

WHAT WE'VE LEARNED ABOUT THE ROLE OF AFFECT IN INFORMATION BEHAVIOUR/ INFORMATION RETRIEVAL

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Abstract

This paper summarizes and analyzes recent research related to «affective» issues in information behaviour and information retrieval, with a view to outlining practical implications for the design of usable information systems. The analysis is based on a systematic review of the recent research literature, both inside and outside of library and information science, which reports research findings related to issues of affect (emotion) in human information behaviour. The key conclusion is that information retrieval research and the design of systems for information retrieval must rest on an understanding of the users of those systems as complex human beings whose emotions affect their information retrieval as much (or perhaps more so) as their cognitive skills. These new understandings must focus on users' personal perspectives of their information needs and the contexts of those needs, and thus on their affective motivations, in addition to their cognition. If information systems are to be usable and useful to users, the emotions of those users must be accounted for. Affective variables which must be incorporated into an understanding of how users will approach information systems include users' total affective load, their anxiety, confidence, self-efficacy, need to trust information sources, and need for simplicity. Systems need to be fun, attractive and pleasurable to use. System designers must also recognize that the information their information retrieval systems provide access to is constructed by users into personal, fluid, and inter-subjective knowledge, therefore requiring that information systems be flexible.

Keywords

affect in information retrieval, information behaviour, cognitive processes, interfaces design, emotive aspects

1 INTRODUCTION

1.1 Objective

The objective of this paper is to provide an analysis and summary of research related to «affective» issues in human information behaviour and information retrieval, with a view to outlining practical implications for the design of usable information systems.

1.2 The user-systems gap

The «user» has been privileged in human information behaviour research since Dervin and Nilan's (1986) analysis of library and information science (LIS) research nearly two decades ago. Those authors articulated the gap that existed then between «systems-centred» and «user-centred» perspectives in our research and practice. Since that key analysis, the «user» has moved to centre stage in work being done by information behaviour researchers. The role of information systems (defined broadly to include information dissemination organizations and informal information sources, as well as computerized information retrieval systems) in the life of the user has taken precedence over a focus on specific interactions of the user with information systems. However, for the most part, a gap has grown and remains between this sub-set of LIS research, and researchers doing work on information retrieval systems. Regret has been expressed about that gap. For instance, Saracevic (1999) wrote that «Information science will become a full-fledged discipline when the two ends are connected successfully» (p. 1055). He suggests that the lack of connection remains because of a lack of communication between systems-oriented and human information behaviour researchers: they fail to read one another's literature and to listen to one another. Saracevic suggests that user-centred researchers ought to provide «concrete design suggestions» (p. 1057). Nevertheless, he sees some progress, claiming that information retrieval research has recognized that relevance includes «motivational or affective relevance» defined as the «relation between the intents, goals, and motivations of a user and texts retrieved by a system, or in the file of a system, or even in existence. Satisfaction, success, accomplishment, and the like are the criteria for inferring motivational relevance» (p. 1059). The focus of this conference on many «user-centred» issues demonstrates that recognition.

1.3 Affect in human information behaviour

One aspect of human information behaviour that is gaining prominence is attention to issues of affect or emotion, and includes a focus on the roles of motivation, mood, preference, and evaluation. All these variables are increasingly viewed as central to the user-centred perspective in library and information science. Norman (2004) provides the following

definitions: «Affect is the general term for the judgmental system, whether conscious or subconscious. Emotion is the conscious experience of affect, complete with attribution of its cause and identification of its object... cognition and affect influence one another: some emotions and affective states are driven by cognition while affect often impacts cognition» (NORMAN 2004, p. 11). Despite the fact that «we have generally insisted on rational, cognitive models of information seeking, processing, and use, and paid little attention to the affective aspects of information behaviour... search behaviour is demonstrably opportunistic... not linear, nor “logical”, and seldom “expert”» (JULIEN 1999, p. 587).

2 AFFECTIVE VARIABLES IDENTIFIED IN LIS RESEARCH

2.1 Models of human information behaviour

Current models of information behaviour frequently involve an affective component. Carol Kuhlthau's (2004) Information Search Process (ISP), one of the two most frequently cited theoretical approaches used in information behaviour research (MCKECHNIE 2001), is a prominent example. Kuhlthau postulates six steps in the information search process: initiation, selection, exploration, formulation, collection and presentation. Patterns of thinking, feeling (affect) and acting are associated with each stage.

