

Attributional style of emotions and its relationship with users' search behaviour

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Abstract

This study aimed to assess the users' style of attribution of emotions in information retrieval process based on Weiner's attribution theory of emotion. The research method in the present research is descriptive and the type of study is practical. The population of this study consisted of MA students of different humanistic science branches studying at Imam-Reza International University. A sample of 72 students was selected. The required information were collected through a questionnaire of attribution style and two researcher-made questionnaires. Results showed that the majority of the users attributed their failure and success in information retrieval to internal causes. Also according to Weiner's theory, they mentioned 'effort' as a factor in their success and 'inability' and 'inadequate effort' as their main failure factors. Research showed that individuals who attribute their emotions to internal factors are more satisfied with their search. On the other hand, it was found that there is a significant relationship between the overall style of user's attribution and their style of attribution in information retrieval.

Keywords

Attribution; attribution style; emotion; information retrieval; Weiner

1. Introduction

Today, search engines are becoming a part of a new dominant paradigm in the web information retrieval (IR) [1]. Web search engines are the second most commonly used Internet application followed by email services [2]. Nevertheless, users are still facing with problems in web IR such as retrieving redundant results, unrelated and unreliable information, and variance in the results generated by different search engines. These all may cause dissatisfaction with the search results and affect users' next information seeking behaviour.

There are good evidence that internal factors which are related to human inner characteristics are at play in determining information seeking behaviour. From the mid-2000s onwards, we are seeing new trends that arise in the study of web IR with a shift and focus on the human (internal) factors [3] rather than external factors. The basic presupposition of these efforts was based upon the fact that designing an efficient IR system is almost unlikely without having knowledge of how users interact with these systems [4]. The focus on the user paved the way for emerging a new approach in information seeking behaviour in social and individual contexts. This approach was supporting information management in real life and in laboratory studies and identification of the human factors in designing new-generation IR systems, as well. In this approach, users are allowed to express their information needs and accordingly are assisted in formulating queries and tackling problems they are faced with [5].

Thereafter, IR studies were to address the end users' mental and physical capabilities and their cognitive limitations [6]. Thus, the users' internal factors were considered as critical parts of designing an efficient retrieval system for the role

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they had in interactions between the user and the machine [7], optimal functioning of information systems in the IR process and the relevancy.

2. Statement of problem

Identification of users' internal factors is highly important due to the role they play in our everyday lives. Recently, some studies [8–10] have focused on the role of emotions and feelings in web information behaviour to provide us with important relationships about how environment and context would influence users' judgements, decisions, priorities, performances [8], reasoning, motivation, attention and memory [9]. Research demonstrated that emotions and feelings can have a significant impact on people's judgements about quality of their decision making [10].

The roles of feelings and emotions are previously addressed in several IR models such as the Dervin's Sense-making Model, Wilson's [11] Information Behaviour Model and Kuhlthau's [12] Model of Information Search Process (ISP). According to these models, information seeking is an emotional experience with positive and negative effects on attention, memory, judgement and performance [13]. The role of emotions as the control process is to determine the individuals' cognitive behaviour, emotional movement and performance orientation [1].

The emotions can direct some particular aspects of information seeking behaviour favourably or disturb it in some other situations. Therefore, attribution of emotions to a series of causes should be taken into consideration. Bernard Weiner developed Emotion-Attribution Theory in 1986. Weiner revealed that a motivation sequence is initiated by an outcome that individuals interpret as positive or negative. The theory in this manner relates the structure of thinking to the elements of feeling and activity [14]. The Weiner's assumption was that one of the major influences of emotions is the ways of perception and thinking about the events. The importance of attribution of emotions relies in the fact that they act as a stimulant for users' future behaviour. In other words, the perceived causes of success and failure may lead to some particular emotions. These emotions, in turn, affect the individual's future reactions and behaviours, and depending on favourable or unfavourable consequences, they express positive or negative emotions. These emotions 'depending on attribution-independent consequences' include happiness as a result of success and disappointment or sadness as a result of failure. These emotions are expressed as a result of success or failure in achieving a desirable goal and not the causes of the consequences. Causal inference leads to emotions different from the primary general emotions. These emotions are 'emotions depending on attribution' [15]. As an example of attribution theory use in the field of Library and Information Studies (LIS), Gedeon and Rubin [16] focused on the role and impact of attribution theory in evaluating the performance of university libraries. They examined how the library supervisors may describe and explain their successes and failures. For example, if a supervisor perceives a reference librarian performance as remarkable, it is possible to attribute this performance to (1) librarian's intelligence (ability), (2) librarian's hardworking (effort), (3) simplicity of the questions (difficulty of the tasks) and (4) librarian's good chance of finding the answer (luck). Certainly, every type of these attributions will affect the output and assessment of librarian performance. It is noted that in the area of attribution theory, most studies are performed in the fields of education and management; nonetheless, university library managers should be aware of the nature and importance of attribution theory to evaluate the performance of their employees.

