DESIGNING HELP FEATURES TO SUPPORT BLIND USERS' INTERACTIONS WITH DIGITAL LIBRARIES

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OVERVIEW

- Blind users face unique help-seeking situations in digital library (DL) interactions
- Design help features to overcome the top critical help-situations
- Implement into UWM digital collection
- Test help features in a usability study with 20 participants

- Experimental design:
  - ✓ Control group (10 blind users) – existing DL features, live site
  - ✓ Experimental group (10 blind users) – new DL features, test site

- Make DL design recommendations

RESEARCH QUESTIONS AND HYPOTHESES

- **What are the similarities and differences in help-seeking-situations that blind users encounter in interacting with the original and the experimental version of a digital library?**

  - There is no significant difference in the mean number of help-seeking situations between control group and experimental group for all search tasks/task 1-3.

- **Does the control and experimental group spend the same mean time in interacting a digital library?**

  - There is no significant difference in the mean time between control group and experimental group in completing all search tasks/ task 1-3.

- **What are main types of reasons for levels of perceived ease of use and satisfaction for control and experimental groups?**

  - There is no significant difference in the mean level of perceived DL ease of use between control group and experimental group.

  - There is no significant difference in the mean level of perceived DL satisfaction between control group and experimental group.

- **Which help system is perceived more helpful: the original version and the experimental one?**

- - There is no significant difference in the mean level of perceived DL helpfulness between control group and experimental group.

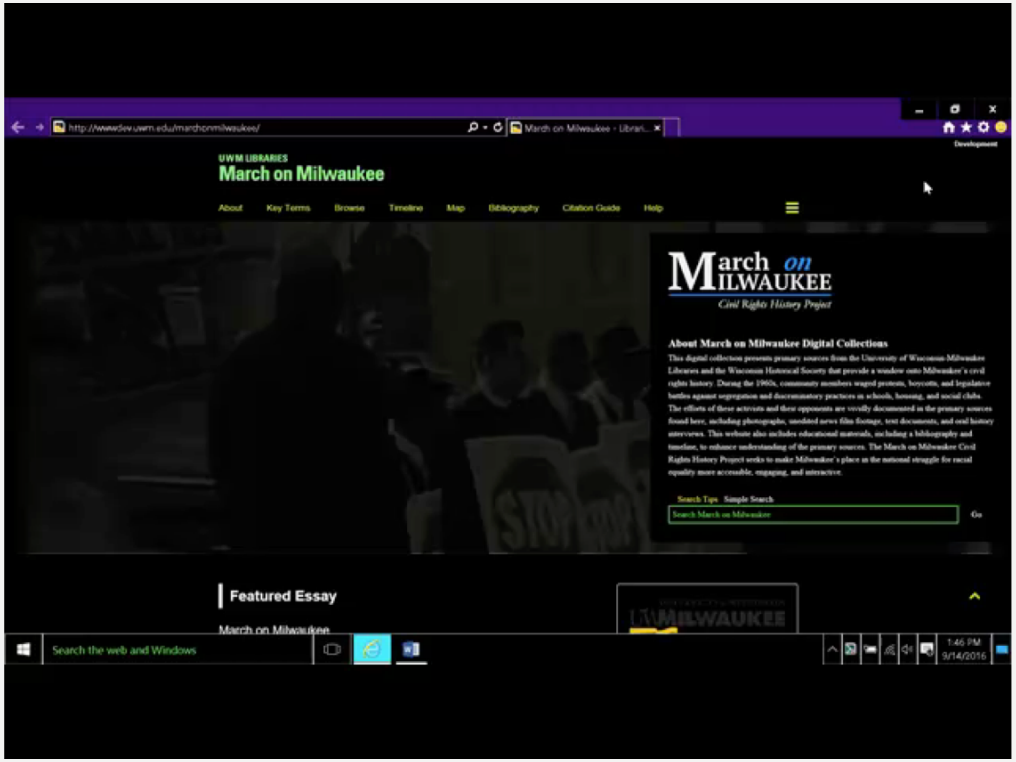
- **What are the main types of reasons that blind users use or do not use new features in interacting with the experimental digital library?**

- **What are the top 3 help features and associated reasons for their high ranking?**