An important finding [of Kuhlthau's work] was the sequence of feelings commonly experienced during the search. Students' feelings about themselves, the library, the task, and the topic evolved as their understanding of the topic deepened... At the beginning of a search, evidence of uncertainty, confusion, and apprehension was evident. Indications of increasing rather than decreasing uncertainty were noted as the search progressed. In the middle of the search evidence of a sense of clarity was documented as a focus was formed. With the focus, a sense of direction and confidence was common, and that sense increased toward the end of the search. (KUHALTHAU 2004, p. 41)

Kuhlthau's model has been tested through empirical research by herself and others across a number of information contexts including school, academic, public and special library settings as well as everyday life information contexts, and user groups, including children, teens, adults, ethnocultural communities and seniors (KUHALTHAU 2004; KUHALTHAU 1990). Byron and Young (2000) found that the ISP model held in a virtual learning environment. Kuhlthau, Spink and Cool (1992) tested ISP in an online information retrieval situation. While Kuhlthau used observation and interviews, Branch (2000) documented the usefulness of think-aloud and think-after protocols in collecting information about the affective state of teenagers searching CD-ROMs. The results of these and other studies suggest the ISP model is robust and applicable in both physical and online settings.

Other models also incorporate affect. For example, in his study of high school students searching a history database Yang (1997) found that confusion, irritation, frustration and relief characterized the searches and developed a model of information seeking that included affective responses. Savolainen's framework of everyday life information seeking postulates «four ideal types of mastery of life with implications for information-seeking behaviour» (SAVOLAINEN 1995, p. 265): optimistic-cognitive mastery of life; pessimistic-cognitive mastery of life; defensive-affective mastery of life; and, pessimistic-affective mastery of life. Savolainen (2002) also proposes a model of network competence involving perceived self-efficacy and affective states such as anxiety and enjoyment. Wilson's General Model of Information Seeking Behavior (2005), which has been widely cited by researchers, originated in 1971 and underwent several revisions through the 1990s. Wilson was the among the first to understand the importance of affect, including it in the 1981 version of his model where it was presented as one of the personal contexts that give rise to information seeking (WILSON 1981). Dervin's call for a shift from system to user focused studies (DERVIN & NILAN 1986) is evident in her own sense making model of information seeking in the implicit role of affect in delineating the situations, gaps and helps individuals encounter when seeking information.

2.2 Literature reviews

Recent information behaviour literature reviews also list affect as an important variable. McCreddie and Rice (1999) identify affect as an influence and constraint to information access. In their overview of research literature from six disciplines, they describe studies that explore the relationship between attitudes, confidence, fear, trust, comfort/discomfort and motivation with information seeking. Hsieh-Yee (2001) reviewed the literature on Web search behaviour. While only a small part of the article, what Hsieh-Yee calls the «affective functions» (HSIEH-YEE 2001, p. 177) of web searching is included. A bibliography published in *Reference and User Services Quarterly* (USERS 2001) includes a section «Satisfaction and Affect Factors», although it includes only nine items within a list of 141 items. Finally, an *ARIST* review on conceptual frameworks in information behaviour (PETTIGREW 2001) acknowledges affective factors as part of information behaviour, particularly in its overviews of social and multi-faceted approaches to information behaviour research.

2.3 Specific examples from the research

In addition to models and literature reviews, reports of individual research studies point to the importance of affect in information searching. The work of Diane Nahl is particularly important. Nahl starts from the position that positive affect influences cognition and learning (NAHL 2004, p. 191), and she emphasizes the importance of motivation. She states, «Cognitive information will become relevant and of interest to the

extent that it promotes the culturally organized affective goals of each searcher. Without this affective support, information is of no value to the individual» (NAHL 2004, p. 191). Motivation is needed to activate searching, and people need continuous motivation to complete an information search to satisfaction. Nahl also notes that affective norms are constructed socially and shared (NAHL 2004), a notion that fits well with the work of Chatman, who demonstrated that affect within social networks (issues such as alienation, information avoidance, disinterest) influences information behaviour. Nahl takes a classical psychological approach to measuring affect by asking participants to self-report on the intensity of affective states of interest. She has found predictable affective states associated with the reduction of uncertainty in information searching, including «uncertainty, pessimism, dissatisfaction, confusion, frustration, self-doubt and disappointment» (NAHL 2004, p. 192). Affective issues of particular importance to Nahl include self-efficacy, optimism, uncertainty, time pressure, expected effort, task completion motivation, and expected difficulty. For example, optimism will motivate a searcher to consider a greater range of problem-solving strategies, whereas pessimism leads to inflexibility (NAHL 2004, p. 192). She also has found that «affective differences in behavior are associated with certain cognitive behaviors of searchers. People who attribute success to their own search skills experience significantly less uncertainty and affective load [the totality of affective issues influencing the task at hand] than those who attribute success to uncontrollable factors outside of themselves» (NAHL 2004, p. 196).

