Investigating Gaze Behavior in Faceted Search Interfaces for Library Catalogs

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OCLC/ALISE LIS Research Grant Report
ALISE 2010
January 13, 2010

Outline

• 60-second demo
• Research goals and questions
• Experimental design
• Initial results
• Next steps
Faceted Search Findings

- Support exploratory search tasks
- Help with: vague, evolving or ill-defined needs, poor results
- Less “lostness”, more organized
- Help to assess search results
- Not always preferred
- **Appear to affect search actions and tactics**

Faceted Search in Library Catalogs

• Facets played a major role in exploratory searches after brief training
  – Fixation time about 1/3 - 1/2 as much as on results
  – Facets used more at early stage of search (first page of results)

(Kules et al. 2009)

Research Goals

• Investigate a practical implementation issues for libraries
  – Do users need intro or training?
• Improve understanding of how faceted interfaces affect searcher actions and tactics
  – Can we replicate previous results?
Research Questions

Q1) Does gaze behavior differ when training or specialized online help is provided?
   • How many times and for how long do searchers look at major elements (query box, facets, results, breadcrumbs)?

Q2) Does gaze behavior change as searchers become familiar with the interface during the session?
   • How many times and for how long do searchers look at major elements?

Q3) Does gaze behavior differ depending on the stage of search?
   • How frequently and how long do searchers look at major elements (query box, facets, results, breadcrumbs)?
   • (Still analyzing this data)
Experimental Design

• N=18 sessions, CUA undergraduates
• 1x3 between-groups design

• Conditions
  1. Baseline with no specific intro to facets
  2. Baseline with 60 sec video on facets
  3. “What’s This” link with no specific intro to facets

• 6 exploratory tasks-balanced Latin square
Procedure

- Introduction, informed consent
- 60 or 120 second intro video
- Calibrate eye tracker
- Conduct 6 searches
- Questionnaire after each search
- Retrospective review – Stage of search
  - Half-speed video of two searches with gaze data overlaid
  - Subject reported search stage (5 choices)
- Final questionnaire
Search Stages

A) Coming up with search terms  
B) getting an overview of the results of your search  
C) Extracting specific information from your results  
D) Deciding what to do next  
E) Deciding on a topic  

Six Exploratory Tasks

A) Feminism in the United States  
B) Textile industry on three continents  
C) Great Britain and the colonies in the 20th century  
D) History of the Olympic games  
E) Medical sociology  
F) Native Americans in the Colonial period
Exploratory Task

You are taking a class called “History of the Olympic Games” for which you need to write a research paper. You have yet to decide on a specific topic for this paper. Use the library catalog to explore possible topics and find two. Then find at least three books for each so that you might make a decision as to which topic to write about.

Data Collection

- NCSU Catalog Research Testbed
- Tobii T120 remote eye tracker
  - 17” monitor
  - 120 Hz sampling rate
  - Resolution 1024x768
  - Tobii Studio analysis software
- Gaze fixations
  - Minimum 100 ms
  - 30 pixel radius
- Manually segmented into areas of interest (AOIs)
### Descriptive Task Measures

<table>
<thead>
<tr>
<th>Mean values</th>
<th>1. Baseline</th>
<th>2. 60 sec facet intro</th>
<th>3. What’s this link</th>
</tr>
</thead>
<tbody>
<tr>
<td># of fixations in AOs</td>
<td>926</td>
<td>860</td>
<td>648</td>
</tr>
<tr>
<td>Total fixation seconds in AOs</td>
<td>185.6</td>
<td>201.2</td>
<td>182.8</td>
</tr>
<tr>
<td># of queries</td>
<td>24.3</td>
<td>19.2</td>
<td>33.7</td>
</tr>
<tr>
<td># of facet adds (narrowing)</td>
<td>17.8</td>
<td>37.7</td>
<td>23.0</td>
</tr>
<tr>
<td># of (facet removes)</td>
<td>3.5</td>
<td>17.2</td>
<td>5.7</td>
</tr>
</tbody>
</table>
Results

- RQ1 – Does gaze behavior differ when training or specialized online help is provided?
  - AOI fixation counts by condition
  - AOI fixation total time by condition
- RQ 2 - Does gaze behavior change as searchers become familiar with the interface during the session?
  - AOI fixation counts by task sequence number
  - AOI fixation total time by task sequence number

RQ1 – Does gaze behavior differ when training or specialized online help is provided?

Training significantly increased:
- Mean total fixation time in the facets
- Mean total fixation time in the breadcrumbs (slightly)

![Graph showing mean total fixation time](image)
RQ1 – Does gaze behavior differ when training or specialized online help is provided?

Training significantly increased:
• Mean total number of fixations (vs. help condition)

RQ 2 - Does gaze behavior change as searchers become familiar with the interface during the session?

No significant differences
• Some drop-off in last sequence task, but not significant

Note
Bar #1 = first task
Bar #6 = last task
Limitations

- Tasks
  - One high-level scenario
  - Closely matched facets
  - Researcher provided tasks in lab setting
- Eye tracker
  - Mediocre “capture” rate

Conclusions

- 60 sec video intro increased facet use to about 30%
  - Comparable to previous results
  - Libraries should consider providing intros
- “What’s this” link did not increase facet use
  - Similar to baseline - about 15%
  - Would different visual design help?
- Facet use did not increase later in session
  - May take longer to see changes
Next Steps

- Analyze stage of search data
- Additional factors
  - Number, size and presentation of facets
  - Domain, search knowledge
- Extend measures
  - Compare with click data
- Continue exploring use of gaze replay for retrospective interviews

Acknowledgements

- Collaborators:
  - Robert Capra, UNC Chapel Hill
  - Joseph Ryan, NC State
  - Research assistants - Matt Banta, Abbey Gerken
- This research was generously supported by an OCLC/ALISE LIS Research Grant
Ancillary Material