
Influences of Mood on Information Seeking Behavior

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Abstract

In this study, we explored how moods influence the way people seek information. We conducted a controlled lab study to test our hypotheses drawn from affect-as-information theory. Fifty-eight participants were randomly assigned to the happy or sad condition. They were primed for a certain mood, and they then performed a search task and finished a series of questionnaires. Our findings supported affect-as-information: the comparatively happy participants were inclined to process more general and less specific information; the comparatively sad participants were likely to process more specific information. The findings advances theoretical and empirical understanding concerning the characteristics of users' information seeking behavior under different moods. Our study will contribute to affective search systems design.

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CHI 2009, April 4 - 9, 2009, Boston, Massachusetts, USA
ACM 978-1-60558-247-4/09/04.

Keywords

Mood, emotion, affect, information seeking behavior, Web search.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

Introduction

Our affective feelings can shape our perceptions, cognitions, and behaviors. They can also influence the way we process information and make decisions [6]. Wilson [17] argues the psychological predisposition influences the information seeking process. Mood is one of the most important and commonly seen psychological factors. However, Wilson fails to explain what the exact influences of mood are on information seeking. In fact, there is a general lack of empirical studies that examines mood influences in the information seeking behavior field. Humans are emotional. Different moods represent different statuses of the user. If knowing the influences of mood, system personalization will not be only on the individual level, but within individual, and for individual user under different moods. Our study aims to address empirical gaps in information seeking behavior area by investigating the influence of mood on the information seeking process.

Literature review and research questions

There are a number of terms like mood, emotion, affect describing similar ideas. We want to first define what we mean by mood and differentiate it from the other similar terms. Mood is a transient and diffuse affective state. It does not tie with any explicit causes and usually runs in the background of our daily life. Emotion is different from mood and is a stronger affective state compared to mood. It has the specific salient causes and operates in the forefront of our life. [4] However, mood and emotion are associated. Emotion can degrade into mood. Mood can also moderate the threshold of emotion. [4] Affect is another similar concept. Affect sometimes is used as a synonym for emotion. It can also refer to the positive or negative aspect of feelings. Affect is a broader concept than emotion. [11] In our study, we use mood to refer to the most common affective state operating in the background of our daily activities. Affect is employed to refer to the positive or negative aspect of the mood, such as positive mood, happy, pleasant, content, negative mood, sad, unhappy, unpleasant, or upset.

Affect and cognition are a major area of study in psychology. Psychology has a major approach regarding this topic: affect-as-information (AAI). According to the AAI view, people make decisions based on their feelings and asking questions like "how do I feel about it?". Affect is informative and functional. Negative mood informs people of a problematic situation. It makes people process information more carefully and systematically in order to mitigate their problematic situation. However, people in a positive mood feel more secure about their current situation. They are not fully motivated to process information in a comprehensive way. Thus, affect influences the types

of information that individuals seek during information processing. [5]

In Isbell, Burns, and Harr's [6] experiment, they utilized the natural mood differences and explored the influences of positive and negative affective states on information seeking. They conducted two experiments. In the first experiment, they presented both global and specific information to the participants but asked them to choose which type they wanted to hear first and then recall a specific information item later on. The results show that the relatively happy people were inclined to hear the global information first compared with the relatively unhappy people, who were more likely to seek the specific information first. All the participants were able to recall the specific information item. There was statistically significant difference for relatively happy and unhappy participants. In the second experiment, the participants' mood was manipulated by asking them to write a happy or sad personal experience. After that, they were given a task to build some impressions about one person by selecting and reading some information. On the computer system, two types of information (global and specific) were presented. The participants could select either type they preferred. In the end, they were asked to rate the usefulness of different types of information. The results turned out to be consistent with the first experiment. Happy participants were more likely to choose global information first than were sad participants. They viewed a larger proportion of global items than did the sad participants. Happy participants viewed a smaller proportion of specific items than did the sad participants. Mood influenced the information selection in the negative condition but failed to in the positive condition.

