

I. Appendix I. Details of Experiment 1

Below are procedures and handouts for experiment 1, as they were submitted to the Institutional Review Board.

Procedures

October 2002

The subject pool will be computer science graduate students, primarily those in Dr. Fox's CS5604 class, but open to the other graduate students as well. They will be recruited by an in-class call for participation in research on information retrieval. Approximately 30 students will be involved. The only non-selection criteria is that students who are fluent Spanish speakers will be excluded, since the research involves showing the students abstracts from Spanish research papers, and if some students can read and fully understand the abstract, and others cannot, then this will skew the results. The age range will be that of computer science graduate students, that is, about 23 to 40. The research is open to both males and females.

This research is testing the effectiveness of concept maps in finding research resources that are written in languages that the speaker cannot read. This is done with concept maps, which are diagrams with nodes representing the major concepts in the document, and labeled links between the nodes, which represent the connections between these concepts.

Each user will be tested individually. Each subject will participate in only one session. Total time commitment will be less than one hour. The study will be conducted in Torgersen 2030E.

Users will first be asked to fill out a subject profile form, concerning their knowledge of Spanish, and also their experience level with digital libraries and human-computer interaction, which are the subjects of the abstracts that they will read. The form will not ask for users' names, so the users will be completely anonymous based on the data collected.

The users will be divided into 2 groups. Each group will have 2 subgroups (a and b). Members of Group 1a will be given the abstract of four research papers written in English. Then they will be asked to rank the documents in order of relevance to a particular research question. The subjects will be timed (with a stopwatch) to see how much time this takes. If they select a paper which is not the most relevant, then the researcher will tell them to try again. A running time will be kept for this. Then the user will be presented with abstracts for four Spanish research papers on a different topic. They will also be presented with versions of these abstracts translated into English by a machine-translation system. As with the English papers, they will be asked to rank the documents with respect to relevance to a particular research question. Members of Group 1b will do the same tasks, but they will perform the Spanish task first, and then the English task.

The members of Group 2a will be presented with the same set of four English abstracts, but in addition they will be given a concept map (drawn by a domain "expert") for each of the research papers. They will then perform the same task as group 1a. Then they will see the Spanish abstracts (plus machine-translated versions), with concept maps that have been translated into English. Then they will perform the same task. Group 2b

will perform the same tasks as Group 2a, except they will first do the Spanish task, and then the English one (just like in Group 1).

From the experiment I will collect the times (recorded on a stopwatch) that each subject took to complete each task. Finally, each subject will be asked to fill out a post-test questionnaire, concerning how they felt about the effectiveness of the abstracts, the machine-translations of the abstracts, and the concept maps (if applicable). These forms are attached. The experiment has no risks aside from those associated with ordinary classwork.

Participant # ____

Date: ____/____/2002

Subject Profile for Knowledge Discovery Experiment

1. Have you participated in an experiment on information retrieval before? ____
2. How often do you read research papers in the field of computer science?
weekly____ monthly____ seldom____ never read one before____
3. Do you have experience in the computer science area of digital libraries? ____
If so, how many semesters? _____ semesters
4. Do you have experience with distance learning classes? ____
If so, how many semesters? _____ semesters
5. Have you studied Spanish before, either in the U.S. or abroad? ____
If so, how many years of study have you had? _____ years

Participant # ____

Date: ____/____/2002

Post-test Questionnaire for Knowledge Discovery Experiment (Group 1)

1. Thinking about the English documents, how helpful were the abstracts in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

2. Thinking about the Spanish documents, how helpful were the original Spanish-language abstracts in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

3. Again concerning the Spanish documents, how helpful were the machine translations of the abstracts in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

4. At this point, please write any other comments (if you have any) in the space below.

Thank you for your participation in this study!

Participant # ____

Date: ____/____/2002

Post-test Questionnaire for Knowledge Discovery Experiment (Group 2)

1. Thinking about the English documents, how helpful were the abstracts in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

2. Again concerning the English documents, how helpful were the concept maps in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

3. Thinking about the Spanish documents, how helpful were the original Spanish-language abstracts in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

4. Again concerning the Spanish documents, how helpful were the machine translations of the abstracts in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

5. Again concerning the Spanish documents, how helpful were the concept maps in determining the relevancy of the document?
Not helpful 1 2 3 4 5 Very helpful

6. At this point, please write any other comments (if you have any) in the space below.

Thank you for your participation in this study!

Results for Experiment 1

App. I. Table 1: Timings and relevance rankings, Group 1. If a subject ranked two papers equally, the ranking is in parenthesis. User numbers were randomly assigned.