In addition to individual factors, cultural frameworks largely affect the expression of emotions alongside the IR process. Different studies (e.g. Markus & Kitayama, 1994, 1991; Stephan et al., 1996, as cited in Gorman [17]) have shown that cultural differences affect the expression of emotion. In other words, deep expression of emotions has roots in the culture and since the culture teaches us how to interact with others, these emotions would become pervasive.

The way users respond to emotions during the IR process, in addition to individual factors, is largely influenced by cultural frameworks. Li and Kirkup [18] investigated differences in use of, and attitudes towards, the Internet for Chinese and British students, and gender differences in this cross-cultural context. They showed that differentiating roles of national cultures should be considered in studying students' information behaviour. In addition, the results of various studies (e.g. Marcus and Keithayama, 1991; 1994; Stephen et al., 1996, quoted in Gorman [19]) showed that cultural differences affect emotional expression. These studies confirmed that the expression of emotions is deeply rooted in culture, and since the culture teaches us appropriate interactions with others, these emotions are becoming even more complex.

Emotions not only regulate our social encounters but also influence our cognition, perception and decision making through a series of interactions with our intentions and motivations [20,21]. Existing connection between the emotion and cognition has been less considered in the research. Thus, the issue should be properly investigated due to the fact that emotion is a ubiquitous element of any human-computer interaction (HCI) [13] and intelligent systems [22]. Information systems should not only provide relevant information to the user, they must also be able to enhance positive emotions, bring negative emotional experiences to the lowest level and enhance the overall performance.

Another factor that has been considered less in emotional research is the type of emotions shaped up after completion of a search session. A review of the literature in IR field demonstrates that the perceived emotions after the search would

affect the users' perception of searching process. This perception can modify users' information seeking behaviour in the future. This should be noticed that the users do not always look for information in similar emotional situations (i.e. happy or sad moods); however, they are susceptible to their past information seeking emotional experiences. Therefore, post-session emotional mood or emotional induction of users should also be considered while analysing users' information searching performance.

This research was conducted on the grounds of the above-mentioned issues in order to investigate those factors in a sample of higher education students to provide a better understanding of users' attributes for explaining success or failure in search task sessions.

3. Literature review

According to the subject of the study, the existing literature on the application of emotions in IR as well as attribution theory are briefly discussed. Although it seems that Mote's work at Shell Research has been an early example of work that focused on the information user [23], in 1991 Kuhlthau [12] for the first time considered feelings factors in the area of information seeking behaviour.

Evidence of a relationship between affection, cognition and behaviour in IR domain is traceable to the work of Nahl [24]. In 2005, she developed Affective Load Theory [24] to explain students' IR behaviours. She found that people with high emotional coping skills (self-efficacy and optimism) are able to function more effectively than their counterparts in IR situations [25]. Kim [26] studied the ways by which the emotions take control over the IR process. Emotional feedback and the role of emotions in the information seeking process were examined by Arapakis et al. [27]. Gwizdka and Lopatovska [28] investigated the role of subjective factors in the ISP by recruiting 48 participants whom each conducted six web searches in a controlled setting. The findings confirmed relationships between objective search task difficulty and the perception of task difficulty, and between subjective states and search behaviours and outcomes. The study suggests that higher happiness levels before and during the search not only correlate with better feelings after the search but also correlate with worse search outcomes and lower satisfaction, suggesting that, perhaps, it pays off to feel some 'pain' during the search to 'gain' quality outcomes. Lopatovska [3] studied the effect of mood on IR and its changes before, during and after information seeking on 36 undergraduates. The results showed that neither the search tasks nor other search performance variables influenced searchers' mood; this finding suggests that searching is a complex experience and factors outside of the search task domain may contribute to searcher's mood. Also, positive mood was found to be associated with fewer search activities (e.g. fewer visited websites and reformulated queries) while the negative mood was associated with increased search activities. Neither mood nor search performance affected the quality of search results.