Affect, while not the main focus, plays a role in other information behavior research studies as well. For example, Mellon's grounded theory study (1986) of college students using an academic library identified library anxiety, fear and a feeling of being lost, as a common barrier to use. Metoyer-Duran (1991) provided a taxonomy of affective dimensions in her broader study of the information-seeking behavior of gatekeepers in ethnolinguistic communities. Pettigrew (2000) discovered that trust was essential to the information giving exchange between nurses and seniors in her study of chiropody clinics. In their studies of children searching the Web, Large et al. (2002) noted affective differences between girls and boys. Bilal (1998, 2002) is somewhat unique in including a specific research question about affect in the design of her study of children searching Yahoo!igans, asking what affective states children experience when using Yahoo!igans. She reports both positive (self-confidence, satisfaction and comfort) and negative (confusion and frustration) emotions associated with information searching. Harada (2002) used journal writing to capture children's experiences during an information search task and found that confusion, doubt, frustration, optimism, confidence, and satisfaction / dis-satisfaction were frequently reported. Julien and Michel (2002) examined source selection choice among information seekers and found psychological comfort associated with sources as well as other affective variables to be relevant. In a study of college students' electronic searching, Ren found that library instruction improved students' self

efficacy and helped them «not to be overwhelmed with negative emotions such as confusion and frustration» (REN 2000, p. 327) which interfered with search success. Watson (1998) used open-ended interviews to explore eighth-grade students' perceptions of their experience using the Internet and found that self-confidence, resilience and openness to learning new technologies were important self-identified factors. Finally, Ross (1999) in her report of interviews with more than 200 individuals who read for pleasure, highlights the importance of affect in this special type of information seeking, a reader's search for a text: «The reported research with pleasure-readers suggests that the affective dimension is involved throughout the process, from choosing a book according to mood to valuing a book for its emotional support in providing confirmation, reassurance, courage or self-acceptance» (ROSS 1999, p. 796).

2.4 Treatment of affect in LIS «systems» research

A recent study of research in information systems (i.e., research focusing explicitly on information retrieval systems) found that a small proportion pays substantial attention to issues of affect or emotion (JULIEN 2004). Those that do make more than a passing reference to affective issues focus on a range of variables. For example, Marsh & Dibben (2003) discuss trust as it relates to user interfaces, autonomous agents, and information systems, in order to understand the role and impact of trust. Griesdorf and O'Connor (2002) note the importance of affective-based query terms as an important descriptive category for image retrieval. Anxiety is noted as one affective factor in Savolainen's (2002) model of network competence. Wastell (1999) discusses how social defences, such as stress avoidance and anxiety issues, are the primary reason why information systems fail. A detailed analysis of motivation in terms of fostering user acceptance of computer and information technologies is central to research conducted by Venkatesh (1999). Customer satisfaction, from an affective perspective, is a major theme of Susarla et al.'s (2003) study. A theoretical paper proposing a model of organizational communication for designing information technology includes affective complexity and trust in communication as a central component of that model (TE'ENI 2001). Fitzgerald and Galloway (2001) describe how affect-related reasoning during information retrieval can include a range of emotional responses to the information topics being sought. These emotional responses will be familiar to anybody, including amusement, distress, desire, sadness, annoyance, and happiness. Fidel et al. (1999) relate how, during web searches, their research participants feel frustration, the need for security, impatience, anger, helplessness, being lost, fear, and confidence. Ford et al. (2003) describe the relationship between web searching and emotions such as anxiety and fear of failure. Despite these outstanding efforts, the vast majority of work in information retrieval assumes a strictly rational approach to searching, and fails to account for affective issues that searchers bring to their information behaviour.