METHODOLOGY

- New Help Feature Design
- Sampling
- Data Collection
- Data Analysis

MARCH ON MILWAUKEE



NEW HELP FEATURE SELECTION AND CLASSIFICATION

- Selection criteria for help features
  - Frequency of help-seeking situations
  - DL-oriented situations
  - Feasibility
- Types of help features

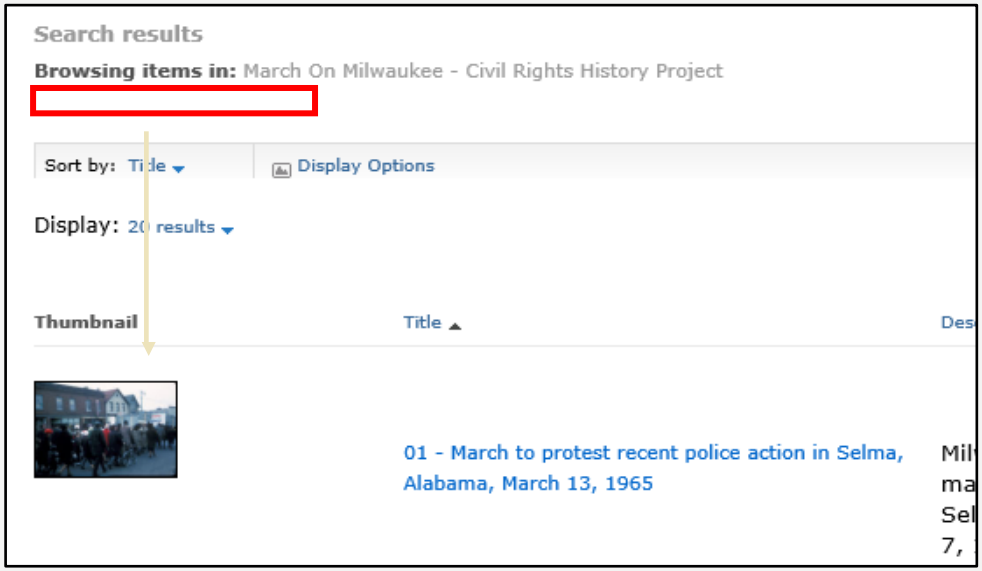
Feature types	Definitions
Description	**Provide added description or clear labels**
Instruction	**Provide instruction and context-sensitive help for features and webpages**
Navigation	**Improve ease of navigation and increase access points**
Format	**Modify text or spacing elements to eliminate confusion of screen reader interpretation**
Search function	**Enhance search function or add new search features**
Multimedia	**Modify multimedia items (e.g., change start time of video to eliminate delay)**

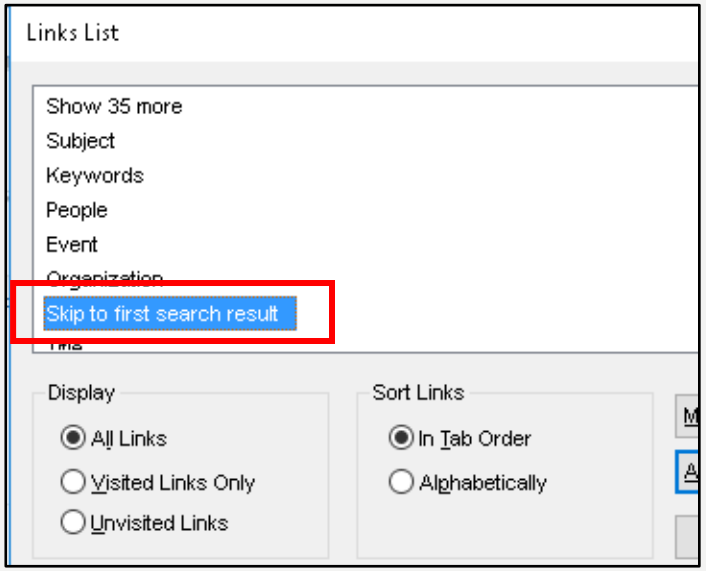
NEW HELP FEATURE DESIGN

- The March on Milwaukee:
  - WordPress (https://wordpress.com/)
  - CONTENTdm (http://www.oclc.org/en-US/contentdm.html)

- New Help Feature Design
  - code revision
  - using web administration tool
  - open solution embedment.