From the perspective of information seeking behaviour and emotions, Jamali and Shabzatabar [29] investigated the impact of Internet filtering on emotions. They measured emotions of a group of master students with a questionnaire and followed up interview after complementation of the search tasks. All participants mentioned the experience of negative emotions when they encountered Internet filtering during their search. Users' finding and non-finding information resulted in positive and negative emotions, respectively. Similar to Arapakis et al.'s [27] study, Poddar and Ruthven [30] examined the effects of emotion on search tasks and found that in all search tasks, there were rarely negative emotions before doing the search; however, they reported more negative emotions after the search. Moreover, no significant relationship was found between the two groups. In a review article, Lopatovska and Arapakis [31] reviewed the definitions and theories of emotions, methods for studying emotions and surveying the current state of emotion research in LIS, IR and HCI. They reread two major categories of classical emotion theories: (1) cognitive, which stresses the importance of cognitive evaluation (appraisal) in establishing the meaning of stimuli and ways of coping with it, and (2) somatic, which emphasises somatic factors and describes expressions and perceptions of emotional experiences in terms of bodily responses. Emotions, from the perspective of a computer science expert, were examined in a thesis by Moshfeghi [32]. He tried to examine emotions as a factor which should be considered in retrieval algorithms of web browsers.

Generally, as Lopatovska and Arapakis [31] have mentioned, very often, studies that investigate affective variables such as emotions, feelings, affections or moods do not define these concepts, which may lead to misuse of the terms or misrepresentation of findings. For example, indiscriminate application of the term 'emotion' has led to vague differentiation between 'emotion', 'feeling', 'mood', 'attitude' and other related concepts. Lopatovska [3] states that 'LIS studies of emotions, affections, and feelings rarely define these phenomena'. Then she quotes a definition of emotion from Reinhard and Dervin [33] that is based on all emotive concepts discussed in the LIS literature:

... emotion conceptualized as being caused by or arising out of situations, tasks, or contexts or their subparts; being attributes of persons – their personalities, demography, genetics, physiology, or past experiences; being causes of inhibiting or activating motivations; causing or leading to specific act or goals or activities; being encoding traces left in information, message, or text packages; and serving as states of being that have informational value. [3]

Although aforementioned studies have not been conducted within a framework of a particular theory, in general, they focused on the role of emotions in IR. It is safe to say that, according to attribution theory, people attribute their experienced emotions to a series of factors and these attributions themselves are generating emotional reactions to explain the consequences. This issue has remained untouched so far in the area of IR, and thus, it is necessary to consider it as an important factor.

4. Research questions

1. To what factors do users attribute their emotions in search tasks?
2. Is there any significant relationship between the users' attribution styles of emotions and the level of satisfaction in the searches?
3. Is there any significant difference between users' general attributional style of emotions and their attributional style of emotions in search tasks?

5. Research methodology

In terms of analysis, the present article is a descriptive research, and in terms of objective, it should be considered as an applied research. The sample size consisted of 72 participants selected from a population of 530 graduate students from various fields of Arts and Humanities at Imam-Reza International University, Mashhad, Iran. The respondents were chosen using a purposive non-probability sampling given that random sampling was not possible.

Data were collected through three questionnaires. The first questionnaire is Attributional Style Questionnaire (ASQ) which is used for measuring positive or negative thinking styles (i.e. internal or external attributions). This attribution questionnaire is a self-reporting instrument consisting of 12 hypothetical events. Half are good events, and the other half are bad events. In addition, half of the events are interpersonal/affiliative, while the other half are achievement-related. In ASQ, each event has a parallel question. First, the subject is asked to 'write down the one major cause' of the event. Then, the subject is asked to rate the cause along with the three attributional dimensions. Also, the subject is asked to rate the importance of the situation described.¹

Questionnaire of success and failure in IR was the second tool used in this study. This instrument has two sections: success questionnaire (Appendix 1) and failure questionnaire (Appendix 2). These two sections were similar in their structures and number of items; the only difference was expression of success or failure (i.e. in the success questionnaire, the sentences were written positively, while in the failure questionnaire, the sentences were written negatively). If a user was able to retrieve the appropriate response for his or her search tasks, he or she would fill the success questionnaire, and if he or she failed, the user would fill failure questionnaire. The aim of these questionnaires was to identify the reasons for success or failure in retrieving right information. In fact, the questionnaires attempted to collect information about the factors to which the users attribute their success and failures. These two questionnaires were developed based on internal and external attribution dimension as well as the three dimensions of Weiner's attribution theory. To ensure the reliability (internal consistency) of the questionnaires, a pilot study was conducted and accordingly Cronbach's alpha was calculated. The coefficients of 0.752 and 0.762, respectively, for success and failure questionnaires indicated the reliability of the instruments.

