Sparks of Innovation in Human-Computer Interaction,
B. Shneiderman, Ed., Ablex Publ., Norwood, NJ (1993)

5.1 Guide to Opportunities in Volunteer Archaeology: case study on the use of a hypertext system in a museum exhibit

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Introduction

This case study describes the steps of the birth and traveling life of GOVA, the Guide to Opportunities in Volunteer Archaeology, and demonstrates that such an adventure can be successful without being burdensome. The database was constructed by the professors and students at the University of Maryland History Department. Regular updates of the database were made for each new venue of the exhibit. Finally the database was translated into French for use in Canada. System users were observed in the museum and usage data were collected and analyzed. Helpful features of the hypertext system as well as the difficulties encountered are described here.

Hypertext/Hypermedia Handbook, Berk E. & Devlin, J. Eds., McGraw-Hill Publ. (1991) 498-505

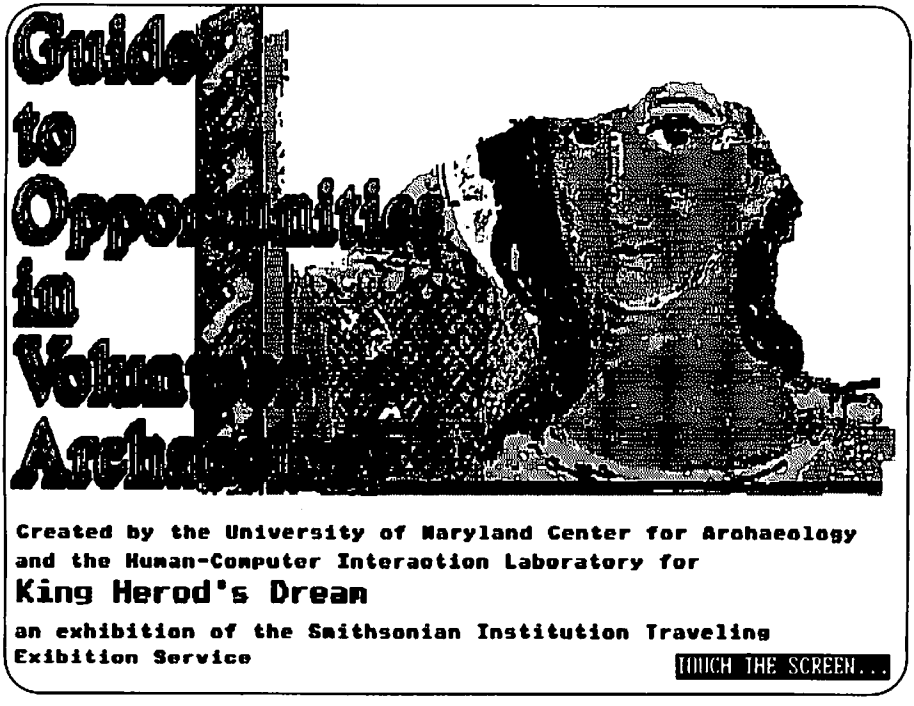

Figure 1. The title page of GOVA.

In the summer of 1987, Professor Ken Holum of the University of Maryland History Department approached the Human-Computer Interaction Laboratory for help in developing a hypertext application for a museum exhibit to open the following spring. Thus began a two-year collaboration between the two groups, which allowed us to test Hyperties (Hypertext Interactive Encyclopedia System) (Shneiderman, et al., 1989) in the "real world".

The exhibit was organized by the Smithsonian Institution Traveling Exhibition Service. It opened in Washington, DC, March, 1988 at the National Museum of Natural History, then traveled to five museums for the next two years (Los Angeles, Denver, Minneapolis-St. Paul, Boston and Ottawa.)

The museum exhibit

Two freestanding podiums were installed in the final chamber of the exhibit on "King Herod's Dream". This exhibit was about the ancient Roman port city of Caesarea located on the shores of what is now modern-day Israel. It focused on the rise of urbanism in ancient times and the archaeological methods used during the past 20 years of excavation (Holum, 1988; Holum, et al., 1988). This last station of the exhibit invited visitors to learn more about the archeological sites around the world that welcome volunteers, and about how to join such a dig.

The two custom made podiums housed IBM PC-AT computers. The EGA monitors, each equipped with a Microtouch touchscreen, were at about waist level and tilted at a 45 degree angle to the horizon. The only permanent instruction on each podium was "Touch the screen" written above the monitor. No keyboards were provided.

The database

The GOVA database was developed under the direction of Ken Holum. It consists of about 200 articles. The contents include information about archaeological digs (Figure 2) taking place around the world, descriptions of historical periods, and practical suggestions about how to join a dig.