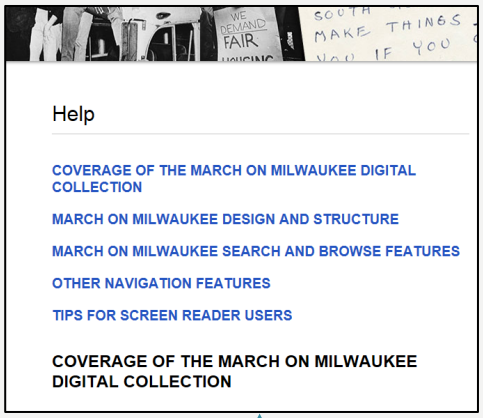
Example of Navigation Feature – Skip to first search result





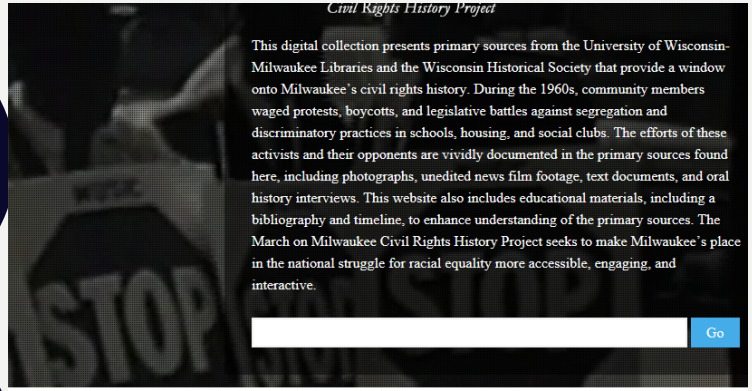
Invisible link added (Skip to first search result), identifiable by JAWS:
Skip to first search result

Example of Instruction Feature – help

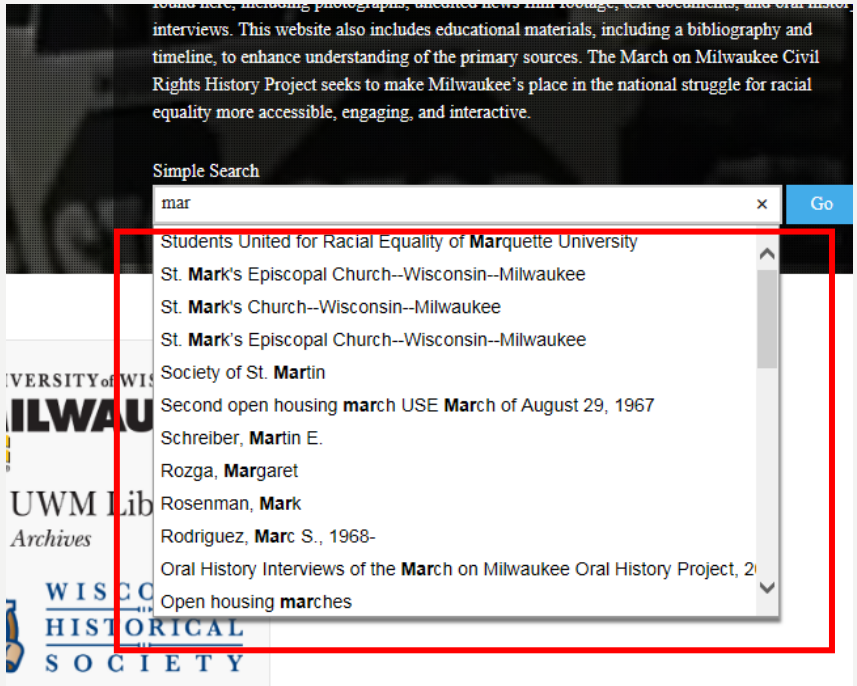


Help added

Example of Search Feature – Main Page



Key word (vocabulary words) Suggestions



SAMPLING

- 20 blind subjects
- Recruited from the Midwest through regional BVI associations
- Purposive (past participants), convenience, snowball strategy
- 3 yrs experience using the Internet
- 18 yrs or older
- Experience using a screen reader to access the Internet

