Investigation of User's Emotional Aspect in Information Search Process

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Abstract— The principle of uncertainty introduced by Carol Kuhlthau has demonstrated the significant influence of emotions in information search process. Yet, few works have been carried out to investigate this aspect of user experience in interaction between information searchers and information systems. This paper presents a preliminary explorative study investigating emotional aspect in information search process. The common premise is that positive emotions encourage better interaction with the systems. Therefore, it is essential to provide necessary supports when information searchers experience negative emotions during interaction with information systems. Our study shows that three aspects of information search attributes – search engines, search tasks, and information layout – are mostly being appraised by information searchers. We found some evidences that suggest certain aspects of information search attributes, upon being appraised by information searchers, have tendency to elicit one of the three major emotion families: positive, negative, and neutral.

Keywords— emotion, appraisal, user interaction, information search

I. INTRODUCTION

Though information systems bring with its many benefits such as bringing forward the so-called effortless promises of accessing countless information, information systems' users have been reported to experience various cognitive and affective challenges such as information overload due to vast information availability. This preliminary explorative study was our first attempt to investigate affective aspects – in particular emotional aspect - in online information search process that are mainly driven by cognitive appraisals. Our investigation was led by our major query about "how information systems are being appraised by information searchers that might cause them to experience certain emotional states during their search activities". We anticipated that our findings might provide a richer insight in understanding the interaction between cognitive appraisals and emotions in relation to information systems.

The outline of the paper is as follows. A short review on relevant previous works in information search is presented in the following section. Next, the design of this study is described; followed by the analysis of the results. Finally, we conclude by discussing the results and their implications to future research.

II. Previous Works

The seminal work of Kuhlthau [1] has demonstrated the significance of affects – emotions in particular – in terms of influencing the way people conduct their information search. As people progress in their information search activities from one stage to another, the study found that each stage is accompanied by at least one strong emotional state. This study has inspired various works which further explore about this aspect of information search in various information spaces such as physical libraries and electronic information systems. These works have demonstrated that the attributes of search tasks, the searchers' personality, and the design of information systems are three major factors that influence emotions during information search activities.

There were two approaches used by previous studies to administer search tasks. This first approach refers to search tasks assigned by the experimenter for participants to complete in a controlled environment, normally conducted in a research lab. Using this approach, the experimenter has the ability to control and manipulate certain parameters of the search tasks. These parameters include their types, complexity, ambiguity and difficulty. For example, a study by [2] has revealed that as the difficulty and complexity of the search tasks increased, positive emotions eroded and negative emotions intensified during the search. The study also has noted that the searcher's interest level declined towards attempting search tasks with higher difficulties. This suggests that the searcher's interest towards the difficult search tasks may contemplate the valence of one's emotion.

On the other hand, a study by [3] has found that information searchers searched differently for self-chosen tasks in comparison to assigned tasks. This is the second approach where participants were given freedom to choose their own search tasks. In addition, the search activities were conducted in a more natural setting such as at home or school on a daily basis. Nahl [4] has explored the interactions in a more naturalistic setting where a group of college students were asked to complete a questionnaire for every Web search done for a number of days. Her analysis showed that personalities of the searchers also contribute the emotion being experienced during the search. Searchers with higher levels of optimism and self-efficacy were able to overcome negative experiences during the search. They also reported positive feedback on their search outcomes and the overall information search process. In conclusion, the study found that participants were highly motivated to complete their own search tasks, and produced relevant outcomes for the tasks. Due to the nature that participants were in controlled of the search topic, they were confident and highly regarded their search skills.

Another study by Kim [5] revealed that information searchers with high ability to control their emotion were found to performed explorative search better than their counterparts. It was also found by [6] that searchers in happy mood tend to search for more general information. Besides search tasks and searchers' personality, [7] has demonstrated that interface and search features did elicit certain emotions among children when they search online.

This study complements the existing knowledge in this area by offering a specific investigation on the role of cognitive appraisals in eliciting emotion during information search activities. This study specifically examines which aspects of information systems are being appraised by information searchers during interaction with the systems.

III. Methodology

The emphasis of this study is to gain insight about emotions felt by information searchers as they perform cognitive appraisals throughout information search process. Qualitative method was used to design this exploratory study. Five participants were recruited; of which their academic backgrounds were in computer science. One research staff, three postgraduate students and one undergraduate student, all were attached to a Computer Science department. Due to the exploratory nature of this study, the selection of participants was convenient by not putting emphasis on demographics aspect.

Participants were asked to solve two assigned search tasks. Each task must be completed within fifteen minutes. The degree of difficulty and the level of ambiguity of the tasks were manipulated by the experimenter. Task 1 was an open-ended information search task with a high degree of difficulty and a high level of ambiguity. Meanwhile, Task 2 contains multiple short questions that were easy and direct. In order to minimize the effect of assigned task, participants were informed that they would be paid only when they managed to complete the tasks by providing the right answers. This technique was deemed as an enabler to instill intrinsic motivation that would encourage participants to treat the assigned search tasks as their own.

During the search session, the computer screens of participants' search activities were video recorded. Participants were allowed to stop earlier if they had completed the search tasks. In the interview, participants were asked to give an account about the entire sessions, in particular identifying moments where peculiar emotional states were experienced, while watching the re-play of their computer screens. Data from the questionnaires and post-search interview was analyzed using content analysis method. Conceptual themes that were emerged from the data were identified.

IV. FINDINGS

Content analysis of the questionnaire and interview data revealed that there were five aspects of information search process commonly being appraised by participants. Search engines, Internet browser, content, information layout, and search tasks are the aspects being appraised by the participants.