Thus, based on the AAI view, we propose:

Hypothesis 1: People in a negative mood are more likely to process specific information when searching than people in a positive mood.

Hypothesis 2: People in a positive mood are more likely to process general information than people in a negative mood.

Searching is a major activity in information seeking process on Web. Therefore, we extended AAI application on information processing to information searching. We propose:

Hypothesis 3: People in a negative mood are in search of different information (general or specific) from people in a positive mood.

Our hypotheses focus on evaluating interactions of search engine users, specifically the query and results. Hypothesis 1 and 2 relates to search result components. Each result on the search engine result page (SERP) have three components: title, snippet, and URL. The user browses the SERP and determines which result to click to fulfill his/her general or specific information needs. Operations on the search result page and normal Webpage are major sources of information searching and seeking evaluation measures. Researchers have explored various aspects of these interactions. For example, Seo and Zhang [12] studied reading time, scrolling, link selection, and bookmarking. They found that bookmarking had the strongest relationship with interesting documents, but scrolling had no relationship. Research has also investigated users' attention on different links on the Webpage by using search result components [3]. Thus, search result component view selection is a useful implicit feedback measurement.

Query length is used to test Hypothesis 3. It is a measurement of users' intention to search for specific or general information considering using long queries, one usually can retrieve specific information; using short queries, one usually retrieves general information [8]. Query is the central aspect of information searching and information seeking [13], although it is acknowledged as an imprecise representation of underlying information needs [2]. Numerous empirical studies have focused on various aspects of the query as surrogates for the expression of need, including session length [9] and number of terms [15]. Therefore, we believe query is an appropriate seeking measurement for this study.

Methodology

Design overview

We designed a between-subject experiment. The participants were randomly assigned to one of two conditions (happy and sad). We primed them with the mood assigned by using different movie clips. 27 participants were assigned to the happy condition, and 31 to the sad condition. After watching a short movie clip, they completed a mood manipulation check questionnaire, which asked them to indicate the level of agreement with words describing the mood they just experienced. They then received a searching task, searched for some information over the Web, and responded to a questionnaire on the searching process, task, and their background.

A total of 58 undergraduate and graduate students (16 women and 42 men) participated in the experiment. Participants were between 18 and 31 years old (21.12 ± 3.10). They were from a variety of colleges in a state university, 33% of which were from Information

Sciences and Technology, 17% Human and Health Development, 12% Liberal Arts, and 38% others.

Stimulus material

We used both movie and music as mood induction methods. Westermann et al [16] compared eleven major mood induction procedures. Using film or story was shown to be the best induction method for both positive and negative moods. Given that story writing cost more effort than watching a movie clip, we chose movie as the major mood induction method. We also used music as an auxiliary method since it could be played in the background during the experiment.

The first stimulus material was a roughly 7-minute movie clip. The happy movie clip was from "Play It Again, Sam" (directed by Woody Allen in 1972) and the sad movie clip was from "Terms of Endearment" (directed by James L. Brooks in 1983). They were borrowed from Pfaff's [10] study. His pretest has shown effectiveness in inducing mood after watching these movie clips. The clips were purposely tailored to display the humorous scenes in the happy movie clip and the last moment two children spent with their mother dying of terminal breast cancer in the sad movie clip.

The second stimulus material was music. To maintain the participants' mood obtained from the movie clip, the experimenters played music consistent with the movie clip category. The happy and upbeat disco music (LMNT's "Hey Juliet"; DJ BoBo's "Chihuahua") followed the happy movie while the sad music (Jean Sibelius' "The Swan of Tuonela") followed the sad movie. The sad music was adopted from a prior study that effectively produced a sad mood [1].