3 AFFECTIVE VARIABLES IDENTIFIED IN OTHER DISCIPLINES

In the computing literature, self-efficacy is a well-recognized variable in IT use (cf. CHAU 2001). At MIT's Media Lab, Rosalind Picard's «affective computing» project is very compelling. A recent issue of the *International Journal of Human-Computer Studies* (volume 59) was devoted to affective computing, and many of the contributed articles come from Picard's research team. In her introduction to that special issue, Hudlicka (2003a) notes that responses to concern for affective issues have led to «techniques and devices for assessing user state (e.g., eye tracking, facial expression recognition, wearable computers such as earrings collecting physiological data... «expression glasses» detecting interest or confusion... through integrated systems functioning as socially intelligent agents... to high level «paradigm shifts» in thinking about HCI [human-computer interaction]» (HUDLICKA 2003a, p. 1-2). In contrast to Saracevic (1999), Hudlicka (2003a) suggests that «the burden of adaptation has gradually been shifting from the human user to the computer... the user is now the central component of system design and user needs drive both the nature of the user interface, and the function allocation of tasks between the user and the machine» (HUDLICKA 2003a, p. 2). The challenges being addressed include affect sensing and recognition, adapting to user affect, machine «affect expression», and modelling affect in user and machine (HUDLICKA 2003a). Hudlicka goes on to suggest that affect in HCI needs to be addressed by seeking to «understand the range of user affective states and their effects» (HUDLICKA 2003a, p. 7), «accurately recognizing the user's affective state», and determining «whether or not the system should respond to this state, and how» (HUDLICKA 2003a, p. 8). It should be said that the term «affective computing» is not without its detractors, and is problematized in at least two articles in that special issue (HUDLICKA 2003b; MCNEESE 2003).

The role of affect in information behaviour also is evidently of interest in the literatures of marketing, organizational management, health, communication, psychology, and other disciplines. For example, in recent marketing research, affect has been demonstrated to have a role in consumers' satisfaction with Internet service providers (EREVELLES 2003) in that those with responsive, relationship-building service staff are more successful. Trust has been demonstrated as essential for gaining and retaining consumers of online vendors (GEFEN 2002). In predicting the influence of advertising, affect was found to be a better predictor of consumer action than was cognition (MORRIS 2002). Consumer behaviour, including information seeking, has been shown to be influenced by marketing strategies (DESMEULES 2002) and Internet versus paper information context (SCHLOSSER 2003), as these variables influence how people feel. Research in organizational management has found that «attitudes» about sharing information have an effect on organizational information behaviour (KOLEKOFKI 2003). Specifically, self-efficacy has been shown to influence information sharing behaviour (BOCK 2002). The importance of affect in cross-cultural organizational contexts also has been explored

(SCHNEIDER 2002), and affect is recognized as having a central role in workplace judgements and decision-making (FORGAS 2001). The role of affective rewards in levels of engagement in group support systems also has been studied (REINIG 1995-1996). In addition, information sought by subordinates of their superiors evidently is influenced by affective factors, such as self-esteem (MADZAR 2001).

In the communication field, the role of affect in human information behaviour has long been recognized. This acknowledgment is manifest in a study analyzing survivors' information seeking following a workforce reduction (CASEY 1997). Similarly, in another communication paper, affective responses such as fear have been found to influence people's tendency to seek information (ROSER 1995). A very recent communications study suggests that emotions help people to frame issues, influence judgements about information accessibility, and guide decision-making (NABI 2003). The role of self-efficacy in Web use (KAYE 2002) and in information seeking in health contexts (RIMAL 2003) also has been studied in this discipline.

Information behaviour in health contexts has received widespread attention, and the centrality of affect is well-recognized. For example, feelings of confidence, sense of control, worry, fear, and depression all play a role in information seeking by women with breast cancer (REES 2001). McGrath (1999) found that cancer patients' emotional needs were associated with their information seeking. Information seeking by cancer patients has been associated with the fear and stigma connected with seeking emotional support (MATTHEWS 2002). The role of anxiety has been explored in AIDS information seekers (SCOTT 1998) and in children awaiting surgery (THOMPSON 1994). Information seeking by surgical patients also has been found to be related to «emotional arousal» (KROHNE 2000), while health information seeking in general is affected by emotional response to information about health risk (GRIFFIN 1999).

