Tactics applied by blind and sighted users:

Initial exploration of a digital library

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ABSTRACT

This study investigates types of tactics that blind and sighted users applied in their initial exploration with a digital library (DL). Sixty participants with 30 blind and 30 sighted novice users were recruited for the study. Multiple data collection methods were employed to collect data: questionnaires, think-aloud protocols, and transaction logs. The findings of the study show that sighted participants focused on browsing DL content when blind participants concentrated on browsing DL structure. As the first study of its kind, it has both theoretical and practical implications.

KEYWORDS

Types of tactics; blind users; sighted users; digital libraries

1 Introduction

Digital libraries (DLs) have become a key information retrieval (IR) system for users to search for information. In order to design DLs for universal access, it is critical to understand diverse users' information search tactics applied during their interactions with IR systems. Search tactics are defined as a move or moves that users take to achieve a specific goal during their information searching process [1]. In this paper, tactics refer to a move or moves that users take to achieve a specific goal during their initial interactions with a DL. The majority of existing research focuses on examining tactics employed by sighted users, with less on blind and visually impaired users. Very few studies compared search tactics between blind and sighted users in different search environments. Bigham, Cavender, Brudvik, Wobbrock, and Ladner investigated browsing behaviors by focusing on probing (leaving and quickly returning to the same page) by sighted and blind users; they found that blind participants applied more probing tactics than the sighted

participants [2]. Sahib, Tombros, and Stockman compared information seeking tactics between fifteen visually impaired and fifteen sighted participants [3]. Their study revealed several unique tactics employed by the visually impaired participants: using browser history, sending e-mail to themselves, saving in calendar, and creating desktop shortcuts for relevant pages. Finding new information and reviewing existing information were identified as two commonly used search tactics, and were used by fifty-eight percent of the visually impaired participants.

The complexity of DL structure and diverse types of DL materials pose significant challenges for blind users in their interactions with DLs [4]. However, current research has not studied the exploration of tactics applied by novice users in the DL environment. To the best of our knowledge, the present study is the first one to systematically investigate exploration tactics of novice users, both sighted and blind, in the context of DLs. This study intends to address the following research question:

Q1. What are the types of tactics applied by blind and sighted users in their initial exploration of a digital library?

2 Methodology

Thirty blind and 30 sighted users, were recruited from the Midwest region of the United States. To recruit blind participants, fliers were distributed to different blind associations. Both groups of participants were required to meet the following requirements: (a) 18 years of age or older, (b) a minimum of three years of experience searching for information on the Internet, (c) novice users of DLs, and (d) comfortable verbalizing one's thoughts in English. For the blind group, two special requirements were added: (a) legally blind, and (b) use of computers non-visually by using a screen-reader software. They were invited to the usability lab in an iSchool of a university. The demographic data of two groups are comparable.

American Memory Digital Collections (AMDC) was selected because its content was of interest to both sighted and blind participants. Multiple methods were applied to collect data related to participants' initial orientation with the DL: questionnaires, think-aloud protocols, and transaction logs. First, participants were instructed to fill out a questionnaire regarding their demographic information, Internet experience, and search skills. Second, participants were asked to explore the DL without assigning any specific search tasks and "think aloud" protocols were used during their interaction process. Morae 3.1 was used to capture the interaction process and associated verbal think-aloud. Valid data of 28 of the blind users and 27 of the sighted users were analyzed. Based on open coding, taxonomies of search tactics were identified,

derived from participants' explorations of the AMDC. To ensure inter-coder reliability, two researchers analyzed the data. If there were disagreements on the coding, the research team discussed the differences until an agreement was reached. After qualitative analysis, the researchers calculated the frequency of each type of tactic. A radar chart -- a way of comparing multiple quantitative variables -- illustrates the differences between the frequencies of types of tactics applied by the blind and sighted groups.

3 Result and Discussion

Based on the think-aloud and log data, seven types of tactics emerged from the data. Table 1 presents each type of tactic and associated definition.