Searching task

All participants were given exactly the same searching task: "Imagine that your close friend has a tattoo and is thinking of getting it removed. He/she is asking your opinion if he/she should do this or not. In order to provide him/her a considered opinion, you are looking for information via search engines by using INTERNET EXPLORER." Logging software [7] was installed to track and log the participants' interactions with computer. The participants were encouraged to conduct as many searches as needed until they gathered enough information and knowledge. Next, they answered the questions regarding the search task.

Dependent variable

The primary dependent variables examined in this study were general and detailed information processing. The general and detailed information processing was determined during the participants' searching process. By default, the search engines they used show 10 results per page. The participants were trained to keep track of the relevance judgment tactics based on title, URL or snippet. Title and URL are counted as general information. Snippet is counted as detailed information. Query length is used to evaluate one's intention to search for general or specific information since usually long queries get detailed information back, but short queries get general information [8].

The study measured general information processing as the ratio of the number of title and URL used to determine relevance to the total number of items, whereas detailed information processing referred to the ratio of the number of snippets used to the total

number of items. The ratio showed the participants' preference to process general or specific information.

Manipulation check

The effectiveness of our manipulation was checked by asking the participants how well each affective term described the feeling they experienced while watching the movie clip, on a scale from 0 (not at all) to 9 (very strongly). Measurement items were acquired from Wang, LaBar, and McCarthy's [14] study and included sixteen mood related terms: amusement, anger, arousal, confusion, contempt, contentment, disgust, embarrassment, happiness, fear, interest, pain, relief, sadness, surprise, and tension.

Results

Manipulation check

The one-way t-test indicated that mood manipulation was successful through the study ($p=0.000$) as shown in Table 1. The participants in the happy condition rated significantly higher on happiness than those in the sad condition after watching the movie clip. Therefore, participants in different groups were able to maintain different moods during the search process.

Affect-as-information

The one-way t-test results shown in Table 1 indicated that the happy participants had a higher percentage of general information processing than the sad ones ($p=0.035$); the sad participants had a higher percentage of specific information processing than the happy ones ($p=0.035$). Therefore, Hypothesis 1 and 2 are supported. There was no significant difference between sad and happy participants on query length ($p=0.656$) as shown in Table 1. So, Hypothesis 3 is not supported. Although mood did not affect how the

participants searched for information, it effected how they processed information. Our study supported AAI on information processing but failed to extend it to information searching behavior.

Discussion

Our study supported AAI theory, which states that mood influences judgment [5]. The happy participants focused more on general information sources like title and URL. The sad participants focused more on detailed information source like snippet. The findings are similar to prior work on AAI [6]. Isbell and fellow researchers [6] asked the participants to select general and specific information directly with labels on it. In our study, title and URL are implicit labels for general information; snippet is implicit label for detailed information. Title, URL, and snippet are general or detailed information sources on the format level. Our study did not support the hypothesis that there were query length differences between participants under different moods. Query length is a measurement of one's intention to search for general or detailed information on the content level. Therefore, we can see the participants did not seek different information on the content level but did on the format level. It does make sense, since the happy participants felt secure and easy. They were laid back during the search process. They did not put much effort into processing something complicated. Thus, they chose to process simpler information items like title and URL. The sad participants felt they were in some problematic situation. They processed detailed information from the snippet in order to make best judgment. The system or content designers could utilize our findings to improve the delivery of information to a targeted audience: sad or happy people. They could put more triggers in the snippet if

Dependent Variable	Condition (mean)		T value
	Happy	Sad	P value
Happiness	5.56	4.74	-3.74 0.000*
General info %	0.60	0.48	-1.85 0.035*
Specific info %	0.40	0.52	1.84 0.035*
Query length	3.11	3.20	0.48 0.656

table 1. Means and t-values for manipulation check, percentages of general and specific information, and query length ($p^* < 0.05$).

they want sad people to look at certain result. They could place the triggers in the title if they want happy people to click that result.

Conclusion

Different moods indeed play a role in human information seeking process. Understanding the exact influence can motivate and facilitate the affective search system design.

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