The third used tool was satisfaction questionnaire (Appendix 3) consisted of 10 items. This questionnaire was a researcher-made instrument. Through a review of the literature, some factors such as allocated time [34,35], devoted effort [36,37], relevance [38], user expectation and usefulness [39] were identified as effective factors in user satisfaction. Also, some other factors suggested by IR experts were included. The validity of the questionnaire was confirmed by some specialists. Cronbach's alpha equal to 0.781 confirmed the reliability of the questionnaire. The collected data were analysed through SPSS version 19.

Since a part of the present study was based on responses to search tasks, two scenarios were constructed for relevant search tasks. The scenarios were constructed according to Borlund's [40] framework. For scenarios' simplicity and complexity, Anon's [41] and Bystrom's [42] models were taken into consideration. For this purpose, 25 graduate students from various disciplines of Arts and Humanities participated. Out of 75 search tasks performed by the students, six

searches were selected without considering any specific domain of information seeking. Overall, six scenarios accompanied with their relevant search tasks that were constructed and passed to four LIS university professors to determine the best scenario for the simple and the difficult tasks. Following receiving professors' ideas, a simple scenario and a difficult one were identified. The search tasks are presented below. Some amendments were made to the selected scenarios.

Search tasks

Simple search task:

Suppose for one of your course assignments you need information on the items listed below. Open a browser and use Google search engine to find relevant information on the topics.

1. The first Nobel Prize year
2. The first winner of the Nobel Prize
3. The name of Asian literature award
4. The winner of the Pulitzer literature award
5. The name of selected work as the winner of the Pulitzer Prize in poetry

Difficult search task:

Suppose for one of your course assignments you need information on the items listed below. Open a browser and use Google search engine to find relevant information on the topics.

1. The social classes in Iran in Qajar, Pahlavi and current periods
 2. The social classes in the United Kingdom from 200 years ago
 3. The differences between the social classes in the United Kingdom and Iran
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The study was implemented in the university computer lab where participants performed search tasks independently. The computer lab had a computer desk with a monitor and a keyboard, and a table where participants read and answered the questionnaires and a wireless alarm. After entering the computer lab, the ASQ questionnaire was given to the examinee to be filled out. Then, the simple scenario was given to him or her for search session to be completed using the Google search engine. When completed, the examinee pressed the wireless alarm button and then started to complete the search satisfaction questionnaire. Finally, after controlling the results of the search by the researcher, if the examinee was successful in IR, he or she filled out success questionnaire and, if not, completed the failure questionnaire. The same process was done for the difficult scenario.

6. Findings

This section presents the findings of the study. To do so, study questions are presented consecutively along with their test results.

Question 1: To what factors do users attribute their emotions in search tasks?

As stated earlier, individuals attribute their success and failure to a series of factors. In attribution styles, these factors are divided into two general categories: internal and external. Weiner [14] believed that individuals attribute their success and failure to four attributions: (1) ability, (2) effort, (3) luck and (4) task difficulty [43].

The data related to this question were obtained from the responses given to the failure/success questionnaires. Participants required to identify the reasons for their success or failure. Each questionnaire contained 19 items divided into internal and external causes. Among these 19 items, several items measured the Weiner's four attribution styles. Thus, in answering this question, the two attributions were taken into account and endeavour was made to indicate whether the users attribute their success or failure to internal or external factors. The results of general attribution styles for success and failure are presented in Table 1.

Table 1. Users' attribution styles for success and failure in search tasks.

Attribution	Statistical indices	General attribution style		Total
		Internal	External	
Success	Number	43	21	64
%	67.2	32.8	100	
Failure	Number	56	24	80
%	70	30	100	

Table 2. Users' attribution styles of success and failure in search tasks.