A. Search Engines and Internet browser

The analysis revealed that found that the type of search engine used could exert stress among participants. One participant blamed the search engine and Internet browser he used for the negative experience, and regretted for not using other search engines.

> "*OK, I don't really expect more time, I was expecting it to be more straight forward by the search engine. I don't think it gave me too much stress, but I thought OH NO, I have to search more because I thought it will be much easier..but I think this, I'm blaming the search engine. I could have tried something else but the important issue is the browser.*" [P2]

On the other hand, participants showed disappointment and annoyance when search engines produced results that were not relevant to the task requirements.

> Researcher: "*And then it came out with this result. How do you feel?*"
>
> Participant: "*I feel like 'kicking' it. I didn't even write something like that [referring to her entering wrong search terms]. Since it's not successful, I went to Google. And I think this one is not useful as well [referring to one of the sites].*" [P5]

On the contrary, relevant results by search engines made participants happy, and further boosted their interest to further explore the results to find correct answers for the tasks.

> "*I was quite surprised because I got this scientists [in the search results] very quickly...and scientists are very clear, and I was so glad I found Isaac Newton. Actually I don't know if he was in 17th century. I was pleased upon that.*"[P3]

B. Information Presentations

Participants were upset when the information required to satisfy certain requirements of the task was not found from the web pages viewed. In addition, they also yearned for information that was categorized according to certain labels or criteria.

> "...but I spent time in this site because I <u>like</u> the categorization, but they don't have a date – by date... They only have by names. That is a <u>little bit disappointing</u>, to be honest – not to be able to find dates." [P2]

On the contrary to the experiences identified earlier, participants showed satisfaction with complete information that also include supported information such as pictures. They also expressed likeness towards information categorization because it allows them to easily access specific information, thus, speed-up their search.

> "At first I didn't take this camera. I thought it is a little bit strange. It looks a bit more fashionable, too fashionable. The camera is just for work. Well, I have to take it because I couldn't find another one which is looking within the dimension and portable, because the other one is big - for professional. I put 10 Mega pixels so I just copy paste 10 10 10. But the other one was like 12, and the other one was 12.1." [P6]

C. Search Tasks

Interest towards search topic as well as time constraint imposed on task completion influenced the experience of emotion among participants. Few participants were disappointed when they were assigned topics of not their interest. Meanwhile, the limited time frame also induced nervousness and stress among participants when they search was disrupted due to irrelevant search results or missing information on web pages since these obstacles would delay their efforts to complete the task on time. They also felt dissatisfaction by not being able to complete the search tasks within the given time frame.

> "I was <u>quite nervous</u> because when you told me that I have another 5 minutes, I just have two cars, and I was like, this is not good." [P4]

In addition, certain terms in the difficult search tasks were set to be ambiguous. This ambiguity has caused participants to time searching for meaning of those terms prior to searching answers for the tasks.

> "I think somewhere it has special meaning. It is about the business or retailing all that. So I'm not sure if could find the answers. So I just want to make sure that I understand what is the in-store. So, I'm not yet clear whether the in-store ones are the smaller shops or some little kiosk inside the big stores. I thought I was <u>stress</u>, but I have a task, so let us try to give an answer. So, let us stick to the task and enough of educating." [P2]

V. IMPLICATION TO DESIGN

To support searchers during negative emotional experience, evidence suggests that when searchers were uncertain about task requirements, they were expecting to obtain accurate and precise results from search engines. In addition, information categorization also is useful because it provides easy and quick access to information desired, especially when searchers are exploring information for topics they have no prior knowledge. The information categorization also helps to boost their interests to further explore about

the topic. Gradually, as structured and well-organized the information could be, the emotion starts to improve into a more positive emotion.

Our finding also suggests that information searchers experience positive emotion when they encounter novel yet relevant information during the quest. As long as the information is relevant and consistent with searchers' expectations, the positive emotion will be elicited although the information is not novel. On the other hand, information that was appraised as not relevant, or maybe relevant but not consistent with one's expectation; negative emotion was experienced. Despite of this negative experience, due to controlled experiment setting, searchers felt obliged to complete the task within the given time frame. Therefore, under any circumstances. searchers need to cope with the negative experience in order to complete the tasks.

Neutral emotion was felt during coping when searchers were assessing the search results and information they found in the system. This emotion was necessary in order to weight the consequences of every choice they have; and later selecting one action that could lead them to the completion of the tasks.

VI. FUTURE WORK

This is an explorative study aims to identify the implications of emotion to the design of information system. This study is not without limitations. Given that the number of participants is small, generalization of this finding must be used with cautious. We also do not consider to include the influence of other confounding variables (i.e. personality, major of study, age, internet skills, etc.) over emotional experience during information search. These limitations could be addressed in future works.

VII. CONCLUSION

This study has demonstrated a promising opportunity to further investigate how cognitive appraisals and emotions are relate during user interaction with online information systems. We do regard the complexity of gaining insight about on-going experience during interaction. We anticipate that our method and analysis may assist online information designers to improve existing practice in system design. Our methodology and analysis may assist designers to gain insights about which various aspects of information systems interaction are being appraised by information searchers, and therefore influence the emotional states. Besides that, it might also useful for designers to take into considerations about varying knowledge levels of information searchers who deal with various degree of task complexity. By means of understanding how each of these elements affecting each other, it is possible to design a system that will be able to address the cognitive needs and at the same time, support emotional challenges experience by information searchers. This possibility may induce positive interaction between information searchers and online information systems.

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