	Types of Tactics	Definition
1	Checking current location (CL)	Examining the position where the user is presently situated within the DL to get oriented
2	Exploring DL features (EF)	Identifying or using DL features to learn how these features work
3	Exploring DL structure (ES)	Surveying the structure and associated components of the DL to learn how the DL organizes its content
4	Examining search results (ER)	Sifting through a list of the search results or checking out an individual document within in the list in finding relevant info.
5	Formulating a search (FS)	Using search box or advanced search tools to construct a search query
6	Reading DL information (RI)	Studying information about a DL - history, purpose, etc. – to understand its background
7	Skimming DL content (SC)	Reading through available topics or collections of the DL to learn DL coverage

Table 1: Types of tactics applied

The data for initial interactions with the DL reveals 7 types of tactics utilized by the blind and sighted participants: CL, EF, ES, ER, FS, RI and SC. Interestingly, sighted participants were more likely to apply SC to obtain more information about specific topics. As one sighted participant stated, "I'm gonna browse the cities and towns. … I'm gonna browse by geographic location. There we go. I'll pick Wisconsin. Click on Wisconsin." RI is associated with the interaction with the 'about' section in the DL. The result of this tactic leads to learning more about the DL's purpose, coverage, or history etc. ES involves checking or listening to the headings on the DL main page or going through the tabs at the top of the homepage. Since blind participants cannot see the structure, they were more likely to apply this tactic. According to one blind participant, "What I'm doing is, I'm hitting H to see the different headings of the website. <Heading level 1 collection highlights. Today in history heading level 3 link. Heading level 3 link today in history. [Ding.] Wrapping to top.>" Generally, ER comes after SC and FS. During the interactions, participants had to assess search results derived from their searching and browsing behaviors. Interestingly, ER was not always applied after each searching or browsing tactic because participants mostly tried to get familiar with the DL and spent less time on the results in the exploratory stage. The EF tactic facilitates participants' interactions with DLs by visiting the "help page," scanning "frequently asked questions," using "ask a librarian" option, and locating a "search box." Searching is one critical option

for participants to acquire relevant information on certain topics either by entering key terms or using search tools. More sighted participants than blind participants employed SC tactic. Finally, CL was applied by blind participants in particular to know their current location in a DL before they moved to a different section.
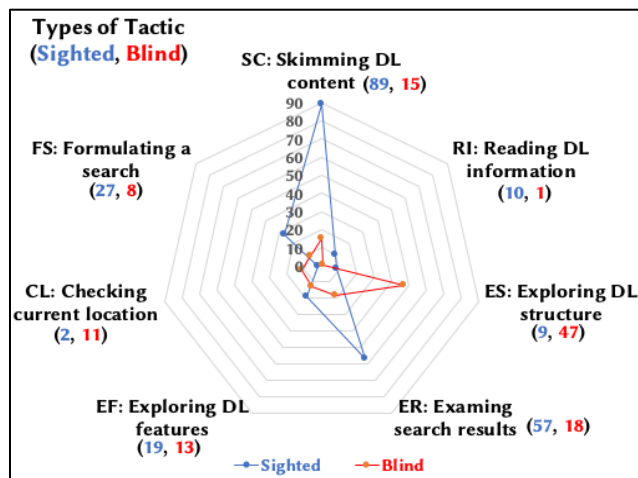
Figure 1: Radar chart comparison of sighted and blind user group

Figure 1 presents the frequency of each type of tactic applied by sighted and blind users and their differences. The total number of tactics applied by the sighted user group was 213 while the total number for the blind user group was 113. Figure 1 shows that, when sighted participants focused on SC, blind participants concentrated on Bs. The most frequently applied tactics for sighted participants were 'SC (89)' and 'ER (57).' For blind user participants, 'ES (47)' and 'ER (18)' were the two most frequently applied tactics when exploring a DL.

4 Conclusion

The findings of this study demonstrate that blind and sighted users apply not only similar but also different types of tactics in their exploration with a DL. The design of DLs needs to support blind users' tactics in their initial interactions with DLs. For example, it is critical to offer an overview of the DL structure and shortcuts to each section so they don't need to go through it in a linear fashion.

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