Group 1												
User #	9933			1545			3386			2205		
	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank
Q1	3	52	4,2,3,1	5	6	4,1,3,2	5	21	4,1,3,2	4	41	4,1,3,2
Q2	3	39	2,3,(4,1)	0	59	3,4,1,2	1	40	3,(1,2,4)	1	57	3,2,1,4
Q3	3	30	3,4,2,1	5	40	3,(2,1,4)	7	14	3,2,(1,4)	9	6	2,3,4,1
Q4	0	40	2,(1,3,4)	0	46	2,(3,1,4)	4	32	2,(1,3,4)	2	31	2,4,3,1
User #	1742			3358			9803			3913		
	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank
Q1	5	9	4,1,3,2	6	21	4,1,3,2	1	49	4,1,3,2	1	13	4,1,3,2
Q2	2	25	3,2,1,4	2	18	3,(4,1,2)	2	0	3,1,2,4	1	4	3,2,1,4
Q3	3	45	3,4,1,2	11	21	3,1,2,4	2	8	3,1,2,4	1	54	3,1,4,2
Q4	1	55	2,1,3,4	3	27	2,1,(3,4)	1	12	3,2,1,4	0	56	2,4,1,3
User #	4047			775			9562			2360		
	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank
Q1	1	54	4,1,2,3	5	59	3,(1,2,4)	2	31	1,4,(2,3)	4	26	4,1,2,3
Q2	1	12	3,2,1,4	3	26	1,3,2,4	2	46	2,(1,3,4)	3	8	3,2,1,4
Q3	4	14	3,4,1,2	9	21	3,4,1,2	4	9	3,2,1,4	3	59	3,4,(1,2)
Q4	0	20	2,1,4,3	1	21	2,1,(3,4)	1	39	2,(3,1,4)	1	4	2,(1,3,4)
User #	1917			3264								
	Min	Sec	Rank	Min	Sec	Rank						
Q1	6	41	1,4,(2,3)	2	33	4,3,1,2						
Q2	2	0	3,2,(1,4)	2	43	3,2,1,4						
Q3	9	49	3,2,1,4	2	22	3,4,2,1						
Q4	0	55	2,(1,3,4)	1	59	2,1,3,4						

App. I. Table 2: Timings and relevance rankings, Group 2. If a subject ranked two papers equally, the ranking is in parenthesis. User numbers were randomly assigned.

Group 2												
User #	1524			2727			8633			1501		
	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank
Q1	3	42	4,3,2,1	2	58	4,1,2,3	5	56	4,(2,3),1	5	28	4,3,2,1
Q2	1	28	3,2,1,4	3	5	3,1,2,4	0	56	3,1,(4,2)	4	12	3,(1,2,4)
Q3	5	55	3,(4,1),2	3	24	3,1,4,2	6	50	3,(1,2),4	3	28	3,1,(2,4)
Q4	1	35	2,1,4,3	1	52	2,4,1,3	2	30	2,1,(3,4)	2	9	2,(1,3,4)
User #	2517			2619			3400			2473		
	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank
Q1												
Q2	1	41	4,1,2,3	3	10	4,1,3,2	3	30	1,3,4,2	10	47	4,1,2,3
Q3	1	46	3,1,2,4	2	9	3,1,4,2	1	48	3,4,1,2	2	29	3,1,2,4
Q4	8	29	3,2,1,4	1	18	3,4,1,2	6	36	3,2,4,1	9	48	3,(1,2,4)
	0	54	2,1,3,4	0	42	2,3,1,4	1	57	2,1,4,3	1	2	2,(1,3,4)
User #	3340			3272			3372			3560		
	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank	Min	Sec	Rank
Q1												
Q2	1	29	4,3,2,1	7	52	4,1,(2,3)	5	2	4,1,2,3	1	42	4,1,3,2
Q3	1	34	3,(4,2,1)	3	21	3,4,1,2	3	17	3,1,(2,4)	0	40	3,4,1,2
Q4	3	36	3,4,1,2	5	50	3,4,2,1	4	38	3,4,1,2	7	1	3,4,1,2
	2	10	2,1,(4,3)	2	58	2,(4,1),3	2	42	2,1,(3,4)	0	38	2,1,3,4
User #	5102			2594								
	Min	Sec	Rank	Min	Sec	Rank						
Q1												
Q2	2	58	4,1,(2,3)	1	45	4,2,3,1						
Q3	1	40	3,(1,4,2)	2	31	3,2,4,1						
Q4	1	9	3,4,1,2	5	16	3,4,1,2						
	1	10	2,(1,4,3)	2	48	2,1,4,3						

App. I. Table 3: Subject's relevance rankings with counts of identical rankings.