DEMOGRAPHIC INFORMATION

Subject	All	Control	Experimental	GAP(E-C)
Age	3.89	4.00 (50-59)	3.80 (40-59)	-0.2
Gender	1.68	1.75	1.70	-0.05
Language	1.00	1.00	1.00	0
Vision condition	1.68	1.67 (Close to blind)	1.70 (Close to blind)	0.03
Internet year (year)	15.94	16.13	15.80	-0.33
Frequency of use (1 to 5 highest)	4.63	4.67	4.60	-0.07
JAWS experience				
Length of time (year)	14.21	11.56	16.60	5.04
Familiarity (1 to 7)	5.00	4.89	5.10	0.21
Ease of use (1 to 7)	5.05	4.89	5.20	0.31
Usefulness (1 to 7)	6.21	6.22	6.20	0.02
Hindrance (1 to 7)	3.26	2.78	3.70	0.92
IR use (1 to 5)	3.23	3.44	3.03	-0.41
File format (1 to 5)				0
F: Text	4.53	4.67	4.40	-0.27
F: Image	1.58	2.00	1.20	-0.8
F: Audio	4.11	4.33	3.90	-0.43
F: Video	3.11	3.11	3.10	-0.01
Help feature (1 to 5)	2.55	2.51	2.58	0.07
HF: Important (1 to 7)	5.32	4.56	6.00	1.44
HF: use (1 to 7)	3.42	3.11	3.70	0.59
IR usefulness (1 to 7)	4.00	3.67	4.30	0.63
Subject Knowledge (1 to 7)				0
Martin Luther	1.63	1.11	2.10	0.99
Housing	2.63	2.33	2.90	0.57
Vel Phillips	2.11	1.67	2.50	0.83

SEARCH TASKS

Known Item Search

- Find the clip with the speech of Martin Luther King Jr. at the University of Wisconsin-Milwaukee dated November 23, 1965 in two approaches: employ the browse approach and a keyword search to find the clip. Play the clip briefly to verify that the audio is the correct one.

Specific Information Search

- Identify at least two different events regarding housing discrimination in Milwaukee. What happened at these events? Name two key figures who fought against housing discrimination.

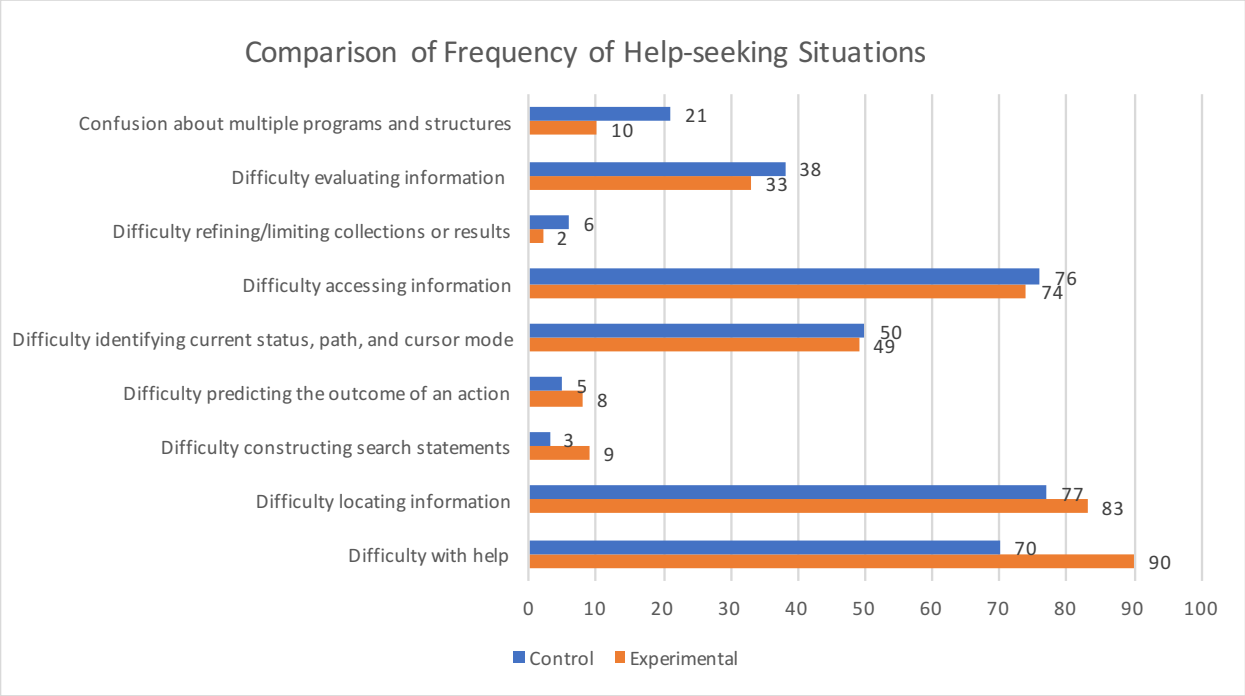
Exploratory Search

- Find information about Vel Phillips' involvement with legislative issues. Please find as many items as possible from the digital library as you can. Make sure each item either represents one distinct format or one distinct aspect of this search topic.

