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EVALUATION OF ALTERNATIVE INTERFACE DESIGNS FOR E-TAIL SHOPPING: AN EMPIRICAL STUDY OF THREE GENERALIZED HIERARCHICAL NAVIGATION SCHEMES

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Abstract

This paper describes a study designed to evaluate the effectiveness of alternative hierarchical navigation schemes and to determine the relative advantages and disadvantages of specific design features and to identify information needs of the on-line shopping task. An experiment will be conducted to examine a participant's performance on a known-item, on-line shopping search task using one of three generalized hierarchical navigation schemes. The results of this study may provide insight into how to design effective navigational schemes for online stores, increase our understanding of the basic task of shopping in the "click-and-order" world, and classify the information needs of online shoppers.

Introduction

A November 2000 survey by the Yankee Group found that 77% of online shoppers had abandoned a cart at least once while shopping online (Yankee Group 2000). Twenty-nine percent of respondents listed difficulty navigating the web site as a primary reason for abandoning their shopping cart before completing the checkout process. Successfully translating the "brick-and-mortar" space of aisles, shelves, signs, and floor staff into the virtual "click-and-order" cyber-space of the web browser is a non-trivial challenge. Most e-tailing sites affect this translation by organizing merchandise as a hierarchy of categories. Instead of cruising the aisles, glancing up at signs, or stopping a passing clerk for assistance, the online shopper navigates a hierarchy of hyperlinked merchandise categories and sub-categories.

Research in the field of human factors in interface design (Ashai et al. 1995, Byrne et al. 1999, Carmel et al. 1992, Conklin 1987, Rosenberg, Shneiderman 1998, Tauscher and Greenberg 1997, Utting and Yankelovich 1989) indicates that successful navigation of hyperlinked content requires that interfaces provide users with an overview and sense of location within the information structure being browsed (Kandogan and Schneiderman 1997). Studies show that interface designs using hierarchical navigation schemes can provide both overview and sense of location in hyperlinked content (Kandogan and Schneiderman 1997). And yet, difficult navigation and the resulting user frustration and abandoned shopping carts remain a serious problem for e-tailers (BizJournals.com 1999, Yankee Group 2000). The purpose of this study is to evaluate the effectiveness of alternative hierarchical navigation schemes, to determine the advantages and disadvantages of specific design features, and to identify information needs of the on-line shopping task.

Navigation Schemes

Our review of major e-tailing sites suggests that current e-tailing hierarchical navigational schemes can be generalized into three basic forms according to the level of overview and sense of location of the information structure provided. The navigation schemes differ in the extent to which the hierarchical structure is made explicit (overview) and maintained at each level (sense of location) of the hierarchy. The navigational scheme in Figure 1 provides a very high level of overview and sense of location. The hierarchical structure is explicit and the user's location within the hierarchy is maintained at each level. As the user clicks on a hyperlink, the next level in the tree is expanded. If a hyperlink represents a leaf node (e.g., Category 2.2.3.1), the bottom portion of the screen directly below the tree (see "item information") is populated with a list of items associated with that leaf node. Highlighting the nodes along the path visually represents the current path. This scheme is illustrated by www.webvan.com.

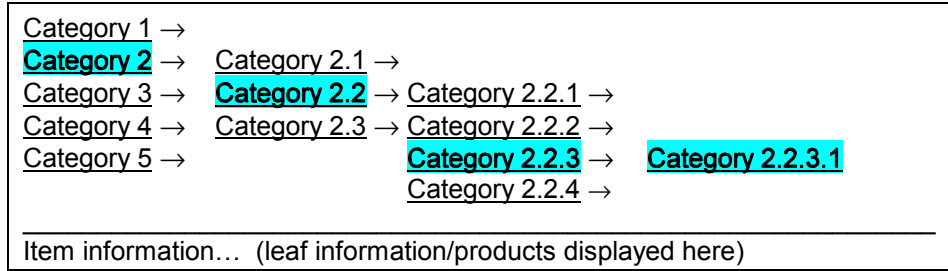


Figure 1. Hierarchical Navigation Scheme #1

The navigational scheme in Figure 2 provides a moderate level of overview and sense of location. The tree structure can be inferred but is not explicit. When the user clicks on a leaf node, the table of categories disappears leaving a list of items for that leaf node. Because this tabular representation of the tree displays only two levels of the tree at a time, most sites use a variation of the (Category 1> Category 1.2> Category 1.2.2) device to provide a sense of location or path. This representation of the current path provides less context than the highlighted path in Figure 1, as it gives no information about sibling nodes along the path. This scheme is illustrated by www.wal-mart.com.