Attribution	Statistical indices	General attribution style				Total
		Ability	Effort	Difficulty	Luck	
Success	Number	5	31	18	10	64
	%	7.8	48.4	28.1	15.6	100
Failure	Number	24	25	18	13	80
	%	30	31.2	22.5	16.3	100

Table 3. The results of *t*-test for comparing users' satisfaction with internal and external attributions.

Variable	Group	N	Mean	Levene's test		t-test for equality of means					Cohen's <i>d</i>
				Sig.	<i>F</i>	<i>t</i>	<i>df</i>	Sig.	Lower	Upper	
Satisfaction	Internal	43	3.21	0.148	2.142	1.499	70	0.003	-0.073	0.419	0.41
	External	21	2.84			1.504	51.61	0.003	-0.043	0.349	

As Table 1 indicates, out of 144 searches, 64 were successful and 80 were unsuccessful. Furthermore, 67.2% of users attributed their success to internal factors, and in the case of failure, 70% of users attributed it to themselves and their internal factors. Important factors included lack of adequate ability in working with computer and Internet, lack of skill in searching data via search engines and so on. Table 2 presents the users' attribution styles based on Weiner's model.

According to Table 2, about half of the respondents (48.8%) attributed their success in search tasks to their exerted effort and 28.1% to the simplicity of the task. Therefore, based on Weiner's attribution theory of emotion, after success in search tasks, individuals looked hopeful about success in future IR efforts and in subsequent searches. In failure attributions, nevertheless, effort and ability enjoyed quite identical contributions and individuals believed that the failure in assigned searches has been occurred because of their inadequate ability in search tasks and inadequate effort in gaining favourable results. According to Weiner's attribution theory, these attributions would result in secondary emotions of guilt and shame. In other words, the users were frustrated with their failure in obtaining favourable results and felt guilty of inadequate effort.

Question 2: Is there any significant relationship between the users' attribution styles of emotions and the level of satisfaction in the searches?

To answer this question, the satisfaction questionnaire was administered, and like the first study question, the success and failure questionnaires were used to determine the internal and external attributions. Due to the normal distribution of the data on satisfaction variable, *t*-test was performed to compare the two independent variables of users' satisfaction and their internal and external attributions. In particular, the satisfaction level of the users who attributed their emotions to internal factors was compared with that of their counterparts with external attributions. The results are displayed in Table 3.

As Table 3 indicates, the satisfaction level of users who attributed their emotions to internal factors ($M = 3.21$) was higher than that of users with external attributions. Furthermore, based on the results of *t*-test, the significance level was 0.003, which is lower than 0.05, demonstrating a significant difference between satisfaction levels of users with external and internal attributions. It implies that users who attributed their emotions to internal factors enjoyed higher levels of satisfaction. Therefore, we reject the null hypothesis that there is no difference in reading scores between users' satisfaction with internal and external attributions. Furthermore, Cohen's effect size value ($d = 0.41$) suggested a moderate practical significance.

Question 3: Is there any significant difference between users' general attributional style of emotions and their attributional style of emotions in search tasks?

Table 4. Users' general attributional style and their attributional style in simple search tasks.

	Group		General attributional styles			χ^2	df	Sig.	Cohen's <i>d</i>
			Internal	External	Total				
Attributional styles in simple search tasks	Internal	Number	34	9	43	3.50	1	0.062	0.08
		%	79.1	20.9	100				
	External	Number	17	12	29				
		%	58.6	41.4	100				
	Total	Number	51	21	72				
		%	70.8	29.2	100				

Table 5. Users' general attributional style and their attributional style in complicated search tasks.

	Group		General attributional styles			χ^2	df	Sig.	Cohen's <i>d</i>
			Internal	External	Total				
Attributional styles in difficult search tasks	Internal	Number	39	16	55	9.41	1	0.002	0.37
		%	70.9	29.1	100				
	External	Number	17	12	5				
		%	29.4	70.6	100				
	Total	Number	72	28	44				
		%	61.1	38.9	100				

Table 6. Users' general attributional style and their attributional style in search tasks in total.

	Group		General attributional styles			χ^2	df	Sig.	Cohen's <i>d</i>
			Internal	External	Total				
Attributional styles in search tasks	Internal	Number	73	25	98	9.914	1	0.001	0.51
		%	74.5	25.5	100				
	External	Number	46	24	22				
		%	47.8	52.2	100				
	Total	Number	95	49	144				
		%	66	34	100				

To address this question, the general attributional style of emotions was determined via ASQ, and the attributional style of emotions in IR was developed via data from success/failure questionnaires. In accordance with the responses given by the participants on these two instruments, chi-square test was employed. The results of the participants with general internal or external attributional styles were compared with the participants' internal or external attributional styles of IR. Tables 4–6 present the users' attributions in simple, complicated and overall search tasks.