DATA COLLECTION AND DATA ANALYSIS

Research Questions and Hypotheses	Data collection	Data analysis
Types of help-seeking-situations **Mean no. help-seeking-situations tasks/per task**	Think-aloud protocol; transaction logs	Descriptive analysis; t-tests Open coding Taxonomies of types of situations
Mean time tasks/per task	transaction logs	Descriptive statistics; Mann–Whitney U tests
Mean perceived level of DL system helpfulness **Types of reasons for helpfulness/unhelpfulness**	Post-task interviews; post-interview	Descriptive analysis; t-tests Open coding Taxonomies of types of reasons
Mean level of perceived ease of use **Mean level of perceived satisfaction** **Types of reasons for perceived satisfaction**	Post-interview	Descriptive analysis; t-tests Open coding Taxonomies of types of reasons
Types of reasons for using or do not using new features	Post-task interviews; post-interview	Open coding Taxonomies of types of reasons
Top 3 help features **Types of reasons for high ranking**	Post-task interviews; Post-interview	Descriptive analysis Open coding Taxonomies of types of reasons

RESULTS I: FREQUENCY OF HELP-SEEKING SITUATIONS



RESULTS II: TIME SPENT

Wilcoxon rank-sum (Mann–Whitney U) tests were conducted to compare the time spent of the task completion between the controlled group and experimental group (alpha = 0.05).

- No significant difference in median time on all search tasks (z=0.3690, p=0.7122).
- No significant difference between the mean ranks of time on task 1 (z=-0.0830, p=0.9341).
- No significant difference between the median time on task 2 (z= -0.2020, p=0.8400).
- No significant difference between median time on task 3 (z= 1.2890, p=0.1975).

RESULTS III

Perceived ease of use of the DL.

There is **no significant difference** between the controlled group (M=4.5, SD=1.58) and experimental group (M=5, SD=1.05) in the mean perceived ease of use of the DL; t(18)=-0.832, p=0.416.

