Disorientation and Hypermedia Structure

Gary Randolph
Purdue University

Jeffrey Griffin
Purdue University

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Disorientation and Hypermedia Structure

Gary B. Randolph, Purdue University, gbrandolph@purdue.anderson.edu
Jeffrey A. Griffin, Purdue University, jgriffin@iusb.edu

Abstract

Subjects viewed information on a web site presented in one of four types of hypermedia structures. A measure of disorientation was taken immediately after the task was completed. No significant differences in disorientation was found among the four styles.

Introduction

Hypermedia documents have the potential to enhance learning, by providing a structure to the information being presented (Thuring, Hannemann, and Haake, 1995). But hypermedia is a two-edged sword. It also adds cognitive overhead by requiring additional effort and concentration to mentally maintain the linked trail (Thuring, Hannemann, and Haake, 1995). Cognitive overhead is a negative influence that can negate the positive influence of the hypermedia’s structure. The nonlinear nature of hypermedia is often disorienting to readers (Beekman, 1994), and studies have shown that as disorientation increases, learning is likely to suffer (Beasley, 1994; Tripp & Roby, 1990).

How then can hypermedia be structured to minimize cognitive overhead and maximize coherence? Three typical structures used in research are hotwords, hierarchical maps, and spider maps (Beasley and Waugh, 1995). “Hotwords” are simply links embedded in the body of the text. “Hierarchical maps” provide a graphical representation of the information in a hierarchical structure similar to an organizational chart. “Spider maps,” also called “concept maps,” provide a more detailed graphical representation of the information with more extensive non-linear cross-linking, similar to a spider web. A comparison of these three structures found a significant difference in perceived disorientation, with subjects in the “hotwords” condition having the most disorientation, and subjects in the “hierarchical maps” condition having the least (Beasley and Waugh, 1995). Another study comparing hotwords versus “hypermap” structures found that the group using hotwords reported feeling significantly more confused and frustrated (Reynolds and Dansereau, 1990).

A study comparing four structures: (1) an index, (2) an imagemap, (3) and index with a context path, and (4) an imagemap with a context path found significant differences in both speed and accuracy, though not confidence or satisfaction (Rumpradit, 1998).

Another research finding of relevance to hypermedia structure is that providing semantic descriptors for hyperlinks (such as “has contrast with” or “is an example of”) can significantly improve adult learners’ performance scores compared to links with generic identifiers (“related content 1” or “related content 2”) (Zhao, O’Shea, & Fung, 1994).

Fredin (1997), writing from a journalistic perspective, suggested several possible formats for “hyperstories.” One of those formats was a simple glossary window that ran alongside a news story, explaining confusing or technical words. Another format, the simple digression format expands the glossary into headlines of related stories, which when clicked would show the related story beside the main story. This would allow readers to digress by reading the related files and easily jump back to the main story.

Hypothesis and Experimental Design

The hypothesis tested was that readers of electronic news stories using a digression or hierarchical map layout would have significantly better lower disorientation compared to either readers of electronic news stories that used the hotwords layout or readers in a no hyperlinks control group.

Fifty subjects were randomly assigned to read one of four versions of a news story concerning video conferencing technology. This topic was chosen in the hope that most subjects would have enough interest in it to trigger learning, but few would have significant prior knowledge that would act as a compounding factor.

The four versions were coded into HTML, the language used to present pages on the World Wide Web, and published to the Internet. Each version used the same pictures to accompany the story. Disorientation was
measured with a modification of Beasley and Waugh’s Non-Linear Media Disorientation Assessment.

Participants were led through launching Netscape, a popular browser program for the World Wide Web. Once Netscape started, it first loaded a brief set of instructions on how to use the scroll bars to read through the story and how to click on hypermedia links to jump to other parts of the story. Practice was allowed in both skills. At the bottom of the instructions participants clicked on a hypermedia link to launch the appropriate version of the story. Immediately after reading the story, participants rated their disorientation.

Results

The average disorientation scores showed that little difference among the various formats. The scores, listed in Table 1, range from a low of 14.67 (out of 25) for readers of the no hyperlinks structure to a high of 15.82 for readers using the hierarchical map structure.

The hypothesis was tested using analysis of variance (ANOVA) and an alpha level of .05. The differences among the various structures were not statistically significant at the .05 level (Versions of Story: F = 0.1188). Therefore no support was found for the hypothesis.

Discussion

Beasley and Waugh found differences in disorientation in two of the four structures tested. Reynolds and Dansereau found more confusion in two of the four, also. Yet the present study did not.

The relatively small sample size may have contributed to the problem. However, it is reasonable to suspect other variables may be at work. It is possible that in the present study the screen resolution may have acted as a compounding factor. The monitors used were set to a 640 by 480 pixel resolution. As Figures 1, 2, and 3 show, that made for small frames and a lot of scrolling that could have added to the disorientation of the hierarchical map and digression formats. This could have caused increased disorientation for the hierarchical and digression conditions. Yet web sites must design for 640 by 480 screens as they are the lowest common denominator and are still used by many people. Perhaps future studies might want to add various screen resolutions as part of the design.

It is also possible that individual learning style may have more to do with orientation than hypermedia structure. Some structures may fit some people well while other structures work better for others. Certainly the relationship between hypermedia structure and reader disorientation is not a simple one.

References


<table>
<thead>
<tr>
<th>Hypermedia Structure</th>
<th>Average Disorientation Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Hyperlinks</td>
<td>14.67</td>
</tr>
<tr>
<td>Hierarchical Map</td>
<td>15.82</td>
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<tr>
<td>Digression</td>
<td>14.92</td>
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<tr>
<td>Hotwords</td>
<td>15.25</td>
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