According to chi-square result, there was no significant relationship between participants' general attributional style of emotions and their attributional style of emotions in IR in the case of simple search tasks. Furthermore, Cohen's effect size value ($d = 0.08$) suggested low practical significance.

For complicated search tasks, chi-square result revealed a significant relationship between participants' general attributional style of emotions and their attributional style of emotions in IR in the case of complicated search tasks. Therefore, we reject the null hypothesis that there is no difference in reading scores between users' satisfaction with internal and external attributions. Furthermore, Cohen's effect size value ($d = 0.37$) suggested a moderate practical significance.

According to Table 6, it was found a significant relationship between participants' general attributional style of emotions and their attributional style of emotions in search tasks. Therefore, we reject the null hypothesis that there is no

difference in reading scores between participants' general attributional style of emotions and their attributional style of emotions in search tasks. Furthermore, Cohen's effect size value ($d = 0.51$) suggested a moderate practical significance.

7. Discussion and conclusion

The present research aimed at investigating the users' attribution of emotion in IR tasks based on Weiner's attribution theory. A review of the literature on attributions of users clearly demonstrated that there is only few research on this issue in IR studies. The findings of the study revealed that the majority of individuals (about 70%) attributed their success or failure to internal factors (Table 1). Supposedly, internal attributions may result in enhanced self-esteem. When individuals' self-esteem is improved, they persist in attempting to overcome failures and ineffectiveness. Such individuals display great incentive to control negative events and affairs in their lives. As a result, such individuals tend to exert more effort in their tasks [44]. However, the reverse also holds true. When a person's self-esteem is affected, he or she would put in fewer efforts towards success and take control over life events. The reason is that such a person believes he or she is 'weak and incompetent', 'unintelligent' and 'untalented'. Hosseini [45] noted that self-esteem is a significant factor in academic attitude and in favourable experiences. Several studies (e.g. [14,33]) indicated that attribution of success to internal factors may lead to promising outcomes for individuals. In the current study, it was found that about half of the respondents (48.8%) attributed their success in search tasks to their efforts and their failure to inability and inadequate effort (Table 2). According to this finding, users who faced failure experienced emotions of guilt and shame and this, in turn, inhibited appropriate performance in their subsequent searches. Furthermore, these two secondary emotions (i.e. guilt and shame) probably impede self-esteem. On the other hand, users who attributed their success to their effort would experience the secondary emotion of hope which in turn generates an incentive for future searches. To the researchers' best knowledge, previous studies in this domain did not examine secondary emotions.

It was also found that users who attributed their success to internal factors enjoyed higher levels of satisfaction in comparison with their counterparts with external attributions (Table 3). It can plausibly be argued that this is due to the enhanced self-esteem of these users. Given that their internal competencies create emotions of happiness, users may feel more satisfied with their performance. In contrast, individuals who attributed their success to external factors experience lower levels of satisfaction since they seek causes beyond their inner self. One of the false attributions is external attribution of success given that it ultimately leads to feeling helplessness. Such individuals learn not to exert more effort or not to make any changes in their attitudes, and thus are not aspired to improve their capabilities in IR.

Although there was no significant relationship between users' general attributional style of emotions and their attributional style of emotions in simple search (Table 4), a significant relationship was detected between these two variables in complicated search tasks (Tables 5 and 6). This finding clearly demonstrates that users' general attributional styles are generalisable to IR domain, and via this method, we can identify users' factors of attribution and thus enhance the healthy attributions and impede the false ones. This can favourably pave the way for the more effective web searching endeavours.

In this research, we mainly focused on the role of librarians in identification of underlying factors affecting students' web searching behaviours and the types of attribution they devoted to either failure or success in search tasks' sessions.