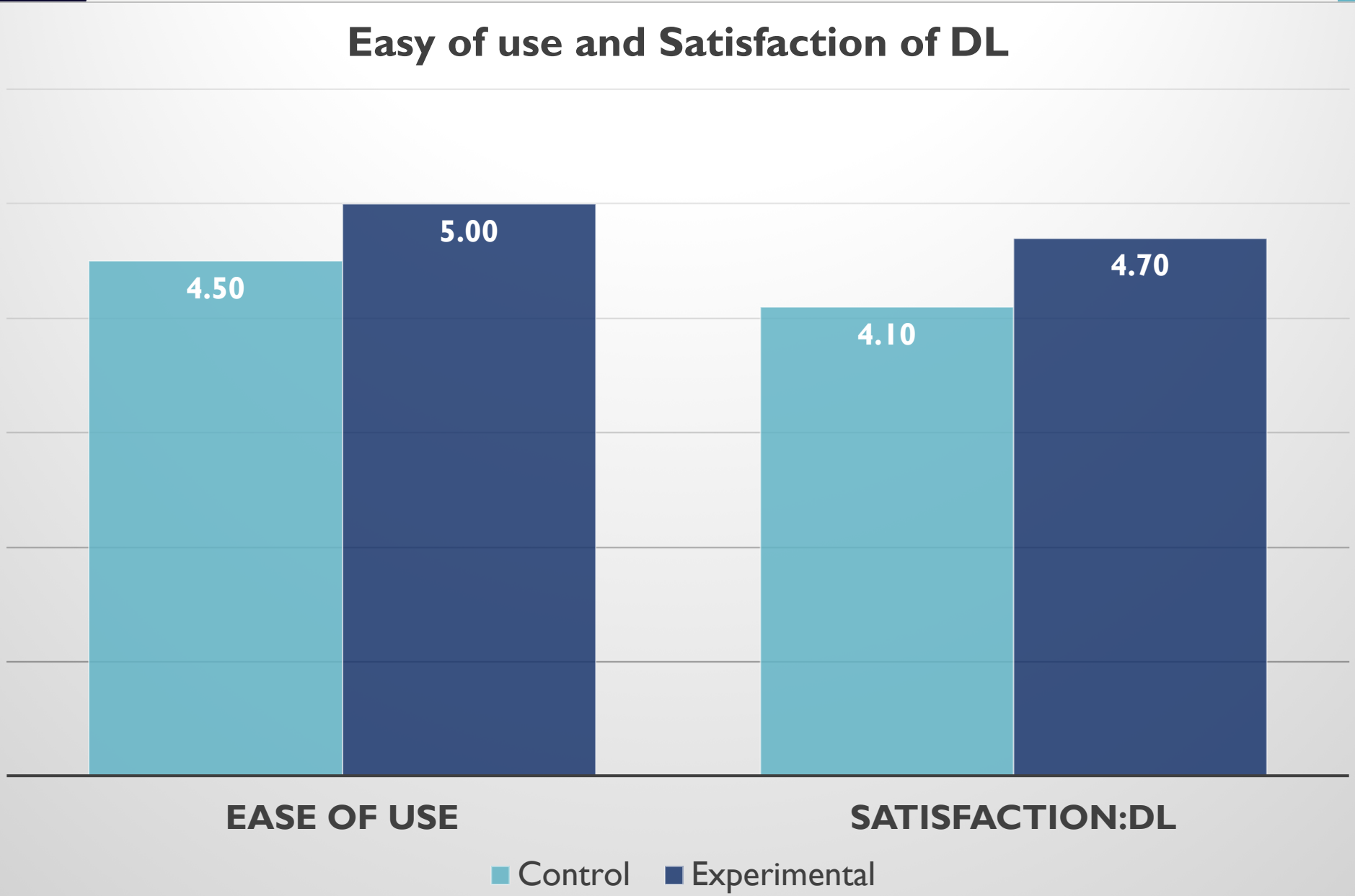
Perceived satisfaction level of using the DL.

There is **no significant difference** between the controlled group (M=4.1, SD=1.66) and experimental group (M=4.7, SD=1.16) in the mean perceived satisfaction level of using the DL; t(18)=-0.936, p=0.362.

Perceived helpfulness level of system help of the DL.

There is a significant difference between the controlled group (M=3.63, SD=1.18) and experimental group (M=4.61, SD=0.69) in the perceived helpfulness levels of system help; t(18)=-2.275, p=0.035. This indicates that the experimental group perceived a higher level of helpfulness than the control group in system help.

