



How Task Types and User Experiences Affect Information-Seeking Behavior on Web: Using Eye-tracking and Client-side Search Logs

Hitomi SAITO (Aichi University of Education)

Hitoshi TERAJ (Tokyo Denki University)

Yuka EGUSA (National Institute for Educational Policy Research)

URL: <http://cres.jpn.org/>

Masao TAKAKU (National Institute for Materials Science)

Makiko MIWA (The Open University of Japan)

Noriko KANDO (National Institute of Informatics)

Email: cres@nii.ac.jp

Objectives

- ✓ How do task types affect information-seeking behavior?
 - ⇒ We compared informational and transactional tasks [1].
 - Informational task: report-writing
 - Transactional task: trip-planning
- ✓ How do knowledge and experience affect search behavior?
 - ⇒ We compared undergraduates with graduate students.

[1] A. Broder. A taxonomy of web search. *SIGIR Forum*, 36(2): 3–10, 2002.

Participants

5 Graduates

✓ Library and information science majors

✓ Ages: between 23 and 28

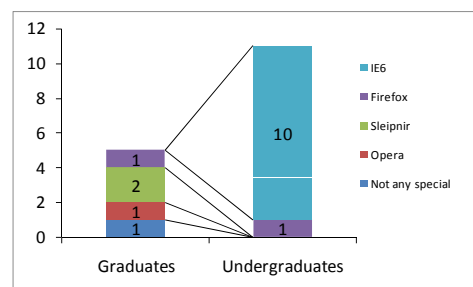
✓ Males: 4, female: 1

11 Undergraduates

✓ Various majors

✓ Ages: between 19 and 21

✓ Males: 5, females: 6



Web browsers

Tasks

Report-writing Task

You are an undergraduate student and have to write a term paper for a world-history class. Your topic is _____.

Participants selected their own topics.

Trip-planning Task

You plan to take a trip with _____. The season you are traveling in is _____ and you are going to _____ (location). You must give your trip partners such useful information as transit points, accommodation, locations, and events.

Participants selected travel partners, season, and destination

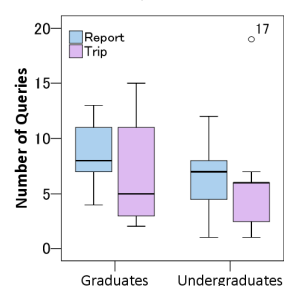
Results of Behavioral Data

Categories of Web search behaviors

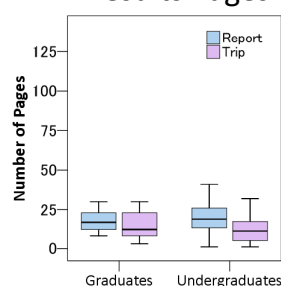
- ✓ Search: searching with search engine
- ✓ Link: clicking on page link
- ✓ Next: going forward to next page
- ✓ Back: going backward to last page
- ✓ Jump: going to page in bookmark or history
- ✓ Browse: browsing next search results
- ✓ Submit: clicking submit button
- ✓ Bookmark: adding bookmarks
- ✓ Change: changing from one tab to another
- ✓ Close: closing a tab or window

	Report Task				Trip Task			
	Graduates Mean	SD	Undergraduates Mean	SD	Graduates Mean	SD	Undergraduates Mean	SD
Search	9.20	3.35	8.00	4.63	7.80	5.89	6.36	5.18
Link	25.80	14.13	19.18	6.66	29.00	14.47	35.73	9.12
Next	0.80	0.84	0.36	0.81	0.20	0.45	0.91	1.14
Back	10.40	9.07	17.18	7.97	10.80	8.04	22.00	14.61
Jump	2.20	1.92	2.36	1.69	3.20	2.68	2.45	1.75
Browse	0.80	1.30	1.82	2.36	0.60	1.34	0.18	0.60
Submit	7.60	12.62	1.27	2.97	4.40	4.34	3.00	3.03
Bookmark	8.00	1.41	4.55	2.16	8.00	6.44	4.55	2.42
Change	43.60	26.38	2.45	5.63	28.40	19.96	3.36	3.11
Close	4.20	3.96	0.36	0.67	6.00	9.82	2.36	1.86

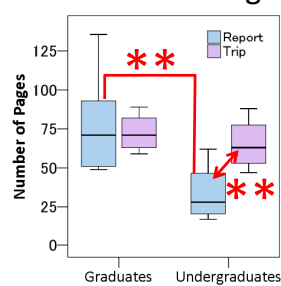
Queries



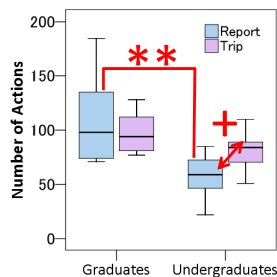
Number of Results Pages



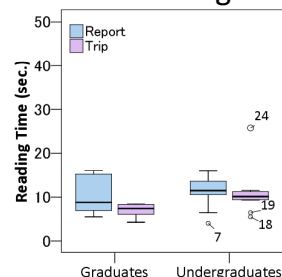
Number of Non-results Pages



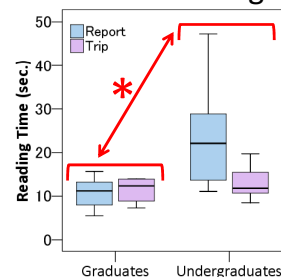
Actions



Reading time for Results Pages



Reading Time for Non-results Pages



User Differences

- ✓ Graduates more likely to:
 - add bookmarks
 - submit more forms
 - change and close more tabs or windows
- ✓ Undergraduates more likely to:
 - read Non-results pages
 - click on more links
 - return to more previous pages