A special effort was made to cover the local sites near each current exhibiting museum. The archaeological sites are organized both geographically and by historical periods. The information can also be accessed by direct selection on 11 maps (Figures 3 and 4).

The initial database was constructed in a relatively short period of time. Between two and three person-months were necessary to collect information about the digs, structure the information, write each article following a predetermined style, and mark the links. Each author used whatever text editor he or she was most

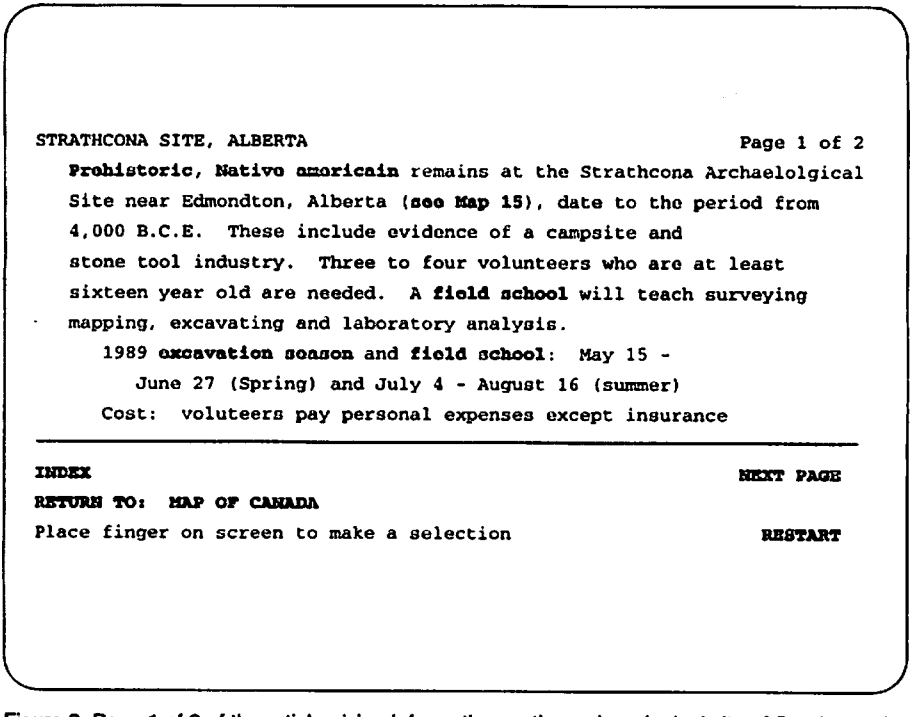

Figure 2. Page 1 of 2 of the article giving information on the archaeological site of Strathcona in Canada. Each blue word (bold in this book) is selectable.

familiar with to accomplish this task. Graphic artist Karen Norman prepared the maps and created three graphic screens (an example of which is seen in Figure 1). Then about two weeks of work was necessary to build the database in the computer (import articles, adjust their formatting, verify the links in the text and create the graphic links). As expected -- as it probably should be -- the initial writing itself was found to be the most important and time consuming task. Most of the help given by the Human-Computer Interaction Laboratory team had to do with the use of DOS and of the package used to create the graphics. Hyperties was easily learned by the History Department team.

The browser

We used a version of Hyperties which supported the use of a touchscreen as our input device, automatic restart after a period of inactivity at the computer, and the automatic logging of usage data. The museum patrons merely touched highlighted words on the screen to see a linked article.

Blue highlighting indicates the selectable items in both text as well as maps. Users receive feedback about the exact touch position by a cursor just above their fingers. When the cursor is on a selectable item, the area is highlighted. The selection is activated when users lift their fingers from the screen. This method produces low error rates and high user satisfaction (Potter, et.al., 1988).