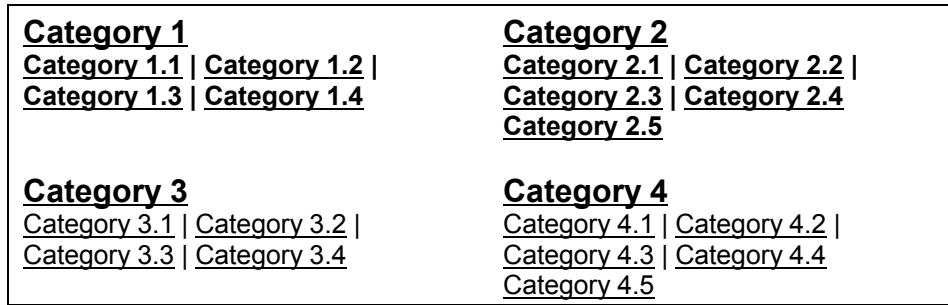


Figure 2. Hierarchical Navigation Scheme #2

The navigational scheme in Figure 3 provides a low level of overview and sense of location. The tree structure is not explicit and difficult to infer. When the user clicks on the navigation bar in the left-hand frame of the window, the sub-categories for that node appear as a list of hyperlink options in the center frame. When the user clicks on a category hyperlink, the frame is refreshed with a list of the sub-categories for that category. When a leaf node is clicked, the center frame is filled with a list of items for that leaf node. The elements or level-1 nodes in the navigation bar remain constant. No path information is maintained. This scheme is illustrated by www.wineandcheeseplace.com.

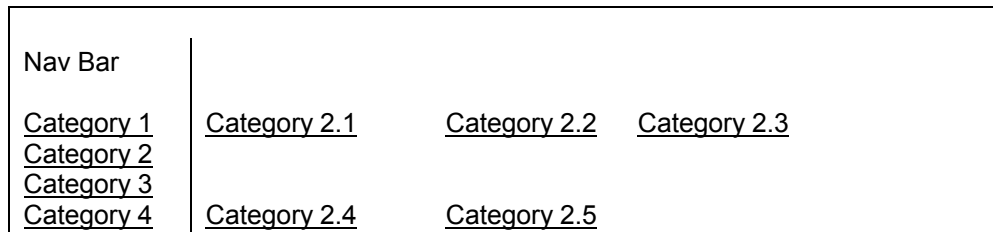


Figure 3. Hierarchical Navigation Scheme #3

Based on prior research that suggests overview and sense of location are key factors in successfully navigating hyperlinked content and the three generalized schemes designed to provide differing levels of overview and sense of location, we hypothesize the following:

Higher levels of overview and sense of location as represented in the three generalized hierarchical navigation schemes will be associated with higher performance on the on-line shopping task.

Methods

The experiment will examine how participants interact with each navigational scheme on a known-item search task. We created a representative database of categories, sub-categories, and merchandise for an on-line grocery store and a web-based interface similar to Figures 1-3. The experimental task will be to locate a single item in a hierarchically arranged list of categories. The task will be replicated for ten items chosen at random. Each participant will be given the same list of items. Participants will be instructed to find each item as quickly as possible. The experimental task is not shopping per se (which could include "window shopping," exploratory browsing, and impulse buying), but finding a known item from a pre-determined shopping list.

The experimental design has two independent variables: *overview* and *sense of location*. Participants will be randomly assigned to one of three generalized hierarchical navigation schemes:

- Scheme #1: high level of overview and sense of location
- Scheme #2: moderate level of overview and sense of location
- Scheme #3: low level of overview and sense of location.

Task performance is operationalized through two dependent measures: *speed of performance* and *number of false paths*. Speed of performance will be measured as time spent (in seconds) locating and placing an item in the shopping cart. Number of false paths will be measured as the total number of clicked hyperlinks (categories) in the hierarchy not appearing on the direct path to an item.

Contribution

Although much is known about the usability of hierarchical navigation, the relative advantages and disadvantages of specific design features for tasks such as online shopping are still poorly understood. An analysis of a user's clickstream data for the three navigation schemes described above may provide insight into how to effectively design the navigational scheme for online stores, increase our understanding of the basic task of shopping in the "click-and-order" world, and classify the information needs of online shoppers.

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