RESULTS III: EASE OF USE



RESULTS III: SATISFACTION LEVEL

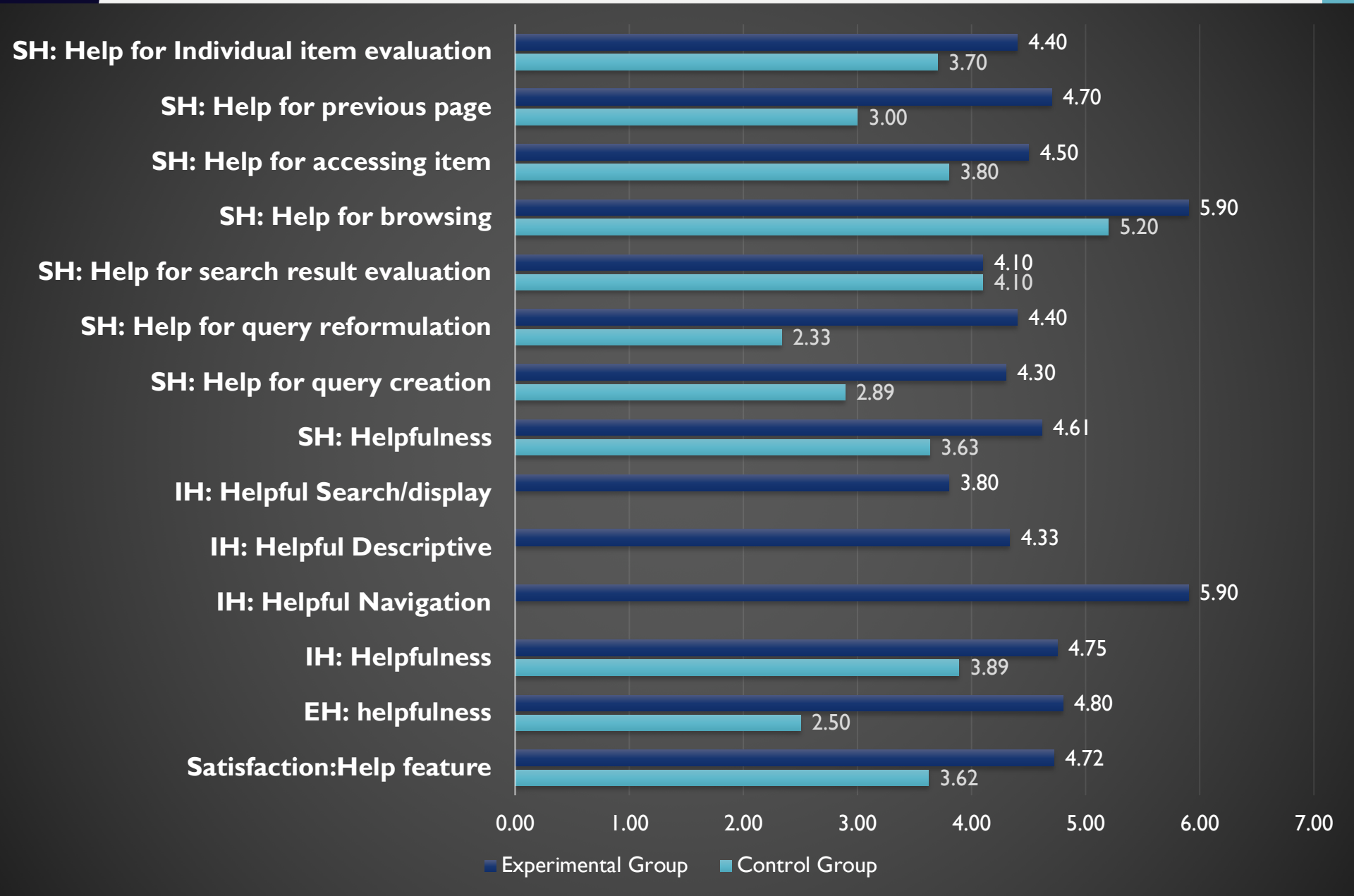
Main reasons for high satisfaction level of the DL

Control	Experimental
Coverage of the DL Browse options and navigation	Availability of multiple help features Clear headings Coverage of the DL Clear labels Easy Navigation

Main reasons for low satisfaction level of the DL

Control	Experimental
Inefficient navigation Inaccessible content/No alternative text Time consuming Unclear labels/description Not as good as Google Complicated structure	Difficulty accessing information No or irrelevant results Multimedia problem

RESULTS III: HELPFULNESS OF HELP FEATURES



RESULTS III: HELPFULNESS OF HELP FEATURES

Reasons of why subjects used the new features

Navigation	Description	Search/Display
Browse Headings Skip to content Go back to home link Jump to search result (Shortcut)	Differentiate subject and keyword instruction/link Helpful to jump over redundant content	Search tips Advanced search Display format (sorting/display options)