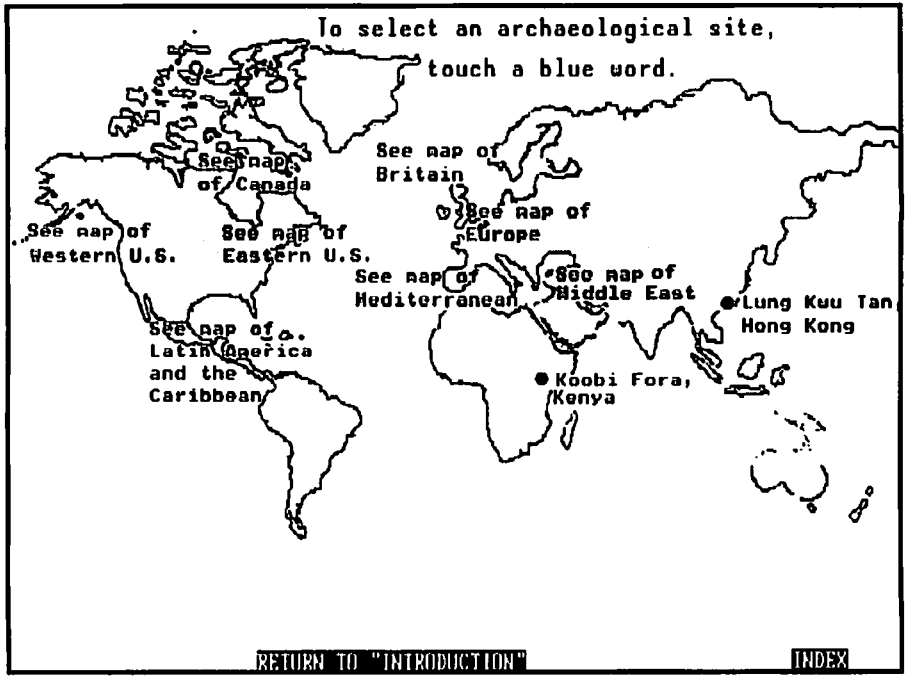

Figure 3. The world map allows patrons to select a geographical area of interest.

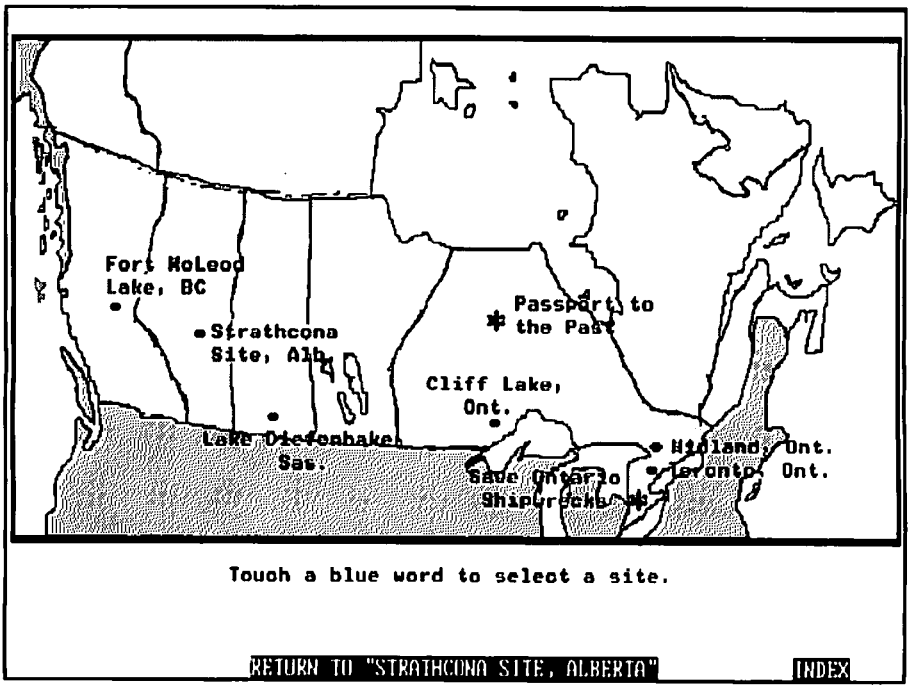

Figure 4. The map of Canada allows users to select an archeological site in Canada by pointing to a spot on the map with their fingers.

Data collection and observations in the museum

Data on the articles accessed, the time spent in each article, the number of times the index was accessed, etc. were collected from a total of about 4500 sessions while the exhibit was in Washington, DC. Results show that visitors used the links embedded within the articles of the hyperdocument more than the traditional index.

Article selection appeared to reflect anticipated interests of patrons suggesting they were able to successfully navigate the database (patrons exhibited a pronounced tendency to ask for information about local sites even though information pertaining to local sites was neither the focus nor the front end of the database) (Shneiderman, et al., 1989).

The data collection was complemented by direct observation and interviews of the museum patrons. Three observers spent 4 sessions of about 2 hours each at the exhibit, observing and discussing three potential problems: the touchscreen interface, the Hyperties mechanism and the database structure. Each session allowed us to pick out the weaknesses of the application and put in place a productive mechanism of criticism and modification between laboratory and museum. This double approach (usage data collection and direct observation) appeared to be appropriate for improving the user interface and database structure and guarantee-