The identification of the causes and attributions of users' emotions can be helpful for three groups: first, for the users themselves in understanding and detecting the right attributions and accordingly experiencing positive emotions; second, for the designers of IR systems in identifying the users' attribution causes and in designing efficient IR systems and producing user-friendly systems. Identifying user's emotions in the early stages of information seeking is possible using hardware and software tools. By identifying these emotions, designing more interactive systems with the appropriate user interface is recommended to weaken the negative emotions and enhance the positive ones. The other suggestion is personalisation in information systems, which is tailored based on users' attribution styles of emotions. Third, identification of the causes and attributions of users' emotions may help librarians to detect the users' attributions in IR process so that they may be able to assist users in amending their attribution errors and in experiencing positive emotions. Purportedly, librarians are facilitating IR behaviours in different domains and formats.

The study also provides necessary impetus for interdisciplinary research on various factors of IR ranging from cognitive-oriented to technology-related research. The study findings are especially helpful in affective computing as it aims to classify data according to emotion labels [45]. As an interdisciplinary field, affective computing is spanning from computer to cognitive sciences to endow machines with cognitive capabilities to recognise, interpret and express emotions and sentiments [45].

The present study limitations included availability of a standard tool and consequently the difficulty of developing valid and reliable tools, recruiting eligible volunteer participants, simulating real-life situations and time-consuming

nature of the research tasks. It is notable that researchers tried their best to overcome limitations by controlling intervening variables.

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Note

1. Available from <http://ppc.sas.upenn.edu/services/optimism-assessment>

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Appendix I

Success in information retrieval questionnaire

Dear student:

Fortunately, your searching was successful, and your results were relevant. Certainly, there are a lot of reasons for your success, but we mention some of the probable ones. Please read each statement and state that how much you agree or disagree with it.

Row	Reasons of success	Absolutely agree	Agree	Disagree	Absolutely disagree
1	I have enough skill to work with the computer.				
2	I have enough skill to work with the Internet.				
3	I have enough skill in searching information via search engines.				
4	I have good information in most subject areas.				
5	I was familiar with the background of this search task.				
6	I am proficient in English language.				
7	I tried a lot for doing this search.				
8	I used the proper methods for this searching.				
9	I am interested in information search and retrieval.				
10	I was lucky with this searching.				
11	My previous training about searching the Internet was useful.				
12	Your search task was simple.				

(continued)

Appendix 1

(continued)

Row	Reasons of success	<i>Absolutely agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Absolutely disagree</i>
13	I liked the environment that was intended for this search.				
14	I was interested to get a good score in this searching.				
15	I was fully prepared for this searching.				
16	I like the Internet very much.				
17	The search task was so low level.				
18	The high speed of the Internet was helpful to get a good result.				
19	The equipment (software and hardware) was good.				

If you believe that there are other reasons for your success, please mention them: _____

Appendix 2

Failure in information retrieval questionnaire

Dear student:

Unfortunately, your searching was unsuccessful, and your results were not relevant. Certainly, there are a lot of reasons for this failure, but we mention some of the probable ones. Please read each statement and state that how much you agree or disagree with it.

Row	Reasons of failure	<i>Absolutely agree</i>	<i>Agree</i>	<i>Disagree</i>	<i>Absolutely disagree</i>
1	I have no enough skill to work with the computer.				
2	I have no enough skill to work with the Internet.				
3	I have no enough skill in searching information via search engines.				
4	I have no good information in most subject areas.				
5	I was not familiar with the background of this search task.				
6	I am not proficient in English language.				
7	I did not try a lot for doing this search.				
8	I used the wrong methods for this searching.				
9	I am not interested in information search and retrieval.				
10	I was not lucky with this searching.				
11	My previous training about searching the Internet was not useful.				
12	Your search task was so difficult.				
13	I did not like the environment that was intended for this search.				
14	I was not interested to get a good score in this searching.				
15	I was not fully prepared for this searching.				
16	I do not like the Internet very much.				
17	The search task was so high level.				
18	The low speed of the Internet was the common cause of bad result.				
19	The equipment (software and hardware) was not good.				

If you believe that there are other reasons for your failure, please mention them: _____

Appendix 3

Satisfaction questionnaire

Dear student:

Thank you for your kind cooperation. Please answer these questions carefully.

Please declare that how much you are satisfied with each aspect of the search that you have completed.

Row	Aspects	Very much	Much	Fairly	Little	Very little
1	Your allocated time for searching					
2	Mental effort for searching					
3	Physical effort for searching					
4	Your selected phrases and keywords during the search					
5	The different links that you followed					
6	The results of searching					
7	The relevance between results and query					
8	The usefulness of the results					
9	Fulfilling your expectancy and expectation from the search					
10	The satisfaction of the all process of search					

Thanks