Reasons of why subjects did not use the new features

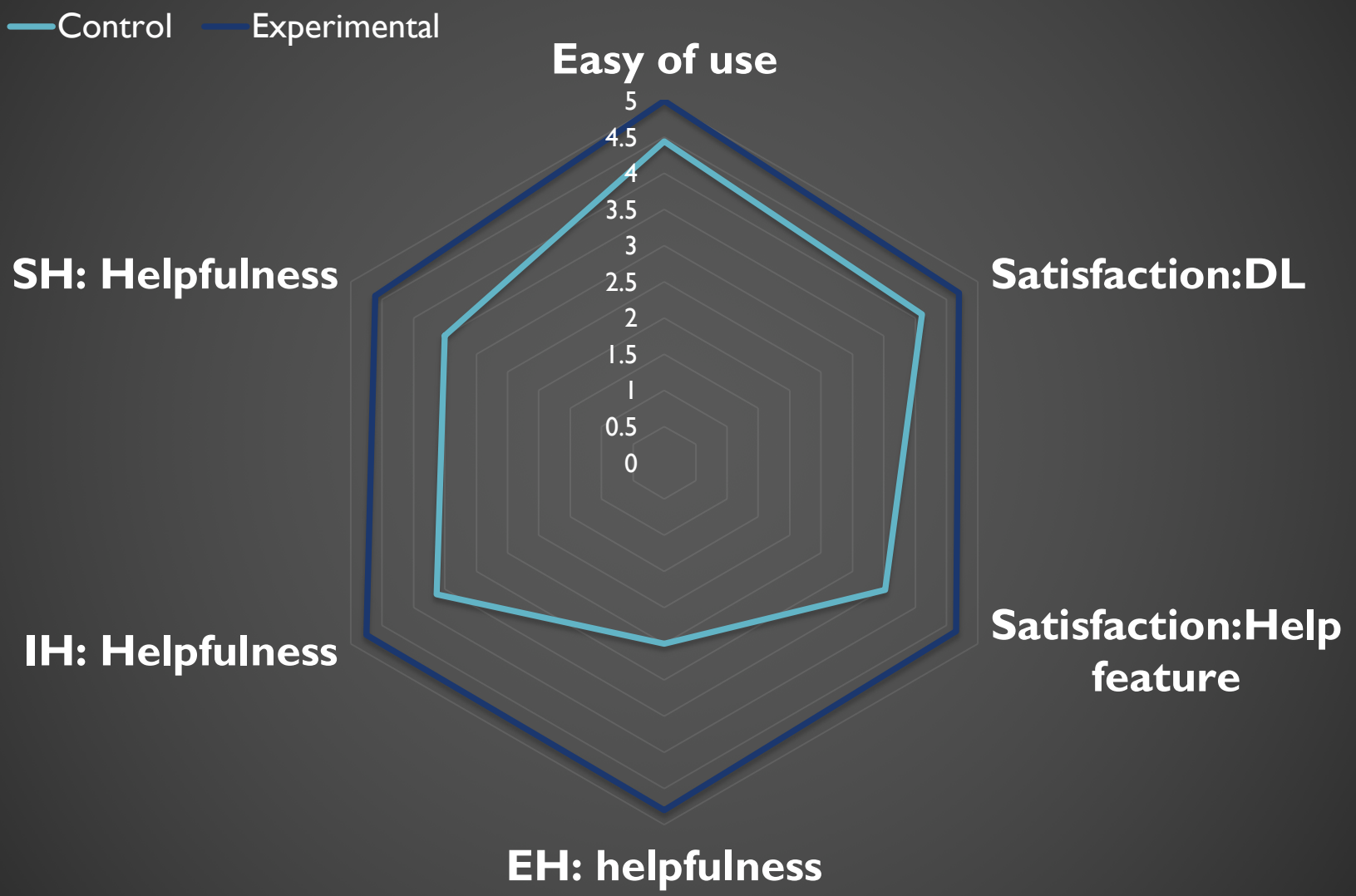
Navigation	Description	Search/Display
Unclear labels Time constraint-accomplish task Internet speed	Limited time	Difficult to use (Collapse/expanded)

RESULTS III: HELPFULNESS OF HELP FEATURES

Reasons of why subjects used the new features but had problems

Navigation	Description	Search/Display
Too many headings Difficult to differentiate headings and text	Lack of time to read instruction Unclear label (expectation) Too short instructions (Need more explanation)	Difficult to understand and use features (search limiter, advanced search) Lack of time Lack of feedback

RESULTS III: COMPARISON



RESULTS IV: TOP THREE HELP FEATURES

Categories	Top1	Top2	Top3	Frequency	Point
Browse	2	1	3	6	11
Skip button/content/search result	1	2	1	4	8
Heading	2		1	3	7

Category	Reason
Browse	Logical organization Useful links Easy navigation Multiple categories S14: "it gives you events, people and stuff, searching under those categories, and main categories and then going from there. So that was a good thing."
Skip button/ content/ search result	Useful Quick navigation Instructive
Heading	Fast access Proper labeling S9: "I liked navigating the page through my headings". "Headings are marked properly"

DISCUSSION & CONCLUSION

- Rethink sight-centered DL design
- Understand the overall DL structure and navigation strategies
- Redesign one DL accommodating both blind and sighted users
- Create new help features blind users can effectively use
- Develop new help features without creating new help-seeking situations
- Test new features in diverse DL designs
- Develop DL design principles and guidelines

Thank you!

Questions?