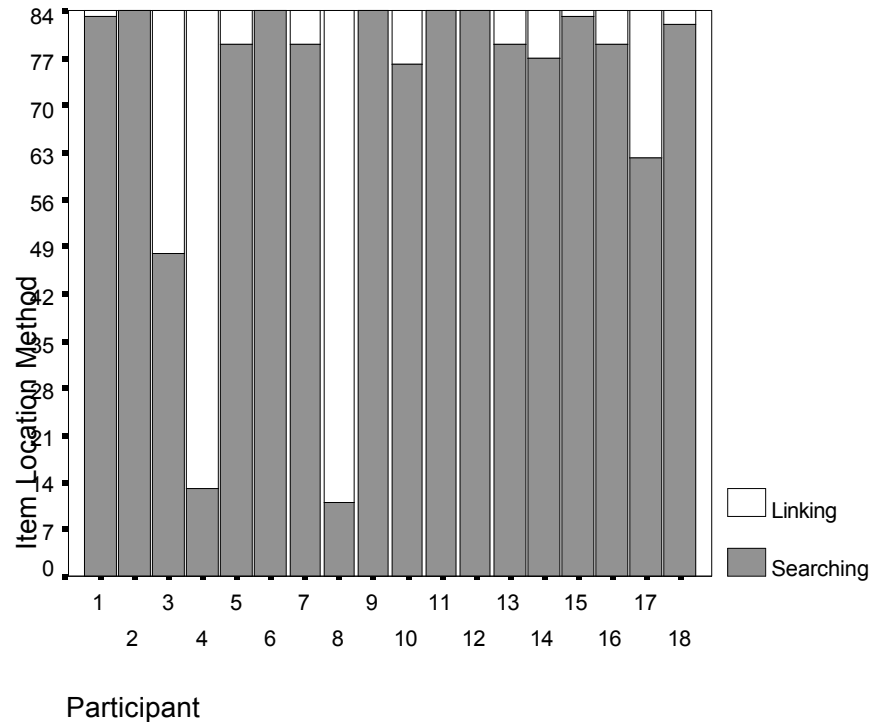


Figure 3: Comparison of linking versus searching – long (28) items test scripts

Figure 3 shows the behaviour of participants during the 3 long tests, and shows the number of times that each participant searched versus the number of times that they used links. The horizontal axis refers to individual participants, and the vertical axis refers to the number of items. A total of 84 items are accounted for on this figure: 3 tests, each of which contained 28 items. The graph shows that most (16) of the participants used the search facility the majority of the time, and that there was a significant increase in the percentage of searches conducted by some participants when compared to the results of the short test. The mean number of searches that the participants conducted was 70.61 (from 84 items over 3 websites), with a standard deviation of 23.19. Overall, 84% of items were located through searching, which is significantly higher than the short tests.

The short and long test results for locating products via searching, of 77% and 84% respectively, are notably higher than those given by Nielsen (50%) and Toms (66%). This may be related to the fact that this study was conducted using multiple items, while figures from previous studies relate to the location of a single item.

CONCLUSION

The results from this study show that the search facilities provided in online grocery store interfaces are simple, yet in most cases allow consumers to locate the desired products. Searches would be more efficient if a range of more advanced search functions, widely available from Internet search engines, were incorporated into the current systems. While participants did not use many of the advanced search features described in this paper, verbal feedback indicated that this may be attributed to the perception that such advanced features were unavailable because the basic features tested did not function effectively.

Results from this study also indicate that the probability of a user employing the search facility is increased as the number of items on the list increases. A more thorough study is required to determine whether these results are widely applicable. Many participants commented that it was natural to conduct a search for the desired item, as that was how they normally located information on the Internet. In situations where users conducted an unsuccessful search, they commonly used linking as a last resort.

User testing outcomes demonstrated that searching was the preferred method for users to locate items. The percentage of items located through searching in this testing was significantly higher than in previous testing where users were only required to locate a single item. Further study is needed to investigate the relationship between the search and linking metaphors, the acceptance of each method, and the impact they have on usability and ease of use for consumers. Such research could be conducted through further user testing, followed by tester evaluations through the completion of the Technology Acceptance Model.

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