In psychology, too, affect is recognized as central to information behaviour. Affect may even be considered a form of information (KETELAAR 2003). For example, mood states have been demonstrated to influence information recall and information processing, as well as information impact (RAGHUNATHAN 2002). Information behaviour also is influenced by goal orientations and their relationship to happiness (MCINTOSH 2001). In addition, the effect of test anxiety on information searching has been explored (NICHOLS-HOPPE 1990), and anxiety in general has been found to be related to information seeking (FREY 1986). Interestingly, depression has been linked to increased information seeking (HILDEBRAND-SAINTS 1989), and self-esteem (SCHULTZ 1988) and self-efficacy (BROWN 2001) have been related to information seeking.

Other disciplines where affect has been shown to play a role in information behaviour include gender studies. For example, gender differences in Internet use are at least partially related to computer self-efficacy, loneliness and depression (JACKSON 2001). In political science, political decision-making has been shown to be influenced by affective biases (REDLAWSK 2002).

4 IMPLICATIONS FOR SYSTEMS DESIGN

Besides the work being done at MIT, some authors have made concrete suggestions for design of systems that take affect into account. Norman (2004) argues persuasively that affective states have a role in design. He notes (p. 26) that «... someone who is relaxed, happy, in a pleasant mood, is more creative, more able to overlook and cope with minor problems with a device —especially if it's fun to work with». He goes on to state that «...when people are anxious, they are more focused, so where this is likely to be the case, the designer must pay special attention to ensure that all the information required to do the task is continually at hand, readily visible, with clear and unambiguous feed back about the operations that the device is performing... Designers can get away with more if the product is fun and enjoyable... things intended to be used under stressful situations require a lot more care, with much more attention to detail». Further, designers need to ensure that their designs appeal to the wide variety of preferences and personality characteristics that are found in people. A single design aimed at a single, particular, set of preferences, will not appeal broadly. People need to have the ability to customize, and to personalize, while ensuring that customization does not make use too complex (NORMAN 2004). To date, the focus in information retrieval systems has been on «behavioural design,» which privileges usability and functionality; the time has come to expand attention to focus on fun, attractive, and pleasurable design.

Using Kuhlthau's (1993) work with the Information Search Process (ISP), Kalbach (2004) emphasizes the need to reduce complexity in information seeking, especially when a searcher is feeling very uncertain (and according to Kuhlthau's ISP model, these times should be predictable). He uses Kuhlthau's «exploration» stage of the ISP to suggest that information systems design should: «Remove unnecessary options and navigation on results pages, while allowing destination pages to be more complex; Repeat key elements to provide a sense of familiarity (e.g., the original search query); Exaggerate visual priorities to increase focus on key tasks; Vary page templates to communicate progress within the search process; [and] Provide next steps and recommendations for assistance» (KALBACH 2004, p. 67).

Bilal (1998) notes that children's frustrations as they try to use a search interface such as Yahoo!igans can be addressed by including a spelling checker with a corrective feedback feature, a thesaurus, a natural language interface, improved indexing, and improved database of content of interest to children (BILAL 1998, p. 52). These appear to be relatively straightforward design improvements.

5 CONCLUSION

The fundamental issue for designers of information systems is the need for a «user» focus. Information system designers need to ask, «Who is the «user» and what motivates people to use or not use an information system?» Information retrieval research and the design of systems for information retrieval must be founded on an understanding of the users of those systems as complex human beings whose emotions influence their information retrieval as much (or perhaps more so) as their cognitive skills. These new understandings should focus on users' personal perspectives of their information needs and the contexts of those needs, and thus on their emotions, in addition to their cognitive processes. If information systems are to be usable and useful to users, the emotions of those users must be accounted for. Affective variables which must be incorporated into an understanding of how users will approach information systems include users' total affective load; their relative anxiety, confidence, and self-efficacy; their need to trust information sources, and their need for simplicity. In addition, systems need to be fun, attractive and pleasurable to use. Finally, we must recall the ultimate purpose of information systems: to help people access the information they need in order to create meaning. Michael Olsson (2004) reminds us that meaning is personal and fluid, but information retrieval systems are designed on the assumption that texts have a single, fixed meaning. If we believe that knowledge is inter-subjective and negotiated socially within discourse communities, then access to texts through information retrieval systems must be allowed in flexible ways that fit the knowledge structures and practices of the communities seeking that access. Let us continue to seek to understand those communities and those potential users, and build information systems on the basis of that understanding.

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