Group 1											
Q1	Answer	Num of occur	Q2	Answer	Num of occur	Q3	Answer	Num of occur	Q4	Answer	Num of occur
4,2,3,1	4,1,3,2	7	2,3,4,1	3,1,2,4	2	3,4,2,1	3,4,1,2	4	2,1,3,4	2,1,3,4	8
4,1,3,2	4,1,2,3	2	3,4,1,2	3,2,1,4	6	3,2,1,4	3,4,2,1	2	2,3,1,4	2,1,4,3	2
4,1,3,2	1,4,2,3	2	3,1,2,4	3,4,1,2	2	3,2,1,4	3,2,1,4	4	2,1,3,4	2,3,1,4	2
4,1,3,2	4,3,1,2	1	3,2,1,4	2,3,4,1	1	2,3,4,1	2,3,4,1	1	2,4,3,1	2,4,3,1	1
4,1,3,2	4,2,3,1	1	3,2,1,4	2,3,1,4	1	3,4,1,2	3,1,2,4	2	2,1,3,4	3,2,1,4	1
4,1,3,2	3,1,2,4	1	3,4,1,2	2,1,3,4	1	3,1,2,4	3,1,4,2	1	2,1,3,4		
4,1,3,2			3,1,2,4	1,3,2,4	1	3,1,2,4			3,2,1,4		
4,1,3,2			2,3,1,4			3,1,4,2			2,1,4,3		
4,1,2,3			3,2,1,4			3,4,1,2			2,1,4,3		
3,1,2,4			1,3,2,4			3,4,1,2			2,1,3,4		
1,4,2,3			2,1,3,4			3,2,1,4			2,3,1,4		
4,1,2,3			3,2,1,4			3,4,1,2			2,1,3,4		
1,4,2,3			3,2,1,4			3,2,1,4			2,1,3,4		
4,3,1,2			3,2,1,4			3,4,2,1			2,1,3,4		
Group 2											
Q1	Answer	Num of occur	Q2	Answer	Num of occur	Q3	Answer	Num of occur	Q4	Answer	Num of occur
4,3,2,1	4,3,2,1	3	3,2,1,4	3,1,2,4	5	3,4,1,2	3,4,1,2	7	2,1,4,3	2,1,4,3	5
4,1,2,3	4,1,2,3	6	3,1,2,4	3,1,4,2	3	3,1,4,2	3,1,2,4	3	2,4,1,3	2,4,1,3	2
4,2,3,1	4,2,3,1	2	3,1,4,2	3,4,1,2	3	3,1,2,4	3,4,2,1	1	2,1,3,4	2,1,3,4	6
4,3,2,1	4,1,3,2	2	3,1,2,4	3,4,2,1	1	3,1,2,4	3,2,1,4	1	2,1,3,4	2,3,1,4	1
4,1,2,3	1,3,4,2	1	3,1,2,4	3,2,4,1	1	3,2,1,4	3,2,4,1	1	2,1,3,4		
4,1,3,2			3,1,4,2	3,2,1,4	1	3,4,1,2	3,1,4,2	1	2,3,1,4		
1,3,4,2			3,4,1,2			3,2,4,1			2,1,4,3		
4,1,2,3			3,1,2,4			3,1,2,4			2,1,3,4		
4,3,2,1			3,4,2,1			3,4,1,2			2,1,4,3		
4,1,2,3			3,4,1,2			3,4,2,1			2,4,1,3		
4,1,2,3			3,1,2,4			3,4,1,2			2,1,3,4		
4,1,3,2			3,4,1,2			3,4,1,2			2,1,3,4		
4,1,2,3			3,1,4,2			3,4,1,2			2,1,4,3		
4,2,3,1			3,2,4,1			3,4,1,2			2,1,4,3		

App. I. Table 4: Post-test Likert scale answers.

Group 1					
Participant #	Q1	Q2	Q3		
9562	5	1	4		
2360	4	1	5		
9933	4	1	4		
1917	4	1	3		
1545	2	1	1		
3386	4	1	4		
2205	3	2	2		
1742	4	1	4		
3358	5	1	2		
9803	4	2	3		
1890	5	1	5		
4047	5	1	5		
775	4	1	4		
3264	5	1	4		
Average:	4.1	1.1	3.6		
Group 2					
Participant #	Q1	Q2	Q3	Q4	Q5
1172	4	3	1	3	3
5102	4	5	1	2	5
1524	3	4	2	3	4
2727	2	5	1	2	5
8633	5	5	1	2	5
2517	3	3	2	4	3
3400	3	5	2	3	4
2473	5	4	1	4	4
3340	2	5	1	3	5
3272	3	4	1	2	4
3372	3	4	1	2	4
3560	4	5	1	1	4
1501	4	5	1	2	5
2619	5	5	1	5	5
Average:	3.6	4.4	1.2	2.7	4.3