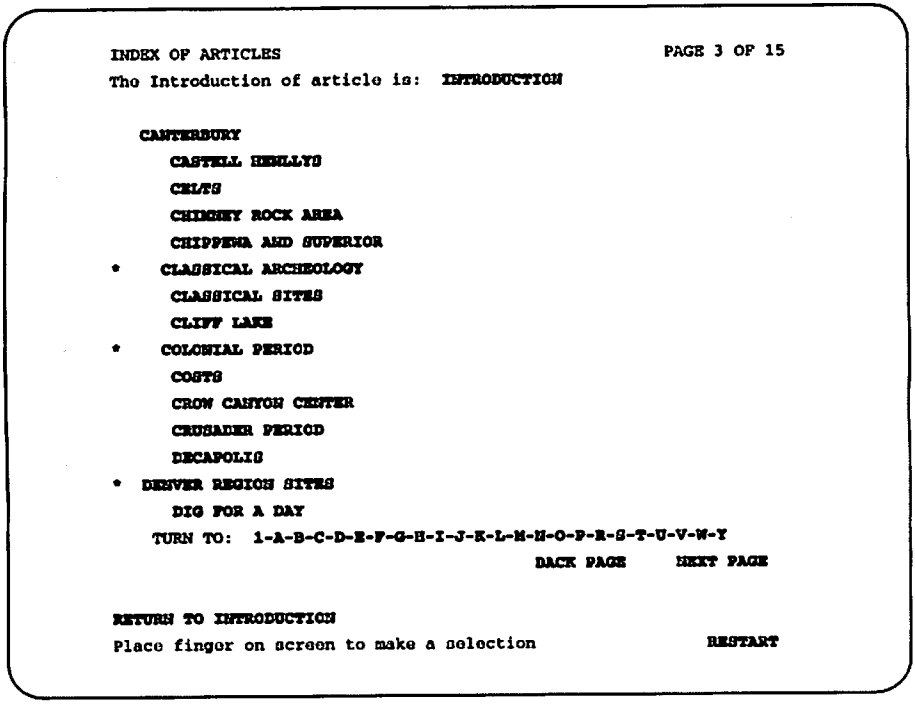

Figure 5. This is page 3 of 15 of the index. It provides direct access to all the articles of the database.

ing the usability of the system (Shneiderman, et al., 1989). Most of the patrons were able to traverse smoothly from article to article and focus on their reading and not on the navigation mechanism.

The process of regular revisions of the database

For each new venue of the exhibit, the database was updated to show the current archeological digs and also to emphasize the sites local to the museum area. The authors of the database found that making these revisions were facilitated by the simple, yet powerful, Hyperties authoring tool. The alphabetical index of articles was highly appreciated when revising an already existing database. Additionally, the browser guarantees that no invalid links (therefore no error messages) are presented to readers, allowing authors to simply remove outdated information without danger.

Updating of maps was the most time-consuming task. The authors of the database expressed the need for a tool for handling lists of topics (e.g., list of sites per area or per period of the past). Some assistance in the maintenance of the overall structure would probably also be useful. For example, using newly developed tools (Botafogo, 1990), we found several structure anomalies in the fifth

version of the database revised two years after the original writing (e.g., some articles could not be reached other than by the index).

A language translation

For the last stop of the traveling exhibit, in Ottawa, Canada, the database was translated in French and the browser modified to handle the two languages. The translation was performed from a printed copy of the database by a team in Canada.

Links in Hyperties are embedded in nodes. A Hyperties link is marked by a pair of tildes surrounding a word or group of words to be highlighted. Therefore, translators were instructed to leave the tildes in the French text just as they appeared in the English. Translators also retained the formatting commands (e.g., @p for next paragraph).

The French text was then automatically imported by the author tool. Most of the links were resolved directly by the authoring tool, and a French-speaking person then verified the accuracy of the links. Most of the human intervention involved assigning synonyms to counteract the human translation variations and fixing instances where the authoring tool didn't handle the accentuated vowels in the article titles properly. Changes to graphics had to be handled manually. A few changes were made to the browser: very few messages and command names changed, and an introduction allowed users to choose which language they wanted to use.

Conclusions

This hypertext system was used successfully for two years. Patrons were able to traverse the database and find information related to their own interests. We depended on direct observation in museums to identify problems and successes, and patron-suggested improvements were made in the first two weeks of operation.

The authors of the database were able to easily update the content and the structure of the database over the two-year duration of the exhibit. The translation process was made easier by the textual representation of the links and the automatic reconstruction of the database.

Acknowledgments

Ben Shneiderman, Professor of Computer Science and Richard Potter, graduate student of the laboratory, were major participants in the development and evaluation of GOVA. Professor Ken Holum initiated the project and actively directed the writing of the database, assisted by Diane Everman. Rodrigo Botafogo created the graphic tools used with Hyperties. We greatly appreciate the cooperation of Myriam Springuel of the Smithsonian Institution.