User and Task Differences

- ✓ Report task:
 - Graduates browsed more Non-results pages
 - Graduates performed more actions
- Task Differences
- ✓ Trip task:
 - Undergraduates browsed more Non-results pages, and performed more actions than in report task

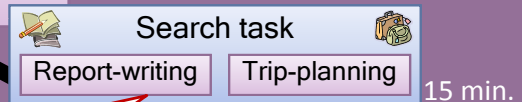
Summary of Results

- ✓ How do task types affect information-seeking behavior?
 - ❑ Task types affect user eye movements and clicking pages
 - Trip task: Users looked more at sponsored links.
 - Report task: Users looked more at snippets
 - Users clicked and viewed lower rankings
- ✓ How do knowledge and experience affect search behavior?
 - ❑ User search patterns differed by experiences
 - Graduates quickly searched in parallel by switching tabs or windows
 - Undergraduates searched sequentially by alternating between links

Procedures

Pre-questionnaires

- How much do you use Web weekly?
- What browsers?
- What search engines?



Repeat twice

Instructions

- ✓ You have 15 minutes to collect related information through the Web.
- ✓ Add pages to browser's book marks if useful.

Post-questionnaire

- How difficult was task?
- Satisfied with search results?

Interview

- Information-seeking processes
- Showed them screen-captured video

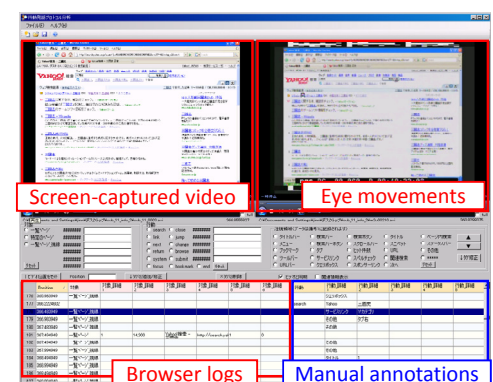
≈ 30 min.

Experimental data:

- ✓ Screen captured video
- ✓ Browser Logs
- ✓ Eye movements

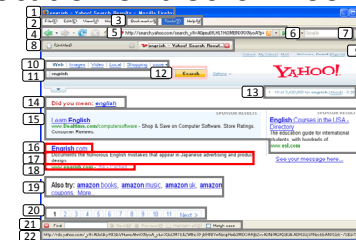


- ✓ Windows XP
- ✓ Firefox

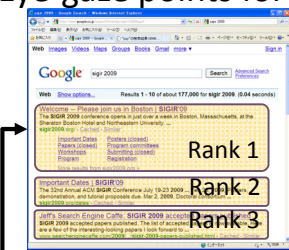


Results of Eye Movement Data

Location of blocks in lookzone

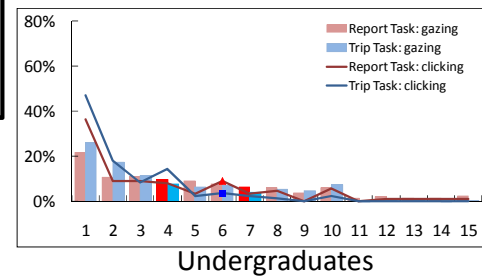
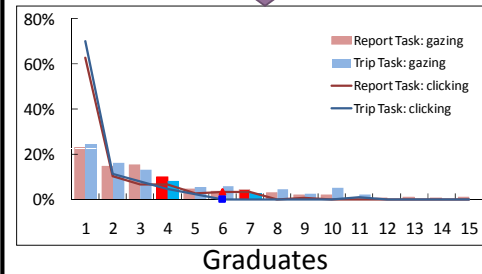


Eye-gaze points for each ranking



+ Click rank data

Blocks	Report Task		Trip Task	
	Graduates	Undergraduates	Graduates	Undergraduates
1 Title bar	0.40	3.78	0.80	1.00
2 Menu	1.80	0.22	0.00	0.11
3 Bookmark	0.00	3.78	0.20	0.00
4 Tool bar	0.40	1.78	0.40	1.22
5 URL bar	0.40	0.78	0.00	0.11
6 Search bar	4.00	0.00	4.00	0.00
7 Search bar button	0.20	0.00	0.20	0.00
8 Tab	10.20	8.11	6.00	9.22
9 Link for services	2.40	17.67	2.20	5.00
10 Query box	5.40	36.89	3.00	12.56
11 Search button	0.00	0.89	0.20	0.67
12 Scroll bar	0.60	0.11	0.00	0.00
13 Number of hits	0.00	0.44	0.60	0.00
14 Sponsor Link	0.00	6.67	11.40	12.11
15 Spell check	0.00	0.00	0.20	0.00
16 Title	38.80	60.67	39.20	42.11
17 Snippet	70.00	91.11	28.40	37.00
18 URL	16.60	40.89	12.40	15.44
19 Related search	1.20	3.00	1.20	2.56
20 Link for next page	1.00	0.78	1.00	0.78
21 Find in a page	0.00	0.00	0.00	0.00
22 Status bar	0.00	1.78	0.00	0.00
Out of lookzone	19.60	52.89	17.00	18.22
Lack of eye position	12.00	83.44	7.20	70.78



User Differences

- ✓ Graduates:
 - focused more attention on Search bar
 - clicked higher ranked pages
- ✓ Undergraduates:
 - focused more attention on tool bar, query box, and search button.
 - clicked lower ranked pages

Task Differences

- ✓ Report task:
 - Both groups looked more at Scroll bar and Snippet
 - Both groups tended to look and click lower ranked pages than trip task
- ✓ Trip task:
 - Both groups looked more at Sponsor links

